# Integrated Outbreak Analytics Toolkit

IOA INTEGRATED OUTBREAK ANALYTICS

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# Contents

# Acknowledgements

This resource has been collaboratively produced by Simone Carter (UNICEF), Marie-Amélie Degail (WHO), Yajna Elouard (WHO), McKinzie Gales (UNICEF), Rachel Goodermote (IFRC), Laurent LeHot (UNICEF), Ruby Siddiqui (UNICEF) and Emelie Yonally Phillips (Epicentre).

Critical support was brought by Noe Tondri Guinko, Lana O'Son, and John Rossow.

We would like to acknowledge the many dedicated individuals in the Democratic Republic of Congo (DRC), working in complex and challenging contexts who led the development of the work from which IOA was first drawn.

As described in this toolkit, the case studies and work developed have been possible through these individuals working collaboratively with a common objective to improve community health outcomes through a more informed and accountable response.

The IOA toolkit pilots in the DRC, Somalia, and Sudan were essential in testing and refining the draft versions of this toolkit. Feedback and insights from these pilot sites guided improvements, ensuring greater relevance and usability. The contributions of those who organised and participated in these pilots played an important role in shaping the final version of the toolkit.

The toolkit was reviewed by members of the IOA network including:

Denis Ardiet (Epicente/MSF), Neale Batra (Applied Epi), Kathryn Bertram (Global Health Cluster), Nadine Beckmann (LSHTM/UK-PHRST), Emilie Buttarelli (UNICEF), Rebecca Coulbourn (Epicente/MSF), Gwen Eamer (IFRC), Sara Ferraz (former FTP director), Kathleen Gecosala (Philippines MOH), Sara Hollis (WHO), Vivek Jason Jayaraj (Malaysia MOH/Applied Epi), Christopher Lee (Resolve to Save Lives), Diana Maddah (American University of Beirut and UK-Med), Yasir Majeed (Iraq FETP alumni), Mohammad Omar Mashal (WHO), Lidia Redondo Bravo (WHO/PAHO), Ruwan Ratnayake (LSHTM), Stephanie Salyer, and Emi Takahashi (Resolve to Save Lives).

This work was supported by UNICEF and WHO.

# Acronyms

| | |
|---|---|
| **COVID-19** | Coronavirus disease 2019 |
| **DHIS2** | District Health Information Software 2 |
| **DRC** | Democratic Republic of the Congo |
| **EOC** | Emergency operations centre |
| **EWAR** | Early warning alert and response |
| **FETP** | Field epidemiology training programme |
| **HIS** | Health information system |
| **IDP** | Internally displaced person |
| **INGO** | International non-governmental organisation |
| **IOA** | Integrated Outbreak Analytics |
| **IOM** | International Organization for Migration |
| **MNCH** | Maternal, newborn and child health |
| **MOH** | Ministry of health |
| **MONITO** | Monitoring tool |
| **MONITITO** | Mini monitoring tool |
| **NGO** | Non-governmental organisation |
| **SOP** | Standard operating procedure |
| **SMART** | Specific, measurable, achievable, realistic, and time-bound |
| **TOR** | Terms of reference |
| **UN** | United Nations |
| **UNHCR** | United Nations High Commissioner for Refugees |
| **UNICEF** | United Nations Children's Fund |
| **UNOCHA** | United Nations Office for the Coordination of Humanitarian Affairs |
| **WASH** | Water, sanitation, and hygiene |
| **WHO** | World Health Organization |

# Glossary

This toolkit uses specific terminology to guide the understanding of its content. It is important to note that these terms are intended to provide clarity and are not meant to be restrictive. We recognise that language is dynamic and differs based on country and context. Thus, we encourage toolkit users to adapt the toolkit's language to better fit local programming needs, government structures, and to align with understandings of disease and epidemiology.

| Term | Definition |
|---|---|
| **Cluster** | The humanitarian cluster system is a coordination mechanism used by the United Nations (UN) and other humanitarian organisations to respond to crises. It is designed to organise humanitarian actors into core sectors, such as water, health and food security. The aim is to improve the efficiency and effectiveness of the response, avoid duplication, and ensure that affected people's needs are met in a timely and appropriate manner.<br><br>*Source: https://www.unocha.org/we-coordinate* |
| **Co-develop** | A collaborative approach where various stakeholders, including local and national authorities, communities, healthcare professionals, local, national and sometimes international organisations, work together to design and implement health interventions or policies. This process ensures that the diverse perspectives and expertise of all involved parties are integrated, leading to solutions that are more culturally relevant, sustainable, and effective in addressing specific health challenges. Co-development emphasises partnership and shared ownership of health initiatives, fostering inclusive strategies that are better tailored to the needs of target populations. |
| **Data** | Unanalysed information (e.g., facts, figures, symbols or values); data are the basic building block of information. |
| **Emergency** | A situation impacting the lives and well-being of a large number of people or a significant percentage of a population, and requiring substantial multisectoral assistance. This includes humanitarian emergencies due to conflict, natural disaster, food insecurity, outbreaks, and famine.<br><br>*Sources: Emergency response framework: internal WHO procedures. Geneva: World Health Organization; 2024. Licence: CC BY-NC-SA 3.0 IGO. https://www.who.int/publications/i/item/9789240058064* |
| **Emergency operations center (EOC)** | A central command and control structure responsible for managing emergency response, emergency preparedness, emergency management, and disaster management functions at a strategic level during an emergency.<br><br>*Source: Emergency response framework: internal WHO procedures. Geneva: World Health Organization; 2024. Licence: CC BY-NC-SA 3.0 IGO. https://www.who.int/publications/i/item/9789240058064* |

| Term | Definition |
|---|---|
| **End user** | Individual, communities, organisations, or entities that directly interact with or use the outputs or services provided by IOA. End users play a crucial role in the implementation and effectiveness of IOA. This category may encompass affected communities, health care providers, professionals from civil society organisations, nongovernmental organisations, policy makers, government officials, and researchers. |
| **Health information system** | This function involves the collection, analysis and dissemination of emergency-specific and contextual information and data, including on health risks and impacts, needs, service coverage and gaps. It uses information to develop and continually refine the response and inform recovery planning.<br><br>*Source: Emergency response framework: internal WHO procedures. Geneva: World Health Organization; 2024. https://www.who.int/publications/i/item/9789240058064 Licence: CC BY-NC-SA 3.0 IGO.* |
| **Health risk monitoring** | The systematic observation, analysis, and interpretation of data and information related to factors impacting public health. This ongoing process involves tracking indicators related to health, the environmental, and overall context to determine and manage potential health risks in communities or populations. It plays a critical role in the early detection of emerging health issues and informs public health interventions and policy decisions, before, during, and after public health emergencies. |
| **Information** | When data are processed, structured, and given context, they become information. In global health, this involves turning raw health data into meaningful insights, such as trends in disease prevalence, the effectiveness of a vaccination programme, or demographic patterns in health outcomes. |
| **Line list** | List of individual cases including relevant patient information (e.g., demographic information and date of onset of disease) used to monitor a suspected or confirmed disease outbreak.<br><br>*Source: Early Warning Alert and Response in Emergencies: an operational guide. Geneva: World Health Organization; 2022. Licence: CC BY-NC-SA 3.0 IGO. https://iris.who.int/handle/10665/365730* |
| **MONITO** | The monitoring tool (MONITO) is an example of comprehensive monitoring tool designed to help outbreak response teams ensure that identified contributing factors and underlying causes are linked to co-developed actions and actively tracked for implementation. It allows users to monitor who is responsible for each action, assess progress, and document any outcomes. By systematically tracking interventions, MONITO helps identify gaps or omissions in response efforts, particularly in cases where health risks persist despite implemented measures. This tool enables response teams to reassess their strategies, ensuring that all identified underlying causes of a given trigger question are addressed in their intervention plans for a more effective and adaptive response. |
| **MONITITO** | The mini monitoring tool (MONITITO) is an example of tool used in co-development sessions to structure discussions on contributing factors, underlying causes, and actionable solutions. It ensures targeted, collaborative action planning by capturing key details—partner information, contributing factors, root causes, and co-developed actions—all in a simple Word document. Each MONITITO is tailored to a partner's capacity to implement actions and directly feeds into the broader MONITO for a comprehensive response strategy. |

| Term | Definition |
|---|---|
| **Observation** | In the context of outbreak response, an observation refers to a specific finding or result. When we collaboratively analyse data, we derive these observations. From these observations, actions are developed to address the key risks or problems, ultimately resolving the trigger question associated with the outbreak investigation. Essentially, observations serve as critical pieces of information that guide our response efforts and help prevent further risk or problems. |
| **Partner** | In the context of the IOA toolkit, a partner is defined as any entity or organisation actively engaged in the response efforts or addressing the underlying causes identified through the IOA process. This includes, but is not limited to, various government ministries (such as Health, Education, and Gender), central and provincial governments, local health authorities, civil society groups, community organisations, UN agencies, clusters, international non-governmental organisations (INGOs), and national or local non-governmental organisations (NGOs).<br><br>Partners are essential collaborators who contribute diverse perspectives and resources, ensuring a comprehensive and effective response to public health challenges. |
| **Pillar** | Domain of responsibility in an emergency response. These may differ between disasters and outbreak responses, but the critical functions and principles remain the same covering Planning and Monitoring, Operations Support and Logistics, technical Expertise and Health Operations, Health Information and Epidemiology, Partner Coordination and Engagement and Finance and Administration.<br><br>*Source: Emergency response framework: internal WHO procedures. Geneva: World Health Organization; 2024. Licence: CC BY-NC-SA 3.0 IGO. https://www.who.int/publications/i/item/9789240058064* |
| **Root cause analysis** | An in-depth analysis of the factors causing the observed health issue described in the trigger question. Its goal is to identify factors that could be influenced by implementing actions.<br><br>The construction process is done by asking "why?" several times and listing factors (one or several) contributing to the health issue or to a previously identified factor. The result can be displayed as a tree-shaped diagram, showing all the causal chains of identified factors:<br><br>• Primary factors directly linked to the health issue are "risk factors".<br>• End of chain factors are "underlying causes". They are usually factors that could be directly influenced by implementing actions.<br>• All the factors linking a "risk factor" to an "underlying cause" are "contributing factors". |
| **Stakeholder** | In the context of the IOA toolkit, stakeholders refer to members of the IOA team, including personnel on-the-ground. These stakeholders are integral to the operational success of IOA and may include individuals working at the national level who are deployed locally, as well as local team members who provide essential feedback to national actors. This broad yet specific designation ensures that all levels of engagement and contribution to the IOA processes are recognised and valued. |

| Term | Definition |
|---|---|
| **Terms of reference** | A formal document that outlines the purpose, structure, and scope of a specific project or initiative. It serves as a guideline for what needs to be accomplished, detailing objectives, methodologies, timelines, responsibilities, and expected outcomes. In emergency situations, terms of reference (TOR) are crucial for providing clear direction and expectations for teams responding to health crises, ensuring a coordinated and effective approach to addressing the emergency. |
| **Tool** | Refers to a range of methods, strategies, instruments, and technologies used to promote health, prevent disease, and manage public health challenges. These tools can include data collections and analysis tools (i.e., surveys, surveillance systems, statistical software), intervention and programme tools (i.e., policies, strategies, education campaigns), technology and digital tools (i.e., informatics systems, telemedicine, mobile health applications, online databases), policy development and advocacy tools (i.e., policy analysis frameworks, strategies, awareness campaigns), evaluation and research tools (i.e., methodologies, assessment frameworks, evaluation models), collaborative and networking tools (i.e., online platforms, professional networks, collaborative frameworks), and more. |
| **Trigger question** | A specific inquiry that initiates the IOA process, typically arising from observations of unusual trends or changes in a public health situation or risk. Trigger questions may come from an observation in case analysis (increased deaths in one location, higher number of children), or from a programme or sector (e.g., Water, sanitation and hygiene [WASH] cluster partners observing drops in water treatment in one location; Red Cross volunteers observing lower participation in nutritional screening in one community) or they may come from trends in health information (drops in maternal care use, increase in simple diarrhoea). Trigger questions are agreed upon among stakeholders who will use the answers and evidence to adapt and improve their interventions for more accountable and effective responses. |

# Document at a glance

This document has been designed to help organisations, countries, and communities apply the integrated outbreak analytics process across various settings. It is a practical guide to this collaborative, multi-disciplinary, and multi approach, which focuses on developing locally-based solutions to public health problems.

**Quick links to useful pages:**

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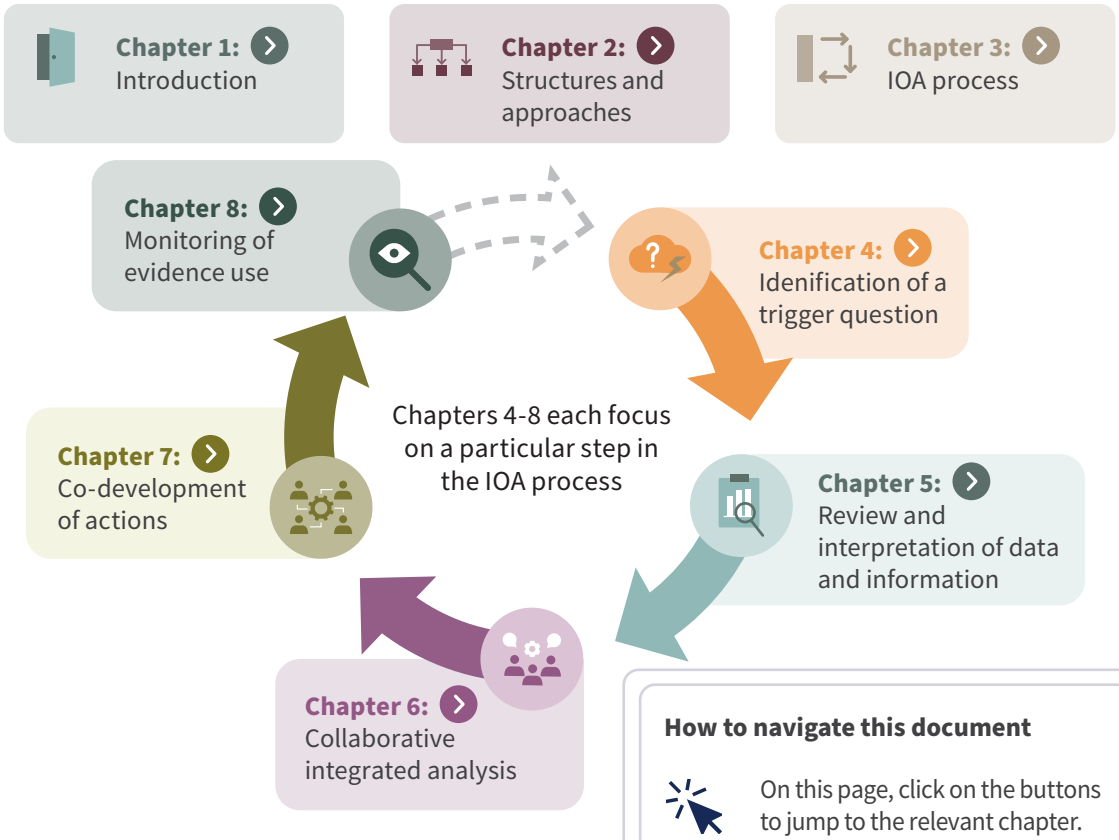
## Document structure and chapter outline

Chapters 1-3 provide background and introduce key concepts, including the IOA structures and approaches, and and overview of the IOA process itself.




**Practical tools, templates and SOPs**

You can find all the resources you need in Chapters 9 and 10.

Chapter 9: Workbook
Chapter 10: Appendix

**How to navigate this document**

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# Introduction



01

# 1.1. What is Integrated Outbreak Analytics?

**Integrated Outbreak Analytics (IOA)** is a collaborative, **multi-disciplinary**, and **multi-actor** approach—typically coordinated under a Ministry of health (MOH)—which focuses on developing locally-based solutions to public health problems. It involves a team that, strives to gain a holistic understanding of disease dynamics and its impact on communities, thereby facilitating a more **effective, comprehensive, and accountable** response. While its implementation may vary depending on the country, context, and specific health concern, the principles of **collaboration, multi-disciplinary work, capacity building**, and evidence-based practice remain constant. IOA builds on seven key principles described in Figure 1.

## Figure 1. Key principles of IOA

**Integrated and holistic:**
use diverse data sources and expertise to understand diseases dynamic and community impacts

**Contextual and localised:**
tailor responses to individual communities, beginning with local-level analysis and co-developed actions

**Collaboratively and locally owned:**
prioritise equitable partnerships among all stakeholders and meaningful local engagement in decision-making.

**Efficient:**
maximise existing data to reduce the burden of data collection and foster data sharing

**Actionable:**
develop evidence when there's a clear plan for its operational use

**Transparent:**
share data openly, respecting data protection policies, where applicable

**Unified:**
diverse partner collaboration to achieve common objectives


Watch the video 'What is Integrated Outbreak Analytics (IOA)' on YouTube @IntegratedOutbreakAnalytics: https://youtu.be/orXdd1FoX4k

# 1.2. Where does IOA come from?

IOA was developed during the 2018-2020 Ebola outbreak in the Democratic Republic of the Congo (DRC) to provide a comprehensive understanding of the outbreak. This approach integrates data from routine health surveillance, clinical care, social and behavioural sciences, and other sources. Lessons from previous Ebola and Zika outbreaks heavily influenced its design.

**Early development:** during the 10th Ebola outbreak in 2018, a team of data scientists and epidemiologists was deployed to support the DRC MOH. They established an epidemiological cell, which focused on analysing and visualising key outbreak data to guide response efforts. The structure of the epidemiological cell was designed to focus on a relatively specific set of data, primarily aimed at tracking and analysing the immediate spread of the epidemic. However, as the outbreak progressed, it became clear that a more holistic approach, considering broader factors such as service availability, healthcare access, and socio-economic conditions, was essential to fully understand the dynamics of the crisis. IOA was formalised to meet this need, combining various data and information sources and involving multiple stakeholders in a collaborative process. Practically, this meant that all relevant stakeholders were brought together to **collaboratively** identify key issues/questions, collect and analyse data, provide recommendations, and develop actions to strengthen outbreak response.

**Formalization and expansion:** once the Ebola outbreak ended (2020), the DRC MOH established an IOA cell to expand and refine the IOA approach. Support from the Wellcome Trust and the UK Foreign Commonwealth and Development Office helped define the IOA logic model and operational mechanisms.

**Broader applications:** IOA has since been applied to other health emergencies, including the Coronavirus disease 2019 (COVID-19), malnutrition, Marburg, measles, gender-based violence, plague, cholera, and polio. It has also been replicated in several countries facing outbreaks, such as Guinea, Ghana, Haiti, Malawi, the Republic of Congo, and Uganda, proving to be invaluable for addressing health crisis in diverse contexts.

# 1.3. Why should IOA be used?

1. **Leverages local expertise:** IOA is flexible and adapts to diverse countries, communities and contexts by integrating local knowledge. It emphasises the investigation of context-specific trigger questions, fostering collaboration between local experts and stakeholders at all levels of health systems for a holistic understanding of health challenges.

2. **Promotes unified coordination:** IOA encourages data and information sharing across sectors and organisations, enabling a coordinated response and co-developing actionable solutions.

3. **Offers holistic insights:** by combining traditional data (e.g., surveillance, medical, epidemiology) with socio-economic, environmental, and other factors, IOA provides a complete picture of outbreaks, enhancing understanding and response.

4. **Supports informed decision-making:** collaborative integrated analysis ensures decisions are well-informed and justified, providing transparency and accountability for resource allocation.

5. **Enhanced preparedness and response:** IOA integrates diverse data/information to understand and anticipate outbreak trends, allocate resources effectively, and enable timely, accurate interventions.

6. **Promotes inclusivity and equity:** IOA analyses data by demographics like age, gender, and location to identify high-risk groups, promoting deeper investigation to address all contributing factors and inform equitable interventions.

7. **Encourages adaptability and learning:** IOA supports the modification of recommended actions based on ongoing monitoring and evaluation, enhancing response strategies with continuous learning and improvement.

# 1.4. How can IOA augment existing systems and paradigms?

IOA can work in tandem with and enhance existing systems and paradigms. Throughout this toolkit, you will find examples illustrating how IOA integrates with One Health and early warning alert and response (EWAR) mechanisms. Additionally, the toolkit demonstrates how IOA enhances gender considerations in outbreak responses and works closely with academic partners. This collaboration ensures academic research is operationally relevant, thereby increasing the efficiency and effectiveness of response efforts.

## 1.4.1. One Health

According to WHO's definition, "One Health is an integrated, unifying approach to balance and optimise the health of people, animals and ecosystems. It uses the close, interdependent links among these fields to create new surveillance and disease control methods." The need for transdisciplinary, multisectoral collaboration is common and complementary in both IOA and One Health.

**Links:** Tripartite Zoonoses Guide; One Health Joint Plan of Action; Competencies for One Health Field Epidemiology (COHFE) Framework; WOAH One Health

## 1.4.2. EWAR

EWAR is an organised mechanism to rapidly detect and respond to signals that might indicate potential acute public health events. It uses a signal-event-alert-response schema where the initial information obtained by indicator- or event-based surveillance undergoes triage before being reported as a *signal*. All signals require *verification*. Verified signals become events. Events in turn require a *risk assessment* and *risk characterisation* and are confirmed as *alerts* if they represent a potential public health threat that requires a *response*. The IOA approach can be used at each step of this process. Conversely, the IOA approach may benefit from the information collection tools used in EWAR where an array of various types of information may be collected.

*Source: Early Warning Alert and Response in Emergencies: an operational guide. Geneva: World Health Organization; 2022. Licence: CC BY-NC-SA 3.0 IGO. https://iris.who.int/handle/10665/365730*

## 1.4.3. Gender

Integrating gender considerations into outbreak responses is crucial for ensuring equitable healthcare access and tailored interventions that address the specific needs of all population groups. The IOA approach emphasises the importance of gender in planning and response strategies, ensuring that gender-based data and insights inform decision-making. This approach helps in crafting targeted health interventions that are effective and sensitive to the diverse impacts of health crises on different genders.

**Links:** Gender roles & Sex-Related Differences in Outbreak Dynamics & Response (IOA network call); SAGER Guidelines; McKinzie Gales, Emelie Love Yonally Phillips, Leah Zilversmit Pao, Christine Dubray, Clara Rodriguez Ribas Elizalde, Shirin Heidari, Marie-Amelie Degail, Marie Meudec, M Ruby Siddiqui, Simone E Carter – Beyond COVID-19, the case for collecting, analysing and using sex-disaggregated data and gendered data to inform outbreak response: a scoping review: BMJ Global Health 2025;10:e015900

## 1.4.4. Academic research

The IOA approach can facilitate the integration of academic research into outbreak response by fostering collaborative partnerships between researchers, the MOH, and local response actors. By ensuring that academic studies are directly linked to practical response needs, IOA enhances the relevance and impact of research findings. This collaboration not only enriches the decision-making process but also ensures that interventions are grounded in scientific evidence and adapted to local contexts. IOA leverages pre-existing research, may support and engage in clinical trials and research, and promotes ethical and effective research practices. Finally, academic partners may contribute to the monitoring and evaluation of the IOA processes.

**Links:** UK Public Health Rapid Support Team; Global.health

# 1.5. What is the toolkit about?

## 1.5.1. Background and objectives

The IOA toolkit was designed to help organisations, countries, and communities apply the IOA approach across various settings.

Developed based on the model from the DRC, its creation involved extensive consultation with experts experienced in IOA applications. The toolkit was piloted in Tanganyika Province, DRC, as well as Somalia and Sudan, demonstrating its adaptability to diverse emergency scenarios. It builds upon an existing array of tools, templates, reports, case studies, animations, and publications used by stakeholders in diverse contexts.

The toolkit aims to provide a clear understanding of IOA and highlight the importance of using an integrated, holistic approach to manage outbreak responses. It also provides step-by-step guidance for setting up IOA and putting IOA principles into action.

This toolkit provides guidance on applying IOA in humanitarian and emergency contexts, offering a practical and adaptable approach to informing public health emergency responses.

## 1.5.2. Audience

This toolkit is a resource for anyone involved in emergency, preparedness, response and recovery. It provides insights for those new to IOA, as well as practical strategies for experienced practitioners. Designed for MOH officials and partners (the United Nations [UN], international non-governmental organisations [INGOS], non-governmental organisations [NGO], etc.) working at the national, regional, provincial, district, and local levels, this toolkit emphasises the importance of a holistic approach and offers clear guidance on implementing IOA.

The anticipated primary users of this toolkit include those involved in enhancing data quality, analysis, and use to support public health emergencies and outbreak responses at local, national, and international levels.

This includes epidemiologists, data scientists, social scientists, behavioural scientists, laboratory scientists, academic researchers, response coordinators/ incident managers, pillar leads, cluster leads and members, civil society representatives, and donors.

# Structures and approaches



02

# 2.1. Structures

## 2.1.1. Three structures

There are three structures that have been used to support the implementation of IOA, which are:

1. **Emergency operations centre (EOC)** is a multi-disciplinary team working at full capacity, able to analyse a range of data and information sources, including epidemiologists, data scientists, social scientists, anthropologists, mathematical modelers, economists and One Health experts. All disciplines do not need to be represented; this is dependent on the Public Health Emergency.

2. **Permanent cell** is a multi-disciplinary team, able to analyse a range of data and information sources, core members may include an epidemiologist, a data scientist and a social scientist, whilst other experts join as needed. All disciplines do not need to be represented; this is dependent on the Public Health Emergency.

3. ***Ad hoc* groups or individuals working on IOA** are often epidemiologists or data scientists, applying IOA principles to a trigger question.

Embedding IOA in these structures help guide operations while allowing flexibility to adapt as needed. For example, during a new disease outbreak, an IOA team may integrate into the existing EOC. Once the immediate crisis is under control, this structure may transition into a permanent structure or be dismantled.

A permanent cell may operate independently or align with existing frameworks, such as WASH or Health clusters, MOH, and national public health institutes. It could also function as part of a technical working group (i.e., *ad hoc*) with clearly defined terms of reference (TOR). This flexibility ensures the structure in which IOA evolves meets ongoing and long-term needs.

During the Ebola crisis in North Kivu, DRC, IOA was performed through an ad hoc group of individuals organised into an epidemiological cell and the cell for social science analyses (CASS). Later, it evolved into a permanent cell with members who engaged systematically in IOA alongside their regular duties. Regular surveillance meetings helped identify trigger questions, which then directed collaborative efforts to address them thoroughly. This approach ensures integrated health risk monitoring is consistent and resource-efficient, driven by need and availability within the health system and partner organisations.

## 2.1.2. Setting up an IOA structure

**An effective IOA structure requires local collaboration.** Regardless of what IOA structure suits your country, community, and/or context best, setting up IOA may require creating TOR in which the following should be included:

- Objectives
- Governance
- Ways of working
- Communication channels

SOP 1. Considerations when setting up an IOA team
Template 1. IOA cell TOR

## 2.1.3. Key considerations for setting up IOA

**1.** Localising IOA for maximum impact
- Focus on local contexts: the success of IOA relies on local teams with a deep understanding of the specific contexts and needs of their communities.
- Context-specific responses: different districts may respond differently to IOA based on their prior experiences with disease and outbreak response measures. Tailor approaches to align with each district's unique circumstances.

**2.** Strategic support approach
- Targeted support: districts who want to use IOA should be supported accordingly with direct resources and assistance, when relevant.
- Readiness matters: focus on districts where teams may be committed and capacitated to effectively use and benefit from IOA, regardless of their previous experiences with IOA, rather than forcing adoption in areas that may not yet be prepared.

**3.** Aligning national goals with local implementation
- National interest, local action: while IOA may be driven by national priorities, its success depends on effective implementation and operation at the district or local levels.


**Watch the video 'How Integrated Outbreak Analytics (IOA) answers operational questions' on YouTube @IntegratedOutbreakAnalytics:** https://youtu.be/0XOExuUXgZA

SOP 1. Considerations when setting up an IOA team

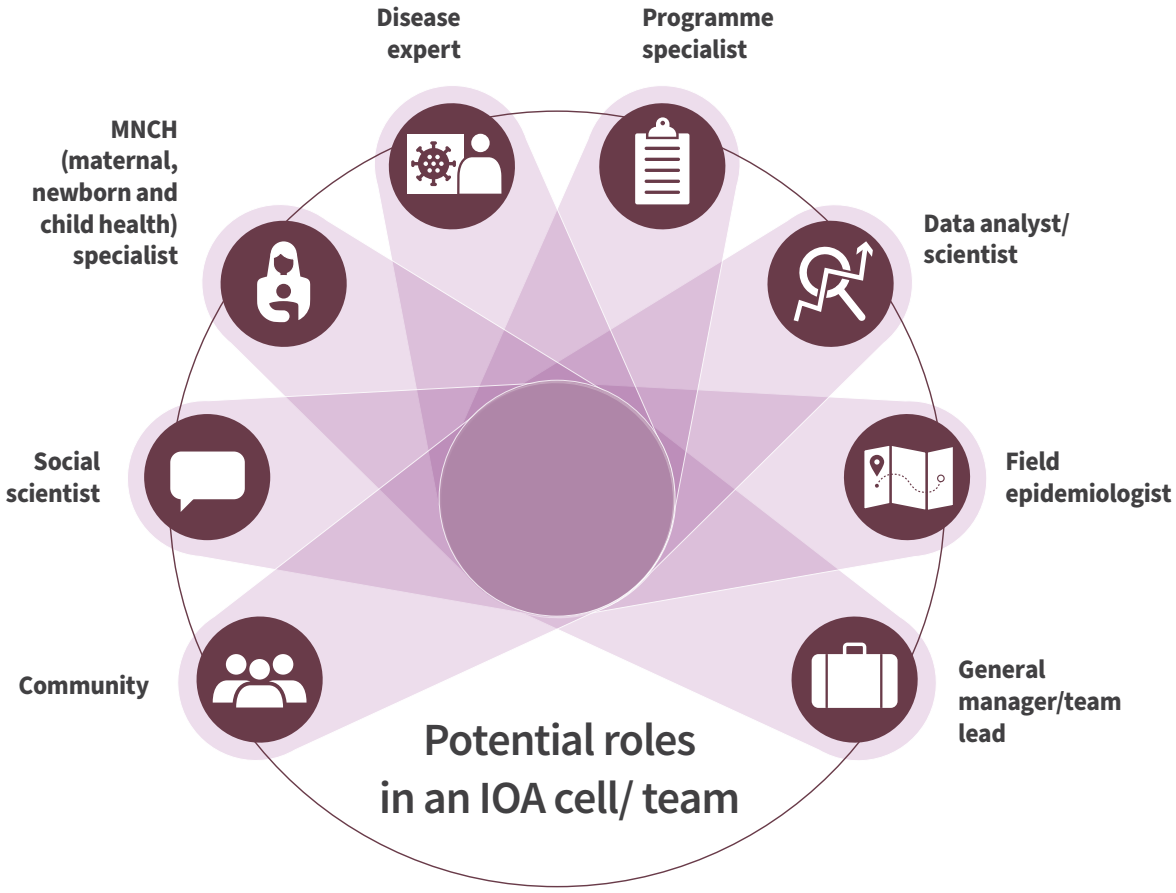
## 2.1.4. Setting up the IOA team

**Who to include in an IOA team**

IOA teams benefit from a variety of profiles covering different expertise. Some of these profiles are more focused on ensuring we have the right technical expertise to holistically understand the drivers of outbreaks (e.g., disease specialist, anthropologist, behaviour change specialist, etc.), while others are key for managing the operations and ensuring that generated evidence can be understood and translated into effective action (e.g., programme managers, data scientists, communication officers, etc.). The organisation of an IOA team will depend on the specific scenarios and evolving needs of the health risk being addressed.

IOA is flexible and adaptable to the specific needs of each country, context, or community. Even in situations where some partners are unavailable, the IOA approach remains feasible. The profiles listed in Figure 2 are suggested for an IOA team but may vary by name or number depending on your local context. The goal of IOA is to engage a diverse, multidisciplinary group of partners that provides a comprehensive understanding of the public health issue, allowing for the identification of risk factors and underlying causes.

## Figure 2. Profiles of IOA team members




Many profiles may contribute in a part-time or *ad hoc* capacity by outbreak response. Additionally, the IOA network provides a valuable resource for additional support.

**Roles and responsibilities in an IOA team**

The composition of an IOA team depends on the structure, approach, and identified need.

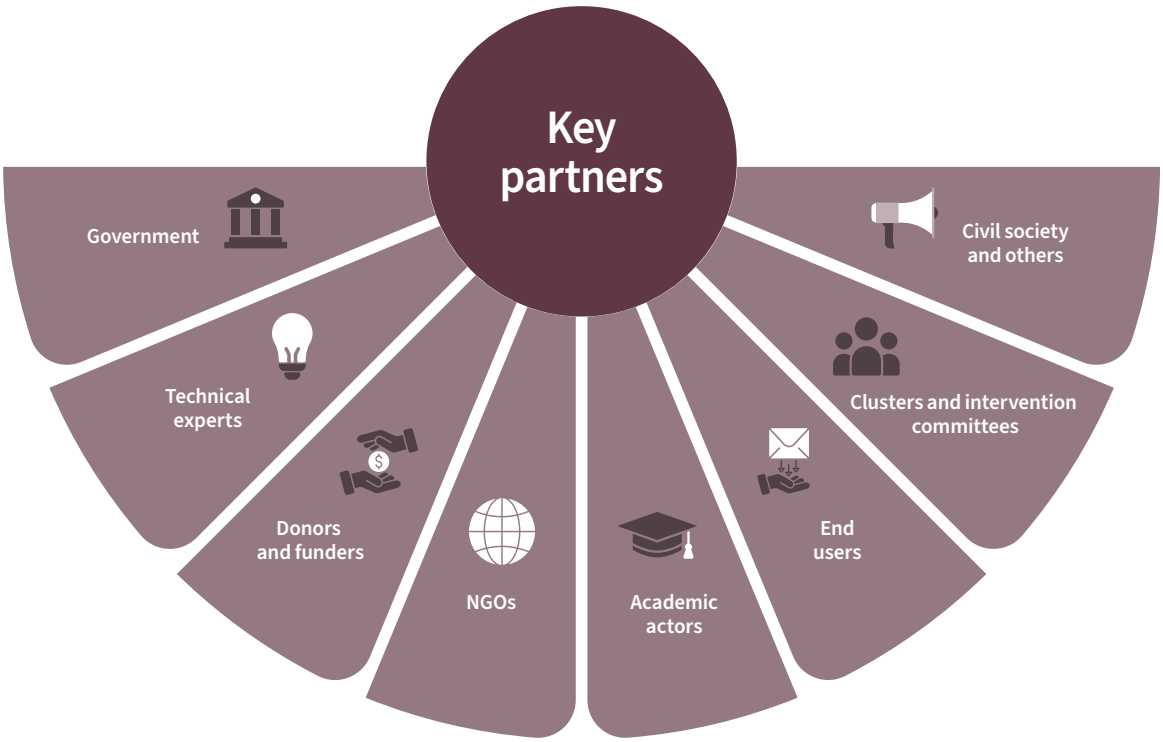
- **Objective-driven role assignment:** determine roles based on what the team needs to accomplish and understand, rather than specific job titles.
- **Information assessment:** consider what information is needed first. Then, identify if it exists and who can access it.
- **Adapting to triggers:** when specific questions arise, consider bringing in additional expertise to enhance the IOA team.
- **Multi-level strategy:** determine resources available both locally and globally and adapt roles accordingly to work effectively with what's available.

## 2.1.5. Partners' engagement

IOA employs a collaborative approach, strategically designed to leverage findings from analyses to enhance response effectiveness.

It is essential to engage the right partners (Figure 3) from the outset to ensure the most effective use of these insights.

### Figure 3. Key partners to engage in IOA




The early inclusion of experts/ specialists is essential to optimise the effectiveness of IOA. For example, a cholera specialist from the MOH played a crucial role right from the start by quickly identifying key challenges in the ongoing cholera management programme. The specialist assessed the health and nutritional status of patients upon arrival and observed clinical practices firsthand. Their comprehensive analysis revealed that delays in treatment and prevalent malnutrition significantly increased the risk of severe outcomes in cholera cases among children. Early engagement of this specialist was pivotal, as it provided insights that prevented any resistance to changing established health programmes, and provided evidence of the relationship between health access, malnutrition, and disease management. Their involvement improved collaboration across healthcare levels and the community, boosting the effectiveness of co-developed actions that aimed at lowering the case fatality rate (CFR). Moreover, it facilitated the co-development of actions with partners to enhance nutritional support and raise community awareness about the importance of prompt cholera treatment.

More on the role of partners and stakeholders is described in the IOA process.

Overview
1. Introduction
2. Structures and approaches
3. IOA process
4. Trigger questions
5. Review and interpretation of data and information
6. Collaborative integrated analysis
7. Co-development of actions
8. Monitoring evidence use
9. Workbook
10. Appendix

# 2.2. IOA approaches

The IOA approach shapes collaboration with partners and stakeholders and guides how it addresses key questions. IOA approaches can vary by group composition, team size, location, and response timeline.

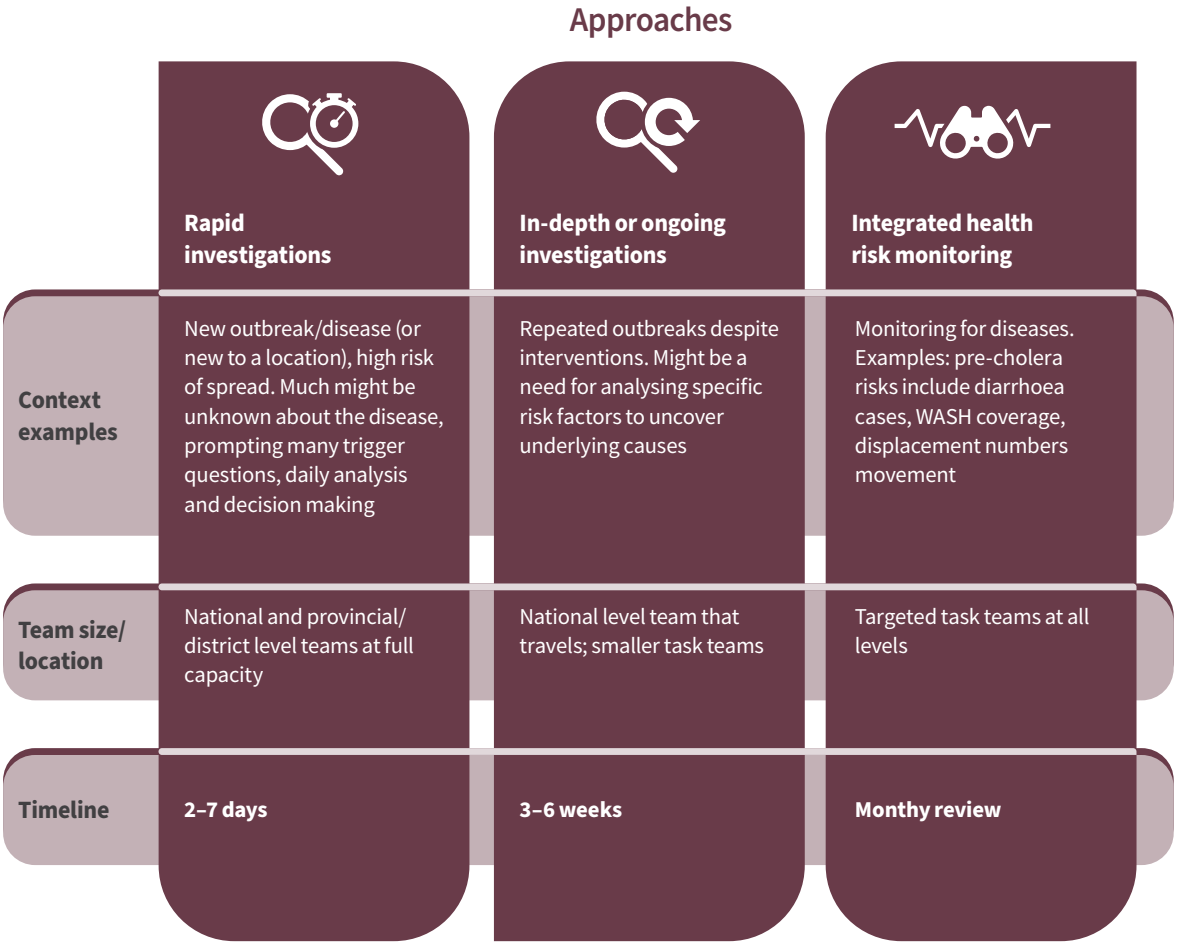
There are three main approaches to implementing IOA, each tailored to specific outbreak scenarios (Figure 4):

1. Rapid investigations
2. In-depth or ongoing investigations
3. Integrated health risk monitoring

An EOC may use IOA for a high-risk outbreak, repeated outbreaks, or integrated health risk monitoring. Any approach can be used by any type of IOA structure (formal or informal) and as with the IOA structures, approaches can be adapted based on teams, contexts, and needs.

**Note:** IOA is designed to be flexible and can be customised to suit the specific needs of different countries, contexts, and communities, building on the approaches that have already been successfully piloted. It is most important to ask the **right question** at the **right time** and prioritise the work to **answer that question**.

## Figure 4. Three approaches to IOA




See Figure 3 for recommended partners in an IOA team, noting that IOA can still work in the absence of all recommended partners.

## 2.2.1. Rapid investigations

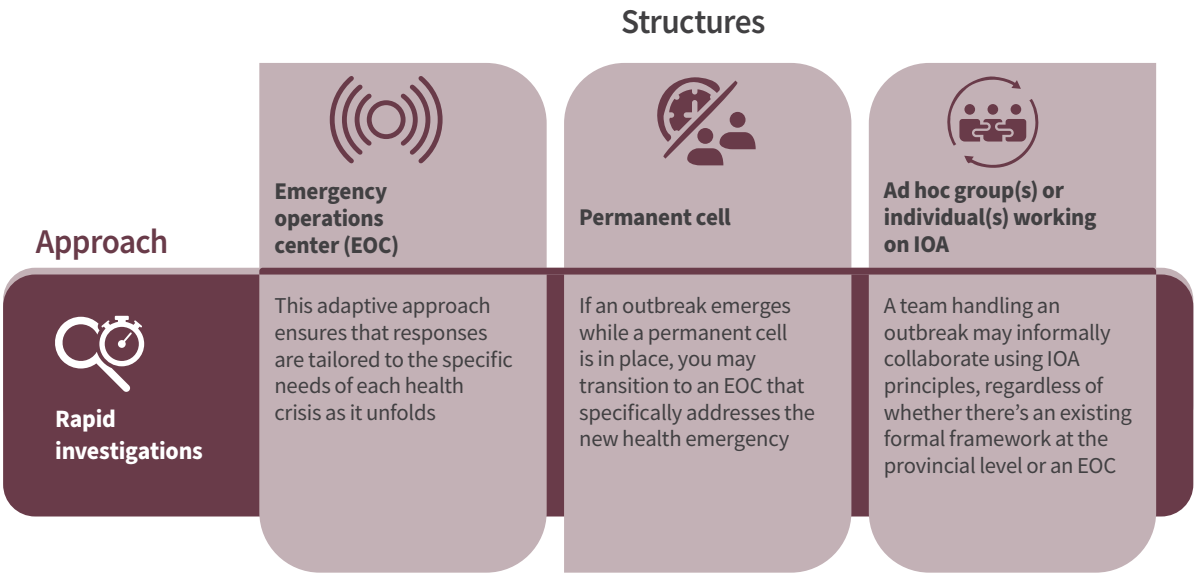
During acute emergencies, many response teams collect large amounts of data using different methods and tools. Trigger questions are generated when the findings from the analyses of these information does not align with what was expected or planned. IOA should be embedded in a structure that seeks to foster a collaborative understanding of the situation where data is analysed collaboratively. This helps improve coordination and collaboration, thus allowing teams to better understand trends like death rates, vaccine uptake, healthcare use, and community involvement in practices like burials (Figure 5).

### Example 1: Ebola, nosocomial infections

During an Ebola outbreak, despite healthcare worker training, one town continued to show high rates of nosocomial infection months into the outbreak, unlike neighbouring areas.

The IOA cell collaborated with surveillance, infection prevention control, water, sanitation and hygiene (WASH), and clinical care teams to investigate the cause.

**Figure 5. Use of IOA in different structures during a high-risk outbreak**




**Note:** For the EOC, the name and setup may vary based on your specific context. While it might not always be referred to as an EOC, this cell/unit is established during a crisis to specifically address and manage the situation.

SOP 2. Structures and IOA approach

## 2.2.2. In-depth or ongoing investigations

Repeated disease outbreaks often occur in areas with pre-existing risks, such as poor water, hygiene and sanitation conditions, or limited healthcare service access. These areas typically receive targeted interventions like vaccination drives, enhanced WASH initiatives, or improved healthcare availability. Despite such efforts, if outbreaks persist, IOA can provide deeper insights into the factors and underlying causes sustaining these risks. This analysis is conducted collaboratively at the local level with partners actively engaged in public health response (Figure 6).

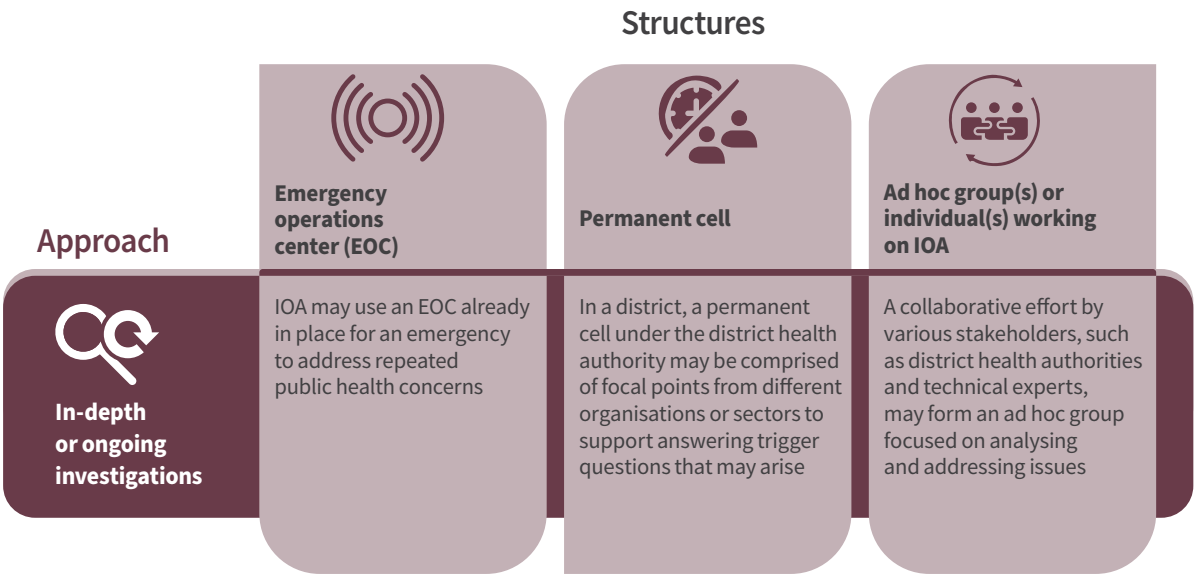
### Example 2: Measles, repeated outbreaks

In a specific area, continuous measles outbreaks occurred despite widespread vaccination efforts. Laboratory confirmations and zero-dose studies suggested sufficient vaccine coverage, yet new cases emerged weekly. This discrepancy warranted further IOA investigation into underlying causes.

### Example 3: Poliomyelitis, new cases reported

Despite six polio vaccination campaigns in one district within a year, polio cases have not decreased. While high rates of malnutrition and low maternal, child, and newborn health services were observed – factors that could contribute to polio - these issues were prevalent across the region. However, neighbouring districts with similar challenges have reported no polio cases in the past two years. This raises the need for further investigation to determine why this district continues to experience persistent polio cases.

**Figure 6. Use of IOA in different structures during repeated outbreaks or public health risks**




SOP 2. Structures and IOA approach

# 2.2.3. Integrated health risk monitoring

Integrated health risk monitoring consists of systematically observing, collecting, analysing, and interpreting information related to factors that can impact health, assessing potential risks to public health. It is a collaborative process in which different stakeholders contribute information from their respective fields to better identify and understand the underlying causes of community health risks (Figure 7).

**How does integrated health risk monitoring work?**

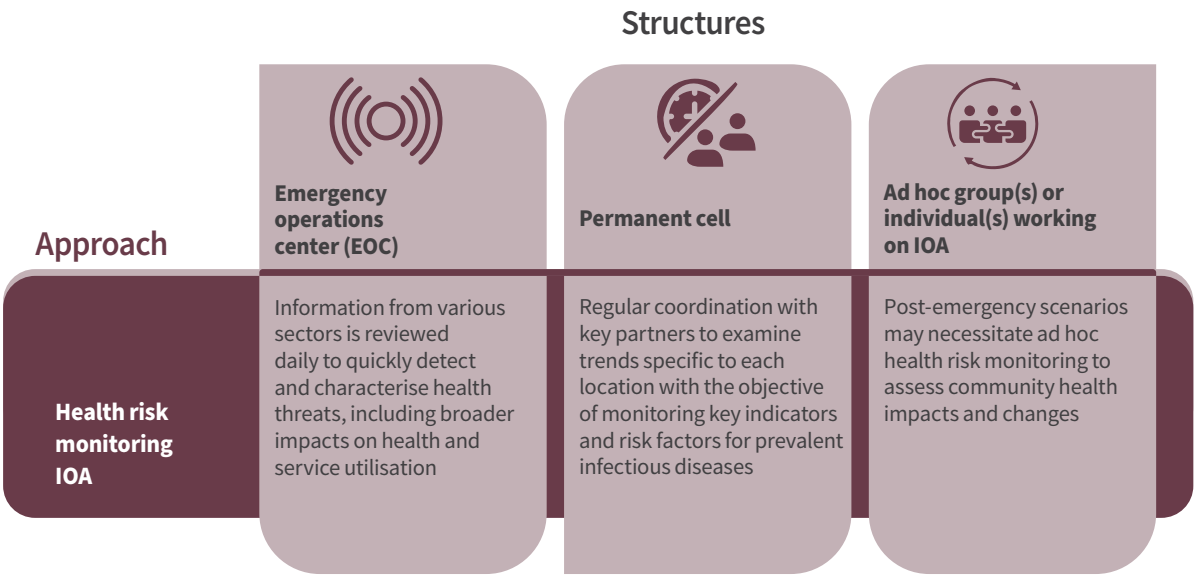
Integrated health risk monitoring is a process where different stakeholders work together to better understand and mitigate health risks.

Different actors can contribute different data and information (e.g., WASH cluster indicators on water coverage; MOH data from both surveillance and routine services or health trends; the United Nations Office for the Coordination of Humanitarian Affairs (UNOCHA), the United Nations High Commissioner for Refugees (UNHCR), or the International Organization for Migration (IOM) data on population movement, and other IOA actors or focal points may bring in information on recent investigations, studies, community observations or from programming). Collaborative analysis can support these different stakeholders to better monitor and explain health trends for those working in their sectors and better identify potential critical trigger questions requiring a deep dive to further explain the situation. While some questions can be answered with existing data, others may necessitate the collection of new information.

**Importance of integrated health risk monitoring:**

- Early detection of health threats
- Anticipatory actions and prevention measures
- Resource allocation
- Public health planning and policy
- Community health awareness
- Response preparedness

**Figure 7. How each IOA structure can be used for integrated health risk monitoring**




SOP 2. Structures and IOA approach

## Example 4: Health risk information that could be monitored for cholera and integrated into early warning and alert system

- Community roles and behaviours (e.g., patterns of fishermen)
- Seasonal, displacement, socioeconomic risk trends
- Incidence in bordering countries
- Vaccination and routine MNCH
- Capacity of healthcare workers to detect and treat disease, prevent nosocomial infection, etc.
- Morbidity monitoring (e.g., malnutrition, diarrhoea, malaria, etc.)

During health risk monitoring, the observation of changes in the factors listed below may prompt a trigger question:

- **Conflicts and events:** shifts in conflict dynamics, political situations, or occurrences like restricted movement and access to services, as well as events such as strikes or vaccine shortages. These changes, sourced from IOM, UNHCR, UNOCHA, and various other reports, could raise key questions.
- **Health service use:** trends in maternal and child health services, vaccination access, and public trust in healthcare can help us understand health service use and contributing factors to health service use.
- **Individual health risks:** fluctuations in syndromic or disease incidence (monitored through the national health information system) might necessitate revised prevention and control strategies or unique treatment approaches.
- **Community risk exposure:** community reliance on water and sanitation infrastructure, noted by the WASH cluster, is critical. Dependency on inconsistent sources like water trucking may prompt urgent queries if suggested changes in funding or security affect access.

# IOA process



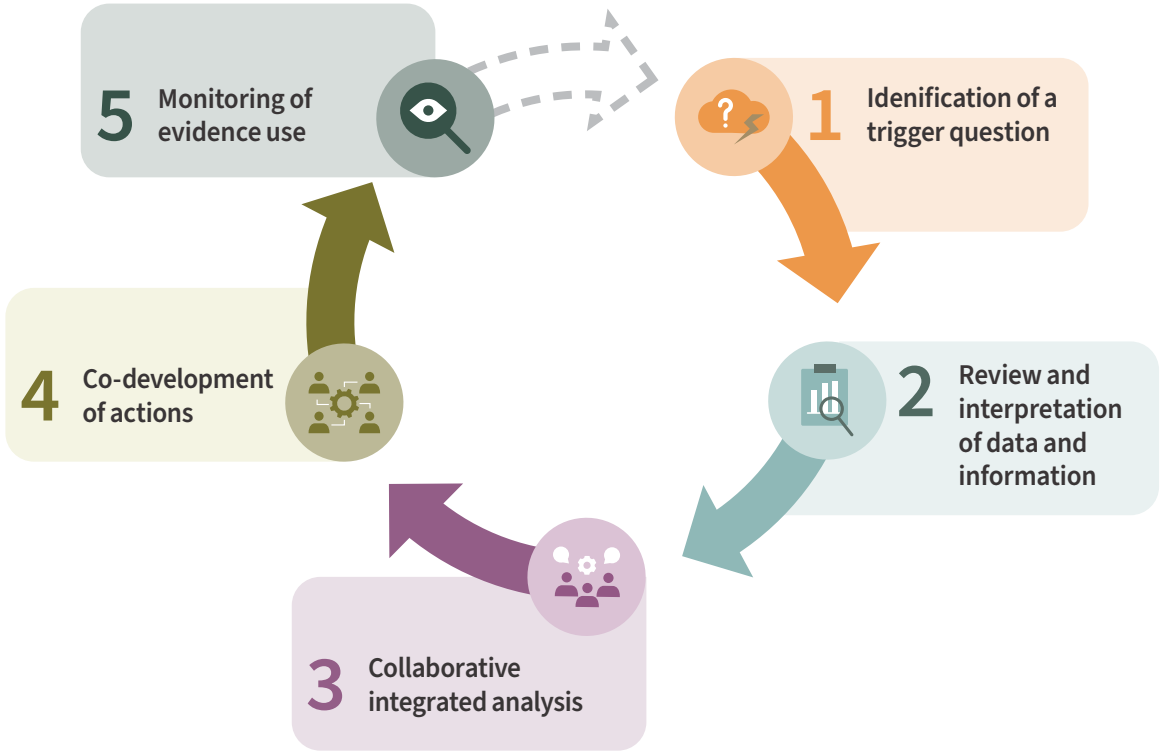
03

# 3.1. A five-step process

The IOA process comprises five steps (Figure 8):

- IOA is initiated by the identification of a **trigger question**, which may emerge from epidemiological trends, requests from response pillars, shifts in health information system (HIS) data usage, or contextual changes. Once a trigger question is raised, stakeholders, including decision-makers, are quickly engaged to start a collaborative response.
- Stakeholders and partners **collaboratively review and interpret data and information**. This includes information from surveillance, health information systems, event records, climate and ecosystems, programmes, local economy, healthcare workers, and community. Additional information may be required and should be collected in a structured manner (SOP 6. Additional information collection and Template 4. Rapid protocol) in collaboration with national, provincial, and local health actors. This may involve collaboratively developing and validating tools and methodologies for gathering additional information as needed. Once established, these tools will be deployed to collect the required information.
- After collecting the necessary information, stakeholders and multidisciplinary teams will collaboratively perform an **integrated analysis** to compile a master list of key risks and observations, as well as potential contributing factors. Further information collection and review may occur during this process.
- Key risks and contributing factors are organised into specific monitoring tools, for example the mini monitoring tool (Chapter 7. Co-development of actions). These tools guide discussions with partners during the **co-development of actions** sessions, where priorities are set. Partners at local, provincial, and national levels collaborate to formulate actions and establish timelines for implementing these actions. Stakeholders and partners will co-develop and document actions, assign responsibilities, establish timelines, and define performance indicators. These agreed-upon details will then be shared with all relevant partners to ensure effective implementation and mutual accountability.
- To ensure comprehensive **monitoring of evidence use**, partners will update stakeholders on progress as outlined in the MONITITOs. All feedback, including implementation challenges, is consolidated into the monitoring tool (Chapter 8. Monitoring evidence use). Designated personnel review this data to assess action effectiveness against health risk/observation. If outcomes are not met, further analysis will identify any missed contributing factors or underlying causes.

## Figure 8. The five steps of the IOA process




SOP 3. IOA process

### Example 5: Diarrhoeal disease, high case fatality rate in children

- **Trigger question:** why does case fatality due to diarrhoea in children remain high?
- **Review and interpretation of data and information:**
  - The IOA team reviewed existing information (e.g., surveillance, national health information system, programmes and intervention initiatives, geographical and environmental factors, gender and social dynamics, local economics, etc.).
  - A rapid protocol was developed with national, provincial and local partners to perform additional information collection via health care worker surveys and in-depth cholera investigations.
  - Based on missing information, healthcare worker surveys and proactive cholera in-depth investigations were performed.
- **Collaborative integrated analysis** was performed by multi-disciplinary teams. Note: additional collection/review may occur during this process.
- **Co-development of actions**
  - Main risk factor: lack of available oral rehydration solution for children at the community level.
  - Recommended actions:
    - Strengthening of diarrhoea care in community care sites including oral rehydration solution supply.
    - Distribution of protocols for the management of diarrhoeal diseases in private facilities.
- **Monitoring evidence use**
  - 17 actions were co-developed.
  - 91% of actions were implemented.

# 3.2. Multi-partner collaboration in the IOA process

Partner collaboration is a key principle of the IOA approach. Early and continued engagement of partners in IOA is key to a successful implementation of IOA (Table 1).

Engagement with appropriate partners should happen early in the IOA process (for more information on partners engagement go to 2.1.5 Partners' engagement). IOA remains flexible and adaptable based on country, context and/or community needs.

## Table 1. Engagement of partners throughout the different steps of the IOA process

| Step in process | Examples of stakeholders | Types of engagement | Example |
|---|---|---|---|
| **Trigger question (stemming from initial observations)** | • End users<br>• MOH<br>• Operational and technical partners, including:<br>– International organisations<br>– Local and/or international NGOs<br>– Sectoral groups and pillars of the response<br>– Academic institutions | • Identification of a trigger question<br>• Agreement of/ sign-off on trigger question<br>• If the trigger question is not identified by end users, they must be included at an early stage | IOA teams notice a decrease in postnatal care. Following discussions with health cluster actors – the trigger question is agreed on and validated, requiring additional information to understand and respond. |
| **Review and Interpretation of data and information** | • End users<br>• MOH including local public health authority and field epidemiology training programme (FETP)<br>• Operational and technical partners | • Agree on all information to be included in the review (did we find everything?)<br>• Confirm and explain observation<br>• Agree on methods for additional information collection and support.<br>• Collect and provide additional data as part of routine activities. | • District Health Information Software 2 (DHIS2) data indicate an increase in diarrhoeal cases. Report from an exploratory mission indicates a decrease in safe water supply in the same location. Collaborative integrated analysis by DHIS2 analysts, report authors, health actors and WASH actors (the absence of safe water is due to a lack of funding).<br>• WASH teams visiting sanitation facilities, could also collect community perception data or take photos.<br>• Active case-finding teams could check registries for number of pregnant women that have been vaccinated. |

| Step in process | Examples of stakeholders | Types of engagement | Example |
|---|---|---|---|
| **Collaborative integrated analysis** | • End users<br>• MOH including local public health authority and FETP<br>• Operational and technical partners | • Real-time collaborative analysis of new and existing information.<br>• Health actors – explain observation<br>• WASH actors – explain observation | The field team returns with an analysed representative household survey on measles vaccination. The wider IOA team meets to review the observations and discuss contributing factors. Various stakeholders contribute additional evidence to the discussion, such as updated figures on population displacement from a partner organisation or information on recent vaccination campaigns provided by the MOH. |
| **Co-development of actions** | • End users<br>• MOH including local public health authority and FETP<br>• Operational and technical partners | • Collaborative and interactive discussions between IOA field teams and stakeholders result in the agreement on operational, high-quality actions to address the factors contributing to key risks identified during the analyses. | Evidence shows that adult women, the target audience for community engagement messages about maternal, newborn and child health (MNCH) services, are often in the fields during the weekly radio broadcast and usually listen to the radio in the evenings.<br>Action: the risk communication and community engagement partner collaborated with the radio station to reschedule the programme to air in the evening when women are more likely to be at home and able to listen. |
| **Monitoring of evidence use** | • End users<br>• MOH including local public health authority and FETP<br>• Operational and technical partners | • Ongoing communication and collaboration between IOA field teams and co- developing partner to monitor implementation progress and ensure agreed timelines are being met.<br>• Regularly assess whether the agreed indicators have been achieved, with progress documented in the MONITO. | The IOA field team maintains regular communication with the risk communication and community engagement partner to confirm that the radio programme's broadcast time has been adjusted. Additionally, they collaborate to assess any observed impacts or outcomes this may have had on access to and use of MNCH services, while acknowledging that correlation does not imply causation. |

**Note:** Even when some partners may not be available, the IOA approach is still possible. For instance, in a province experiencing recurrent measles outbreaks, despite the lack of health partners in the area, the government requested assistance to understand the underlying causes of the outbreaks. The situation provided an opportunity to advocate for bringing a health actor to the province. This example shows that IOA can proceed based on government requests and health needs, even in the absence of direct support from health partners in the area.

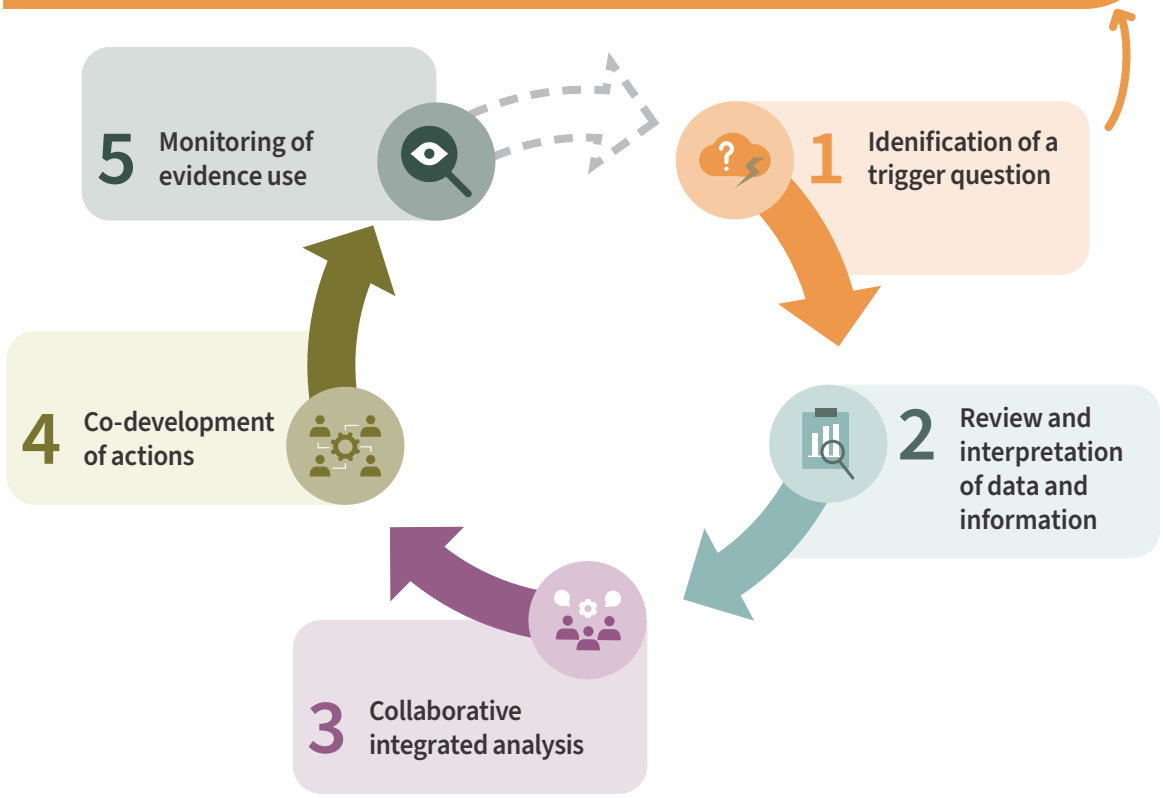
# Trigger questions



04

## IOA process – Trigger question

IOA is initiated by the identification of a trigger question or health/observation, which may emerge from epidemiological trends, requests from response pillar, shifts in HIS data usage, or contextual changes. Once a trigger is identified, stakeholders, including decision-makers, are then quickly engaged to start a collaborative response.




**What is a trigger question?** A specific enquiry typically arising from an unusual trend or change in a public health situation or risk.

**Trigger questions may come from:**

- District or provincial health authorities' health information systems
- National level surveillance teams
- Emergency response coordinators/decision-makers
- Partners/response actors: e.g., health or WASH cluster, pillars, UN organisations, NGOs, academia

**Trigger question examples for different approaches**

Rapid investigations (section 2.2.1)

- In this outbreak, why are there more cases among men than women in internally-displace persons (IDP)/refugee camps?
- In this outbreak, why has the case fatality rate been higher in location X in the past six weeks?

In-depth or ongoing investigations (section 2.2.2)

- Why is diarrhoea incidence consistently high despite sufficient water coverage?
- Why is there recurringly low participation in nutritional screening in community Y?

Integrated health risk monitoring (section 2.2.3)

- Why has there been an increase in at-home deliveries in the past three weeks?
- Why has there been a decrease in diphtheria, pertussis, and tetanus (third dose) vaccination in location Z?

# 4.1. How to identify a trigger question?

Sudden, unexplained changes in trends, or lack of changes in trends despite efforts to address them can lead to trigger questions.

Also, unexplained variations in trends by location or population can lead to trigger questions.

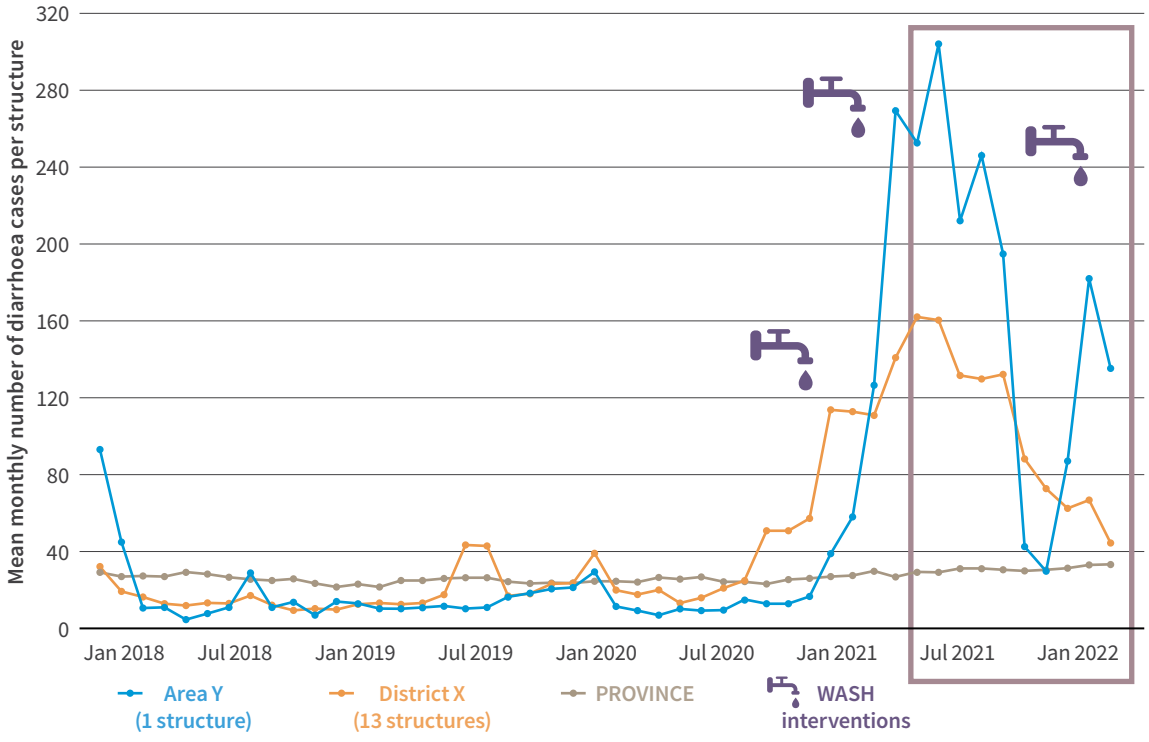
## Example 6: Diarrhoeal disease, high incidence

- In a cholera endemic state with a regular influx of IDPs, the IOA team worked with multiple partners to collaboratively monitor diarrhoea and cholera risks.
- Water trucking was replaced with sustainable water networks. As water coverage improved in district X, the cases of simple diarrhoea also began to decrease.
- In January 2022, there was a large influx of IDPs in area Y (located within district X). Trends in the camp indicated that, compared to the rest of the district, cases of diarrhoea were rising.
- However, the WASH cluster continued to measure high water coverage in area Y, which led to the following trigger question:

**Why are diarrhoeal cases rising in the IDP camp in area y despite high reported wash coverage (Figure 9)?**

This trigger question will be explored in subsequent chapters to demonstrate the different steps of the IOA process.

### Figure 9. Trends over time (2018-2022) of the number of diarrhoea cases reported in area Y, district X and the entire province




Exercise on creating trigger questions

SOP 4. Identification and investigation of trigger questions in IOA

# 4.2. How to validate a trigger question?

Prior to investigating a trigger question, it is crucial to validate it (Figure 10). The validation step checks whether the observation is genuine or influenced by factors such as poor data collection/reporting, programme errors, etc.

Once validated, stakeholders can collectively decide which trigger questions to explore, leveraging analysis observations to co-develop actions and enhance their responses.

## Example 6 (continued): Diarrhoeal disease, high incidence

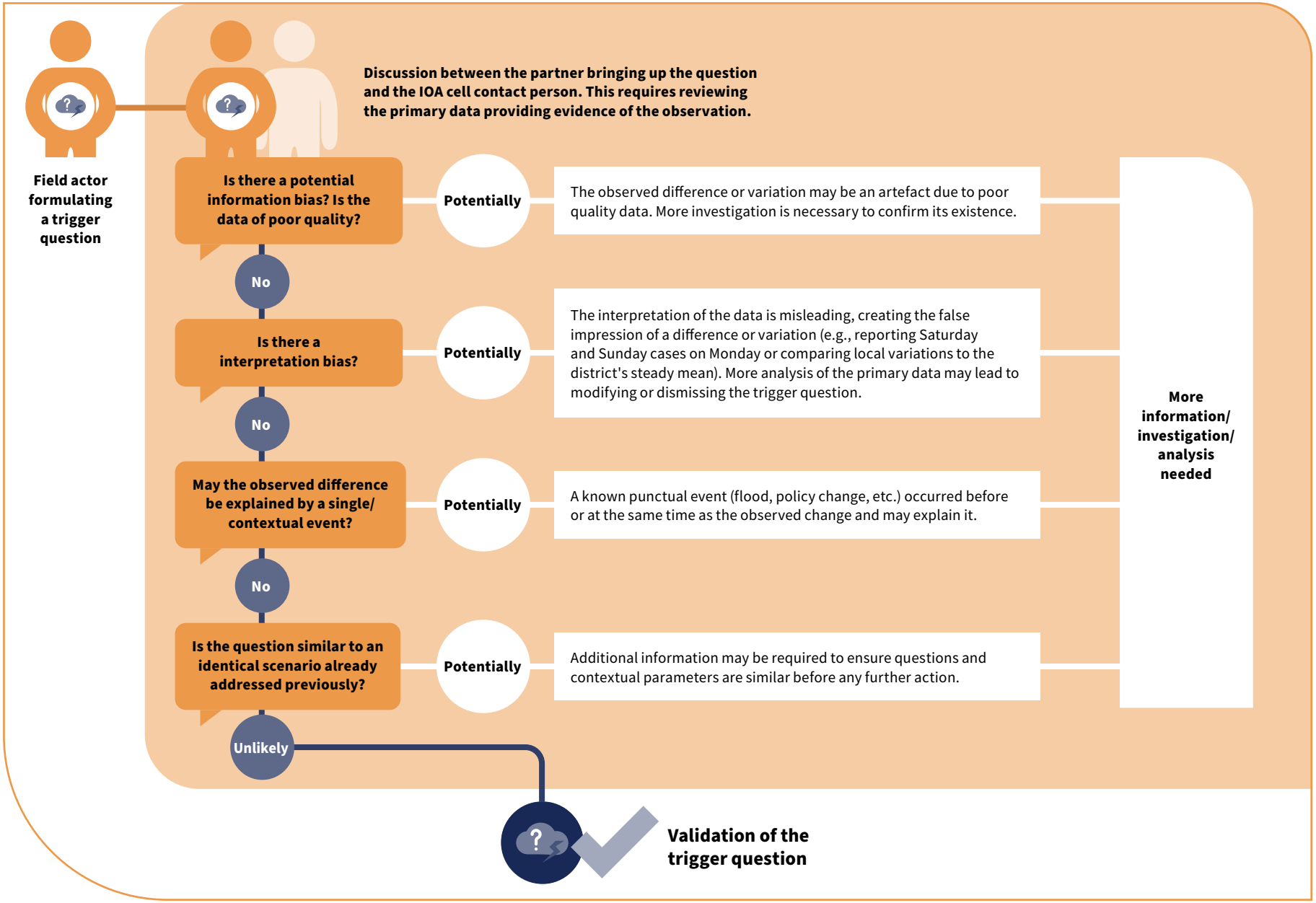
**Why are diarrhoeal cases rising in the IDP camp in area Y despite high reported WASH coverage in district X?**

Key questions for validation:

- Is the trend localised to specific districts or widespread?
- How does the health situation in health area Y compare to neighbouring health areas and districts?
- What recent events have occurred in these health areas and neighbouring districts?
- Is this a new situation, or have similar hypotheses been analysed previously?
- What are the current community risks, including camps, displaced persons, health service use, and health behaviours?
- What programmes are currently active, which organisations are involved (clusters), and what is the extent of service coverage?

Changes like strikes or transitions from free to paid healthcare can also prompt trigger questions. These changes are often related to reporting inaccuracies or programme adjustments rather than necessitating further investigation. For instance, an apparent increase or decrease in healthcare service use might simply reflect a shift where all district residents now access a single facility offering free services. If the change observed can be attributed to reporting errors or programme/service adjustments, the trigger question may not require additional investigation.

## Figure 10. How to validate a trigger question?

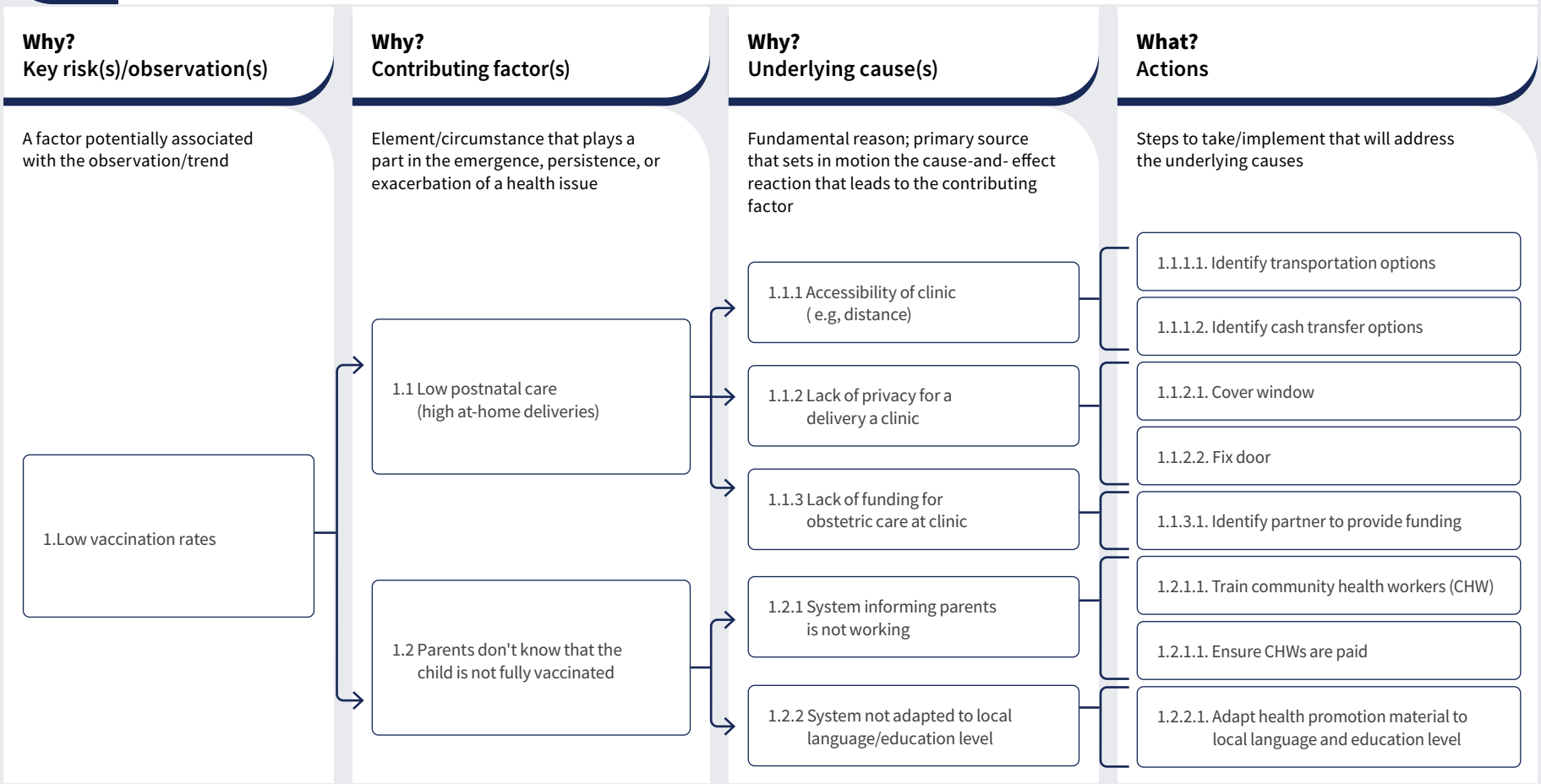


# 4.3. How to investigate a trigger question?

The investigation of the trigger question following each step described in Chapter 3. IOA process will be detailed step by step in the following chapters. An example is given here.

## Example 3 (continued): Poliomyelitis, new cases reported

**Trigger question:** Why are polio cases still observed despite vaccination campaigns?




Exercise on investigating a trigger question

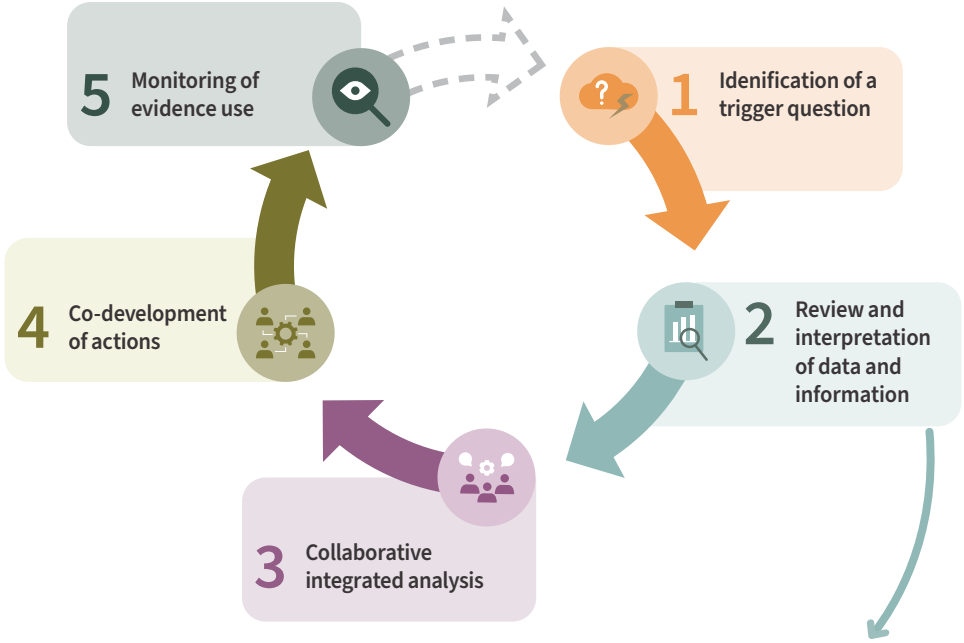
Template 2. Root cause analysis for trigger question investigation

# Review and interpretation of data and information



05

### IOA process – Review and interpretation of data and infomration




**Review and interpretation of data and information** constitutes the second phase of the IOA process. Stakeholders and partners, including multidisciplinary teams, collaboratively review, analyse, and interpret existing data and information. This includes information from surveillance, HIS, event records, climate and ecosystem, programme, local economy, healthcare workers, and community. If gaps in information are identified that cannot be filled with existing information, stakeholders and partners will collaboratively develop a strategy for collecting the missing information.

# 5.1. Data, information, and sources

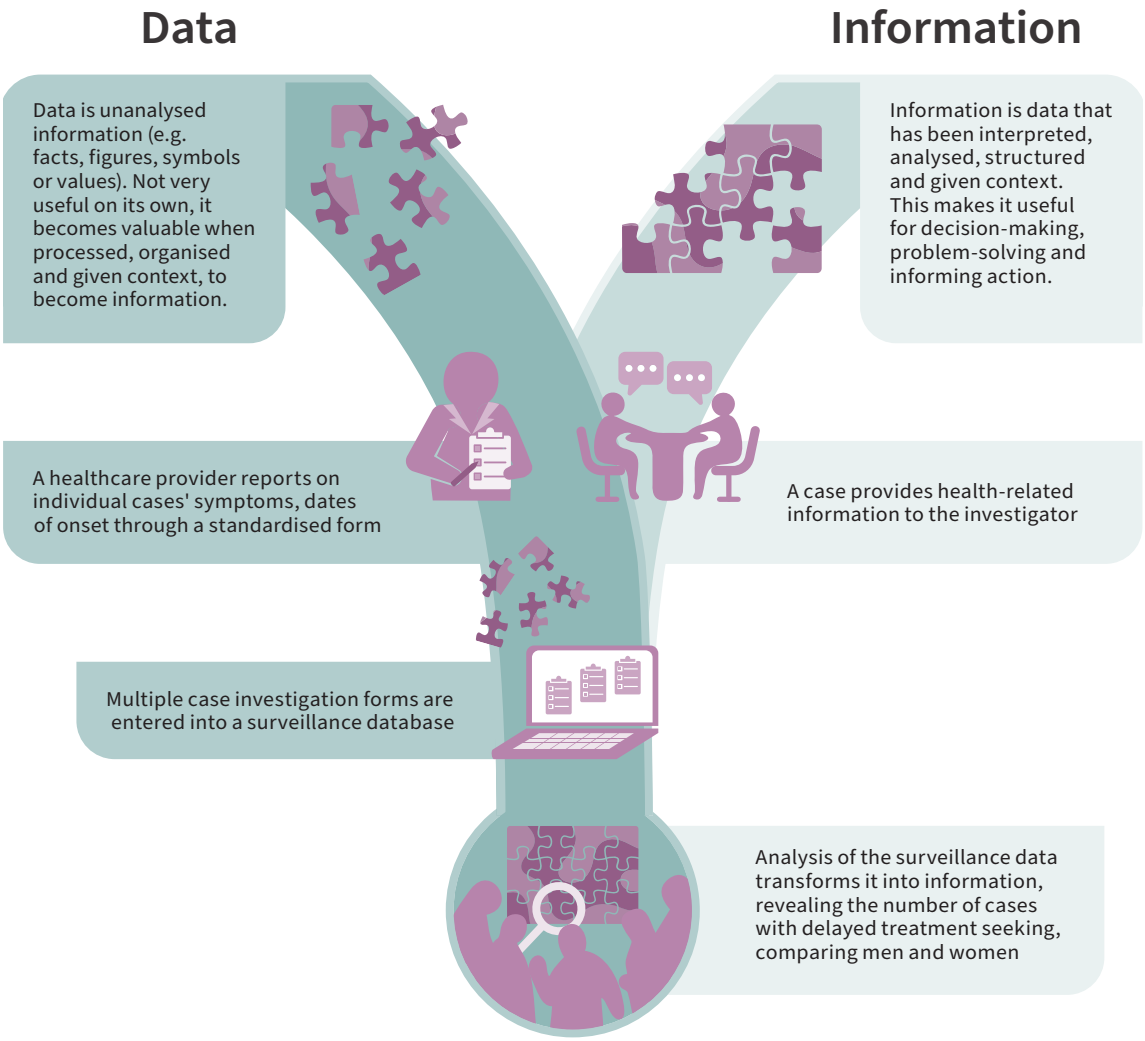
## 5.1.1. Defining data and information

The terms "data", "information", and "intelligence" are often used in different ways in the realm of public health surveillance and outbreak analytics. Given the importance of the access to multiple sources of data and information in the IOA process, it was seen as critical to define those terms here, in the frame of this toolkit (Table 2 and Figure 11).

### Table 2. Defining data and information in IOA

| Data | Information |
|---|---|
| **Definition:** unanalysed information (e.g., facts, figures, symbols or values); data is the basic building block of information | **Definition:** data that has been processed, organised, and given meaning or context; it provides knowledge and understanding |
| **Nature:** numbers, text, images, or any other representation | **Nature:** information is data that has been interpreted, analysed, or structured in a way that becomes meaningful and useful |
| **Use:** data, by itself, is not very useful; it becomes valuable when it is processed, organised and given context (i.e., becomes information) | **Use:** information is valuable for decision-making, problem-solving, or gaining insights; it informs and guides actions |
| **Examples:** list of numbers (e.g., 1, 2, 3) or unstructured text strings (e.g., A, B, C) | **Examples:** a chart showing average rainfall/ flooding in a particular location by month, a report summarising cholera trends by sex and age, etc. |

**Figure 11. How data and information contribute to IOA**




### Example 7: Cholera, incidence in male population

While data might show an equal number of cholera cases in men and women, a deeper analysis reveals trends over time and by sex (information). This analysis indicates that men, due to their fishing activities and consequent proximity to the cholera- contaminated lake, tend to contract cholera earlier than women. This interpretation of the data transforms it into actionable information, highlighting the occupational hazard and guiding targeted interventions.

## 5.1.2. Types of data and information contributing to IOA

To gain a comprehensive understanding of outbreak dynamics, it's essential to collect, review and interpret a broad spectrum of data and information. While specific case data provide insights into the immediate health impact, it doesn't fully capture the contributing factors and underlying causes that influence disease risk, spread, and secondary impacts. This includes looking at how an outbreak influences and is influenced by the economic, social, and cultural aspects of a community. By integrating diverse types of information – from environmental conditions to population behaviours – we can develop more effective interventions and responses

Overview
1. Introduction
2. Structures and approaches
3. IOA process
4. Trigger questions
5. Review and interpretation of data and information
6. Collaborative integrated analysis
7. Co-development of actions
8. Monitoring evidence use
9. Workbook
10. Appendix

to health crises. Therefore, a holistic analysis that includes additional, varied information sources is critical for addressing both the direct and indirect effects of health situations on communities.

IOA combines data and information from various sources, methods, and actors in diverse fields to ensure a comprehensive understanding of public health risks and outcomes. Some sources may provide several types of information.

**Note:** These information 'categories' are just a general guide to help users think through potential information needs. They are interconnected and many types of information fit in multiple 'categories (Figure 12 and Table 3).

## Figure 12. Types of data and information used

## Table 3. Types of data and information used in IOA and examples

| Type of data and information | Examples |
|---|---|
| **Case analysis and laboratory** | Line lists on infected individuals (e.g., sex and age of people with a disease), laboratory test results and their implications for disease management, trends in resistance to antibiotics or other medications |
| **Population health and services** | Rate(s) of diarrhoea, typhoid, malnutrition, etc. in a community, availability of medical facilities and services in an area, vaccination rates and access to preventative care |
| **Geographic, environmental and animal factors** | Terrain features that affect access (e.g., lake and river flooding), impact of climate change on vector-borne diseases, wildlife populations that could harbour zoonotic diseases |
| **Community economic landscape** | Average income levels and unemployment rates in a community, economic dependencies on certain industries (e.g., fishing), access to necessities like clean water and food |
| **Gender and social dynamics** | Differences in gender specific jobs that may increase exposure to a disease, differences in responsibilities of disease prevention, social structures that influence access to healthcare |
| **Community behaviours and perceptions** | Prevailing attitudes towards vaccinations, adherence to health advisories during an outbreak, community trust in health services and providers |
| **Healthcare worker knowledge/capacity** | Training levels of local health workers, knowledge of local diseases and appropriate treatment protocols, availability and use of personal protective equipment and other healthcare supplies |
| **Geopolitics and events** | Impact of political instability of healthcare service delivery, sanctions that affect import of medical supplies, major events like elections, festivals, earthquakes, and volcanic eruptions |
| **Programme and response initiatives** | Public health campaigns and research, emergency response plans and their implementation status, effectiveness of health intervention programmes over time |

IOA strategically gathers targeted information to answer a specific trigger question (Chapter 4. Trigger questions). This focused approach helps prevent data overload (5.1.3 Dealing with data overload) and ensures that the collected information is actionable and directly relevant to the identified health risks or observations. The goal is to collect only the data necessary to effectively answer the trigger question.

## Example 7 (continued): Cholera, incidence in male population – Data and information

**Trigger question:** what are the contributing factors to the risk of cholera cases among a subset of men in district D?

IOA was used to investigate an upsurge of cholera infections among a cohort of men in district D. This assessment used a range of data sources, including **programme data** from the Case area targeted intervention, **case analysis or surveillance data** from the MOH detailing case numbers disaggregated by demographics, **and population health** and **services data** from district health information systems for rates of diarrhoeal diseases. It also incorporated insights into **community behaviours and perceptions**, considering factors like **gender and social dynamics**, and the local **economic landscape**, all of which can influence perceptions and behaviours toward risk and prevention measures. Additionally, **geographic and environmental data**, such as climate conditions and seasonal population movements, were included to account for the potential influence on the outbreak.

The investigation engaged various partners and used several methodologies to ensure a holistic understanding of the outbreak's context. This approach included qualitative research methods like key informant interviews and focus group discussions, as well as quantitative surveys for households affected by cholera. Stakeholders from the health, WASH, emergency, and community engagement sectors were involved in gathering this information. Specialists from these fields collaborated closely, each contributing their unique expertise to the analytical process.

The approach identified that, in district D, men primarily engaged in fishing, placing them at higher risk of exposure to cholera, possibly through contaminated water sources such as the lake from which they fished. Women, on the other hand, typically cared for sick family members, highlighting a distinct gendered exposure risk. Economic considerations included the impact of fishing seasons on income and the affordability of clean water practices. Finally, the community's understanding of cholera (i.e., perceptions), their daily and seasonal routines (i.e., behaviours), and health risk awareness were all influential in shaping the transmission pattern.

IOA revealed that the confluence of gender roles, fluctuating economic realities, varied local beliefs, and environmental factors all contributed to the spread of cholera within the community, especially among men whose fishing activities increased their contact with the contaminated lake waters. This assessment highlights the importance of engaging multidisciplinary teams and methodologies to address complex public health challenges. Observations from this IOA investigation have been shared with partners from MOH, national and subnational health authorities, NGOs, UN agencies and various pillars (e.g., WASH, communication, etc.).

The synthesis of the data pointed to a compounded vulnerability in the fishing community due to these intersecting factors, emphasising the critical nature of a cross-disciplinary approach in public health interventions. A total of 61 actions were co-developed for implementation.

## 5.1.3. Dealing with data overload

**What is data overload?**

Today's ease of available and accessible data often leads to data overload. This happens when the sheer volume of available data overwhelms our ability to process it. Typically, this overload occurs during the collection of data and the subsequent consideration of its use, resulting in an accumulation of data that remains unused.

**How to manage data overload?**

- Define clear objectives and use the trigger question(s) to guide data collection.
- Prioritise data based on information needs, focusing on top priorities.
- Recognise that not all data is necessary, especially when acquiring new data.
- Implement a time constraint on the collection and collation of data to streamline the process.

**Key considerations to avoid data overload**

- What is the question we are trying to answer?
- What information are we looking for? What will this data/information help answer?
- What data/information do we already have?
- What data/information do we need? Why do we need this data/information?
- How will we collect new data/information?

## 5.1.4. Good enough data

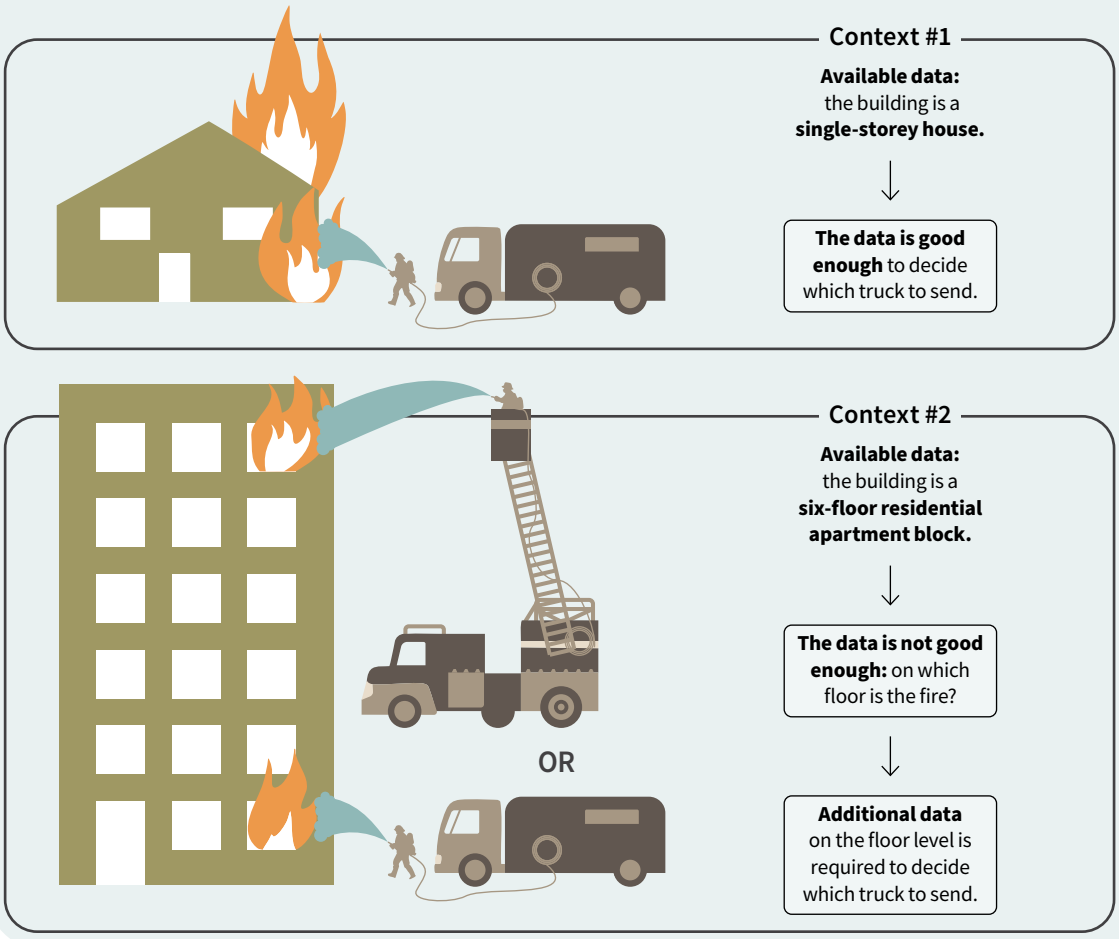
Determining what constitutes good enough data is critical. Often, we already have substantial data at our disposal. Yet, the question remains if we truly need more. With the myriads of data types, accessibility options, tools, and sectors, it's quite common to feel inundated. Key to managing this is to stay focused on the core question(s) we're addressing. **The data required should directly align with and effectively inform the answer to this central query (Figure 13).**

In many contexts, the timeliness of data is as critical as the quality of the data/ information for decision-making. Good enough data means **reproducibility with acceptable risk**. To achieve reliable outcomes, it is essential that data requirements are well-defined, and that data quality is maintained to ensure reproducibility and meet the established risk threshold. If it meets these two requirements, and the data is considered sufficient to inform action, then it is good enough.

## Figure 13. Good enough data – context helps to decide

**Scenario:** There is a fire in the building

**Question:** As firefighters, which truck do you send to respond?



# 5.2. Examples of data and information used in IOA

## 5.2.1. Case analysis/individual health and event/signal analysis

**Information needs**

- Case identification: monitor suspected and confirmed cases (demographics, locations, severity)
- Epidemiological patterns: analyse spread, trends, affected populations
- Affected areas: pinpoint impacted regions or communities
- Healthcare facility capacity

**Data type(s)**

- Individual case data (inclusive of suspected, probable & confirmed): age, gender, symptoms, outcomes
- Geographic data: location of cases/reported events
- Temporal data: symptom onset, diagnosis, treatment initiation
- Laboratory data: test results, pathogen identification

**Data collection method(s)**

- Community-based surveillance, event-based surveillance, indicator-based surveillance, healthcare facility, laboratory data, etc.
- On-site investigations, door-to- door assessments, community health worker reports

**Data analysis**

- Epidemiological analysis: patterns, trends, risk factors
- Spatial analysis: mapping the geographic distribution
- Temporal analysis: tracking outbreak progression

**Information use**

- Early warning: detect outbreaks
- Resource allocation: identify needed resources and their allocation
- Intervention planning
- Monitoring and evaluation: assess effectiveness of measures implemented

# 5.2.2. Population health and services

**Information needs**

- Population health status
- Case tracking: number of diagnosed cases in health facilities
- Health facility capacity: availability of healthcare, supplies, staff

**Data type(s)**

- Individual case data: age, gender, symptoms, outcomes
- Geographic data: location of cases
- Temporal data: symptom onset, diagnosis, treatment initiation
- Laboratory data: diagnostic test results, pathogen identification

**Data collection method(s)**

- Passive surveillance: healthcare facility and lab data collection
- Active surveillance: field investigations, door-to- door assessments, community health worker reports

**Data analysis**

- Epidemiological analysis: patterns, trends, risk factors
- Spatial analysis: mapping the geographic distribution
- Temporal analysis: tracking outbreak progression

**Information use**

- Early warning: predict and detect outbreaks
- Resource allocation: identify needed resourced and their allocation
- Intervention planning
- Monitoring and evaluation: assess effectiveness of measures implemented

# 5.2.3. Geographic, environmental, and animal factors

**Information needs**

- Weather patterns: temperature, rainfall, other climatic factors
- Geographic information: vulnerable areas, water sources, flood-prone regions
- Ecosystem dynamics: impact of ecosystems on water quality and contamination
- Animal reservoirs: routes of human-animal contact, habitats, routes of transmission

**Data type(s)**

- Meteorological data: temperature, rainfall, etc.
- Geospatial data: mapping geographical features, water bodies, terrain
- Environmental indicators: water quality, pollution levels, ecosystem health
- Spatial analysis: mapping cases against geographical and environmental data
- Trend analysis: understand how climatic factors impact outbreak patterns or habitat changes impact frequency of human-animal interactions
- Community practices data to identify human-animal interactions and exposure risks

**Data collection method(s)**

- Weather stations: real-time meteorological data
- Remote sensing: gather geospatial information, monitor land use changes
- Water sampling: assessing water quality from various sources
- Animal studies: determine presence/prevalence of zoonoses in wildlife

**Data analysis**

- Correlation analysis: linking cases with climatic variables

**Information use**

- Predictive modelling: forecast potential outbreak areas based on geographic range of reservoirs and vectors and climatic changes
- Risk assessment: identifying high-risk areas/populations for interventions
- Policy and planning: informing water sanitation strategies, emergency response, and resource allocation based on environmental vulnerabilities

# 5.2.4. Community economic landscape

**Information needs**

- Economic status: income levels, employment rates, poverty, resource access
- Resource distribution: availability and affordability of clean water, hygiene products, healthcare
- Impact of livelihoods: effects of outbreak or response on jobs, businesses, livelihoods

**Data type(s)**

- Income data: average income, unemployment rates, poverty indicators
- Market price data: costs of essential goods, especially hygiene-related products
- Employment data: types, rates, job loss figures due to outbreak impacts

**Data collection method(s)**

- Surveys and interviews: gathering income, employment, expenditure information
- Market price monitoring: regular tracking of essential goods' prices
- Employment reports: data from local labour departments or businesses

**Data analysis**

- Economic impact assessment: outbreak effects on communities
- Vulnerability mapping: correlating economic data with cases to identify vulnerable populations
- Cost-benefit analysis: comparing preventive measures' cost with outbreak consequences

**Information use**

- Resource allocation: identifying areas needing financial aid for essentials
- Interventions: aid programmes supporting affected individuals/communities
- Policy decision-making: economic relief or assistance during the outbreak

# 5.2.5. Gender and social dynamics

**Information needs**

- Gender dynamics: how genders are affected differently by the outbreak and response activities/ measures
- Social practices: cultural norms affecting hygiene, caregiving, health-seeking behaviours
- Access to resources: disparities in resource accessibility based on gender/cultural norms

**Data type(s)**

- Sex/gender data: male-to-female ratios in cases, healthcare access
- Sociocultural norms: hygiene, caregiving, communal gatherings, traditional healing methods
- Household roles: labour division for water collection, childcare, eldercare
- Availability of sexual and reproductive health: proportion of men/women with access to sexual and reproductive health, availability of contraception, availability of preferred/ acceptable contraception
- Availability of MNCH services: availability of sufficient services to meet health area needs, availability of quality services, accessibility of services (geographically, financially)

**Data collection method(s)**

- Surveys and focus groups: explore gender roles, cultural practices
- Observations: daily practices, gender roles within households
- Case studies: narratives highlighting gender impacts of the outbreak

**Data analysis**

- Sex/gender-disaggregated analysis
- Qualitative analysis
- Comparative studies: contrasting gender-specific impacts/cultural practices in affected areas

**Information use**

- Targeted interventions: tailoring hygiene promotion or healthcare access considering gender-specific needs
- Community engagement: designing culturally sensitive interventions
- Policy recommendations: addressing gender disparities in resources/healthcare access

# 5.2.6. Community behaviours and perceptions

**Information needs**

- Behavioural patterns: hygiene practices, water usage, healthcare-seeking, prevention related (e.g., vector control, bed net usage, vaccination), occupational risks, lifestyle
- Perceptions: attitudes, beliefs, knowledge about prevention, treatment, management and recovery
- Risk perception: community's perceived risks associated with the outbreak

**Data type(s)**

- Behavioural data: number of bed nets, bed net usage, hunting activities, smoking, nutritional data, sanitation practices
- Perception surveys: knowledge, attitudes, practices related to a given disease
- Risk perception scores: community members perception of the severity of the outbreak
- Ethnographic data: concepts of illness, causation, experience of past public health campaigns, trust in authorities

**Data collection method(s)**

- Surveys and questionnaires: gathering behaviour and perception data
- Focus group discussions: exploring community beliefs and practices
- Direct observations: observing hygiene and sanitation behaviours
- Community listening

**Data analysis**

- Quantitative analysis: analysing survey responses and behavioural data to identify trends
- Qualitative analysis: extracting themes, patterns
- Comparative studies: contrasting behaviours and perceptions in different communities

**Information use**

- Behavioural change campaigns: health promotion based on practices/beliefs
- Community engagement: involving leaders to spread accurate information, dispel myths
- Policy decision-making: addressing behaviour challenges and improving perceptions

# 5.2.7. Healthcare worker knowledge, behaviours, and practice

**Information needs**

- Knowledge and training: understanding symptoms, treatment, prevention
- Adherence to protocols: compliance with patient care, sanitation, infection control
- Resource needs: gaps in training, supplies, or resources required for effective response

**Data type(s)**

- Knowledge assessments: healthcare workers' understanding of cholera
- Observational data: healthcare practices, protocol adherence, PPE usage
- Training records: attendance, content covered in training sessions

**Data collection method(s)**

- Surveys and questionnaires: assessing knowledge, practices
- Observational studies: assessing healthcare workers' actions
- Focus groups and interviews: exploring perceptions, challenges in managing cholera

**Data analysis**

- Quantitative analysis: measuring knowledge levels, protocol adherence
- Qualitative analysis: extracting themes, patterns
- Comparative studies: differences in practices between healthcare facilities, regions

**Information use**

- Training interventions: identifying areas needing additional education
- Resource allocation: directing resources to fill identified gaps in supplies or training
- Quality improvement initiatives → enhancing infection control, protocol adherence

# 5.2.8. Geopolitics and events

**Information needs**

- Impact assessment: how events may affect response efforts, healthcare access
- Resource allocation: identifying disruptions in supply chains, aid distribution

**Data type(s)**

- Government statements: official records or policies
- Formal and informal media reports: public opinion, political unrest, conflicts, diplomatic issues, mis/disinformation campaigns
- International organisation communications: reports from UN, WHO, NGOs on geopolitical conditions

**Data collection method(s)**

- Document/content analysis: official documents, news articles, reports, social media
- Interviews or surveys: gathering insights on regional politics
- Online monitoring: tracking news, official statements

**Data analysis**

- Trend analysis: patterns or trends in political/social events that could affect response
- Comparative analysis: contrasting geopolitical events against with outbreak timeline
- Risk assessment: understanding risks posed to response efforts, healthcare access

**Information use**

- Risk mitigation: planning strategies to mitigate disruptions
- Resource planning: ensuring adaptability of aid and response efforts
- Advisory services: providing guidance to response teams based on geopolitical implications

# 5.2.9. Programme and response interventions

**Information needs**

- Program efficacy: assessing intervention effectiveness
- Resource allocation: identify which interventions yield better outcomes
- Impact assessment: understanding interventions' effect on outbreak's trajectory

**Data type(s)**

- Program records: design, implementation, outcomes documentation
- Field reports: observations from teams implementing interventions
- Surveys/Interviews: feedback from affected communities, healthcare workers

**Data collection method(s)**

- Surveys and interviews: feedback from beneficiaries, healthcare workers, implementers
- Case studies: analysing specific intervention's impact
- Quantitative metrics: data on reach, supplies, behavioural changes

**Data analysis**

- Comparative analysis: contrasting intervention effectiveness
- Outcome evaluation: assessing intervention results, impact
- Cost-benefit analysis: evaluating intervention cost- effectiveness

**Information use**

- Adaptation and improvement: refining ongoing interventions using data
- Decision-making: scaling up, modifying, terminating interventions
- Reporting and communication: presenting observations to stakeholders for transparency

Template 3. Reviewing information needs, sources, and uses

## Example 6 (continued): Diarrhoeal disease, high incidence – Reviewing existing data and information and collecting additional information to fill gaps

- During a collaborative review of existing data, the MOH data revealed a decrease in the mean number of diarrhoea cases in the area, which coincided with the stabilisation of population numbers and the installation of an improved water network (as reported by the WASH cluster). Partners also shared information on growing numbers of displaced persons arriving in the camp during the month preceding the rise in diarrhoea cases.
- Data collected during in-depth investigations conducted by the IOA and case area targeted intervention teams, geo-localised diarrhoea cases to the outskirts of the camp. These investigations also found that most of the cases were newly displaced, having arrived in recent weeks, and were spending many days moving between their home location and the camp.
- The situation led the teams to collect complementary data to better explain the growing numbers of diarrhoea cases which were observed in a setting of improved WASH coverage. During further field observations, interviews and discussions with cholera-affected households, several contributing risk factors were considered. One underlying cause contributing to the growing cases, was that the new arrivals did not have any shelter materials and so removed plastic sheeting from latrines to build tents for themselves and their families. These families needed to use plastic sheeting to have minimum shelter from the heavy rains. However, this left the latrines unsafe and unused and left families with no safe option for defecation.

**Data and information used**

- Cholera case reports: routine healthcare reports and passive surveillance of diagnosed cholera cases.
- Historical cholera incidence: records tracking past cholera outbreaks and spread.
- Hospitalisation and treatment records: data from cholera outbreaks on patient numbers, admissions, and outcomes.
- Contact tracing information: data on cholera patients to identify transmission patterns.
- Water quality monitoring: testing water for vibrio cholerae to pinpoint risk zones.
- Community behaviour surveys: surveys to assess community practices affecting cholera spread

Template 3. Reviewing information needs, sources, and uses
SOP 5. Reviewing and interpreting data and information

# 5.3. Additional information collection

In some instances, additional information will need to be collected to answer the trigger question. If gaps in information are identified that cannot be filled with existing information, stakeholders and partners will collaboratively develop a strategy for collecting the missing information. This process begins with obtaining commitments at the provincial and local levels.

SOP 6. Additional information collection

## 5.3.1. Developing a rapid protocol

The IOA structure determines the need for a rapid protocol based on its established processes and ways of working, typically outlined in the TOR. Additional data collection may not always require a rapid protocol if the existing TOR already includes provisions for such collection.

Rapid protocols can cover not only new data collection but also new processes or procedures, such as methods for analysing existing information.

Ethics should be considered while preparing additional information collection. It is critical to ensure that any rapid protocol meet the national ethical standards, which can be done by requiring a review and approval from collaborators from the health authorities. The rapid protocol should align with some basic standards:

- provide clear explanations in lay language, including about the purpose and use of the collected information, prior to data collection;
- obtain informed consent from all interviewed individuals, prior to date collection;
- answer any questions with regards to the study throughout the process; and
- provide regular feedback pertaining to the findings of the study.

This will foster trust and ensure community engagement.

Template 4. Rapid protocol


**Watch the video 'What is the IOA approach for decision-making in public health emergencies?' on YouTube @IntegratedOutbreakAnalytics:** https://youtu.be/RyU9fsGYBcE

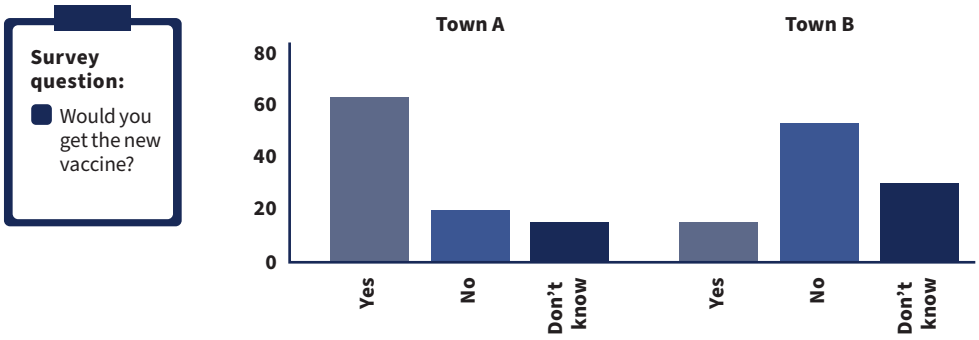
## 5.3.2. Developing and validating data collection methodology and tools

Stakeholders and partners will collaboratively develop and validate methodologies and tools for gathering additional data as needed. This process should ensure that only relevant data and information is collected. As such, considerations should be given to the risk of data overload, as well as to the quality of data (5.1.3 Dealing with data overload and 5.1.4 Good enough data).

In addition, to collect relevant data and information, it is critical to carefully define how those may be collected.

## Example 8: Ebola, access to vaccination

During an Ebola outbreak a novel vaccine became available. A community survey was conducted to understand acceptance of the new vaccine in two cross-border communities.




**What are some of the limitations/problems with this question?**

- **Hypothetical:** Hypothetical answers do not always reflect people's actual behaviours and can provide very unreliable information.
- **Other influencers:** Doesn't ask about barriers or enablers that may determine if a person would or would not get the vaccine.

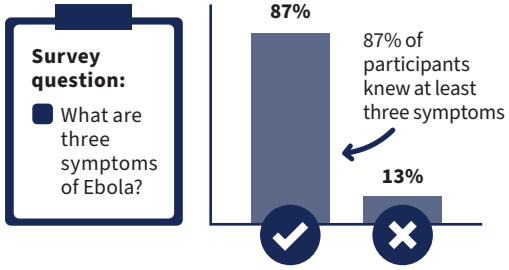
**What are some of the limitations/ problems with the information produced?**

- **Lacks context:** The comparative table lacks context for understanding the information presented, such as if there have been cases near either of these towns, if the vaccine has been available in the town, etc.
- **Might lead to assumptions:** This chart may lead to assumptions about vaccine acceptance or hesitancy in town A vs town B that do not accurately reflect public opinion. Town A may have a higher "yes" rate because there has been an Ebola outbreak in or near their town, or because the vaccine is available in their town, while town B has never experienced an Ebola outbreak in their vicinity. Without additional information we cannot take appropriate action.

## Example 9: Ebola, delayed health seeking

During an Ebola outbreak, it was found that delayed treatment seeking was a contributing factor of poor outcomes in an area.

A community survey was conducted to understand community knowledge, attitudes, and practices around Ebola, particularly looking at knowledge of symptoms that were hypothesised to impact treatment seeking.




**What are some of the limitations/problems with this question?**

- **Generic:** the question asks generically about Ebola symptoms and does not reflect the most common symptoms in the specific context.
- **Limited:** by asking for only three symptoms, we are limiting how much we learn about what people know about Ebola symptoms. This question only allows us to differentiate between people who know three symptoms or fewer but doesn't differentiate between someone who knows only three symptoms from someone who knows eight symptoms of Ebola.
- **Doesn't ask about our contributing factor:** the question doesn't ask about delayed treatment seeking. Instead, it assumes that delayed treatment seeking is driven by lack of knowledge.

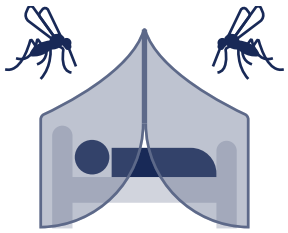
**What are some of the limitations/problems with the observations?**

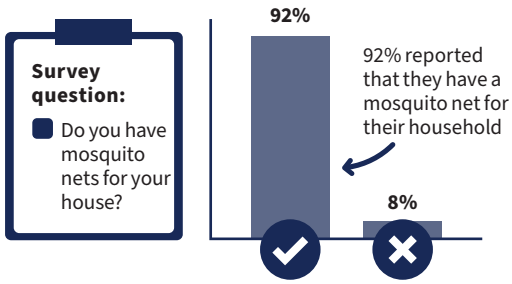
- **Not triangulated:** the results of the survey do not show whether the most commonly known symptoms match the symptoms that are usually found in Ebola cases.
- **Not actionable:** the data collected doesn't provide us with actionable data.

## Example 10: Malaria, use of bed nets

A fishing community is experiencing an outbreak of malaria cases.

A community survey is conducted to find out about the use of bed nets in the community.






**What are some of the limitations/problems with this question?**

- **Incomplete question:** This question fails to ask how many bed nets, how many beds, and how many people.
- **Doesn't ask about use:** This question assumes that if a household has bed nets, then know how to appropriately use them, use them every night during all high-risk hours, and are using them as intended.
- **Doesn't ask about condition of bed net(s):** This question also fails to ask if the household has good condition or treated mosquito nets.

**What are some of the limitations/problems with the observations?**

- **Incomplete data:** since it is an incomplete question; it provides incomplete data that does not provide information on how many people per household are sleeping under a mosquito net.
- **Doesn't tell us about use behaviour:** the question also doesn't provide information on how the mosquito nets are being used, if they are being used as intended, what hours they are being used during, etc.
- **Might lead to assumptions:** the observations might lead to assumptions that the population is adequately provided for, when they may not have enough nets for everyone or the nets may be old with holes, not long enough to reach the bed or not hung from the ceiling.

SOP 6. Additional information collection

## Example 6 (continued): Diarrhoeal disease, high incidence – Additional data collection

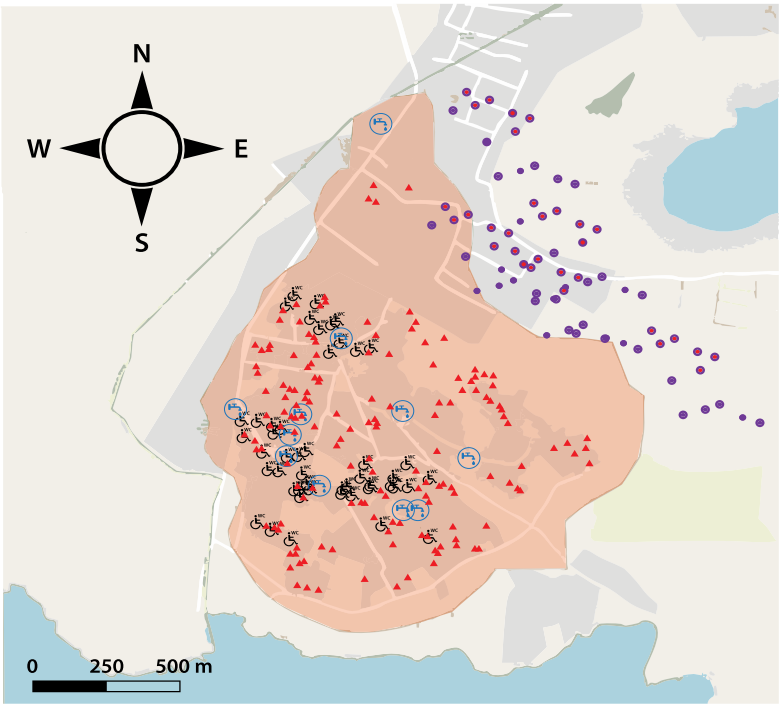
Trigger question: Why are diarrhoea cases rising in the IDP camp despite high WASH coverage?

Stakeholders working with newly displaced families found that a shortage of shelter materials forced many to sleep outside the camp. Since population counts were based on those sleeping in the camp, the IDP population was underestimated. This led to an overestimation of WASH and shelter coverage ratios, causing these areas to be deprioritised for support.

As a result, many families lacked adequate water, sanitation, and healthcare services, which increased the risk of diarrhoea and cholera.

Collaborative integrated analysis with partners revealed that WASH cluster's water coverage estimates only included individuals sleeping in the camps, not the actual number using the facilities (Figure 14). Joint efforts prompted stakeholders to correct this discrepancy and ensure WASH support matched the true population using the facilities.

### Figure 14. Sleep locations of IDP camp households: new arrivals tend to sleep on the outskirts or outside the camp.

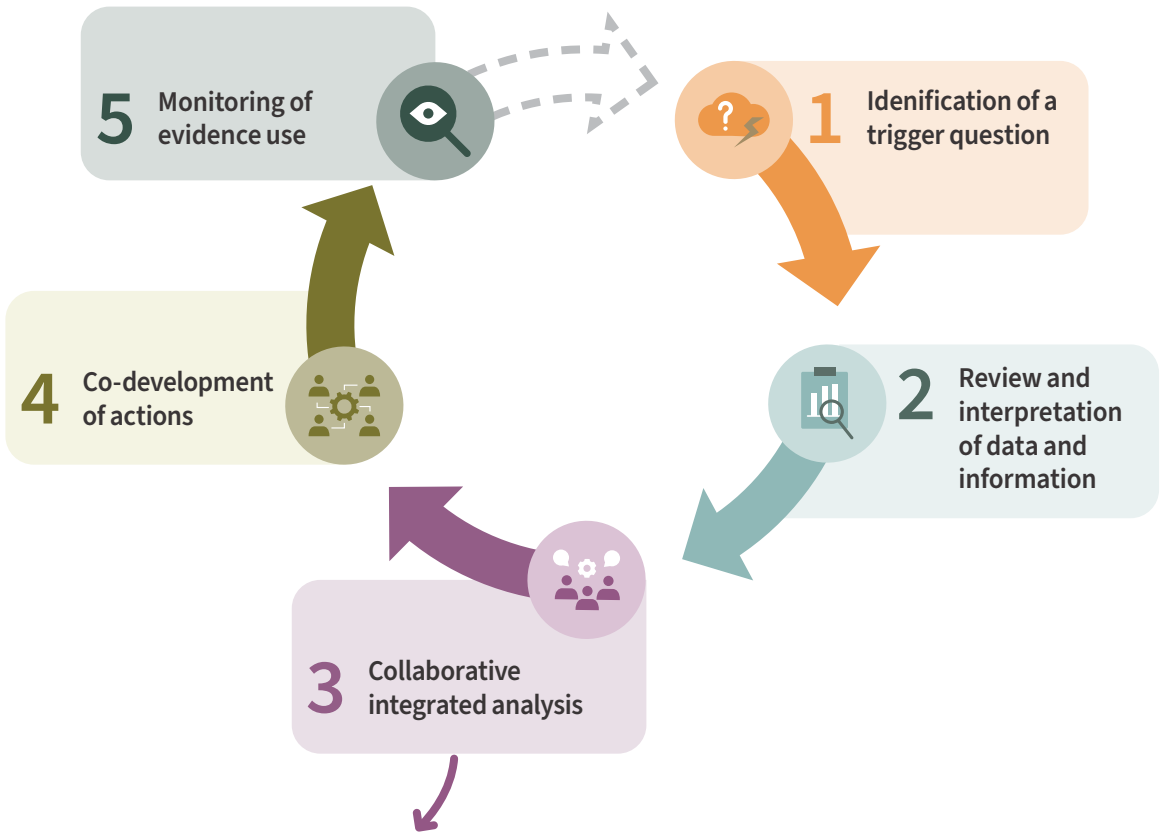


# Collaborative integrated analysis



06

### IOA process – Collaborative integrated analysis




Collaborative integrated analysis constitutes the third step of the IOA process. After collecting necessary data, stakeholders and multidisciplinary teams will collaboratively perform an integrated analysis to compile a master list of key risks and observations. Further data collection and review may occur during this process to throughly understand the contributing factors and underlying causes of these identified risks.

SOP 7. Collaborative integrated analysis

# 6.1. What is collaborative integrated analysis?

**Collaborative** means many stakeholders and partners involved and working together.

**Integrated** means we explore the interconnectedness of different data sources, such as demographic, behavioural, and environmental factors, to get a more holistic view of public health dynamics. When we work as an IOA team, we benefit from the insights and expertise of all stakeholders and partners, allowing us to more effectively identify all the various factors and how they interact.

**Analysis** takes the form of root cause analysis which is an in-depth analysis of the factors causing the observed health issue described in the trigger question. Its goal is to identify factors that could be influenced by implementing actions. Root cause analysis is conducting by asking why and noting the evidence that supports your answer until you cannot ask why anymore. The more we ask "why", the more we understand all the contributors and the more underlying causes we can take action to address.

## Collaborative integrated analysis: more than triangulation

### Triangulation of findings

Data extracted from **diverse sources are analysed by experts/practitioners from this sector** using various methods. Results and findings are then shared through reports with other actors to create the global picture.

#### Example 7 (continued): Cholera, incidence in male population – Triangulation of findings

**Methods:**

- Examining WASH data to assess **water and sanitation conditions**
- Surveying communities to understand **hygiene practices and water sources**
- Analysing epidemiological data to identify **affected areas and demographics**

Reports are shared between actors

**Result:**

Although the outbreak was better understood, certain questions still remained.

- Why is **water quality, sanitation poorer** in area Y?
- Why are **hygiene practices and water source usage different** in area Y?

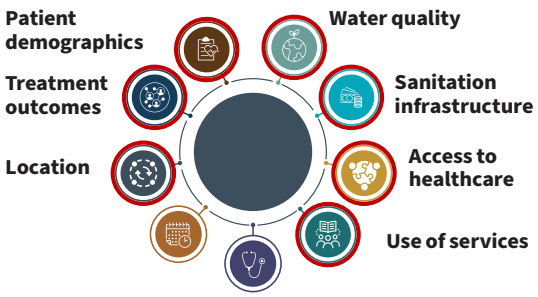
### What IOA proposes with collaborative integrated analytics

Starting from the trigger question, collaborative analysis maps out **all the factors and health risks that may be influencing the observed health event**. It also involves a **collaborative review**.

#### Example 7 (continued): Cholera, incidence in male population – Collaborative integrated analysis

**Methods:**

- Understanding **programmes, weather, underlying health risks** (e.g., malnutrition), **displacement**
- Comparing contributing factors: **socioeconomic, events, services, gender norms** explaining **hygiene practice**




Collaborative review of existing information sources

**Result:**

- **Weaker WASH infrastructure and an increase in displaced populations** in area Y were found to contribute to more cases.
- **Joint discussion and analysis** underscored the way in which displacement, coupled with inadequate WASH, can intensify the risk of cholera outbreaks.
- **Collaborative analysis led to further trigger questions and information collection** through an iterative process.

# 6.2. Examples of collaborative integrated analysis

## 6.2.1. Example 1 (continued): Ebola, nosocomial infections

During an Ebola outbreak, despite healthcare worker training, one town continued to show high rates of nosocomial infection months into the outbreak, unlike neighbouring areas. The IOA cell collaborated with surveillance, infection prevention control, WASH, and clinical care teams to investigate the cause.

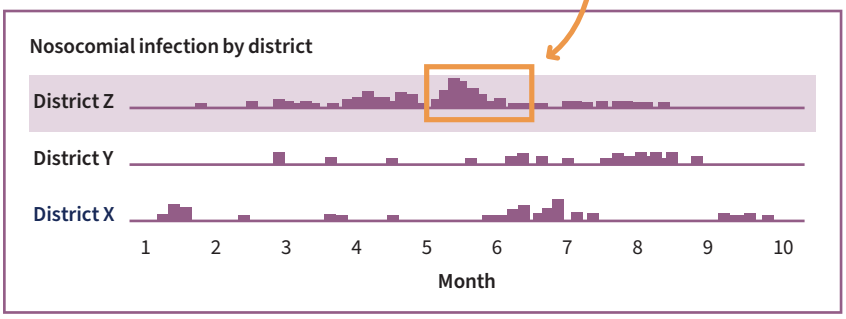
**Crisis/high-risk outbreak Example 1 (continued): Ebola, nosocomial infections**

**Trigger question:** Why are we seeing higher rates of nosocomial infections of Ebola in district Z?

**Observation 1**

### Description of geographical distribution

The highest number of nosocomial infections was in district Z – particularly at month 5 and 6 of the outbreak.

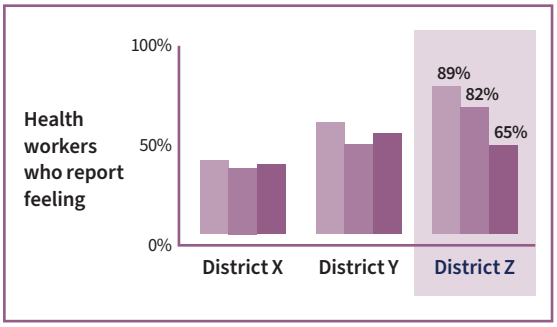



**Question:** does this correlate with feedback from healthcare workers?

**Observation 2**

### IOA healthcare worker surveys

District Z had the highest number of healthcare workers experiencing the following challenges:

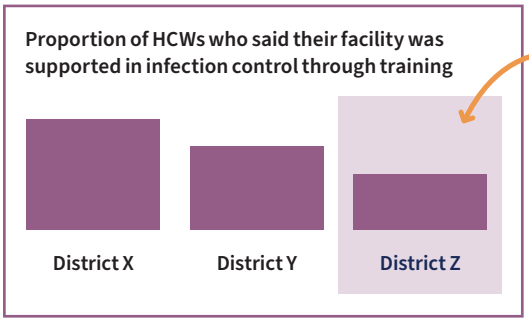


## Crisis/high-risk outbreak Example 1 (continued): Ebola, nosocomial infections

**Question:** what makes district Z different?

### Observation 3

### IOA healthcare worker surveys report on support




Healthcare workers in district Z reported receiving less training overall, and more often reported receiving their training outside of a healthcare facility.

They also reported an increased number of patients (crowding) due to free healthcare.

**Question:** are healthcare worker reports true?

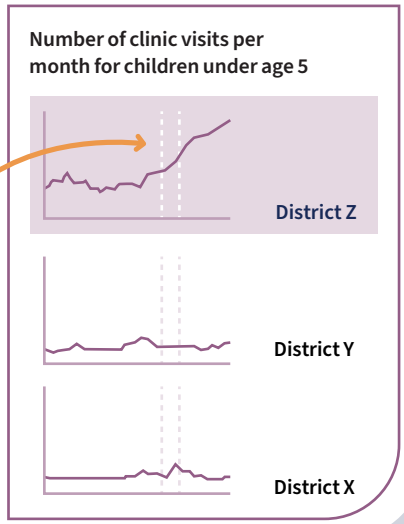
### Observation 4

### Collaborative analysis of observations with infection prevention and control and DHIS2 data

IPC documentation indicated that less than 50% of the 1,200 healthcare facilities in district Z had been supported through training.

There have been increases in clinical visits for children under 5 years during Ebola. DHIS2 data corroborated increased use of health services by up to 200% due to free healthcare.

What is the impact of the increased patient load on the bed capacity in terms of quality and infection prevention and control?



## Crisis/high-risk outbreak Example 1 (continued): Ebola, nosocomial infections

**Question:** why did some healthcare facilities receive less support?

**Observation 5**

### Timeline of events and geo mapping

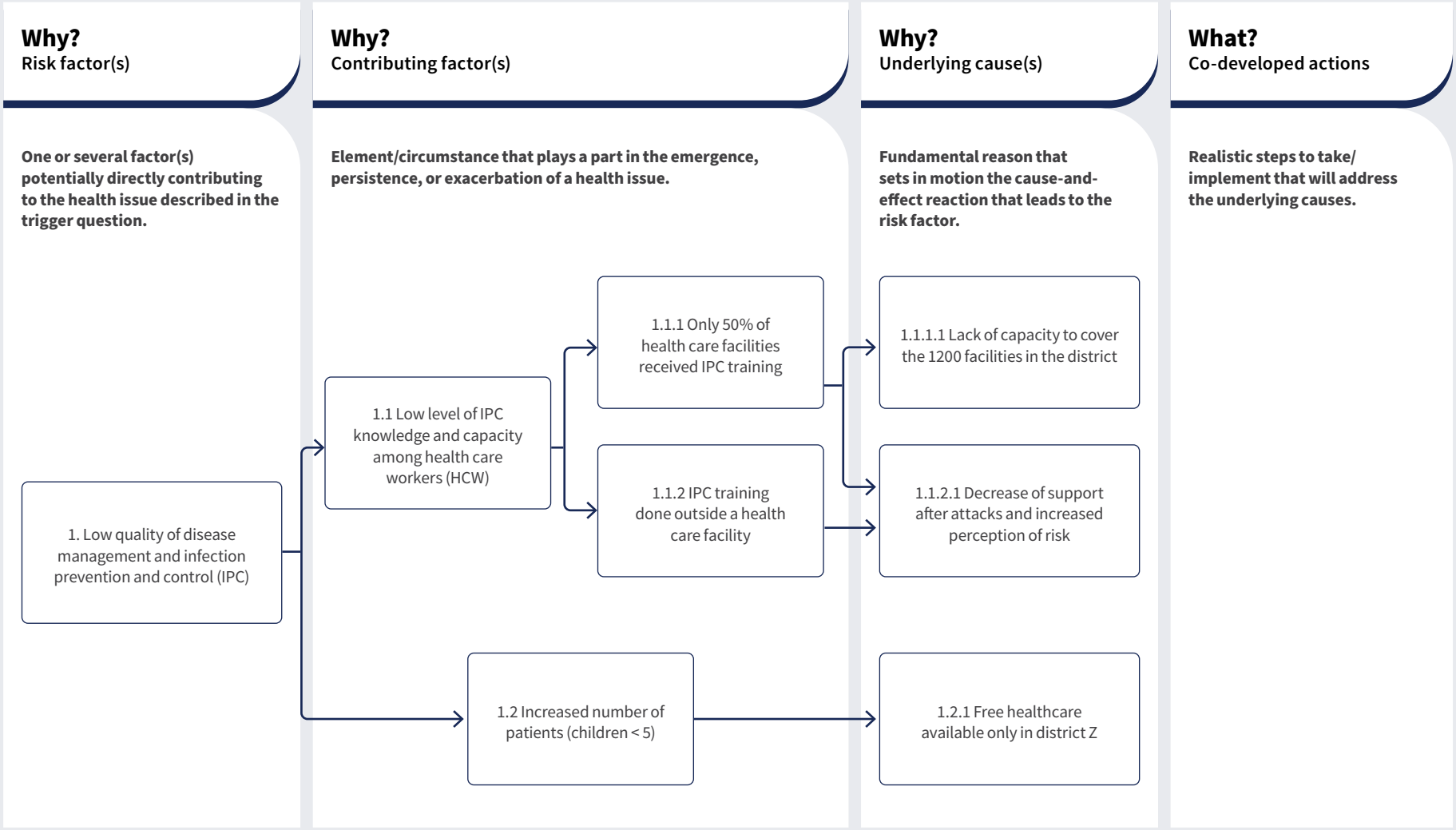
With the occurrence of violent protests against healthcare facilities, dedicated support was reduced to safeguard personnel and resources, in many parts of the district. The district is vast, and 1,200 healthcare facilities make it hard to reach all of them in support.

Figure 15 shows how these findings translate into the root cause analysis diagram.

Figure 15. Example 1 (continued): Ebola, nosocomial infections – Root cause analysis

**Aim: To understand all risk factors (e.g. low vaccination rates, poor sanitation, etc) contributing to the observed situation**

**Trigger question:** Why are we seeing higher rates of nosocomial infections of Ebola in district Z?



# 6.2.2. Example 6 (continued): Diarrhoeal disease, high incidence

In a cholera endemic state with a regular influx of IDPs, the IOA team worked with multiple partners to collaboratively monitor diarrhoea and cholera risks. Water trucking was replaced with sustainable water networks. As water coverage improved in district X, the cases of simple diarrhoea also began to decrease. In January 2022, there was a large influx of IDPs in area Y (located within district X). Trends in the camp indicated that, compared to the rest of the district, cases of diarrhoea were rising.

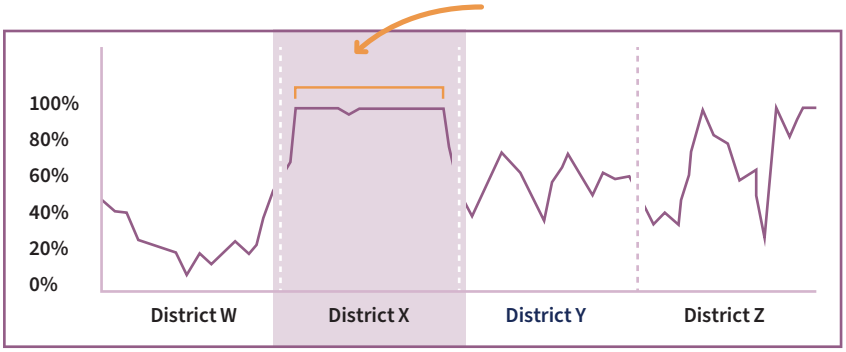
**Crisis/high-risk outbreak Example 6 (continued): Diarrhoeal disease, high incidence**

**Trigger question:** Why are all suspected cholera cases in district X reported severely dehydrated in health facility registers/line lists?

**Observation 1**

**Line list data indicated high rates of dehydration in district X (trigger question validated)**

HZ reporting nearly 100% severely dehydrated patients in district X since January 2023




We know that delays in case management (**risk factor**) may lead to severe dehydration. Such delays have been observed in district X.

**Question:** why is district X particularly affected?

Overview
1. Introduction
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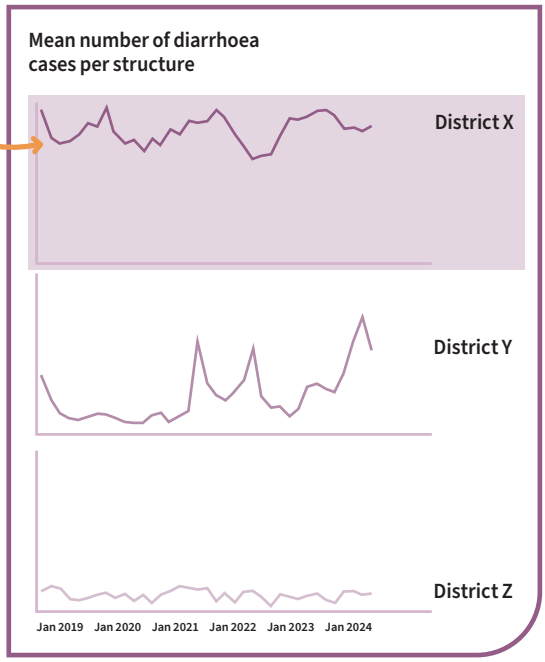
## Crisis/high-risk outbreak Example 6 (continued): Diarrhoeal disease, high incidence

**Observation 2**

### Historically, more diarrhoea cases have been reported from District X

There is higher than average number of diarrhoea cases per structure in district X.




*Source: DHIS 2*

**Observation 3**

### Impact of population displacement

In **February 2023**, **district X** hosted more than **41,530 displaced people**. This movement of population has increased vulnerability to health threats.

## Crisis/high-risk outbreak Example 6 (continued): Diarrhoeal disease, high incidence

**Key underlying causes**

**Shortage of personnel in healthcare facilities due to strike.**
*Healthcare worker shortage and perceived negligence caused by the lack of motivation resulting from non-payment.*

**Shortage of accessible oral rehydration solutions for at-home treatment.**
*Limited oral rehydration solution availability/ preparedness capacity resulted in delays in seeking healthcare. During this time, households do not have access to oral rehydration solution; wait until morning to seek treatment.*

**Lack of access to information on healthcare facilities.**
*Displaced people in IDP camps in district X faced marginalisation as community healthcare workers did not speak their native language, hindering access to information.*

Displaced individuals in district X had low awareness that cholera treatment was free.

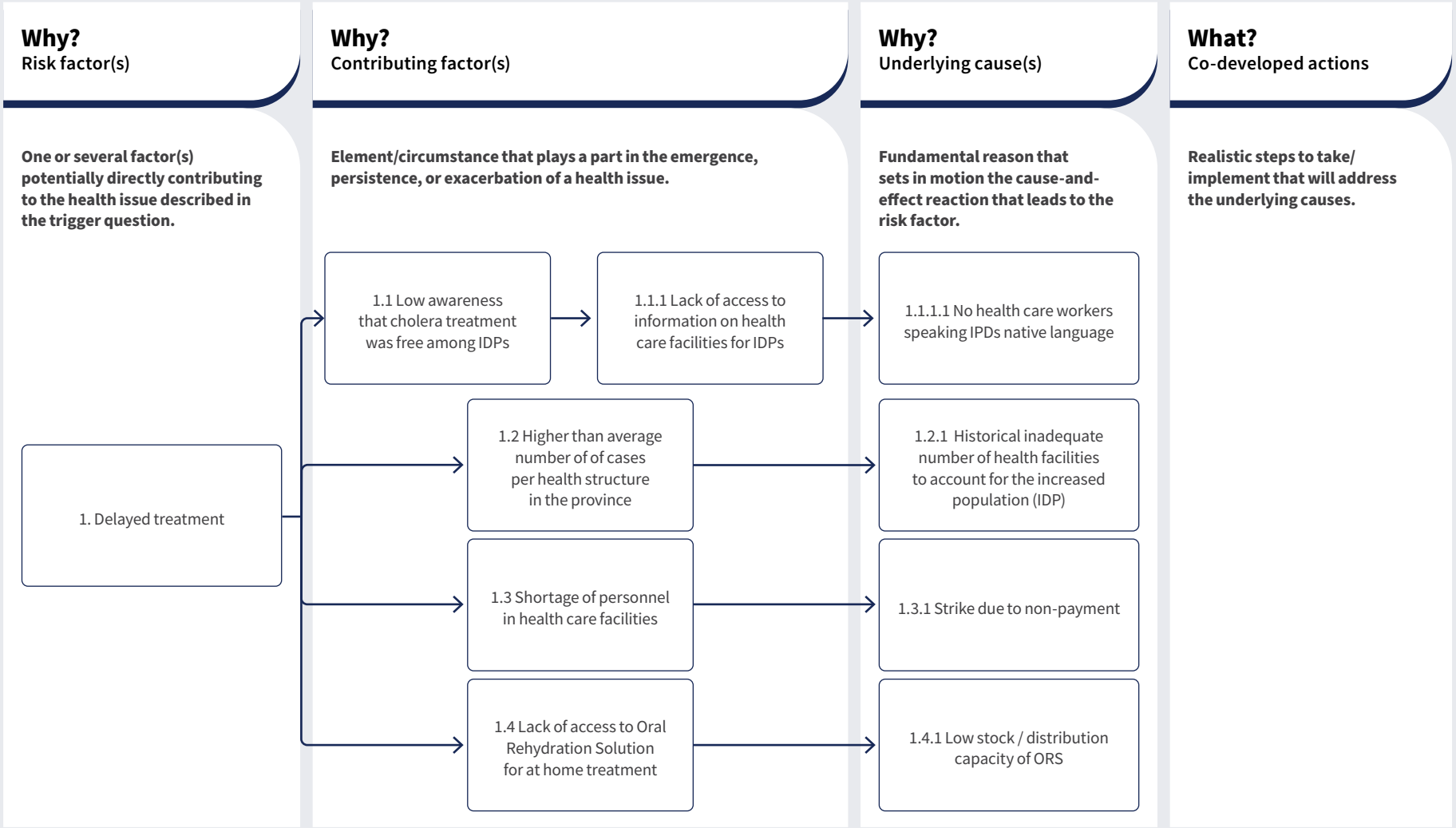
Patients turn to healthcare facilities only when self-medication fails.

Figure 16 shows how these findings translate into the root cause analysis diagram.

Figure 16. Example 6 (continued): Diarrhoeal disease, high incidence - Root cause analysis

**Aim: To understand all risk factors (e.g. low vaccination rates, poor sanitation, etc) contributing to the observed situation**

**Trigger question:** Why are all suspected cholera cases in district X reported severely dehydrated in health facility registers/line lists?



# 6.2.3. Example 3 (continued): Poliomyelitis, new cases reported

The Global polio eradication initiative's work collaboratively with IOA teams to identify underlying causes of repeated outbreaks in high-risk districts. The national and provincial polio teams work within the IOA cell, collaboratively collecting, analysing and interpreting information and codeveloping actions.

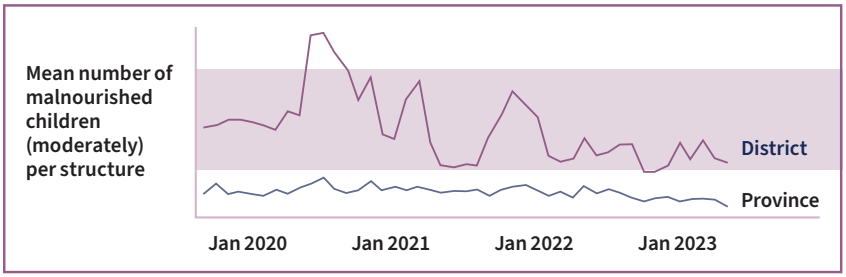
**Crisis/high-risk outbreak Example 3 (continued): Poliomyelitis, new cases reported**

**Trigger question:** why do polio cases continue to occur despite six vaccination campaigns?

**Observation 1**

**Rates of malnutrition in the health district are 50% higher than the province-level rate; and we know that malnutrition is a known risk factor associated with reduced vaccine efficacy.**

- There are low levels of routine immunisation and lack of information (**risk factor**).
- Many mothers are missing antenatal and postnatal appointments where information is provided as well as routine immunisation.
- An issue of combined physical and financial access was identified as a **contributing factor**.
- Healthcare facilities are often 1–2 hours away from homes, forcing mothers to choose between working in the farm or field and attending antenatal and postnatal care appointments.
- Given the scarcity of other income opportunities, many mothers opt to work to support their families, instead of attending the appointments.




*Source: MICS and other surveys; DHIS2*

## Crisis/high-risk outbreak Example 3 (continued): Poliomyelitis, new cases reported

**Observation 2**

### There are low levels of routine immunisation and lack of information (**risk factor**).

Many mothers are missing antenatal and postnatal appointments where information is provided as well as routine immunisation.

An issue of combined physical and financial access was identified as a **contributing factor**.

Healthcare facilities are often 1–2 hours away from homes, forcing mothers to choose between working in the farm or field and attending antenatal and postnatal care appointments.

Given the scarcity of other income opportunities, many mothers opt to work to support their families, instead of attending the appointments.

*Source: community surveys conducted by INGO one year prior*

**Question:** other towns in the same province face similar situations yet do not currently report polio cases. What factors differentiate these areas from those continuously experiencing polio outbreaks?

## Crisis/high-risk outbreak Example 3 (continued): Poliomyelitis, new cases reported

**Observation 3**

### The community reported irregular visits from healthcare workers (**contributing factor**).

Parents reported that community healthcare workers are only visible during paid polio campaigns and have ceased regular visits and health care activities in the community outside of these times; "they no longer visited or cared about the health of the community."

Absence of financial support to health workers was identified as a **contributing factor** to these irregular visits.

Fourteen months before, funding for a programme that supported community healthcare workers was discontinued (**underlying cause**).

Although community healthcare workers typically volunteer their services, they had been receiving support for many years in this area due to the greater-than-average distances required to travel to many villages.

*Source: focus group discussions in the affected communities*

**Question:** if community healthcare workers only visit homes during paid polio campaigns, what impact does this have on local knowledge and understanding of polio?

## Crisis/high-risk outbreak Example 3 (continued): Poliomyelitis, new cases reported

**Observation 4**

### Lack of adequate knowledge about polio and the protection conferred by the vaccine, was observed among parents in the affected communities (**risk factor**).

Among children whose parents believed they were fully vaccinated against polio, only **45% of the children had received all required polio vaccinations needed for protection**.

**Less than 15% of parents knew the proper age of vaccination** or number of doses required for children to be fully protected against polio.

**55% of parents falsely believed their children to be completely vaccinated** (comparing knowledge to vaccination cards).

*Source: surveys with parents*

**Question:** how does misunderstanding vaccine coverage affect disease risk, vaccination, and trust in vaccines? What are the reasons behind parents lacking the necessary information to fully vaccinate their children?

**Observation 5**

### 50% of the cases in the past year had been partially vaccinated.

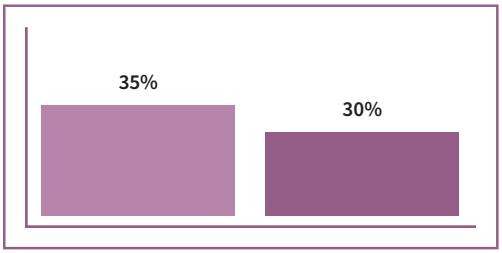
*Source: case investigation forms and line lists*

## Crisis/high-risk outbreak Example 3 (continued): Poliomyelitis, new cases reported

**Observation 6**

### The lack of adequate knowledge and information was replaced by some assumptions, creating fears and rumours.

Parents also observed continued polio cases, despite these visits and campaigns for over a year. This made them question if the vaccines were actually causing polio.




*Source: surveys with parents*

**Observation 7**

### The messaging surrounding the vaccination campaign was inadequate (additional contributing factor):

All messaging focused only on the need to vaccinate children, the location, and/or dates of campaigns.

The information provided through radio broadcasts, community healthcare workers, and printed materials did not adequately explain:

- The number of doses needed to fully protect a child from polio.
- The risks children face if they are not fully vaccinated.

Communication materials and radio messages were not available in the local language.

*Source: analysis from programmes via photos, materials revue and discussions with community healthcare worker supervisors*

## Crisis/high-risk outbreak Example 3 (continued): Poliomyelitis, new cases reported

### Further review

During first analysis with local health and response actors, they associated the lack of understanding among parents with low levels of education.

**However, collaborative analysis with IOA teams challenged the discussion to WHY the parents did not have the information they should. To understand why, further review of programmes data was needed. Teams looked at what information HCWs were providing, how, and when.**

- **If parents mistakenly believed their children were fully vaccinated** when they were not, was there any information provided to distinguish between complete and incomplete vaccination?
- **If parents believe that one of their children had contracted polio in the past three months and should have been immune**, what information is available regarding the symptoms of polio and other diseases or illness that cause paralysis?
- **If parents suspect that vaccination campaigns are causing polio** because they see a rising number of cases with ongoing immunisation efforts, and if the polio eradication teams also notice this concern about the increasing cases, how are we communicating with communities to address these concerns?

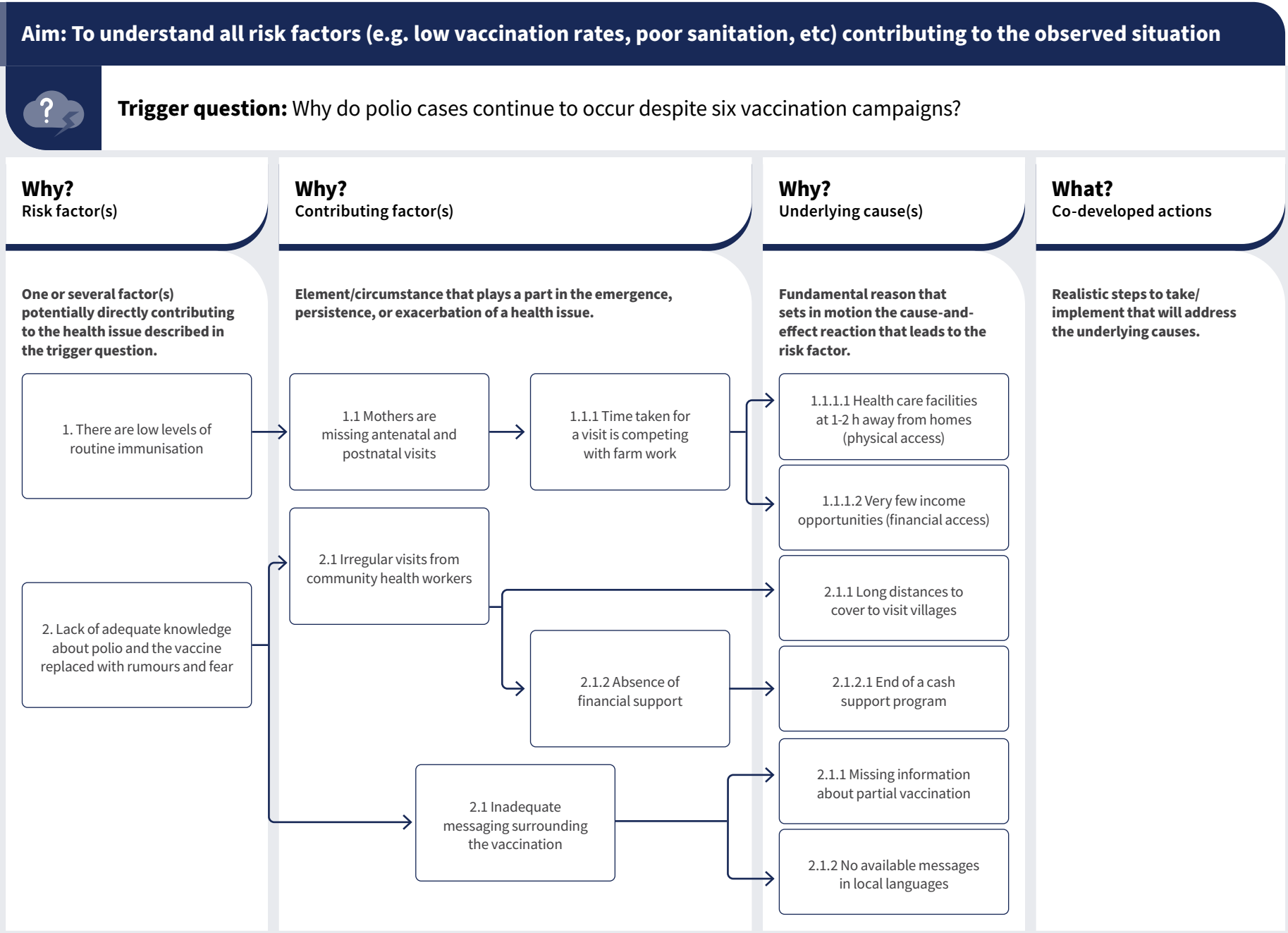
### Lessons learned from the collaborative integrated analysis

- Given the inadequate information about polio and its vaccine, all teams understood the reasons behind parents' distrust in the vaccination campaigns. Many parents were unaware that their children had received only partial vaccination. Consequently, as cases of polio increased among these partially vaccinated children, distrust among parents intensified.
- It was agreed that change could only be achieved through adapted communication to explain vaccine coverage in the local language.

Teams also understood that since these programmes created distrust, to rebuild trust would take time.

Figure 17 shows how these findings translate into the root cause analysis diagram.

Figure 17. Example 3 (continued): Poliomyelitis, new cases reported – Root cause analysis



# 6.2.4. Example 11: Maternal health, drops in service use

Monthly, the provincial IOA cell collaborates with the health cluster to monitor key maternal, child, and newborn health indicators, as well as significant events like flooding, displacement, and vaccine-preventable diseases. This collaboration facilitates early risk identification and timely adjustment of health responses.

## Crisis/high-risk outbreak Example 11: Maternal health, drops in service use

**Trigger question:** Post long term flooding, why has there been a drop in the use of antenatal and postnatal services and what potential impact has this had on maternal and child health outcomes (including vaccine preventable disease risk)?

**Observation 1**

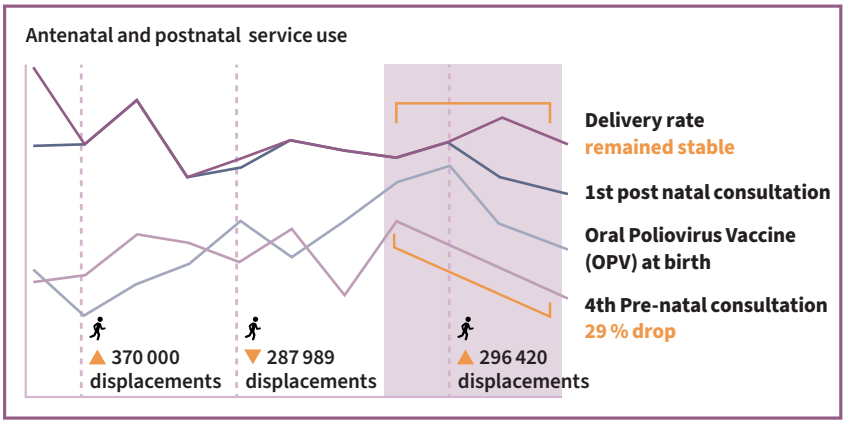
### In the use of antenatal and postnatal services

To validate this trigger question, comparisons were made against:

- **The number of deliveries in district A;**
- **Population size and movements** to confirm there was no reduction in the population following the floods.

Despite an increase in the population over the last period, local health authorities and healthcare service workers confirmed observing this decline in ten sub-districts.

*Source(s): DHIS2, displacement figures (UN); discussions with health actors*



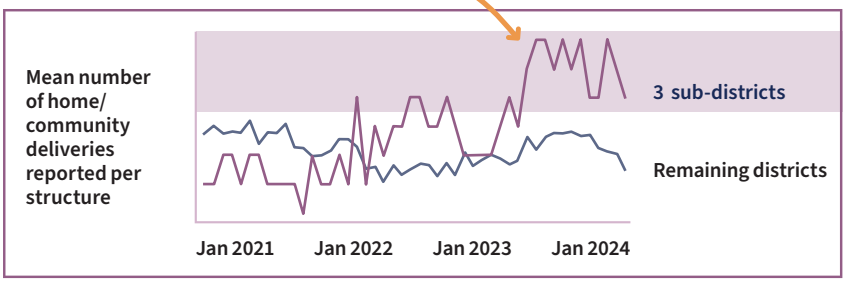

**Questions:** what is contributing to these drops? Where are the mothers delivering?

## Crisis/high-risk outbreak Example 11 (continued): Maternal health, drops in service use

**Observation 2**

### Drops in service use coincided with increased home deliveries

Local health authorities and NGOs running a mobile clinic confirmed that since the floods, in 3 of the 10 sub-districts, community healthcare workers had been reporting increasing rates of at home deliveries following the floods.



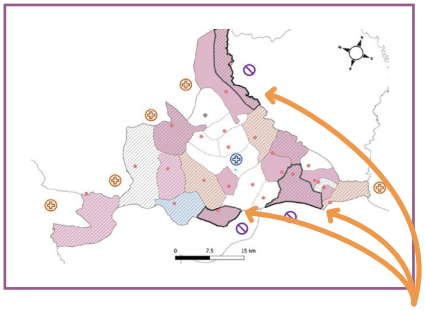

Quick analysis of their community healthcare worker reports from these 3 sub-districts compared to the reports from the CHW in the other sub-districts confirmed a growing number of at home deliveries specific to these sub districts following the floods.

*Source(s): interviews, UN Flash flood reports; community healthcare worker daily reports ; programme reports on free healthcare*

**Question:** drops in the use of antenatal and postnatal services were noted across ten sub-districts, only three districts reported an increase in home deliveries. What are the reasons for this discrepancy?

**Observation 3**

### Flooding blocked access to free maternal health services available in several sub-districts



Partners and local health actors mapped:

- **In the use of antenatal and postnatal services** and those reporting an increase in home deliveries;
- **Programmes and services available**, such as locations offering free care; and
- **Impacts of flooding**, including infrastructure damage like destroyed bridges.

The mapping in district A revealed that three sub-districts with increased home deliveries were completely cut off from accessing the sub-district where free maternal, newborn and child health (MNCH) services were provided.

## Crisis/high-risk outbreak Example 11 (continued): Maternal health, drops in service use

**Question:** other sub-districts were also unable to access the free services at the district's main hospital. However, they only reported drops in the use of antenatal and postnatal services without increases in at home deliveries. Why?

Monthly provincial level IOA cell (permanent structure) works with the health cluster to monitor key indicators on maternal child and newborn health, together with key events (e.g., flooding, displacement), vaccine preventable diseases incidence and health programmes to identify risks and adapt response earlier.

### Observation 4

**Access to free antenatal and postnatal services was limited (risk factor) due to the flooding (underlying cause), however, it only had negative impacts on those unable to find alternative options**

Including health authorities and partners working outside district A into the discussions and analyses, explained that free MNCH services were available in some neighbouring locations which could be accessed by the sub-districts reporting drops in the use of antenatal and postnatal services, but no increase of at-home deliveries.

**Question:** what additional indicators and information need to be monitored?

### Additional indicators and information to monitor

**Floods that hinder access to key MNCH services** can also impact routine immunisations and outreach vaccination campaigns, affecting first vaccinations for newborns.

**Healthcare workers in the three affected sub-districts** now help monitor vaccination rates and MCNH health indicators. They are also involved in planning to prioritise programming and restore access to services in these areas.

**Healthcare workers and authorities in districts with free services**, which are supporting sub-districts impacted by floods, are ensuring that their delivery rates have adjusted to adequately cover those who can no longer access services in district A.

Figure 18 shows how these findings translate into the root cause analysis diagram.

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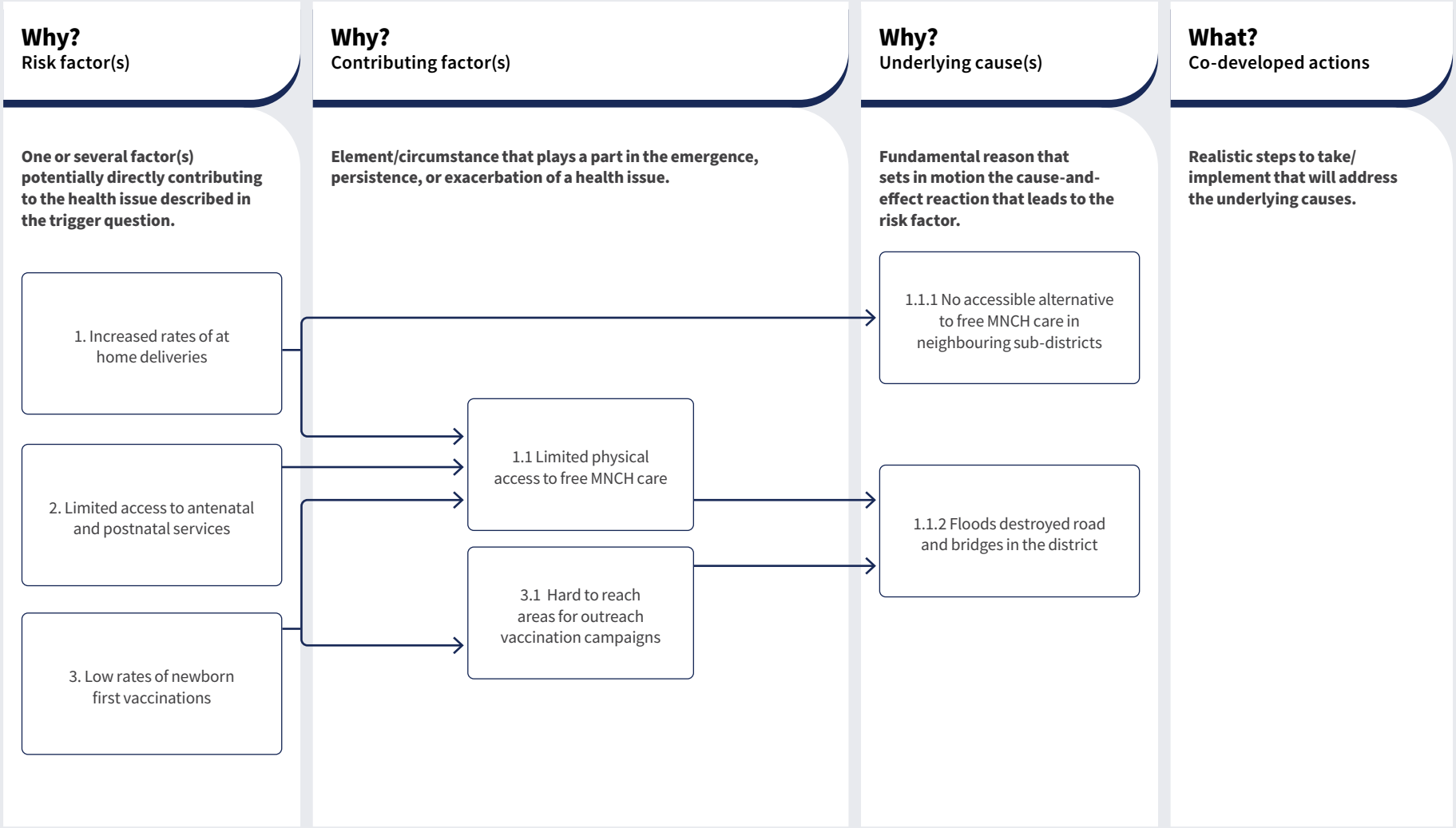
Figure 18. Example 11 (continued): Maternal health, drops in service use – Root cause analysis

**Aim: To understand all risk factors (e.g. low vaccination rates, poor sanitation, etc) contributing to the observed situation**

**Trigger question:** Post long term flooding, why has there been a drop in the use of antenatal and postnatal services and what potential impact has this had on maternal and child health outcomes (including vaccine preventable disease risk)?

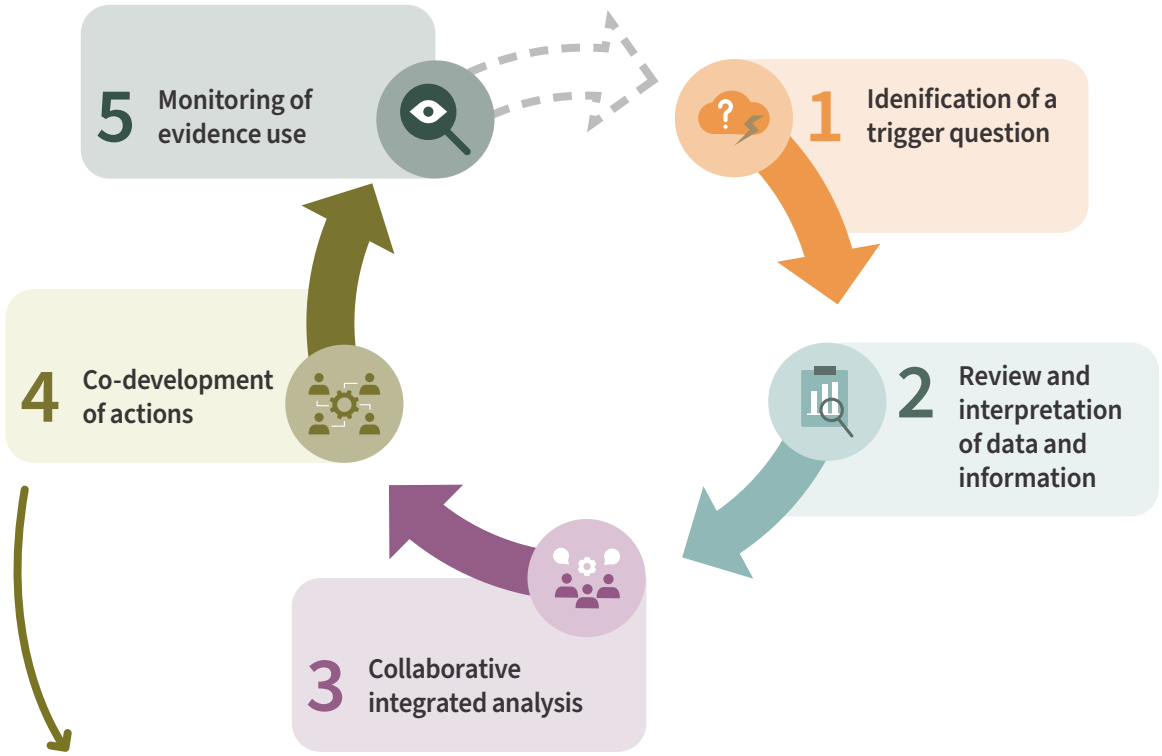


# Co-development of actions



07

### IOA process – Co-development of actions




The co-development of actions is the fourth step of the IOA process. In this phase, the team uses a master list of key risks and observations, created through joint analysis, to guide discussions and and decision-making. During these risks are organised During these sessions, all partners work together to prioritise and organise the risks into specific monitoring tools that help structure conversations with partners during planning sessions. They then agree on who is responsible for each task and set clear timelines to implement the planned actions. This collaborative approach ensures that everyone is aligned and committed to tackling the identified challenges effectively.

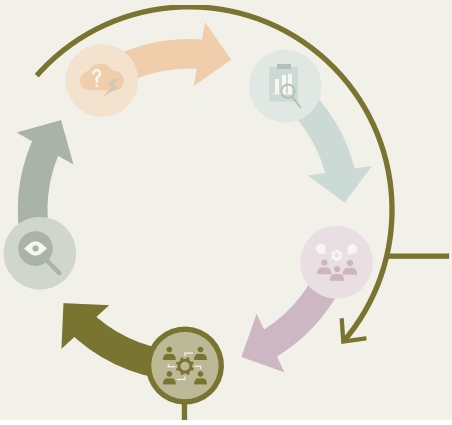
# 7.1. Ensuring co-developed actions are evidence-driven

The cornerstone of the co-development of actions step is to ask why and avoid assumptions when reviewing and identifying potential contributing factors and underlying causes (Figure 19 and Figure 20). To address a problem effectively we must understand what factors are contributing to the problem and why. By using IOA and acquiring a holistic understanding of a situation, we avoid making assumptions, hence developing appropriate and effective actions.

## Figure 19. The co-development of actions process

### The co-development of actions process

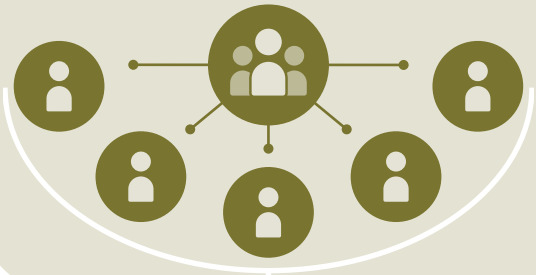
**1** **Prior to the co-developing of actions process, partners should have been actively involved in the IOA process, from onset to collaborative integrated analysis, alongside stakeholders and multidisciplinary teams.**



This engagement will have facilitated the review and interpretation of existing data, and where necessary, the collection of additional data.

Throughout the **collaborative integrated analysis** process, **key risks and observations, contributing factors, and underlying causes related to the trigger question** were collaboratively identified.

**2** **The IOA team and stakeholders assess and determine the most suitable partners** to address the key risks, observations, contributing factors, and underlying causes identified during the analysis.



**For key risks and observations requiring immediate attention, this could be a phone call**. PowerPoint, reports, emails, phone calls, etc. all count as a form of key risk and observation sharing to co-develop an action.

**3** **Each identified partner will be invited to a co-development session where a tailored MONITITO will be created and reviewed collaboratively with them.**

**4** **During co-development sessions, stakeholders will finalise MONITITOs with relevant partners** across various levels, including District, Provincial, and National authorities, NGOs, and UN agencies.



**All MONITITOs contribute to the overarching monitoring tool, MONITO.** Insights from MONITO directly inform and shape response strategies and approaches.

## Example 2 (continued): Measles, repeated outbreaks

Low vaccination coverage was observed in district X. The analysis of existing national health information system data indicated underuse of healthcare services by the local population as a contributing factor. Instead of asking "why?", **assumptions** were made, and actions were taken:

- **Assumed underlying cause:** the local population doesn't know or believe healthcare use and vaccination is important.
- **Action based on assumption:** sensitise the local population about the importance of healthcare use and vaccination.

Despite the sensitisation, vaccination coverage did not increase.

In fact, numerous assumptions were made about the underlying causes of the recurrence of measles in the district. Health managers initially attributed the resurgence to vaccine refusal. However, further investigation uncovered that shortages of measles treatments and vaccines had persisted for six months. This situation was exacerbated by miscommunication between local and provincial authorities, revealing significant gaps in reporting and trust.

Sensitisation did not address the actual underlying causes.

To address the identified issues, actions were taken to establish EWAR monitoring and initiate weekly calls to manage stock levels and mitigate future risks.

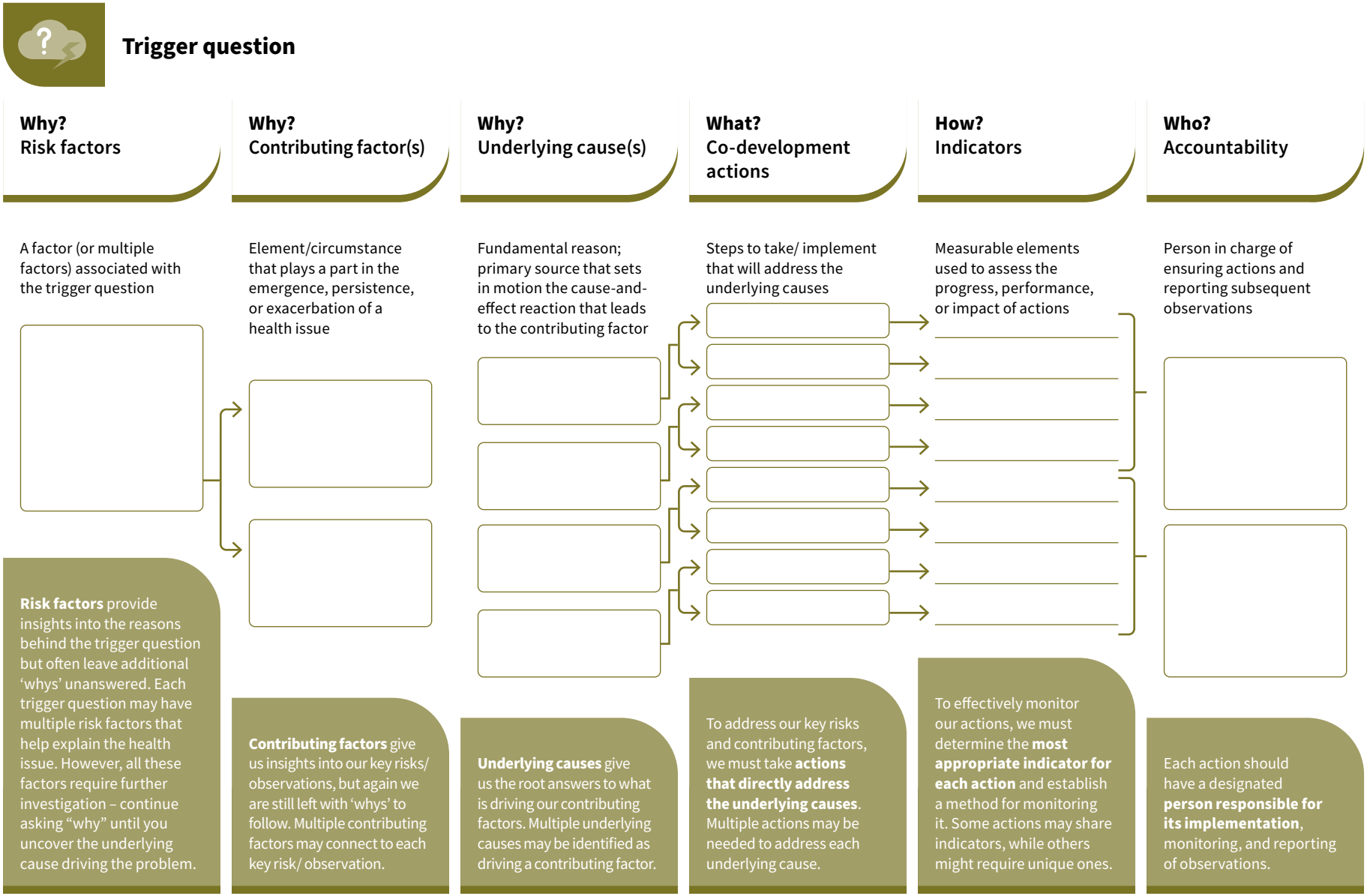
→ To **co-develop appropriate and effective actions**, it is essential to identify the true underlying causes driving the problem.

Exercise on identifying contributing factors and underlying causes

Template 5. Expanded root cause analysis for co-development of actions

SOP 8. Co-development of actions and monitoring of evidence use

## Figure 20. Process of identifying contributing factors, underlying causes and determining mitigating actions, monitoring and evaluation indicators and determining accountabilities




Exercise on identifying contributing factors and underlying causes

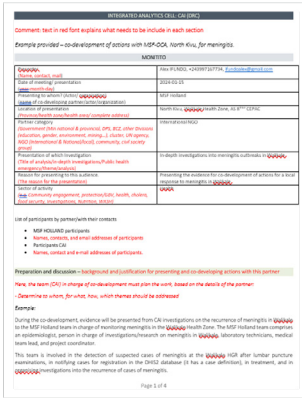
# 7.2. What is MONITITO and how does it help in the co-development of actions?

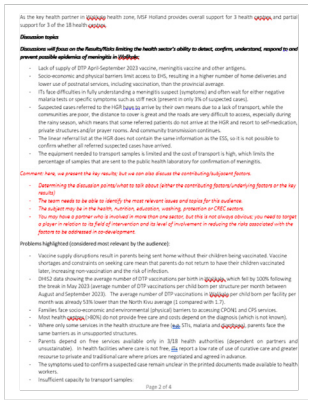
MONITITO is a monitoring tool created for IOA stakeholders to organise key risks and observations, contributing factors, and underlying causes identified during the collaborative integrated analysis. This organisation of observations facilitates sharing of findings and discussion among partners, enabling the collaborative development of actions to address the identified issues.

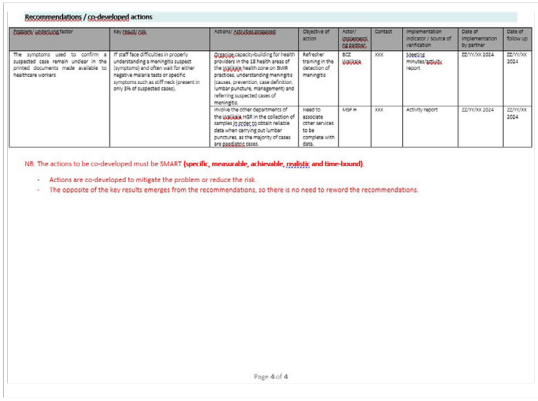
The tool is structured as a simple Word document specific to each stakeholder who should be trained to fill it out accurately. It collects the following information:

- **Actor details:** information about the partners involved in co-developing actions, including responsibility for action implementation and the identities of those present during discussions (with contact details).
- **Key risks and observations, contributing factors and underlying causes:** information on the key risks and observations, contributing factors, and underlying causes pertinent to the stakeholder.
- **Action planning:** the tool facilitates the proposal of specific, measurable, achievable, realistic, and time-bound (SMART) actions and activities. These are designed by the stakeholder with the support of the IOA team to address identified key risks and observations and contributing factors, ensuring that every proposed action is actionable and aligned with achievable goals.

MONITITOs feed directly into the broader MONITO (Chapter 8. Monitoring evidence use), enhancing the overall coherence and efficiency of outbreak response ensuring that all actions are rooted in analysed data and are aligned with collective health objectives.







Download the MONITITO for a practical illustration and an example of a completed MONITITO.

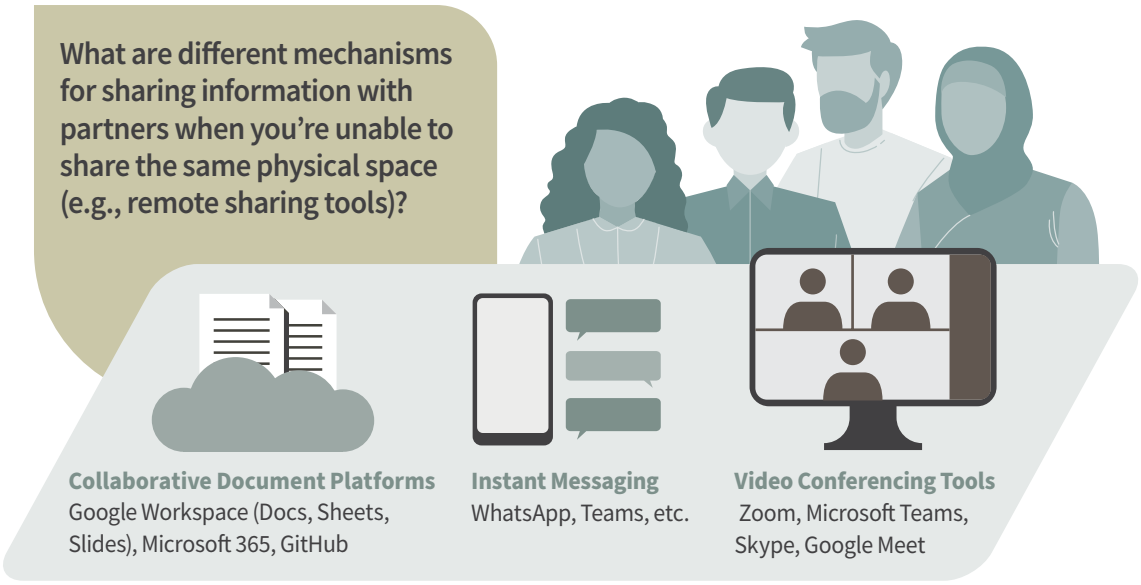
For more information about MONITO and MONITITO see Chapter 8. Monitoring evidence use.

## How is information shared

Various strategies may be used to share information throughout the IOA process with partners and stakeholders. In the past, the following technologies have been used (Figure 21):

- Common workspace and routine in-person meetings;
- Live PowerPoints and WhatsApp groups for continuous knowledge exchange; and
- Virtual platforms to compensate for lack of physical meetings, ensuring active stakeholder participation.

### Figure 21. Mechanisms to communicate findings of IOA




**Key approach:**
Keep asking yourself "What has worked best? Why? When?". Emphasise early involvement and work together to create actionable plans. Keeping partners engaged throughout the process helps reduce last-minute feedback and encourages everyone to work together toward shared goals.

# 7.3. Best practices for the co-development of actions

There can be a tendency for field teams to want to show as many different uses of evidence as possible, reflected in a large number of actions co-developed with partners. However, this may reduce the quality of each action co-developed, often with a heavy reliance on "sensitisation" or activities placing the core responsibility on communities.

Experience has shown that it was more efficient

- to agree on one or two solid, operational co-developed actions, instead of ten vague actions per underlying cause; and
- to ensure co-developed actions go beyond sensitisation and the expectation that communities immediately change their behaviours, to more holistically address barriers and underlying causes.

How to ensure quality actions are developed:

1. Discuss and establish potential impact of action/ activity with the stakeholder – how will this benefit their operations?
2. Action/activities must be operational, with detailed steps specifying how they will be implemented, how they will be measured (e.g., key indicators), how they will be monitored and by whom. This ensures that all parties involved have a shared understanding of the tasks, responsibilities, and expectations.
3. The pressure on teams to return with large numbers of co-developed actions should be limited – reinforce "less can be more."
4. Actions should involve investing in local actors to implement initiatives, ensuring a sustainable and long-term humanitarian response.
5. Run analyses and co-developed actions by different clusters and working groups to enable response coordination to support actors in implementation (and ensure they comply with humanitarian standards).

This might seem like excessive micromanagement but helps to ensure that commitments to affected communities are met, as all parties are clearer on their individual responsibilities in the implementation process.

## Example 3 (continued): Poliomyelitis, new cases reported

In district U, poor communication about maternal health services limits access and contributes to increased polio susceptibility among children.

**Not SMART action:** healthcare workers address the community with targeted messages about maternal health services.

- **Feedback:** this action is too vague as it lacks clear, actionable steps, leaving too much room for interpretation and risking ineffective implementation.

**SMART action: overall objective:** healthcare workers are tasked to develop a communication strategy for three selected areas to enhance the delivery of key messages about sexual and reproductive health services to women. This involves:

- **Step 1:** select three areas, with responsibility assigned to MOH and local healthcare workers, including a clear indicator for selection completion.
- **Step 2:** organise of a workshop with healthcare workers from the selected areas to define key messages, using integrated analytics tailored to the educational levels of local women.
- **Step 3:** test these messages with the target audience to ensure clarity and understanding.
- **Step 4:** determine message dissemination logistics among local health actors, documented in government health strategy with specified indicators for each step to measure implementation and impact.

- **Feedback:** this detailed action plan provides clear directives and measurable indicators for each stage, enabling supervisors to directly verify whether the action has been implemented effectively by field teams. This structured approach ensures that every part of the action can be implemented and closely monitored for success.

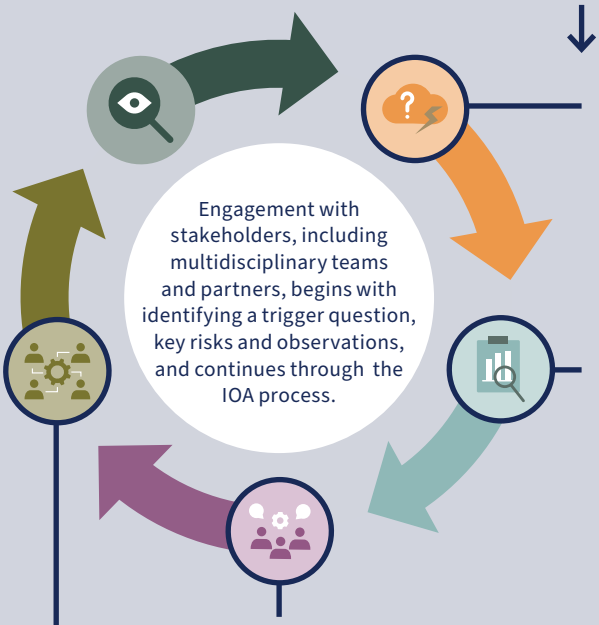
## Example 5 (continued): Diarrhoeal disease, high case fatality rate in children

**Key risks and observations were identified during a provincial level cholera meeting:**

**61,342 cases** (suspected or confirmed) in 6 months

**430 deaths** in 6 months in one district

**CFR increased from 1.5 to 3** among children




**1** **Trigger question:** Why did the CFR double in 3 months in children under 5?

**Confirmed:** This a real problem, not a reporting problem

**2** **Based on missing information**, stakeholder and partners colaboratively decided on methodologies and tools for the collection of additional information to fill gaps. Data collection was conducted by the MOH, IOA team, and cholera team.

**3** **Collaborative integrated analysis** of data by stakeholders (additional data collection/review can occur during this process)

Healthcare workers noted that many children with cholera were arriving at health facilities in critical condition, often exacerbated by acute malnutrition. Upon investigation by stakeholders and a cholera specialist, it was confirmed that this combination of severe illness and malnutrition significantly impacted the CFR.

**Contributing factor identified:**
Children presenting with severe illness and acute malnutrition upon admission.

Is this enough to take action? No! → Why? → Why malnutrition? / Why arriving late for care?

**4** **Co-development of actions with partners from:**

- **Local level** (i.e., district, area) – civil society, traditional healers, CHWs
- **Provincial level** – provincial government, implementing partners
- **National level** – Public health institute (PHI)

Stakeholders collaborated with partners to identify all underlying causes and then created MONITITOs. These tools were used in co-development sessions to facilitate discussions and elaborate actions among partners.

## Example 5 (continued): Diarrhoeal disease, high case fatality rate in children – Co-development of actions

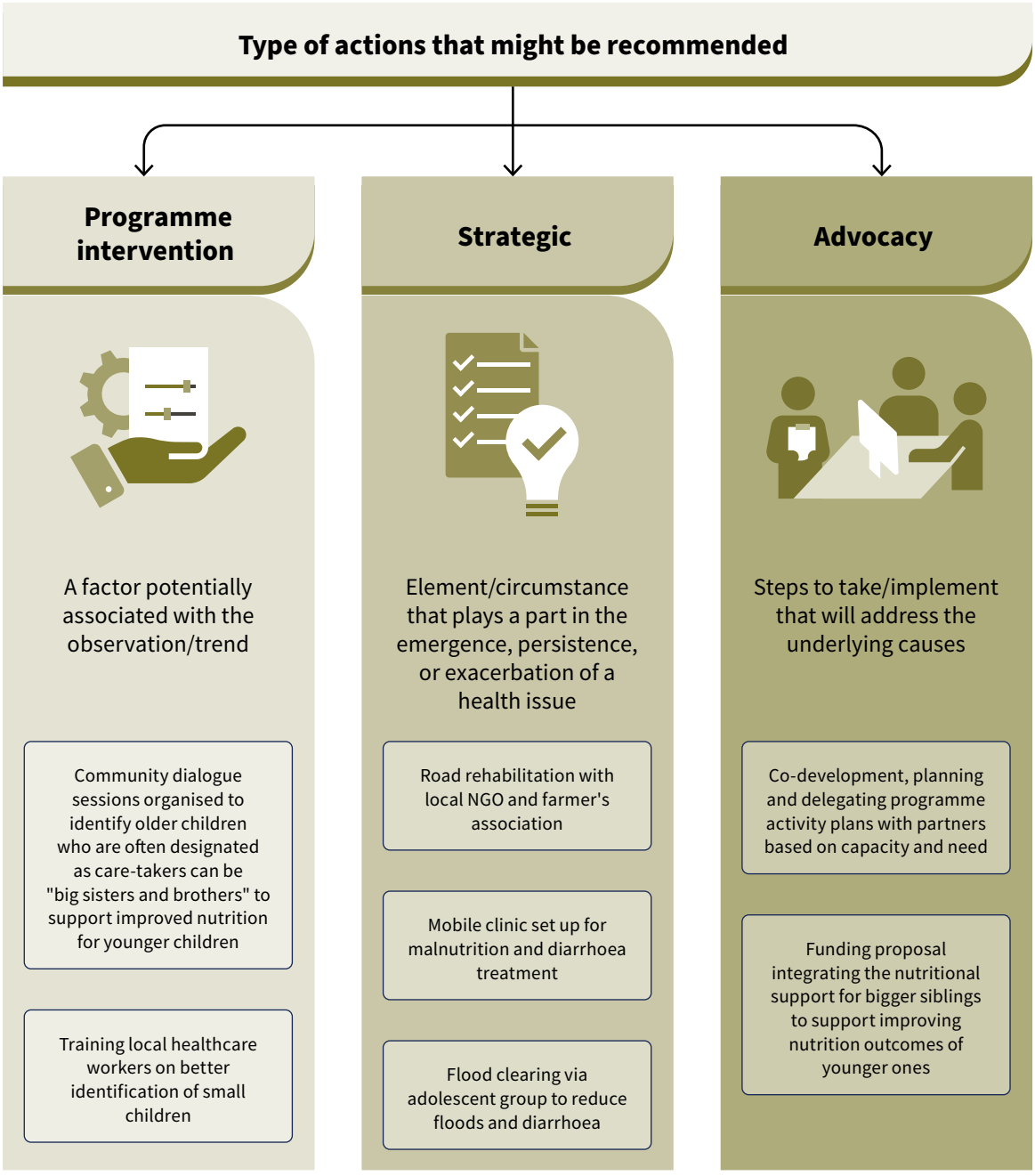
**Trigger question:** why did the case fatality rate double in 3 months among children under 5?

| Why? Risk factors | Why? Contributing factor(s) | Why? Underlying cause(s) | What? Actions |
|---|---|---|---|
| A factor potentially associated with the observation/trend | Element/circumstance that plays a part in the emergence, persistence, or exacerbation of a health issue | Fundamental reason; primary source that sets in motion the cause-and- effect reaction that leads to the contributing factor | Steps to take/implement that will address the underlying causes |
| Children are arriving at the health facility with severe malnutrition | Lack of access to nutritious food | Parents lost jobs, working far from home, not preparing food (left with siblings) | Mobile nutrition programme |
| | | | Training and support to older siblings |
| | | Floods ruined household small gardens | ORS brought to households – train siblings |
| | | | Small distribution of grains for garden |
| | Limited access to healthcare | Road flooded and access to healthcare facility costs increase | Mobile nutrition program |
| | | | Community fund collection |
| | | Healthcare services not available at times for parents (causing delays) | Flexible Saturday hours |
| | | | ORS brought to households – train siblings |

# 7.4. Type of actions that may be recommended

Trigger questions are multifactorial and may be associated with several underlying causes that may be addressed by a variety of actions (Figure 22).

## Figure 22. Nature of the actions that may be recommended



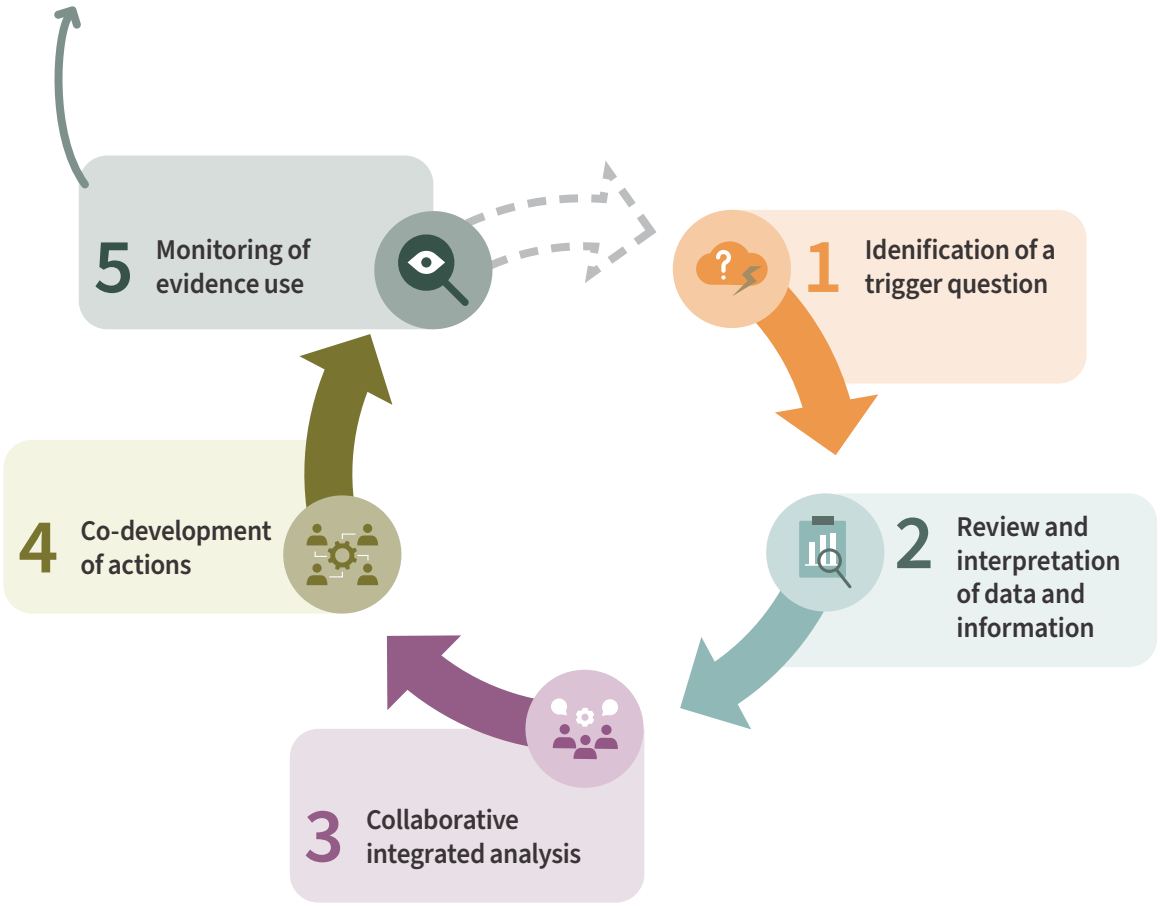
# Monitoring evidence use



08

## IOA process – Monitoring evidence use

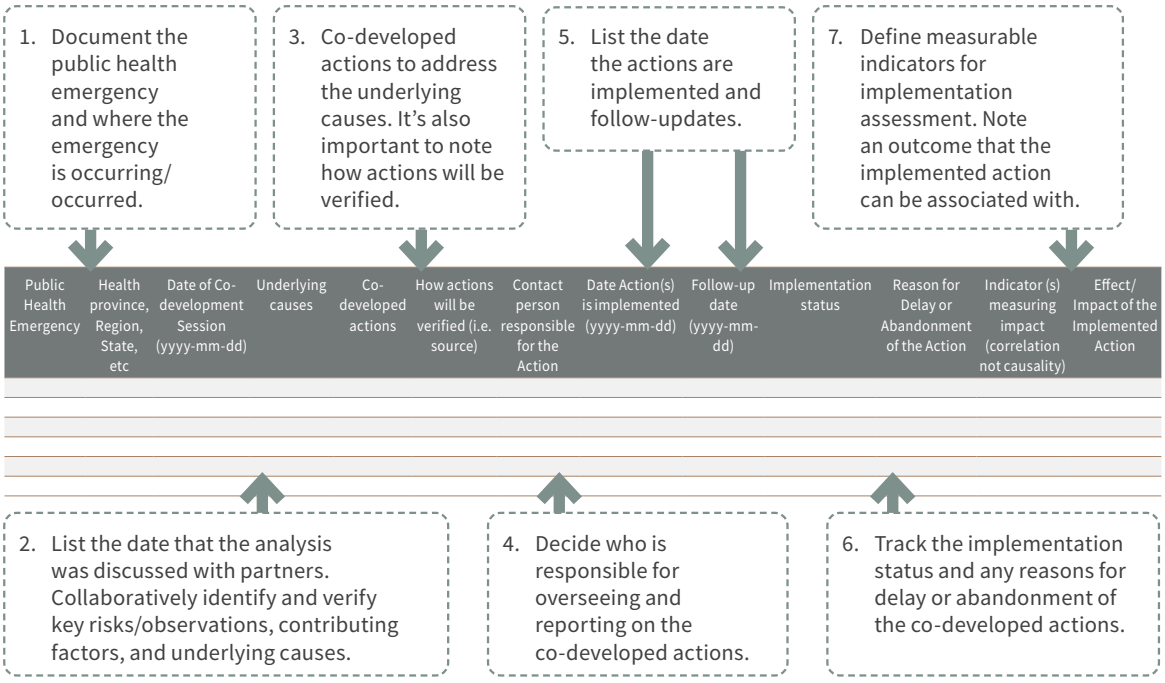
Monitoring the evidence use constitutes the fifth phase of the IOA Process. Stakeholders, in collaboration with partners, will co-develop and document actions, assign responsibilities, establish timelines, and define performance indicators. These agreed- upon details will then be shared with all relevant parters to ensure effective implementation and mutual accountability. Partners will update stakeholders on progress as outlined in the MONITITOs (see Chapter 7. Co-development of actions). All feedback, including implementation challenges, is consolidated into the MONITO. Designated personnel review this data to assess action effectiveness against identified risk factors. If outcomes are not met, further analyses will identify any missed contributing factors or underlying causes.



# 8.1. Key elements of a monitoring tool

Efficient monitoring tools need to include key elements, such as those shown in the MONITO (Figure 23). The MONITO includes specific details relating to contacts and follow up information; there may also be public MONITOs which include general follow up without names/contacts.

### Figure 23. Elements of an IOA monitoring tool




Download the MONITO

The MONITO includes specific details relating to contacts, follow up information, etc., there may also be public MONITOs which include general follow up without names/contacts.

# 8.2. Use of the monitoring tool

To ensure that use of the monitoring tool is effective, and that evidence-based recommendations and actions are correctly, and completely implemented, certain critical elements must be confirmed during the co-development sessions and while completing the MONITITO (see Chapter 7. Co-development of actions):

**Role and responsibility of the IOA team:** the engagement of the stakeholders is instrumental in ensuring that actions are both feasible and impactful. They should be selected carefully for the co-development of actions and have a comprehensive understanding of the context to propose realistic and achievable actions.

**Defining actionable steps:** the monitoring tool guarantees that all actions are clearly defined and can be implemented. Each action is designed to be straightforward, to focus on practical implementation from inception to completion. To prevent any implementation delays, actions should be clear, measurable, and free from ambiguity, ensuring they can be effectively monitored and adjusted as needed.

**Indicators for monitoring progress of co-developed actions:** to ensure actions are operational, they must be linked to tangible indicators that confirm whether the actions have been implemented. The focus is on monitoring the execution of the actions, verifying that the response partner follows through on their commitments according to the agreed timeline.

SOP 8. Co-development of actions and monitoring of evidence use

Download the MONITO

# 8.3. Ensuring collaborative monitoring of evidence use

Ensuring effective and equitable collaborative monitoring of evidence use will be different in different contexts. However, experience has highlighted some key lessons learned for helping to facilitate and ensure this process in collaborative and efficient:

- **Participant engagement:** clearly communicate to all participants that the objective is to collaboratively develop and monitor actions based on shared evidence. This approach ensures that the process is seen as cooperative rather than directive, enhancing buy-in and reducing perceptions of oversight as punitive.
- **Dedicated decision-making time:** allocate specific times during discussions with partners to decide on responsibilities for each implementation stage and establish agreed timelines. This structured approach helps track progress and ensures accountability.
- **Suggest actions:** prepare and share innovative suggestions of actions before meetings to foster creative discussions during co-development sessions with partners. This approach helps move beyond standard sensitisation and community engagement efforts to more impactful activities.
- **Review past agreements:** at the end of each session, review actions and agreements from previous meetings to provide continuity and examples for future co-development efforts.
- **Preparation for meetings:** complete relevant sections of the monitoring tool in advance to cover all essential aspects of the analysis relevant to the discussion. This preparation ensures comprehensive coverage of topics and maximises the effectiveness of the co-development process.
- **Evidence use:** demonstrate the use of evidence, recognising that ease of demonstration can vary significantly, as well as ability to engage stakeholders around particular issues:
  - *It is "easy" to demonstrate the use of evidence* in well-funded, targeted responses (e.g., during EVD outbreaks), or where actions are practical, straightforward, and have directly attributable impacts (e.g. during vaccine-preventable disease outbreaks where low vaccination coverage can be clearly associated with the presence of the disease).
  - *It is challenging to demonstrate the use of evidence* in responses to complex emergencies involving multifaceted interventions (e.g., those linked to conflict, agriculture, or deeply rooted gender issues). These situations often feature poorly funded efforts and deal with long-term impacts that are less immediately apparent, making urgency harder to convey.

SOP 8. Co-development of actions and monitoring of evidence use

# 8.4. MONITO

## 8.4.1. Background and objectives of MONITO

MONITO was developed collaboratively by IOA partners through five collaborative workshops during the Ebola outbreak response in Eastern DRC in 2018–2020.

Its objectives are threefold:

- to document the IOA process;
- to track evidence use and the outcomes of implemented actions over time, while also monitoring the progress and efficiency of stakeholders; and
- to provide ethical justification for data collection, ensuring that information is used effectively.

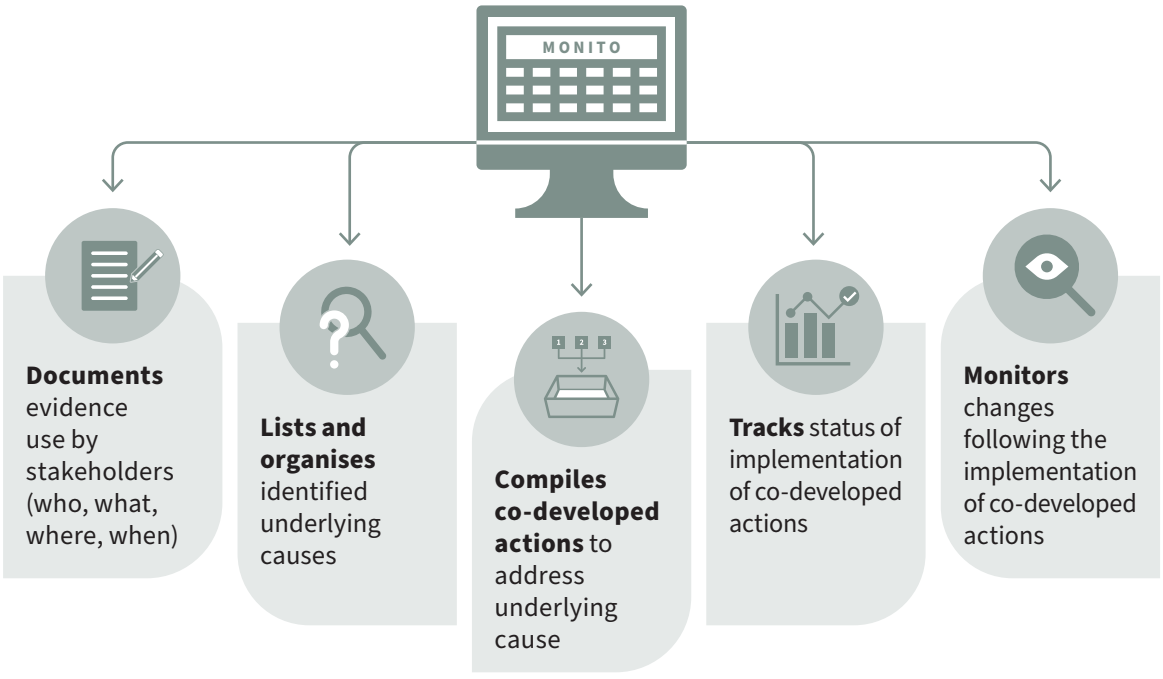
## 8.4.2. What is the purpose of MONITO?

MONITO is a monitoring tool that tracks the implementation of co-developed actions, barriers or delays, and outcomes potentially associated with the actions in addressing underlying causes (Figure 24).

It offers detailed insights into the status of action implementation, reasons for delays or abandonment, and indicators to monitor progress. Additionally, MONITO outlines the implementation process, documents necessary requirements for ongoing progress, and establishes specific timelines for achieving objectives.

If actions fail to produce expected changes, MONITO assists in evaluating whether the actions were suitable or if essential factors were missed, suggesting the need for further information and potential action revisions.

### Figure 24. Functions of an IOA monitoring tool



# Workbook

09

# Exercise on data or information

For each example provided in the subsequent boxes, determine whether the content represents data or information, and mark your selections accordingly.

**01**
Number of reported cholera cases in District X

**02**
Age-specific vulnerability to cholera infection

**03**
Mapping the geographic spread of cholera cases to identify high-risk areas

**04**
Cholera cases by sex

*ANSWERS: 1. Data; 2. Information; 3. Information; 4. Data*

# Exercise on creating trigger questions

Review the three scenarios provided and formulate trigger questions based on the details outlined in each.

## Scenario 1: Polio outbreak

In a region with regular polio vaccination campaigns, two remote villages, X and Y, have not seen a decrease in polio cases. In fact, in May 2022, an increase in polio cases was observed among children under 5 years old in Village Y, despite ongoing vaccination efforts and mothers reporting that their children were vaccinated.

**What is the trigger question arising from scenario 1?**

## Scenario 2: Dengue fever outbreak

A tropical city known for seasonal dengue fever outbreaks has experienced a higher-than-average number of cases following an exceptional rainy season. By March 2023, despite ramped-up mosquito control efforts and intensified public health messaging, dengue cases sharply increased in District C, particularly among women.

**What is the trigger question arising from the scenario 2?**

## Scenario 3: Measles outbreak

In a densely populated urban area known for high vaccination coverage, a sudden measles outbreak emerged in April 2021. The outbreak predominantly affected children who had recently migrated from a neighbouring country.

**What is the trigger question arising from scenario 3?**

*ANSWER TO SCENARIO 1: Why are polio cases rising among children under 5 in Village Y, even though vaccination campaigns are ongoing, and children are reportedly vaccinated?*

*ANSWER TO SCENARIO 2: Why is there a substantial increase in dengue cases among women in District C despite enhanced mosquito control and public health efforts?*

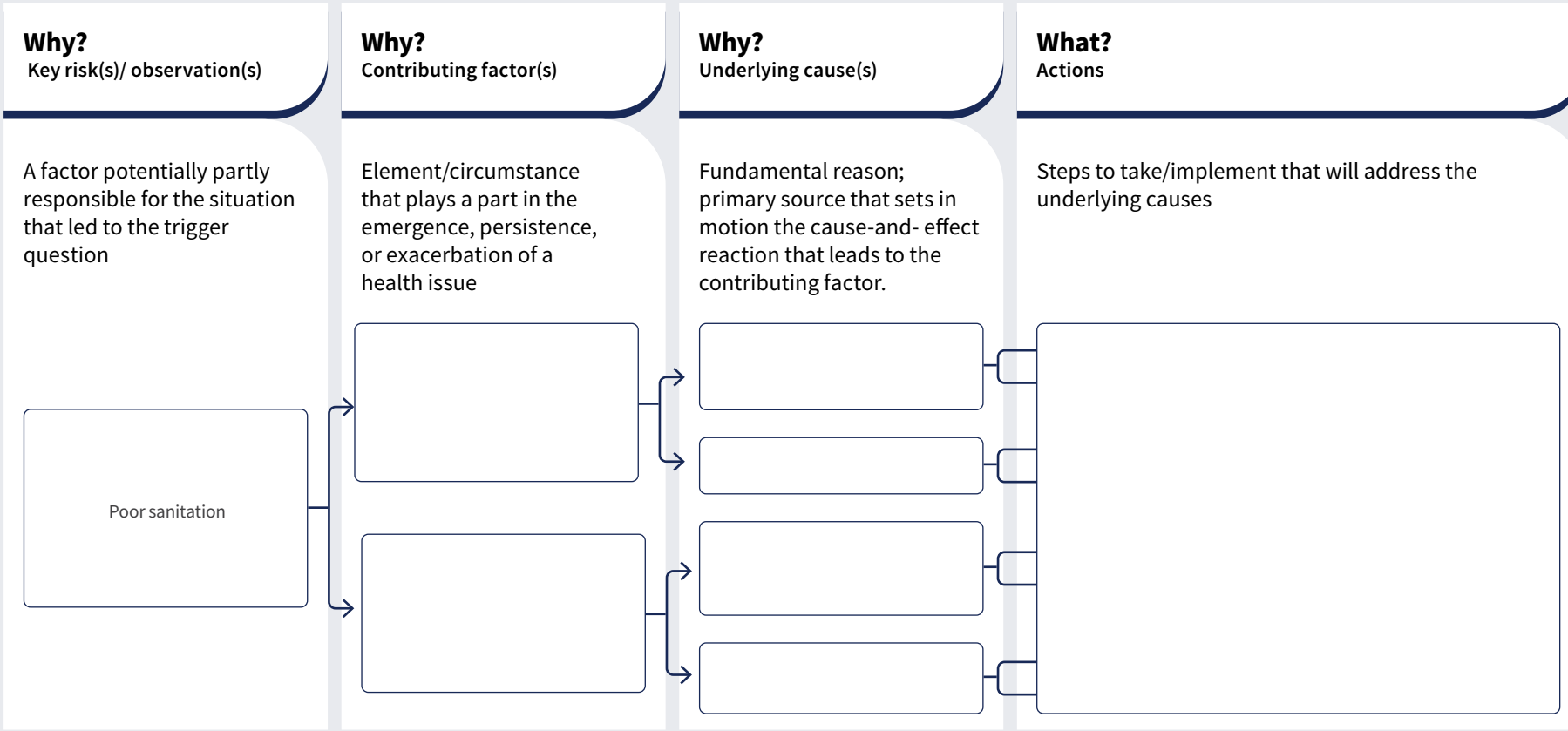
*ANSWER TO SCENARIO 3: Why has a measles outbreak occurred among newly migrated children in this urban area despite high local vaccination rates?*

# Exercise on investigating a trigger question

For the trigger question, 'Why are polio cases still observed despite vaccination campaigns?', complete the root cause analysis tool for the polio risk factor 'poor sanitation' (consider secondary impacts of poor sanitation such as its association with malnutrition. Malnutrition can weaken the immune system, reducing the efficacy of vaccines and increasing susceptibility to diseases like polio).

**Case example: to understand all risk factors (e.g.low vaccination rated, poor sanitation, etc) contributing to the observation**

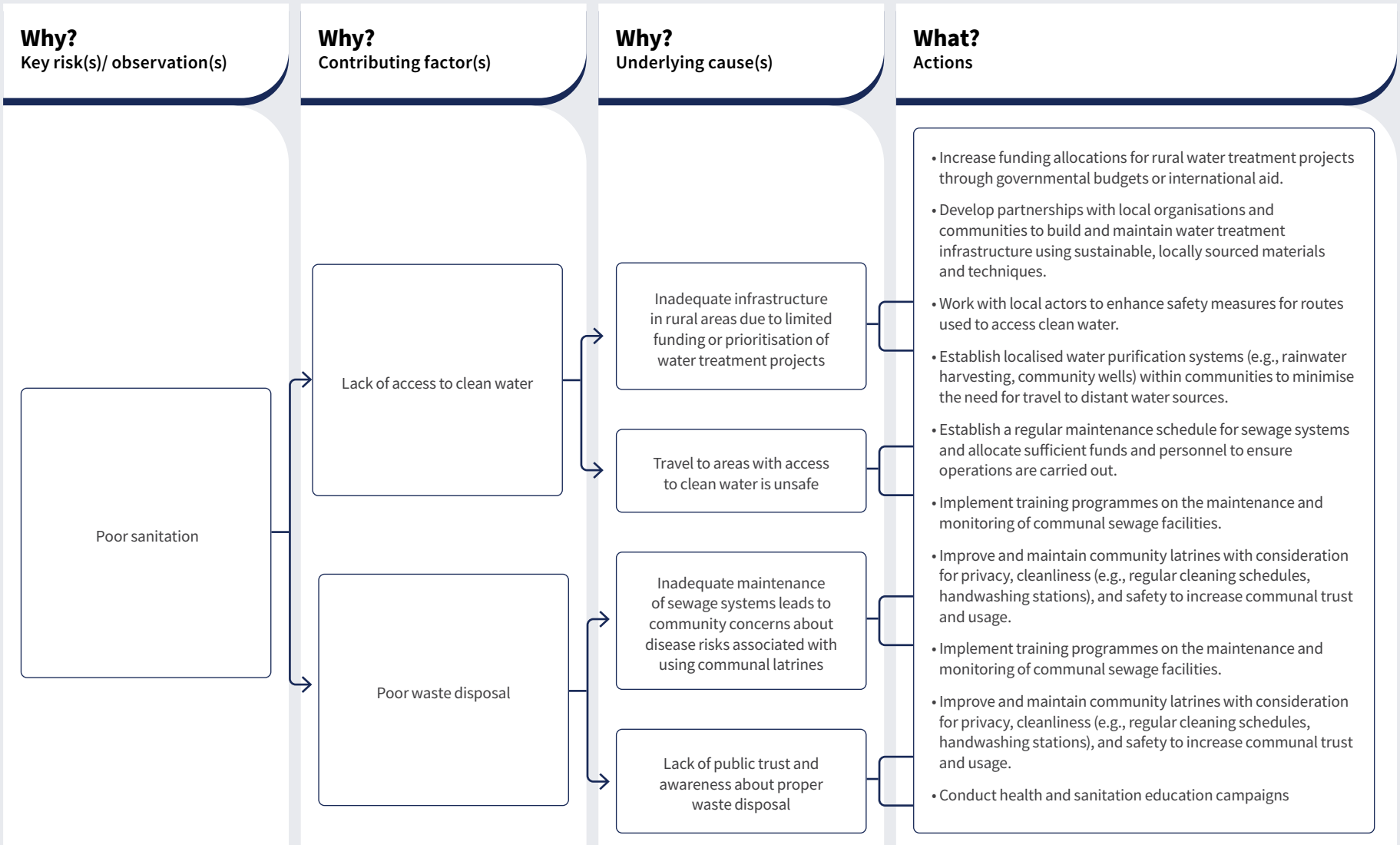
**Trigger question:** why are polio cases still observed despite vaccination campaigns?



*ANSWER: The answers below are potential contributing factors, underlying causes, and co-developed actions for the risk factor poor sanitation (as a risk factor for malnutrition and thus increased risk of polio). However, these answers are not exhaustive, and alternative answers are also possible.*

## Case example: to understand all risk factors (e.g. low vaccination rated, poor sanitation, etc) contributing to the observation

**Trigger question:** why are polio cases still observed despite vaccination campaigns?



# Exercise on good enough data

Do we need exact case numbers to plan a response?

☐ YES ☐ NO ☐ IT DEPENDS

*ANSWER: It depends. It depends on the disease, how it spreads, and what question you are trying to answer. For example, are you trying to request an Oral Cholera Vaccination campaign (exact numbers are needed to demonstrate a good surveillance system) or are you trying to select the location of a measles campaign (approximate case numbers are good enough)?*

# Exercise on identifying contributing factors and underlying causes

For the activity, identify which highlighted issues are "contributing factors" and which are "underlying causes" of the health problem. Continue to ask "why" to reveal additional reasons. Consider potential actions that could address and resolve these "underlying causes."

Go to the next page for the answers to this exercise.

| [Why?] Contributing factor | [Why?] Underlying causes | [What can be done?] Actions | For action! |
|---|---|---|---|
| | | | Each **action** will be managed by a **designated person**, with specific **indicators** to track **functioning** and **effectiveness**. Information will be shared. |

New doctor not known | Women do not attend | Hours of HC not appropriate | Male doctor | Distance is far | Long wait times

Cannot afford test | Lack of HCW visits | Cannot take food with treatment | Transport cost increase | Recent deaths in HCF

Don't know symptoms | Beliefs vs. lived experience | Floods | Lack of supplies | Distrust of services | Lack of access

Fear | End of free healthcare

*ANSWER: The answers for this exercise are context specific. Some elements may be considered contributing factors in one context but an underlying cause in another context. For example, "fear" might be a contributing factor to delayed treatment seeking when considering 'fear of hospitals', while the more specific 'fear of needles' might be considered an underlying cause.*

**Key risk/observation: delayed treatment seeking**

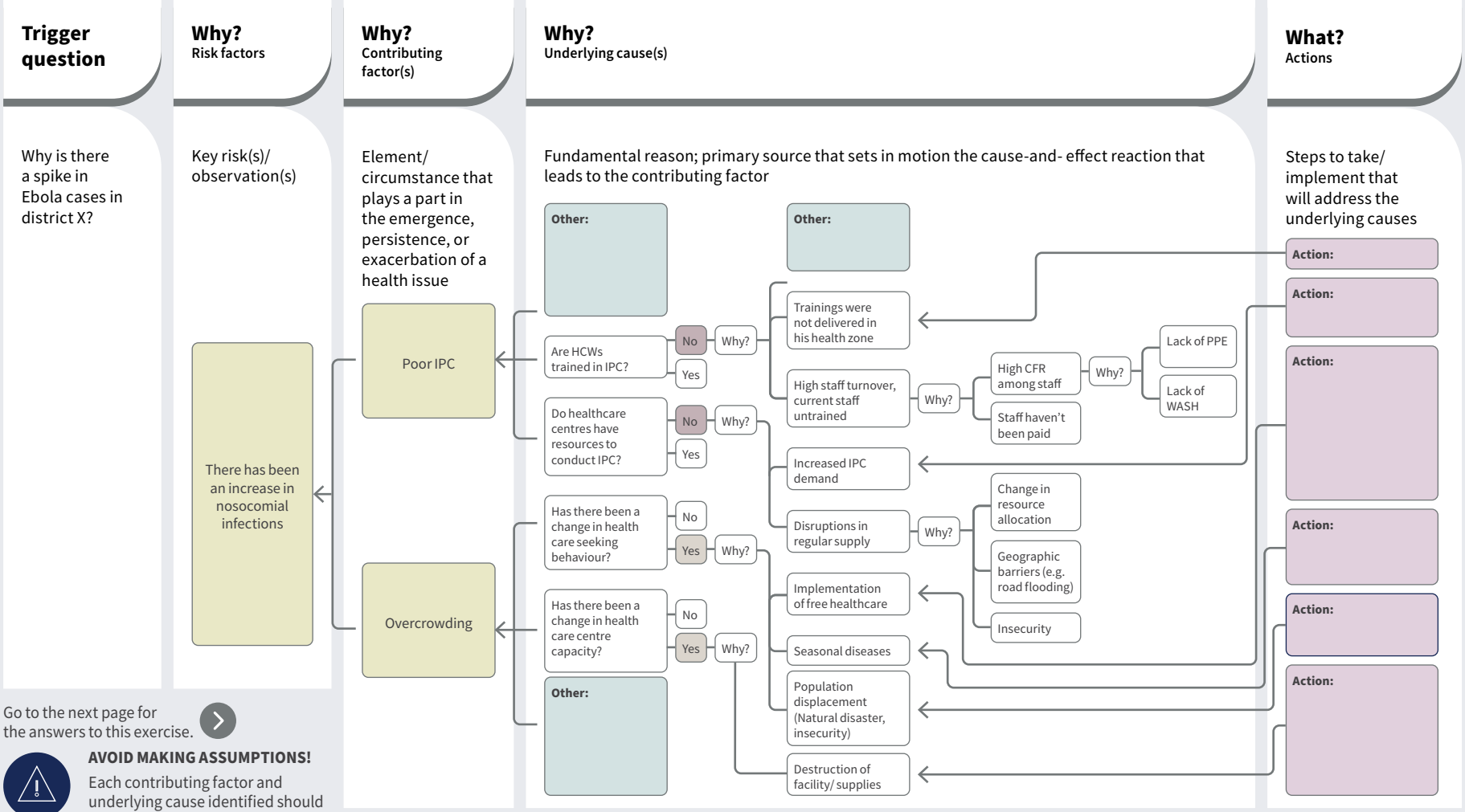
| [Why?] Contributing factor | [Why?] Underlying causes | [What can be done?] Actions | For action! |
|---|---|---|---|
| Women do not attend | Male doctor | Develop actions to address the underlying causes | Each **action** will be managed by a **designated person**, with specific **indicators** to track **functioning** and **effectiveness**. Information will be shared. |
| Recent deaths in HCF; Lack of HCW visits | Distance is far; Floods | | |
| Fear; Lack of supplies | Hours of HC not appropriate | | |
| Don't know symptoms | New doctor not known | | |
| Beliefs vs. lived experience | Transport cost increase; End of free healthcare | | |
| Distrust of services | Long wait times | | |
| Lack of access | Cannot afford test | | |
| | Cannot take food with treatment | | |

| *Continue to explore why:* | *Specific underlying cause that we can take action on!* | *Actions should address the underlying cause:* |
|---|---|---|
| *Why do women not attend?* → | *Women do not attend because the doctor is male…* → | *Female doctor?* |
| *Why aren't there supplies?* → | *Lack of supplies because floods have disrupted distribution…* → | *Alternative distribution method?* |

# Exercise on continuing to ask why

A. Review the flow chart and consider additional potential underlying causes for poor IPC and overcrowding. Add these under 'Other'.
B. Consider potential actions to address the identified underlying causes. Add these under 'Action'.
C. Compare the actions you've identified. Reflect on whether you would have arrived at these actions if you had stopped at the contributing factors?

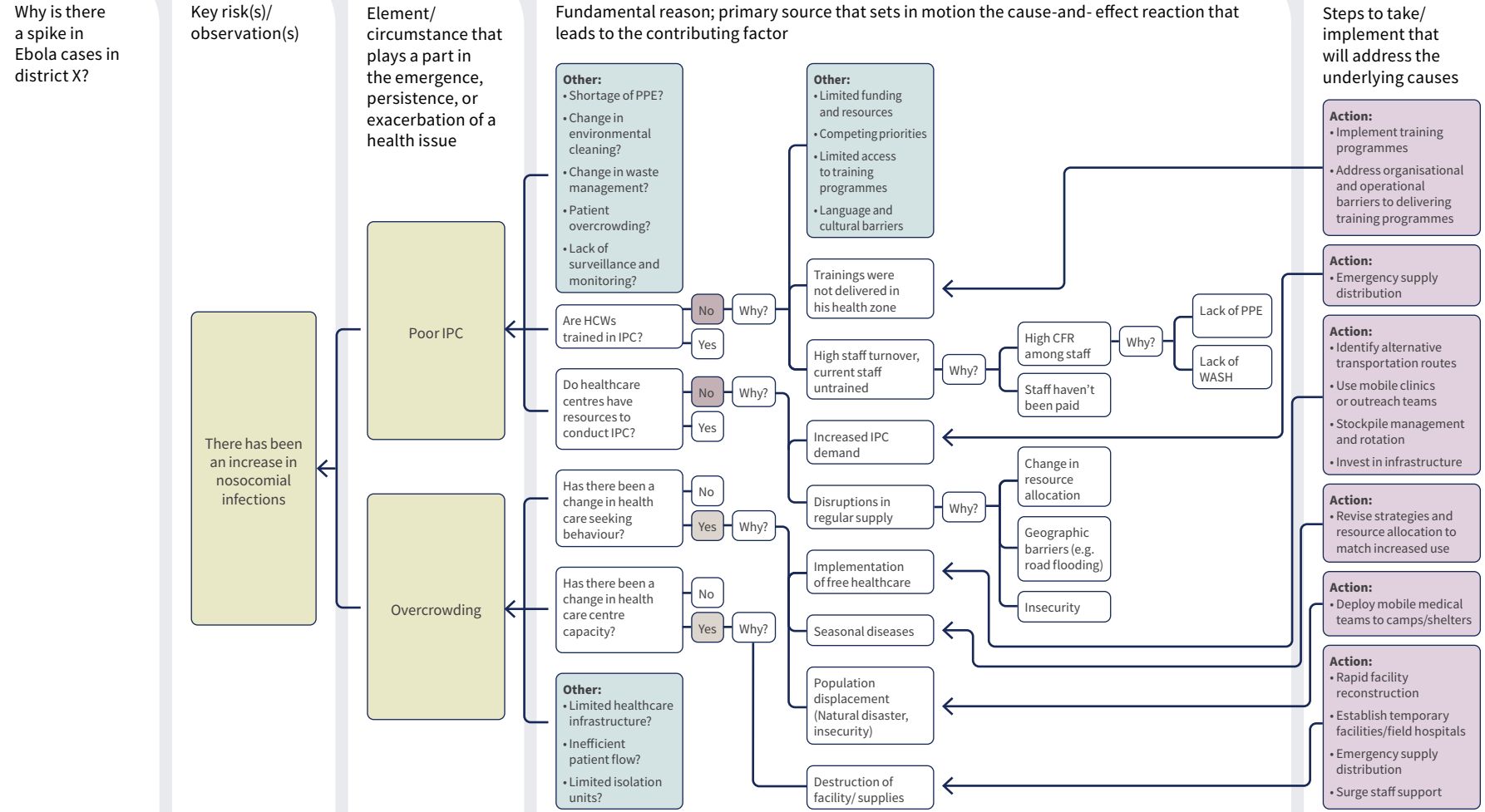
**This exercise aims to help you identify underlying causes of poor infection prevention control (IPC) and overcrowding, both identified as contributing factors to nosocomial infections in District X.**




Go to the next page for the answers to this exercise.

**AVOID MAKING ASSUMPTIONS!**
Each contributing factor and underlying cause identified should be supported with evidence.

**Multiple valid answers exist for this exercise. The provided answers serve as examples**



# Appendix

10

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[Replace text in square brackets]

# Template 1. IOA cell TOR

# [Terms of reference (TOR) for IOA cell operations]

[Version]
[Date]

## 1. Introduction

This document serves as the terms of reference (TOR) for the Integrated Outbreak Analytics (IOA) cell. It outlines the objectives, governance structure, ways of working, and communication channels to ensure effective operation and collaboration among all stakeholders involved in public health and outbreak response.

### 1.1. Background

- [Briefly describe the public health emergency, key morbidities, epidemiological trends, what is known]
- [Briefly describe the location, context and security situation]

### 1.2. Objectives

#### 1.2.1. Primary objectives

*[The following are examples that can be adapted as appropriate]*

1. Support response pillars
   - Facilitate quality data collection and analysis.
   - Ensure evidence-based decision-making across response pillars.
2. Trigger question identification
   - Identify and address key questions to understand outbreak trends and the impacts on community health.
3. Information and data review
   - Collaborative review of existing information and data, collection of additional information and integrated analysis of compiled information
4. Co-development and communication of recommendations
   - Communicate findings and evidence across response pillars to support evidence-based decision-making
   - Prioritise risks and co-develop actions, responsibilities and timelines
5. Monitoring of evidence use
   - Monitor the use of evidence by different pillars, actors, and locations over time.

#### 1.2.2. Specific objectives

*[You may wish to add more specific objectives for this IOA cell/group]*

# 2. Governance

*[The following are examples that can be adapted as appropriate]*

## 2.1. Governance structure

### 2.1.1. Leadership

- Led by a designated Ministry of Health official or appointed leader [add name/organisation]

### 2.1.2. Stakeholders

- Includes representatives from relevant response pillars, technical experts, and partners (including community representatives) [add names/organisations /groups]

### 2.1.3. Reporting

- Regular reporting to the response coordination team.

## 2.2. Roles and responsibilities

### 2.2.1. IOA cell lead

- Overall coordination and oversight.
- Liaison with Ministry of health and other key stakeholders.

### 2.2.2. Technical experts

- Provide subject matter expertise in relevant fields [e.g. epidemiology, data analysis, agriculture, social norms and outbreak management].

### 2.2.3. Partners

- Support technical and operational aspects of data collection and analysis.

# 3. Ways of working

## 3.1. Collaboration

### 3.1.1. Thematic areas

- Assign thematic topics to focal points, [e.g. led by Field Epidemiology Training Program (FETP) fellows with partner support].

### 3.1.2. Collaborative analytics

- Flexible and adaptive approaches to address emerging trends and questions (for best approaches ensure there are diverse perspectives and backgrounds included in the process)

### 3.1.3. Information and data sources

- Utilise a variety of sources including alerts databases, line lists, healthcare facility assessments, community-sourced information and qualitative interviews.

## 3.2. Processes

### 3.2.1. Routine analysis

- Conduct routine analyses to monitor outbreak trends and key indicators.

### 3.2.2. Critical review

- Regularly review data sources for limitations and biases to improve interpretation.

### 3.2.3. Decision points

- Identify decision-making points where analytical capacity is needed.

# 4. Communication channels

## 4.1. Internal communication

### 4.1.1. Regular meetings

- Schedule regular coordination meetings among IOA cell members.

### 4.1.2. Reports and briefings

- Prepare and distribute analytical reports and briefings to response pillars.

## 4.2. External communication

### 4.2.1. Stakeholder updates

- Provide updates and communicate findings to external stakeholders and partners.

### 4.2.2. Public communication

- Coordinate with communication teams to disseminate information to the public as needed, in appropriate formats.

## 4.3. Tools and platforms

### 4.3.1. Data sharing

- Utilise secure data sharing platforms (e.g., SharePoint, Google Drive) for collaboration.

### 4.3.2. Tracking

- Maintain an excel tracker for tasks, roles, responsibilities, and analytics support needs.

# 5. Monitoring and evaluation

## 5.1. Performance indicators

### 5.1.1. Timeliness

- Measure the timeliness of data collection, analysis, and reporting.

### 5.1.2. Quality

- Assess the quality and accuracy of data and analytical outputs.

### 5.1.3. Impact

- Evaluate the impact of evidence-based decision-making on outbreak response outcomes.

## 5.2. Feedback mechanism

### 5.2.1. Continuous improvement

- Implement a feedback mechanism to continuously improve IOA cell operations and outputs.

# Template 2. Root cause analysis for trigger question investigation

*Download onto your computer*

[Replace text in square brackets]

[This is a useful tool for a trigger question investigation and aims to catalyse critical thinking and discussions. However, it is not compulsory to complete it].

## Trigger question

| **Why?**<br>**Risk factors** | **Why?**<br>**Contributing factor(s)** | **Why?**<br>**Underlying cause(s)** | **What?**<br>**Co-developed actions** |
|---|---|---|---|
| Key risk(s)/ observation(s) | Element/circumstance that plays a part in the emergence, persistence, or exacerbation of a health issue | Fundamental reason/ primary source that sets in motion the cause-and-effect reaction that leads to the contributing factor | Steps to take/implement that will address the underlying causes |
| | | | 1. _____<br>2. _____ |
| | | | 1. _____<br>2. _____ |
| | | | 1. _____<br>2. _____ |
| | | | 1. _____<br>2. _____ |
| | | | 1. _____<br>2. _____ |
| | | | 1. _____<br>2. _____ |

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[Replace text in square brackets]

# Template 3. Reviewing information needs, sources, and uses

| | **What data or information types might help answer your trigger question?** Check all relevant boxes | **For the data/ information you selected, what specific details are needed?** (e.g., disease cases by age and sex, weather patterns for flooding prediction, community perceptions, etc.) | **Does this data/ information already exist?** Answer: Yes, No, or Unknown | **If the data exists:** **Do you have access to it?** **If not, how can you gain access?** (e.g., who has access to this data? will a data sharing agreement be needed? etc.) | **If the data does not exist:** **How could it be collected?** (e.g., surveys, field observations, partner organisations, etc.) | **What insights does this data/ information provide?** How does it help you understand the problem? | **Will actions be developed based on these new insights?** If so, what specific actions could be suggested or implemented? |
|---|---|---|---|---|---|---|---|
| **Case analysis & Laboratory** | | | | | | | |
| **Population Health and Services** | | | | | | | |
| **Geographic, environmental, & animal factors** | | | | | | | |
| **Community economic landscape** | | | | | | | |
| **Gender and social dynamics** | | | | | | | |
| **Community behaviour and perceptions** | | | | | | | |
| **Healthcare worker knowledge, perceptions, and practice** | | | | | | | |
| **Geopolitics and events** | | | | | | | |
| **Programme and response interventions** | | | | | | | |

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[Replace text in square brackets]

# Template 4. Rapid protocol

# [Title]

## Introduction

### Background

- [Briefly describe the public health emergency, key morbidities, epidemiological trends, what is known]
- [Briefly describe the location, context and security situation]

### Objectives

- [Define the goals and what you aim to achieve through this Integrated Outbreak Analytics (IOA) investigation]
- [Indicate any secondary objectives]

### Trigger question

- [Detail the specific question(s) that prompted this investigation]

## Methods

### Information sought

- [If this is a new study, indicate type of study e.g. observational, mixed methods, etc]
- [Specify the type of information needed]
- [Describe where and how the information can be obtained]
- [If personal data is being collected, indicate how this will be stored securely and analysed anonymously]
- [Estimate costs, resources needed and what each partner has agreed to support]

### Collaborative analysis methodology

- [List the partners involved in the analysis and key responsibilities]
- [State the mode of collaboration e.g. will the analysis occur remotely or in a collective setting?]
- [Indicate the methodologies to be used for this analysis e.g. logistic regression, qualitative, etc.]

## Results and dissemination

- [Give a timeline for the investigation and analysis]
- [Explain how the results will be used and the impact they aim to achieve]

# Template 5. Expanded root cause analysis for co-development of actions

*Download onto your computer*

[Replace text in square brackets]

[This is a useful tool for considering which actions to recommend, indicators of performance and assigning responsibility, but it is not necessary to complete and should not replace critical thinking].

## Trigger question

| Why? Key risk(s)/ observation(s) | Why? Contributing factor | Why? Underlying causes | What? Actions | What? Indicators | What? Task manager |
|---|---|---|---|---|---|
| A factor (or multiple factors) associated with the trigger questions | Element/ circumstance that plays a part in the emergence, persistence, or exacerbation of a health issue. | Fundamental reason; primary source that sets in motion the cause-and-effect reaction that leads to the contributing factor. | Steps to take/implement that will address the underlying causes. | Measurable elements used to assess the progress, performance, or impact of actions. | Person in charge of ensuring actions and reporting observations. |
| | | | 1. | 1. | |
| | | | 2. | 1. | |
| | | | 1. | 1. | |
| | | | 2. | 1. | |
| | | | 1. | 1. | |
| | | | 2. | 1. | |
| | | | 1. | 1. | |
| | | | 2. | 1. | |
| | | | 1. | 1. | |
| | | | 2. | 1. | |
| | | | 1. | 1. | |
| | | | 2. | 1. | |

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# SOP 1. Considerations when setting up an IOA team

## Questions to consider and answer when developing TOR for IOA

### Example objectives

- Produce routine evidence using IOA to explain trends and outbreak dynamics to support and guide response strategies for all pillars and the coordination
- Work with response coordination and pillars to identify key questions for IOA, to agree on methodology and to share evidence
- Strengthen MOH (national and local level) capacity in terms of data collection, analysis and use (quality) for improved understanding of outbreak dynamics using IOA
- Present observations across different locations and among different actors in adapted approaches to reinforce the co-development of evidence- based actions
- Monitor the use of evidence and analysis to adapt interventions through co-development of actions by location, actor (cluster/ pillar), integrated analysis and over time

### Governance

**Decision making:**

- Who makes the decision to set up an IOA cell?
- How will decisions be made/approval process?
- How will you manage dynamics/hierarchies?

**IOA cell placement:**

- At what level should the IOA cell be positioned for optimal effectiveness?
- What factors determine its physical location or operational setup?

**IOA cell actors and partners:**

- What skills/expertise are essential for effective functioning?
- Who are the key personnel needed at the local/ district/ national levels?
- Who are the designated points of contact within each pillar?
- Who are the designated points of contact within each partner agency, etc.?

**Resources:**

- Financial allocation – who is paying for what (partner vs. MOH)?
- How will the existing capacity be assessed and supplemented if needed?

### Ways of working

**Time management:**

- Who is responsible for setting timelines and deadlines?

**Local information dynamics:**

- How is information managed and shared?
- What strategies are in place to understand local context and adapt the response accordingly?

**Engagement and collaboration:**

- How do we ensure engagement among all levels and pillars?
- How does the national level plan to engage with and support local efforts?
- How will the national level ensure local capacity building and sustained success?
- Is there a monitoring or evaluation period set to assess the effectiveness of collaboration?

### Communication channels

**Create a communication protocol:**

- When and what information is shared with whom? (e.g., who will be included in cc of emails?)
- What will be the method of communication (emails, WhatsApp, etc.)?
- How will communication between partners and external organisations be done (e.g., who needs to be included?)

# Managing dynamics and hierarchies

**Collaborative approach**

IOA operates via collaboration, acknowledging hierarchical nuances and political dynamics. It encourages participants from all levels, recognising the value of local knowledge and expertise

**Hierarchical navigation**

Proactively engaging with provincial authorities ensures smoother connectivity between national directives and district-level operations and improves integration of local expertise and knowledge

**Mitigating politics**

Acknowledging existing hierarchies and political sensitivities without letting them hinder decision-making processes within the IOA cell

**Clear sign-off protocols**

Define who holds the authority to sign off on decisions and ensures transparency in the decision-making process

**Building trust**

Leveraging local connections to enhance trust in outbreak response, acknowledging potential for inherent distrust of higher levels

# Data sharing and information flow

## Alignment of data collection

- How do we ensure aligned data collection across all levels for effective outbreak response?
- What measures are in place to standardise data collection methods and variables?

## Timely and accurate data sharing

- How is data shared among different levels within the IOA cell?
- Are there protocols/systems for ensuring transparent and swift data flow to decision-makers at various levels?
- Are there verification processes in place to validate shared data for reliability?

## Addressing trust and hierarchies

- How do trust and hierarchies within the systems impact data sharing?
- What strategies are implemented to mitigate any trust-related challenges affecting data flow?

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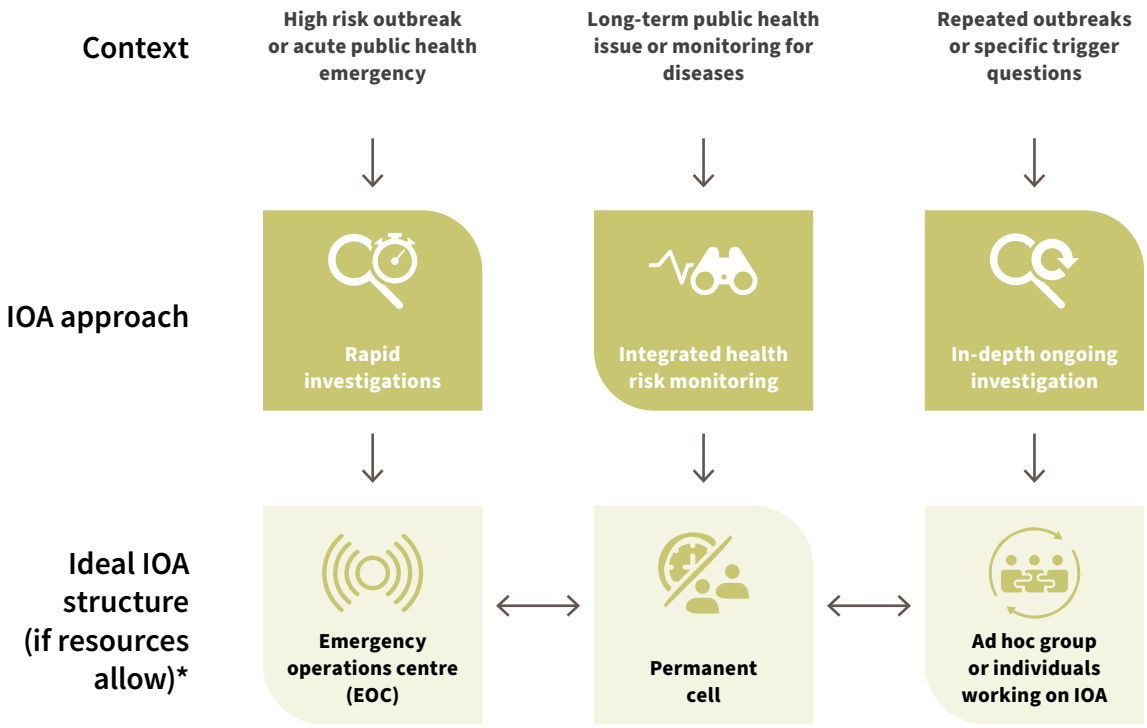
# SOP 2. IOA approach and structure

**Figure S2.1. Most appropriate IOA structure for different scenarios and how they can evolve. These IOA structures are fluid and can evolve from one into another depending on the public health emergency.**




* These IOA structures are fluid and can evolve from one into another depending on the public health emergency

## Purpose

This standard operating procedure (SOP) aims to support outbreak and public health emergency decision makers to establish an effective and adaptable IOA structure and approach to address diverse public health challenges.

# Process

The process for determining the most suitable IOA structures and approaches for the local setting is outlined in Figure S2.1.

## Identifying the context and needs

1) Assessment of the situation
   a) Determine the nature of the public health issue (e.g., high-risk outbreak, repeated outbreaks, ongoing health risk monitoring).
   b) Assess the capacity and readiness of local and national teams to handle the situation.
   c) Identify stakeholders and partners involved in the response.

2) Key considerations
   a) Type of outbreak or health risk.
   b) Geographic location and affected populations.
   c) Existing public health infrastructure and resources.
   d) Previous experiences with similar outbreaks or health issues.
   e) Local acceptance and readiness for collaboration.

## Choosing the IOA approach

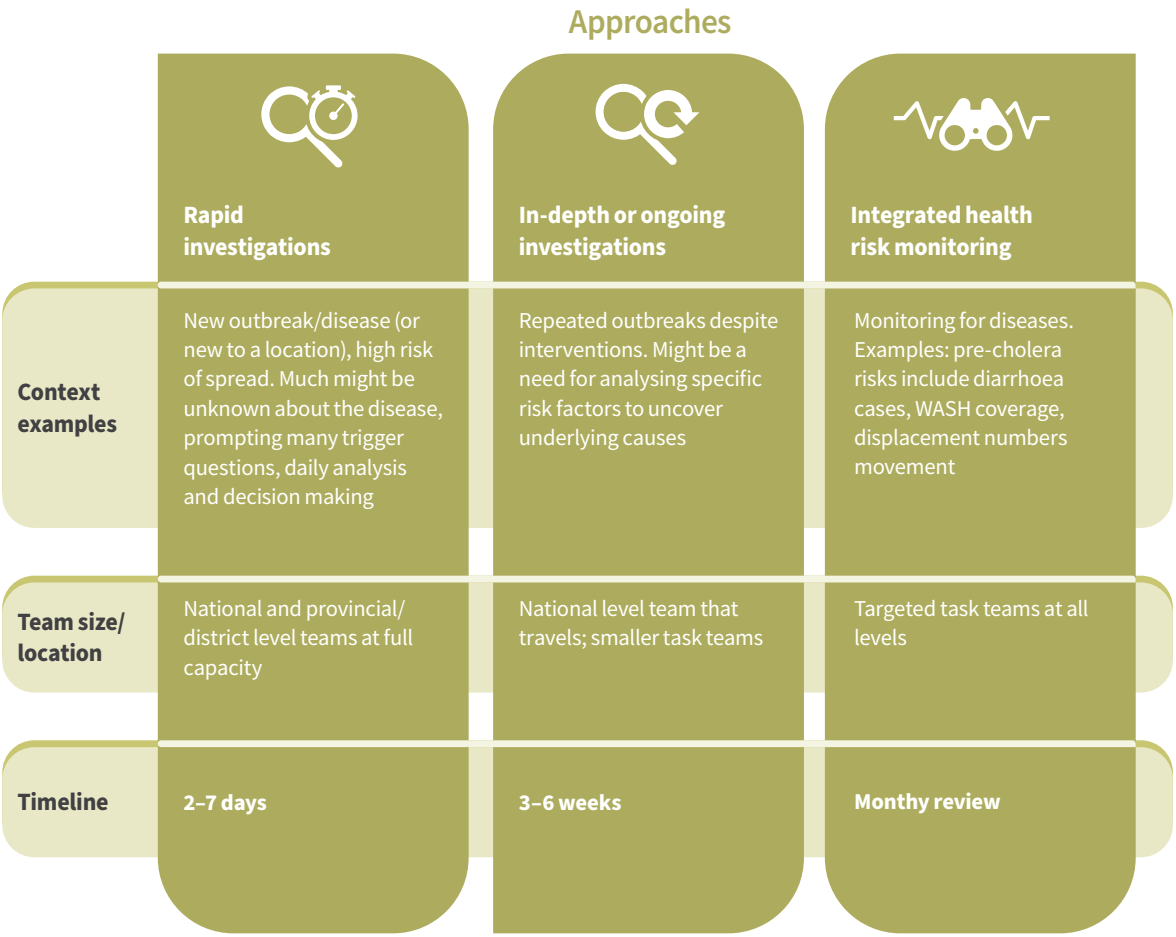
Based on the context and needs assessment, select one of the following IOA approaches (Figure S2.2)

1) **Rapid investigations**
   a) Context: new outbreak or disease, high risk of spread, much unknown about the disease.
   b) Team size/location: national and provincial/district level teams at full capacity.
   c) Timeline: 2-7 days.
   d) Example: high rates of nosocomial infections despite healthcare worker training.

2) **In-depth or ongoing investigations**
   a) Context: repeated outbreaks despite interventions, need to analyse specific risk factors.
   b) Team size/location: national level team that travels; smaller task teams.
   c) Timeline: 3-6 weeks.
   d) Example: repeated measles outbreaks despite sufficient vaccine coverage.

3) **Integrated health risk monitoring**
   a) Context: systematic observation and analysis of health risks.
   b) Team size/location: targeted task teams at all levels.
   c) Timeline: monthly review.
   d) Example: monitoring pre-cholera risks like diarrhoea cases and WASH coverage.

### Figure S2.2. IOA Approaches for specific context examples, team sizes and timelines




## Determining the most appropriate IOA structure for each IOA approach

For each IOA approach, the ideal structure is selected based on the specific needs and context. However, in situations where the ideal structure is not feasible, consider alternative structures (Figure S2.3, Figure S2.4, Figure S2.5).

1) Rapid Investigations
   a) Ideal structure: **Emergency operations center (EOC)**.
      Rationale: an EOC provides a centralised command and control facility during acute public health emergencies, facilitating rapid decision-making and coordination.
   b) Alternative structures: permanent cell or ad hoc group(s) or individual(s) working on IOA
      Rationale: in the absence of a formal EOC, a permanent cell can be repurposed to provide emergency IOA support to a crisis. Alternatively, ad hoc groups or other existing structures can be formed to collaborate informally, leveraging IOA principles to address immediate needs.

2) In-depth or ongoing investigations
   a) Ideal structure: **ad-hoc group or individuals working on IOA**
      Rationale: small, informal groups can be assembled to tackle specific questions or issues.

b) Alternative structures: permanent cell
Rationale: in the absence of ad-hoc groups and individuals, a permanent cell offers a stable and continuous platform for detailed investigations and long-term analysis, with multi-disciplinary members systematically engaged in IOA alongside their regular duties.

3) Integrated health risk monitoring
   a) Ideal Structure: **permanent cell**.
   Rationale: for ongoing health risk monitoring, a permanent cell ensures consistent and systematic observation, data collection, and analysis, integrating with existing health frameworks.
   b) Alternative structures: ad hoc group(s) or individual(s) working on IOA
   Rationale: ad hoc groups can be engaged periodically to review and analyse health risk data.

These three IOA structures are fluid and can evolve from one into another depending on the public health emergency.

# Roles in an IOA team

- **Emergency operations centre** – a multi-disciplinary team working at full capacity, able to analyse a range of data and information sources, including epidemiologists, data scientists, social scientists, anthropologists, mathematical modellers, economists and One Health experts. All disciplines do not need to be represented; this is dependent on the public health emergency.
- **Permanent cell** – a multi-disciplinary team, able to analyse a range of data and information sources, core members may include an epidemiologist, a data scientist and a social scientist, whilst other experts join as needed. All disciplines do not need to be represented; this is dependent on the Public Health Emergency.
- **Ad hoc groups or individuals working on IOA** – often an epidemiologist or data scientist, applying IOA principles to a trigger question.

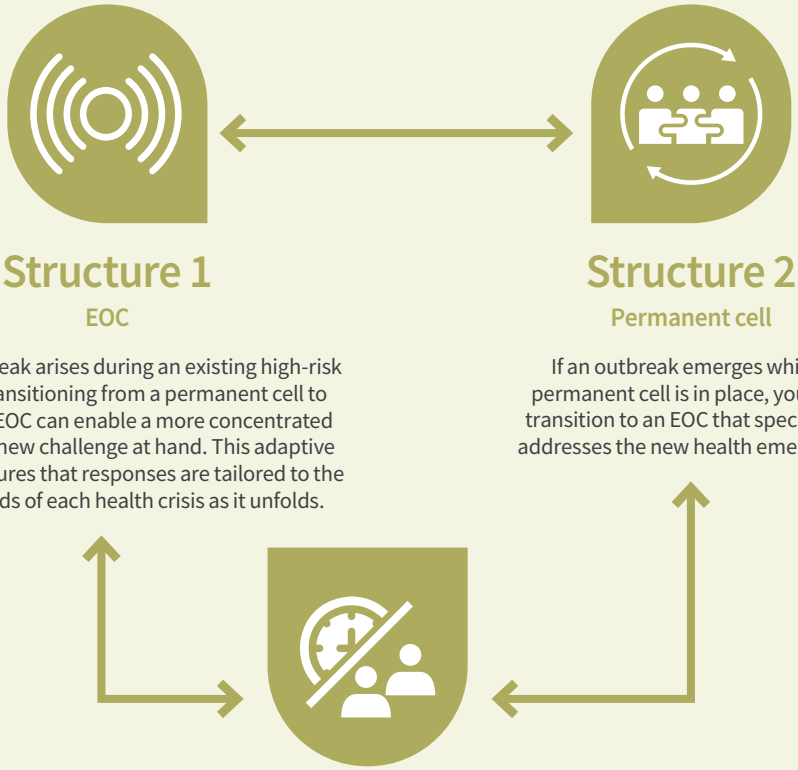
### Flexible role Assignment

1) Adapt roles based on the specific needs and objectives of the IOA initiative.
2) Use part-time or ad hoc capacities of outbreak response actors.
3) Leverage the global IOA network for additional support.

# IOA structures for different IOA approaches

**How IOA structures can be adapted and transition into/from each other based on specific needs**

## Figure S2.3. How each IOA structure can be used during high-risk outbreaks




During a high-risk outbreak, health risk monitoring is happening through daily surveillance and pillar updates that result in the identification of trigger questions. Daily review of risks takes place. Trigger questions can be raised from response pillars (e.g., IPC/WASH) seeking support to better explain differences in nosocomial infection rates in one town compared to another; or surveillance and clinical care pillars seeking to understand high caseloads or case fatality.

# Repeated outbreaks or public health risks

**How IOA structures can be adapted and transition into/from each other based on specific needs**

## Figure S2.4. IOA structures-purposes and functionalities

### Structure 1

**EOC**

IOA may use an EOC already in place for an emergency to address repeated public health concerns. For example, the EOC may be set up to respond to an EVD outbreak in an affected State.

Weekly routine surveillance data and monitoring note measles cases emerging weekly despite widespread previous vaccination efforts and intensified surveillance during the EVD response. The EOC may also support understanding pre-existing health risks for repeated outbreaks.

### Structure 2

**Permanent cell**

In a province, a permanent cell under the provincial health authority may be comprised of focal points from different organisations or sectors to support answering trigger questions that may arise.

A permanent cell will already have a strong understanding of existing evidence, information, and data and will know who are the key stakeholders to best support answering the question.

### Structure 3

**Ad hoc group(s) or individual(s) working on IOA**

Efficient management of health risks like polio outbreaks can occur without a permanent IOA cell. Instead, a collaborative effort by various stakeholders, such as provincial health authorities and technical experts, may form an ad hoc group focused on analysing and addressing the issue. While there may not be a permanent structure at every level, national and provincial entities can come together as needed, leveraging their collective expertise to understand and mitigate repeated health risks in targeted locations. This fluid, coordinated approach ensures that even without a permanent cell, health challenges are met with effective, informed responses.

# Health risk monitoring

**How each IOA structure can be used for health risk monitoring**

## Figure S2.5. IOA structures-purposes and functionalities

### Structure 1

EOC

Health risk monitoring is an integral part of an EOC, where information from various sectors and actors is reviewed daily to quickly identify and prioritise emerging health risks, including broader impacts on health and service utilisation. This constant vigilance involves processing a vast array of data—from healthcare workers, community reports, DHIS2 stats, to surveys—ensuring even indirect risks like nosocomial infections are promptly addressed alongside direct case counts.

### Structure 2

Permanent cell

In a permanent cell, health risk monitoring involves regular monthly coordination with key partners to examine trends specific to each location. The focus is on tracking leading indicators and risk factors for prevalent infectious diseases. For instance, in areas prone to cholera, this might include scrutinising WASH-related risks, water supply, movement patterns, diarrhoea case numbers, and ORS stock levels. This collaborative approach enhances the response to immediate concerns and aids in pre-empting future outbreaks by addressing the root causes common to diseases like cholera, measles, or polio.

### Structure 3

Ad hoc group(s) or individual(s) working on IOA

Post-emergency scenarios, such as after a volcanic eruption, may necessitate ad hoc health risk monitoring to assess community health impacts and changes.

Different sectors collaborate for this: maternal health by MOH and UNICEF, vaccinations by MOH and WHO, and animal health and migration patterns by relevant stakeholders, aligning with the One Health approach that integrates human, animal, and environmental health monitoring.

**Health risk monitoring aims at understanding and managing threats to health within communities or populations. It can be set up within an EOC, a permanent cell, or through ad hoc groups/individuals working on IOA.**

# Additional resources

- Please refer to Chapter 1. Introduction and Chapter 2. Structures and approaches of the IOA toolkit for more information.
- To help develop the TOR document, consider using the Template 1. IOA cell TOR

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# SOP 3. The IOA process

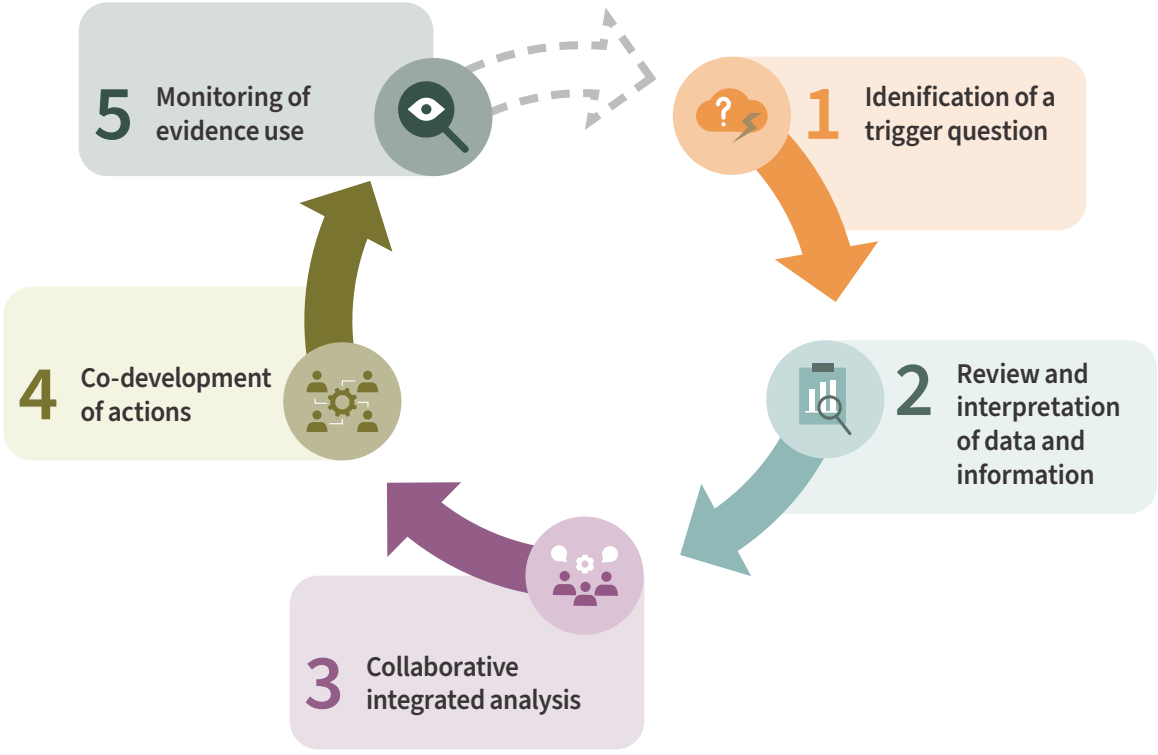
## Purpose

This standard operating procedure (SOP) aims to support outbreak and public health emergency decision makers to effectively implement the IOA process to respond to public health challenges, ensuring thorough analysis and collaborative action.

## Process

The Integrated Outbreak Analytics (IOA) process is designed to be flexible and adaptable to various public health scenarios. This SOP outlines the steps to initiate and conduct IOA, from identifying a health risk to monitoring and using evidence for ongoing improvements (Figure S3.1).

### Figure S3.1: Summary of the IOA process



## 1. Identification of the trigger question

a) **Identify** a trigger question: an epidemiological trend or health risk/observation that is concerning due to its potential impact on mortality, morbidity or transmission
b) **Possible sources:** shifts in health information systems (HIS) data, epidemiological trends, requests from response pillars, or observed contextual changes.
c) **Verification:** verify that the trigger question identifies a genuine health risk or observation, not merely a reporting error or unrelated issue. It must also be relevant and significant enough to warrant investigation for risk mitigation.

## 2. Review and interpretation of data and information

a) **Stakeholders involvement:** engage multidisciplinary teams and stakeholders for a collaborative review.
b) **Data sources:** use existing data from surveillance systems, HIS, event records, climate and ecosystem programmes, local economy reports, healthcare workers, and the community (list non exhaustive).
c) **Review:** perform a thorough analysis and interpretation of the collected data to understand the current situation. Identify gaps in the existing information that need to be addressed.
d) **Additional information collection (if required):**
    i) **Address any gaps** found during the initial review of existing information.
    ii) **Rapid protocol development:**
        a. Develop a rapid protocol in collaboration with national, provincial, and local health actors.
        b. Obtain necessary approvals and commitments from relevant authorities.
    iii) **Tool selection:** select and adapt tools and methodologies for additional data collection.
    iv) **Data collection:** deploy the tools to gather the required additional information.

## 3. Collaborative integrated analysis

a) **Data and information compilation:** collect all necessary information and compile a master list of key risks and observations and any identified contributing factors and/or underlying causes.
b) **Integrated analysis:** conduct a collaborative integrated analysis with stakeholders and partners to understand and verify contributing factors and underlying causes of identified risk factors.
c) **Further collection:** if needed, continue data collection and review during this phase.
d) **Classification:** sort the master list of risks and observations, contributing factors and underlying causes into specific monitoring tools (MONITITO) that will be shared with relevant partners during co-development sessions.

## 4. Co-development of actions

a) **Engagement:** during co-development sessions engage all relevant stakeholders to co-develop actions that address the contributing factors and underlying causes identified during the collaborative integrated analysis.
b) **Action plan:**
    i) Collaborate at local, provincial, and national levels to co-develop actions.
    ii) Establish timelines and responsibilities for implementing these actions.
c) **Documentation:** document all co-developed actions, responsibilities, timelines, and performance indicators (e.g. into MONITITO).

## 5. Monitoring of evidence use

a) **Implementation:** partners implement the co-developed actions as per the established timelines and responsibilities.
b) **Feedback:**
   - Partners provide regular updates on progress.
   - Consolidate all feedback, including implementation challenges, into a monitoring tool (e.g. MONITO).
c) **Review:**
   - The designated person responsible for managing the monitoring tool will review partner updates, including the status of action implementation and any outcomes that may affect the identified health risks/observations.
   - If actions do not yield positive outcomes, conduct further analysis to identify any missed contributing factors or underlying causes.

# Key attributes of the IOA process

a) **Flexibility:** the IOA process is adaptable to different contexts and needs.
b) **Collaboration:** continuous collaboration with stakeholders and partners is essential throughout the process.
c) **Documentation:** maintain thorough documentation at each step to ensure transparency and accountability.

# Additional resources

- Please refer to Chapter 3. IOA process in the IOA toolkit for more information.
- For categorising contributing factors and underlying causes consider using the Template 2. Root cause analysis for trigger question investigation and/or the MONITITO (Chapter 7. Co-development of actions).
- For monitoring of evidence use consider using the MONITO (Chapter 8. Monitoring evidence use).

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# SOP 4. Identification and investigation of trigger questions in IOA

## Purpose

This standard operating procedure (SOP) aims to establish a systematic approach for identifying, validating, and investigating trigger questions that indicate potential public health risks, facilitating an effective and collaborative response. This SOP is designed to be adaptable to various public health scenarios and should be reviewed regularly to incorporate new insights and methodologies.

## Process

The process for identifying and investigating trigger questions involves several critical steps to ensure issues with a high potential impact on mortality, morbidity and transmission in a public health emergency are identified and trigger an IOA investigation.

### 1. Identification of trigger questions

a) Trigger questions are identified based on unusual trends or changes observed in public health data.
b) These questions may arise from:
   - Direct observation of epidemiological trends, shifts in HIS data usage, or contextual changes
   - Requests from response pillars, surveillance teams, partners/response actors (e.g., health or WASH cluster, UN organisations, NGOs, academia), provincial health authorities or emergency response coordinators/decision-makers
c) Ensure the trigger question is specific in terms of who is affected (person), the period of the observation (time) and the location (place).

### 2. Validation of trigger questions

a) Once a trigger question is identified, it is crucial to validate it to ensure the observation is genuine and not influenced by data collection errors or programme issues.
b) Key validation steps include:
   i) **Assessing localised trends:** determine if the trend is specific to certain districts or widespread.
   ii) **Comparing health situations:** compare the health situation in the affected area to neighbouring areas.
   iii) **Reviewing recent events:** consider recent events that may have influenced the data.
   iv) **Evaluating historical data:** determine if similar situations have been analysed previously.
   v) **Analysing community risks:** consider current community risks, such as displacement, health service utilisation, and health behaviours.
   vi) **Reviewing programme coverage:** assess the extent of service coverage and the involvement of organisations

## 3. Investigation of trigger questions

a) Investigating a trigger question involves several steps to identify risk factors, contributing factors, and underlying causes (Figure S3.1).
b) Investigation steps include:
   i) **Identify potential risk factors:** begin by identifying evidence of risk factors linked to the observation.
   ii) **Assess contributing factors:** review available information to identify elements contributing to these risk factors.
   iii) **Analyse underlying causes:** further analyse each contributing factor to uncover the underlying causes behind them.
   iv) **Co-develop actions:** finally, based on your observations, propose co-developed actions with partners aimed at addressing the underlying causes. These actions should lead to a more effective and sustained response.

# Additional resources

- Please refer to Chapter 4. Trigger questions of the IOA toolkit for more information.
- Consider using the Template 2. Root cause analysis for trigger question investigation

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# SOP 5. Reviewing and interpreting data and information

## Purpose

This standard operating procedure (SOP) aims to provide a systematic approach for reviewing and interpreting existing information and data to gain a comprehensive understanding of public health risks and outcomes. This SOP is designed to ensure a comprehensive and structured approach to reviewing existing information and data, enabling effective and informed decision-making in public health interventions.

## Scope

This SOP applies to all IOA stakeholders involved in information review and analysis.

## Responsibilities

- **Team lead:** oversees the review process.
- **Data analysts:** conduct detailed analysis of existing data based on agreed upon plan.
- **Subject matter experts:** provide insights and context for data interpretation.
- **Local staff:** collect and provide relevant data and context specific insights.

## Process

The process for reviewing existing information and data is flexible and adaptable to the local context but involves several broad steps.

### 1. Preparation

a) Identify the scope of the review and specific objectives.
b) Consider what information is needed, information sources and types; and how this information will be collected, analysed and used.
c) Gather all relevant existing information, including case data, environmental information, community behaviours, and socioeconomic factors.

### 2. Information collection and categorisation

a) Compile information from various sources such as health records, environmental reports, socioeconomic databases, and laboratory results.
b) Organise information into the following categories (all categories are not compulsory, and some may overlap):
   i) **Population health and services:** disease incidence, vaccination rates, healthcare accessibility.
   ii) **Geographic, environmental and animal factors:** terrain features, climate impact, wildlife populations.

iii) **Community economic landscape:** income levels, unemployment rates, economic dependencies, food insecurity.
iv) **Gender and social dynamics:** gender-specific roles and responsibilities, social structures, power dynamics and access to resources.
v) **Community behaviours and perceptions:** attitudes towards health measures, adherence to advisories, healthcare seeking behaviours.
vi) **Healthcare worker knowledge/capacity:** training levels, availability of resources, implementation challenges.
vii) **Geopolitics and events:** political stability, major events affecting healthcare.
viii) **Programme and response initiatives:** public health campaigns, emergency response plans.
ix) **Case analysis and laboratory:** individual case data (inclusive of suspected, probable & confirmed), age, gender, symptoms, outcomes, laboratory data.

## 3. Information review and analysis

a) Conduct a thorough review of each data category.
b) Use qualitative and quantitative methods to analyse data.
c) Identify trends, correlations, and gaps in data.
d) Engage subject matter experts for context and deeper insights into the data.

# Additional resources

- Please refer to Chapter 5. Review and interpretation of data and information of the IOA toolkit for more information.
- Consider using the Template 3. Reviewing information needs, sources, and uses to support the identification and analysis of existing information.

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# SOP 6. Additional information collection

## Purpose

This standard operating procedure (SOP) aims to establish a structured approach for collecting additional information required to address gaps identified during the IOA process.

## Scope

This SOP applies to all IOA stakeholders involved in data collection, analysis, and public health response. This SOP ensures a systematic and collaborative approach to additional information collection, enabling comprehensive analysis and informed decision-making in public health responses.

## Responsibilities

- **Team lead:** oversees the additional information collection process and ensure compliance with the SOP.
- **Data analysts:** develop tools and methodologies for data collection and analyse the collected data.
- **Stakeholders and partners:** collaborate in the selection and adaptation of data collection tools and methodologies.
- **Local staff:** collect and provide relevant data as needed. Conduct data collection as per the developed tools and methodologies.

## Process

The process for collecting additional information and data is flexible and adaptable to the local context and involves several broad steps.

### 1. Identify the need for additional information

a) **Assessing data/information gaps:** after reviewing existing information, identify any specific gaps that may require additional data collection to fully answer the trigger question. When additional information is required, clearly specify the types of data necessary, focusing on their practical application.
b) **Engage end users:** involve end users from the beginning to ensure accountability, relevance, and effective use of collected information.

### 2. Develop collaborative rapid protocol

a) **Define objectives:** clearly define the goals and objectives of the additional data collection.
b) **Establish rapid protocol:** develop a rapid protocol (if terms of reference [TOR] does not exist), specifying the objectives, information sought and methodologies.

## 3. Collection of information

a) **Collaborative development:** work with stakeholders and partners to collaboratively select and adapt tools and methodologies.
b) **Responsibility:** assign responsibilities for data management and outline a plan for information sharing.
c) **Training:** train local staff on the use of data collection tools and methodologies.
d) **Data collection:** conduct data collection as per the developed tools and methodologies.
e) **Quality assurance:** implement quality assurance measures to ensure data accuracy and reliability.
f) **Ethical considerations:** prepare clear information for study population; prepare informed consent collection form; plan regular information session to study population; and share results of study with study population.

## 4. Considerations for additional information collection

Key list of questions to help ensure the usability of additional information in answering the trigger question:

- What is the specific issue(s), trend(s), etc. that we are aiming to understand?
- What data/information is needed to help us understand the specific issue(s), trend(s), etc.?
- Does existing data provide insights into these issue(s), trend(s), etc.? If so, what does it reveal?
- If existing data is lacking, what specific information needs to be collected to better understand the issue(s), trend(s), etc.?
- Which experts should be consulted to refine the information collection tools, and optimise the data gathering strategy? (e.g., One Health expert, nutrition expert, HCW)
- How will this new additional information be used, and by whom?
- What are potential actions that could be taken based on new insights?
- Who is best positioned to lead/implement these actions? (e.g., health care workers, partner agencies, community members, district health officials, etc.)

# Additional resources

- Please refer to paragraph 5.3 Additional information collection of the IOA toolkit for more information.
- Consider using the Template 4. Rapid protocol to guide the development of a rapid protocol for additional information collection.

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# SOP 7. Collaborative integrated analysis

## Purpose

This standard operating procedure (SOP) aims to provide a structured approach for conducting collaborative integrated analysis within the IOA process. This SOP ensures that stakeholders and multidisciplinary teams effectively collaborate to identify, analyse, and address key risks and observations, leading to informed decision-making and improved public health responses.

## Scope

This SOP applies to all IOA stakeholders involved in information review and analysis.

## Responsibilities

- **Team lead:** facilitates the collaborative analysis sessions, ensure the participation of all relevant stakeholders, and guide the iterative process of data collection and analysis.
- **Data analysts:** compile and analyse data from various sources, prepare visualisations, and support the discussion with evidence-based insights.
- **Stakeholders:** actively participate in discussions, provide expertise, and contribute to the interpretation of findings, as well as to the identification of risks and observations, including contributing factors and underlying causes.

## Definitions

- **Collaborative integrated analysis:** a data analysis method consisting of a collaborative effort by multidisciplinary teams who examine, analyse, interpret and compile data from various sources to identify risk factors and their main causes.
- **Triangulation:** methods of validating observations and providing a complete picture of a situation through the use of multiple data sources.

Chapter 6. Collaborative integrated analysis seeks to provide an illustration of these definitions.

## Process

The process for collaborative integrated analysis is flexible and adaptable to the local context and involves several broad steps.

### 1. Preparation

a) Identify the scope of the analysis and objectives.
   i) Identify the primary goals of the collaborative integrated analysis.
   ii) Establish the key questions to be addressed (trigger questions).

## 2. Collaborative integrated analysis

a) Data collection and sharing
   i) Continuously collect additional data as necessary to address the trigger questions.
   ii) Share data and insights across all disciplines involved.
b) Interpretation of analysis
   i) Integrate findings from different information categories to form a holistic understanding of the public health emergency.
   ii) Interpret information in the context of the current health situation and trigger questions.
   iii) Consider the economic, social, and cultural aspects influencing the data.
c) Discussion and debate
   i) Engage in collaborative discussions to interpret the data.
   ii) Debate the findings to ensure a thorough understanding of the contributing factors and underlying causes.
d) Iterative process
   i) Reiterate the data collection, sharing, and discussion process as needed.
   ii) Refine the analysis based on new information and insights.

## 3. Compilation of findings

a) Triangulation
   i) Verify the observations by cross-referencing with data from various sources.
   ii) Ensure the robustness and validity of the observations.
b) Master list of key risks and observations
   i) Compile a master list of identified risks and observations, and their underlying causes.
   ii) Document the observations from the analysis e.g. in a MONITITO that will be shared with all the stakeholders during a co-development session.

## 4. Presentation of collaborative integrated analysis

a) Report/presentation preparation
   i) Prepare a detailed report or presentation summarising the collaborative integrated analysis.
   ii) Include visualisations and key findings for effective communication
   iii) Share the report with all stakeholders in the co-development of actions meeting.

# Additional resources

- Please refer to Chapter 6. Collaborative integrated analysis of the IOA toolkit for more information and examples.

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# SOP 8. Co-development of actions and monitoring of evidence use

## Purpose

This standard operating procedure (SOP) aims to outline the process for the co-development and monitoring of actions to address key risks and observations identified during the IOA process. This SOP ensures that stakeholders and multidisciplinary teams apply a structured and effective approach to the co-development and monitoring of actions, enhancing the overall impact and sustainability of health interventions.

## Scope

This procedure applies to all stakeholders involved in the IOA process, including the Ministry of Health (MOH), local, provincial, and national authorities, NGOs, UN agencies, and other stakeholders.

## Process

The co-development of actions is a critical phase of the IOA process aimed at formulating actionable plans based on identified key risks and observations. This phase involves collaborative efforts with various partners to ensure effective and sustainable implementation of action.

### 1. Preparation

a) Engagement in IOA process
   i) Ensure that all partners have been actively involved in the IOA process from the onset, including the collaborative integrated analysis.
   ii) Review and interpret existing data collaboratively and collect additional data if necessary.
b) Identifying stakeholders
   i) Assess and determine the most suitable partners to address the identified key risks, observations, contributing factors, and underlying causes.

### 2. Co-development of actions

a) Co-development sessions
   i) Organise sessions involving relevant partners across various levels (district, provincial, national authorities, NGOs, UN agencies).
   ii) Use the master list of key risks and observations to guide discussions and set priorities for actionable risks and observations.
b) Creating tailored monitoring tools (e.g. MONITITOs)
   i) Develop a tailored monitoring tool for each partner. This tool will detail the co-developed actions, assign responsibilities, and outline implementation timelines and follow-up schedules.
   ii) Each stakeholder should accurately capture, contact details, key risks, contributing factors, underlying causes, and proposed actions on the tool.

c) Action planning
   i) Propose specific, measurable, achievable, realistic, and time-bound (SMART) actions and activities.
   ii) Ensure that every proposed action is actionable and aligned with achievable goals.
   iii) Discuss and establish the potential impact of each action with stakeholders and partners.

## 3. Monitoring of actions

a) Using MONITO
   i) Integrate insights from individual MONITITOs into the overarching monitoring tool, MONITO. This tool will provide a comprehensive view of the response strategies and approaches.
   ii) Ensure that all actions are rooted in analysed data and aligned with collective health objectives.
b) Indicator development:
   i) Develop clear indicators for each action to monitor progress, performance, and associated outcomes.
   ii) Each action should have a designated person responsible for implementation, monitoring, and reporting.
c) Regular review and feedback:
   i) Maintain regular communication with partners during data collection, analysis, and action implementation phases.
   ii) Provide space for feedback to ensure the data and information provided are useful and actionable.
   iii) Continuously monitor the implementation of recommendations.
   iv) Monitor the outcomes of interventions and adjust strategies as needed, if the expected changes are not observed.

## 4. Best practices for co-development and monitoring

a) Quality over quantity:
   i) Prioritise the development of a few solid operational actions over numerous vague ones.
   ii) Ensure that actions are operational with clear steps detailing implementation and responsibilities.
b) Collaborative approach:
   i) Engage all relevant partners in the action development process, ensuring that key indicators are included to monitor implementation.
   ii) Promote investment in local actors for sustainable and long-term responses.
c) Expert involvement:
   i) Involve experts/specialists early in the process to provide insights and improve the effectiveness of co-developed actions.
   ii) Use their expertise to identify key challenges and opportunities for improving health outcomes.

## 5. Documentation and reporting

a) Action documentation:
   i) Use MONITITO and MONITO to document all co-developed actions, responsibilities, and timelines.
   ii) Ensure that all information is accurately recorded and shared with relevant stakeholders and partners.

b) Reporting:
   i) Establish a regular reporting schedule to track the progress of implemented actions.
   ii) Use the collected data and feedback to continuously improve the co-development and monitoring processes.
   iii) Document lessons learned and best practices for future reference.

## 6. Understanding the distinct roles of MONITITO and MONITO

MONITITO and MONITO are tools that can be used for the co-development and monitoring of actions, each fulfilling distinct roles in action implementation and monitoring during emergencies. Here's a streamlined overview of how they function together:

MONITITO
Purpose: serves as an information collection/organisation tool used to support the co-development of actions.
Functions: collates contributing factors and underlying causes, helps partners identify addressable factors, and tracks management responsibilities and timelines for each action. A MONITITO is created for each stakeholder when key risks or observations are noted through collaborative analysis.

MONITO
Purpose: acts as the overarching monitoring tool of evidence use.
Functions: consolidates data from various sources into a comprehensive repository, tracking the status of actions, identifying reasons for any delays or failures, and monitoring outcomes through specific indicators.

### Operational relationship and usage

MONITITO: Used by stakeholder (i.e., on-site/field teams) for detailed, real-time data collection, ensuring actionable insights flow into the broader MONITO system.

MONITO: Managed centrally, integrating all inputs from MONITITOs to provide thorough monitoring and evaluation, crucial for accurately tracking all co- developed actions, implementation status, delays or failures, and outcomes associated witht the actions. This system ensures that while MONITO oversees strategic outcomes and broad analysis, MONITITOs supply the necessary details, making the overall monitoring effective and reflective of current ground realities.

## 7. Monitoring and evidence use

Key questions that IOA teams and partners might consider when filling out and working through the MONITO:

- What factors contribute to some co-developed actions being successfully implemented while others are abandoned?
- What causes delays in the implementation of certain actions, while others are completed on time?
- Why do certain groups of actors (e.g., local NGOs) develop more actions compared to others (e.g., UN agencies)?
- Why are certain health emergencies (e.g., cholera) given more focus in terms of action development and implementation compared to others?

Considering these questions helps IOA teams and partners to identify whether the objectives of the action need to be redefined, or whether different support is required to facilitate the implementation of an action or activity. For example, more money, human resources, or logistics would improve the feasibility of the activity for a particular response partner (end user).

# Additional resources

- Please refer to Chapter 7. Co-development of actions and Chapter 8. Monitoring evidence use of the IOA toolkit for more information and examples.
- Consider using the Template 5. Expanded root cause analysis for co-development of actions when considering which actions to recommend, indicators of performance and assigning responsibility.
- We recommend using the MONITITO (Chapter 7. Co-development of actions) and MONITO (Chapter 8. Monitoring evidence use) for the co-development and monitoring of actions.