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A Guide for Presenting Integrated Disease Surveillance and Response Data in Public Health Bulletins

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2020

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Abstract

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By Vanessa Orduna Zarazua

In Africa, public health surveillance has been challenging. [2] The region is often faced with the failure to detect and respond to epidemics which is due to their health systems and, development and implementation of surveillance and response. [2] Multiple vertical systems creates fragmented data which adds to these challenges. [2] In response to these challenges in Africa, Integrated Disease Surveillance and Response (IDSR) guidelines were adopted in 1998. [2] The IDSR guidelines detail “thresholds for action on priority diseases, public health events and conditions for responding to alerts” and introduced concepts of indictor-based and event-based surveillance as incorporated into IDSR. [3] Additionally, they define and illustrate the different types and approaches of public health surveillance.

The goal of IDSR was to be “comprehensive, integrated, [and] action-oriented”. [2] One core function of IDSR is the dissemination of public health data in epidemiologic bulletins, [2] much like that of the “Bill of Mortality”. [1] Of the 47 Member States in Africa, [4,5] and estimated two thirds (68%) share surveillance data through the feedback mechanism of IDSR. [2]

At present, the IDSR Guidelines provide limited guidance on how epidemiologic bulletins should be structured, what requirements must be met, and how data should be presented. Currently, published bulletins exhibit a myriad of inconsistencies such as the number of diseases reported, types of graphs and tables used, data visualizations and frequency of publication.

This special studies thesis project aims to create a standardized template for the implementation of WHO AFRO MS that integrates optimal methods and best practices for displaying data and data visualizations and establishes clear components and structure for how to present IDSR data published in PHBs. The template encourages better analysis and interpretation of IDSR data to optimize action and response in the case of a public health threat.

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Table of Contents

Chapter 1: Introduction

The understanding of public health surveillance (PHS) has evolved over time. [1] One early definition is the “watch or guard kept over a person, especially over a suspected person”. [1] Currently, PHS is defined and understood as the “monitoring of disease occurrence in populations” or the “continued watchfulness over the distribution and trends of incidence through the systematic collection, consolidation and evaluation of morbidity and mortality reports and other relevant data”. [1] There have been many examples of PHS throughout the centuries. The usage of mortality and morbidity data as a form of PHS originated nearly 600 years ago in Europe, during the Renaissance. [1] The purpose was the collection and interpretation of health-related data to identify appropriate actions and inform the public. This has shaped today’s concept of PHS as illustrated in its definition.

In the past thirty years PHS once recognized as a branch of epidemiology, has become a discipline on its own and an integral part of population health. [1] Weekly bulletins during the seventeenth century is one example. [1] During this century, data were collected sporadically during plagues and eventually parish clerks in London began publishing weekly reports that included the number of burials and causes of death. [1] Dissemination of this weekly report was published in the “Bill of Mortality” which illustrates principles of PHS which are still being used in the twenty-first century such as data collection, analysis, interpretation and dissemination of information. [1]

1.1 Rationale for Project

In Africa, PHS has been challenging. [2] The region is often faced with the failure to detect and respond to epidemics which is due to their health systems and, development and implementation of PHS and response. [2] Multiple vertical systems creates fragmented data which adds to these challenges. [2] In response to these challenges in Africa, Integrated Disease Surveillance and Response (IDSR) was conceived in 1998. [2] IDSR details “thresholds for action on priority diseases, public health events and conditions for responding to alerts” and introduced concepts of indictor-based and

event-based surveillance as incorporated into IDSR. [3] Additionally, they define and illustrate the different types and approaches of public health surveillance.

The goal of IDSR was to be “comprehensive, integrated, [and] action-oriented”. [2] One core function of IDSR is the dissemination of public health data in epidemiologic bulletins, [2] much like that of the “Bill of Mortality”. [1] Of the 47 Member States in Africa, [4,5] and estimated two thirds (68%) share PHS data through the feedback mechanism of IDSR. [2]

1.2 Problem Statement

At present, the IDSR guidelines provide limited guidance on how epidemiologic bulletins should be structured, what requirements must be met, and how data should be presented. Currently, published bulletins exhibit a myriad of inconsistencies such as the number of diseases reported, types of graphs and tables used, data visualizations and frequency of publication. CDC technical experts who support MOH and National Public Health Institutes (NPHIs) recognize the need for a standardized template to encourage a consistent approach to presenting IDSR data across NPHIs that produce bulletins.

1.3 Purpose of Project

This special studies thesis project aims to create a standardized template for the implementation of WHO AFRO MS that integrates optimal methods and best practices for displaying data and data visualizations and establishes clear components and structure for how to present IDSR data published in PHBs. The template encourages better analysis and interpretation of IDSR data to optimize action and response in the case of a public health threat.

Chapter 2: Literature Review

2.1 Disease in the World Health Organization African (WHO AFRO) Region

WHO AFRO is composed of 47 Member States (MS) [1,2] and historically has faced one of the largest disease burdens and challenges to effectively mitigate public health threats. WHO AFRO has consistently faced threats of (re)emerging infectious diseases (ID) and events of public health significance [3–10] contributing to the burden on MS. [2,3]

The leading causes of illness, death, and disability is not limited to communicable but also non-communicable diseases. [5] Approximately 100 –140 outbreaks are recorded annually [3,4] that impact mortality and morbidity. [2,7,10] While elimination and eradication of some ID have been underway for decades (e.g., polio, malaria, dracunculiasis, yellow fever, meningococcal meningitis, Ebola) the burden continues to be substantial. [5–7] WHO AFRO is often unable to deal with the burden of (re)emerging diseases due to ecological and economic/political reasons. [11] The region's multiple and vertical public health surveillance (PHS) have also caused a significant barrier to reduce (re)emerging diseases. However, action by WHO AFRO MS towards investing human and material resources to continue improving PHS in the region has been underway. [3] The region has already made great progress toward IDSR.

2.2 Public Health Surveillance (PHS)

PHS is the systematic collection, analysis, interpretation, and dissemination of health data. [7,9,12,13] The health data gathered generates information about disease trends (e.g., severity, etiologic characteristics, location of outbreaks needed to assess population health and enable decision-making and effective public health action). [3,9,12–14] Information generated from PHS (e.g., disease trends and identification of disease outbreaks) enables future detection, prediction, prevention, and assessment of threats. Further, these data are essential to set national priorities for response to outbreaks or

public health threats and mitigation of such events that include preparing, mobilizing, and allocating resources during emergencies. [3,9]

As a result, PHS is a key component of any public health system as it provides effective monitoring and evaluation of ID and the system itself. However, WHO AFRO faces several challenges given the implementation of the PHS in MS.

Historically public health systems – particularly PHS in WHO AFRO – have been implemented through vertical programs [7,8,12,15] which are disease-specific and include PHS for each (e.g., malaria, HIV/AIDS, tuberculosis, and other vaccine-preventable diseases). [7,8,12,15] Implementation of vertical PHS programs highlight drawbacks such as high cost to maintain various systems, duplication of work, lack of coordination and inability to detect outbreaks. [3,7,12,15] Vertical PHS programs further highlight inefficiencies such as ineffective monitoring and prevention of outbreaks. [2–4,8,12,15,16] Health data collected from PHS produce fragmented data and inaccurate case detection of threats, thus affecting appropriate policy-making. [3,8]

The rapid transmission of ID through pathogens has also urged the implementation of a global health security solution to address a leading factor of ID outbreaks. [2,6,9] The spread of known and unknown pathogens through global travel [2,6] called for the revision of the International Health Regulations (IHR). [2,6,9]

2.3 IHR 2005

The IHR 2005 was adopted by the WHO and MS to improve health security. IHR 2005 became a legal instrument providing a framework to coordinate and respond to public health threats among other core capacities caused by international travel and requires MS to evaluate their PHS structures and improve response capabilities. [5,12,13] IHR 2005 addresses ID and non-infectious threats to develop public health systems to prevent, detect, and respond. [2,4–6] It provides a list of priority diseases that require mandatory notification to WHO in the case of a pandemic or ability to spread rapidly. Constraints to IHR 2005 in WHO AFRO include multiple vertical PHS programs that do not harmonize and create fragmented data.

Long-standing (re)emerging ID threats and outbreaks in WHO AFRO highlight gaps and impediments of PHS; the adoption and implementation of IHR 2005 called for the need to integrate PHS. Given the disease burden in WHO AFRO and the need for integration, the conception, piloting, and adoption of the Integrated Disease Surveillance and Response (IDSR) framework was initiated.

2.4 IDSR

In 1998, weaknesses in PHS and poor outbreak preparedness and response in WHO AFRO were widely recognized. Coupled with increased global travel and the (re)emergence of ID, WHO AFRO adopted and implemented IDSR. [5–10,12–16] Of the 47 WHO AFRO MS, an estimated 43 or 44 are currently implementing IDSR, [4,5,8] implementation has varied by country. [8,10,15] Differences are partially due to the endemicity of diseases varying among countries in addition to workforce and other economic capacities available in MS.

Having adopted IDSR, WHO AFRO saw this as a platform to integrate vertical PHS and response capacities. [5,6,8,9,12–14,17] Additionally, IDSR became the platform to achieve IHR 2005 requirements since they both had common goals of improving early detection, verification, timely response, and dissemination of information on outbreaks and public health threats. [4,5,8] IDSR aims to strengthen PHS at the community, health facility, district, and national levels. [4,5,9,10,13,14] It is meant to develop action plans; mobilize resources; integrate vertical PHS; and improve the dissemination and use of health data more efficiently. [12,15]

2.4.1 IDSR Functions

IDSR consists of core and support functions. Core functions include (a) detection, (b) confirmation, (c) registration, (d) reporting, (e) data management, (f) data analysis, (g) outbreak preparedness, and (h) feedback. [6,8,10,14,18] Support functions include (a) guidelines, (b) laboratory capacity, (c) supervision, (d) training, (e) resources, and (f) coordination. [6,8,18] While assessments of PHS in WHO AFRO have revealed improvements, [8] there are still several functions of IDSR that require additional

development and strengthening. Strengthened PHS should ensure increased achievement of core capacities and inform decision and policy making of disease outbreaks and public health threats, thus alleviating the disease burden faced by WHO AFRO MS. [17]

Since the conception, piloting, and implementation of IDSR in WHO AFRO in 1998, the IDSR guidelines have seen two revisions.[5,10,13,18] Revisions have progressively implemented lessons learned from subsequent disease outbreaks, (re)emergence of ID (e.g., malaria, yellow fever) and public health threats such as the 2014 Ebola outbreak in West Africa. With each revision, the original list of priority diseases under IHR 2005 has expanded beyond ID to include noncommunicable diseases. [8,10]

2.4.2 Current Status of IDSR Implementation in WHO AFRO

PHS has improved with the implementation of IDSR and IHR 2005. Effective implementation and achievement of IDSR functions (e.g., reporting) requires the support of the health workforce.[12,13] Awareness of IDSR reporting and its purpose are essential for health workers' performance and willingness to adhere to reporting guidelines which result in efficient and effective PHS and response functionality.[6,13,19] Health workers can increase their awareness of IDSR through the core function feedback and support functions (e.g., supervision, training, and resources).

Review of IDSR in several countries revealed that 6/30 (20%) studies recommended the need for improved feedback and 8/30 (25%) recommended improving PHS reporting which included improved quality reporting and adequate provision of reporting forms.[13] Studies found that reports submitted to regional levels were inaccurate and had missing data resulting in poor quality data and reporting challenges.[12,13] Additionally, lack of feedback and supervision were found to demotivate health workers affecting their performance resulting in poor quality data reporting.[13,14] Reporting from public health officers and general workforce can be improved by providing feedback through national epidemiologic bulletins.[6,12,13,17] Epidemiologic

bulletins provide a feedback loop that are essential for the collection, analysis, and use of IDSR data.

2.4.3 IDSR Feedback Function

Feedback mechanisms – such as epidemiologic bulletins – provide timely, accessible, cost-effective, and actionable preventative data that can facilitate curtailing disease burdens, outbreaks, and public health threats.[9,14,15,19] They serve as monitoring and evaluation mechanisms of PHS that provide identification of problems and solutions.[14] Feedback provided through epidemiologic bulletins is made available on a weekly, quarterly, or annual reports and is frequently used to disseminate IDSR data.[9,10,12,14,17] Bulletins provide summary data on disease trends for notifiable and priority diseases, and analyses of the completeness and timeliness of reporting IDSR data from health facilities.[14]

PHS officers have indicated that they have found the dissemination of weekly bulletins useful to monitor health trends and share them with various stakeholders.[9,14,17] However, they also state that they could be more useful if the bulletins were sent to additional reporting sites.[17] Currently, feedback in the form of epidemiologic bulletins comes from the national level to the district levels.[6] Although, some country districts have adopted bulletins to disseminate information to health facilities and other reporting sites.[14]

The Uganda Ministry of Health (MOH) disseminates weekly IDSR data routinely used by national and sub-national technical leaders.[15] One study found that weekly trends reported in bulletins revealed that measles incidence was signaling a public health threat, thus the Uganda MOH conducted a mass vaccination campaign successfully resulting in the decline of measles. This is one example of how the dissemination and use of IDSR data in bulletins was used to effectively and efficiently respond to potential public health threats.

The dissemination of IDSR data is crucial to provide timely and reliable information to officials and the public. A key to useful data interpretation begins with

quality routine reporting from reporting sites. However, quality is affected when factors such as poor motivation, lack of supervision, or inadequate feedback is present. Furthermore, it is crucial that the epidemiologic bulletins disseminating IDSR data are presented in a clear and accessible structure that can be easily understood by all stakeholders, including members of the community.

2.4.4 Gaps with Current IDSR Approach

At present, the third edition of the IDSR Guidelines provide limited guidance on how epidemiologic bulletins should be structured, what requirements must be met, and how data should be presented. Currently, published bulletins exhibit a myriad of inconsistencies such as the number of diseases reported, types of graphs and tables used, data visualizations and frequency of publication. While the epidemiology for each country contributes to expected inconsistencies among the AFRO MS and the diseases they report on, minimum requirements on the variations of the number of diseases present an issue that requires additional review. Issues with the current approach of presenting IDSR data is that the epidemiologic bulletins do not provide background information on the diseases they report on. For example, they do not provide details on the impact of the disease on humans, how diseases are spread or how to protect oneself and the community. There are also no details on who, how, or where to report suspected cases. Data quality indicators are also missing from several published epidemiologic bulletins such as timeliness and completeness or any other type if quality indicator.

This special studies thesis project aims to create a template to be implemented by WHO AFRO MS that integrates optimal methods for how to present IDSR data published in PHBs.

Chapter 3: Methods

Prior to the initiation and development of a guide and template for presenting IDSR data published in epidemiologic bulletins, to the best of my knowledge and that of the CDC technical advisors, there does not exist guidelines, templates or agreed upon components of epidemiologic bulletins published by PHB.

To facilitate the organization of content within epidemiologic bulletins, a template and accompanying guidance document were developed specifically for this special studies thesis project.

For the development of the guide and template, there were four steps. The first step was to develop guidance on epidemiologic bulletin creation as described in the Third Edition of the IDSR Technical Guidelines.

- Perform an in-depth review of the Third Edition of the IDSR Technical Guidelines; and
- Identify the minimum requirements for an epidemiologic bulletin.

The second step was to review how WHO AFRO MS are currently presenting and displaying IDSR data in published epidemiologic bulletins.

- Systematic review of currently available and published epidemiological bulletins covering IDSR data from Ethiopia, Ghana, Pakistan, and Zambia for the year 2021 and 2022; and
- Identification of key components across bulletins.

The third step was to create an outline structure with the required and key components identified from steps one and two and expand on them to begin formulating a guide for the template.

- Creation of an outline structure that included …
    - minimum requirements identified in the Third Edition of the IDSR Technical Guidelines.
    - key components from currently available and published bulletins.
- Presentation of the template structure and draft template to CDC technical staff;

- Finalizing the structure of the template and drafting a guide for how to use it.

The fourth and final step was to present the guide and receive validation of the structure and components.

- Presentation of guide and template to CDC technical staff; and
- Presentation of the guide and template to selected MOH/NPHI staff for validation.

Steps three and four included several rounds of drafts that were reviewed by CDC technical staff. CDC technical staff were the primary group of stakeholders who, through technical assistance to WHO AFRO MS publishing PHB, identified inconsistencies with the presentation and data visuals of IDSR data in existing and currently published epidemiologic bulletins.

Chapter 4: Discussion

4.1 Conclusion

This special studies thesis project developed a standardized template that encourages a consistent approach for presenting IDSR data across NPHIs that produce epidemiologic bulletins in WHO AFRO MS. The standardized template recommends a maximum number of priority diseases to be reported, the types of graphs and tables to be used, best practices for data visualizations, and the frequency of publication for bulletins in PHBs.

Studies have indicated that reporting IDSR data from catchment areas to the next level (i.e., NPHIs and MOHs) has proven to improve the core functions of PHS systems, particularly the feedback function and data quality indicator. When IDSR data is collected and reported it is also analyzed, interpreted, and then disseminated back to the public. As a result, IDSR data disseminated in epidemiologic bulletins allows for the prediction, detection, prevention, and response to potential public health threats. MOH and other government agencies can adequately implement national strategies, priorities and take action to address public health threats and disease outbreaks.

Challenges that currently exist are that few NPHIs and MOHs are providing feedback to lower-level facilities and catchment areas that collect and report IDSR data. This, in turn, disincentives these facilities to accurately and completely report data in a timely manner creating inefficiencies in the ability to predict, detect, and prevent public health threats and outbreaks. Additionally, when data are not complete nor timely, it does not present an accurate landscape of the epidemiologic situation. Furthermore, challenges in the current approach for publishing IDSR data in epidemiologic bulletins are inconsistent among other WHO AFRO MS and best practices.

Existing challenges among published IDSR articles provide an opportunity to address and promote increased incentives for public health workers in health facilities and catchment areas to report complete and timely data to the next levels. Furthermore, taking advantage of these challenges can advance the dissemination and

use of epidemiologic bulletins to facilitate and promote national action during public health threats and disease outbreaks.

4.2 Limitations

This special studies thesis project has several limitations due to the collaboration with the CDC technical staff. One is that the standardized template included in the annex of this thesis is only a draft. The final version of the template is still being reviewed and vetted by other partners at WHO AFRO MS MOH and other stakeholders. Since the final version is yet to be completed, the proposed components and structure of the template can change to include new recommendations. Additionally, the scope of the current template can be increased or decreased based on feedback provided by WHO AFRO MS MOH.

Another limitation is that the template provides several recommendations that the CDC technical staff deem best practices. However, the landscape and ability for different WHO AFRO MS can vary greatly and therefore they may need to adopt or make extensive changes beyond the recommendations in the template and accompanying guide. This limitation is of the scope of each WHO AFRO MS and the workforce, economic, and political environment. Buy-in from MS MOH is also required.

A final limitation is that this special studies project and deliverable focus on one function of IDSR- dissemination of feedback. While publishing epidemiologic bulletins is important and fundamental to increasing quality reporting, the deliverable does not address the required training that is needed nor does it explore the current landscape and capacity of each WHO AFRO MS publishing epidemiologic bulletins.

4.3 Recommendations

Since the standardized template is in the draft phase and under review by stakeholders, one recommendation would be to continue research on how to incentivize community workers to collect and report quality data which is necessary for the appropriate and complete landscape of the epidemiologic landscape of an MS. This

could be achieved through additional training provided to individuals who collect and report the data. The training could include a review of SOPs and other guidelines for the collection of the data and when and who to report the data to the next level.

A second recommendation is also regarding additional training. Additional training on data visualizations and best practices could help increase analysis and interpretation of the reported data which in turn allows for more accurate detection, prevention, and response to potential public health threats. While the guide and standardized template is meant for NPHIs and MOHs producing, publishing, and disseminating epidemiologic bulletins the guide can be updated and evolve to provide additional guidance on best practices of data visualizations.

4.5 Public Health Implications

The product (standardized template) of this special studies thesis project aims to serve as a guiding document to NPHIs and MOHs in WHO AFRO MS producing, publishing, and disseminating epidemiologic bulletins as an indicator of data quality and providing feedback function of the IDSR framework. While a majority of WHO AFRO MS disseminate epidemiologic bulletins, the presentation and structure of these bulletins varies greatly.

Strengthening the structure of epidemiologic bulletins and its content facilities increased accurate interpretation and analysis of IDSR data necessary to accurately detect, prevent, and respond health threats and disease outbreaks. Additionally, accurate analysis of IDSR data allows for appropriate national strategy implementation and planning. Therefore, the implications of using and improved, structured template for producing epidemiologic bulletins have implications beyond the protection of health and implicates different levels of stakeholders.

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Appendix 1:

A Guide for Reporting Integrated Disease Surveillance and Response Data in National Public Health Bulletins

A Guide for Reporting Integrated Disease Surveillance and Response Data in National Public Health Bulletins (PHBs)

Introduction

The World Health Organization (WHO), the U.S. Centers for Disease Control and Prevention (CDC), and other technical partners adopted the Integrated Disease Surveillance and Response (IDSR) framework to implement comprehensive public health surveillance and response systems in Africa. The IDSR framework facilitates the use of surveillance and laboratory data to improve detection and response to the leading causes of illness, death, and disability.[1] It has several core functions, including identifying and reporting cases and events, analyzing and interpreting data, investigating and confirming suspected cases and outbreaks, preparing for potential epidemics, responding to detected outbreaks and emerging public health threats, and providing feedback. Producing and disseminating IDSR reports is an indicator of the providing feedback function and the focus of this guide.[2]

National public health bulletins (PHBs) serve as the government's primary communication channel for disseminating timely and relevant information to reduce public health threats.[3] They publish surveillance reports, outbreak reports, and original research. The purpose of disseminating surveillance data in PHBs is to inform stakeholders about potential health threats and provide information about prevention and treatment so that action can be taken to minimize threats and protect the public's health.[1-3] Publishing IDSR data in PHBs:

- Creates a published record of underreported diseases of underrepresented populations
- Provides feedback to district-level staff responsible for collecting and entering data, which can improve data quality
- Shares knowledge about trends in diseases and conditions at national and local levels.

CDC provides technical assistance to ministries of health (MOHs) and national public health institutes (NPHIs) to establish and strengthen national PHBs. As part of the technical assistance, a review of existing IDSR articles published in PHBs was conducted. It revealed presentations of data in tables and figures inconsistent with best practices for data visualization, limited analyses, and unrealistic recommendations for public health action. To address these limitations, CDC created this guide to facilitate publishing IDSR articles in a PHB. This guide distinguishes between an IDSR article and an IDSR report. An IDSR article is the manuscript published in a PHB. An IDSR report is the document submitted to MOH and WHO regions and headquarters.

The structure and content of this guide are based on the common elements of existing IDSR articles, the *Technical Guidelines for Integrated Disease Surveillance and Response in the African Region*,[4] and feedback from MOHs and NPHIs.

An IDSR article includes the following elements:

1. Overview, which provides objectives, description of data, and key findings from analyses
2. Report on IDSR data completeness and timeliness
3. Disease-specific reports
4. Reference tables with data for all reportable diseases

Note that each PHB issue also includes a cover page, front matter (e.g., table of contents), and a back page. This guide addresses all four elements of an IDSR article and the additional three elements of a PHB issue.

Throughout this guide, we provide templates for tables, figures, and language, which should be modified to meet users' needs, critiqued examples from sections of published IDSR articles. An editable version of an IDSR article template is provided in Annex 1.

As mentioned previously, a PHB can also include articles on original research and outbreak and surveillance reports. This guide is not intended for those types of articles. More information about types of PHB articles can be found in *A National Public Health Bulletin: Considerations for its Development*.

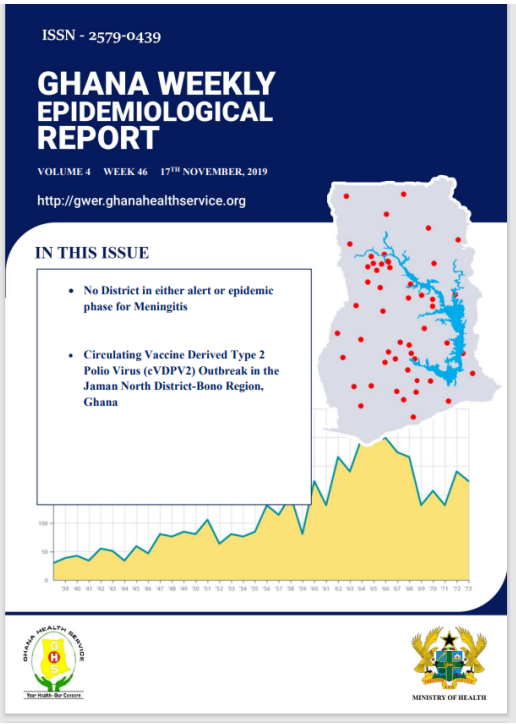
Cover Page and Front Matter

Cover Page

The first section of any PHB issue is the cover page, which provides branding functions for the publisher. The cover page can follow any format but should include:

- Country Name
- Name of Department/Division/Center of Producer
- PHB Name
- International Standard Serial Number (ISSN)
- Reporting period (e.g., epidemiological week or calendar quarter)
- Logos
- Date of publication.

The colors, logos and titles should be consistent with those of the MOH and/or the NPHI. Figure 1 is the cover page of Ghana's *Weekly Epidemiological Report*, which is published by Ghana Health Services.[5] Note that it includes all the elements listed above. The inside cover page states that the PHB is a publication of the Ghana Health Services and Ghana's Ministry of Health.



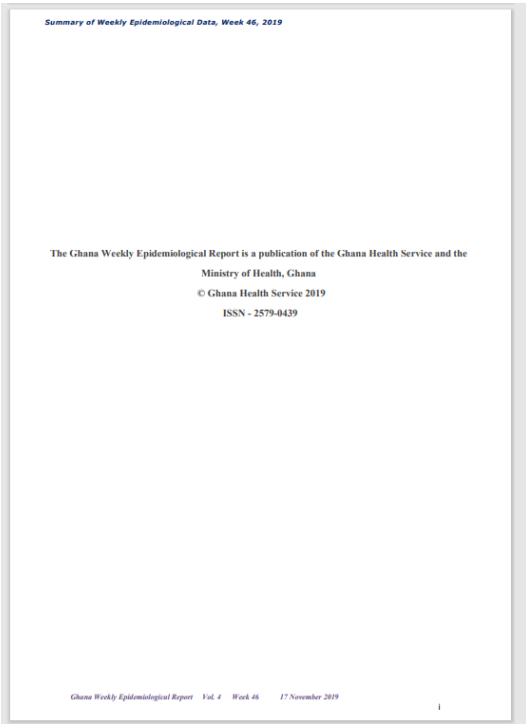
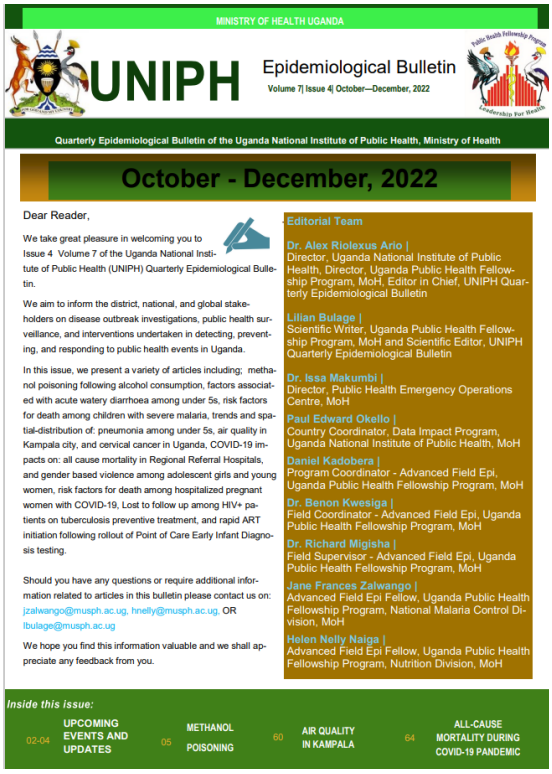


Figure 1: Cover pages of Ghana's PHB issue

Front Matter

The front matter of the PHB issue should include the table of contents and acknowledgements. The table of contents provides the reader with an overview of the content and structure of the issue. Including acknowledgements is a best practice because they serve as a "thank you" to colleagues who helped to collect and analyze the data. They also encourage collaboration. If acronyms, abbreviations, and initialisms are extensive, consider listing these to facilitate reader comprehension. Figure 2 is the combined cover page and front matter of Uganda's *Quarterly Epidemiological Bulletin of the Uganda National Public Health Institute*.[6] It includes all elements of a cover page plus the names of the Editorial Team, a letter to the reader from the editors, and the table of contents.



MINISTRY OF HEALTH UGANDA

UNIPH Epidemiological Bulletin

Volume 7| Issue 4| October—December, 2022

Quarterly Epidemiological Bulletin of the Uganda National Institute of Public Health, Ministry of Health

October - December, 2022

Dear Reader,

We take great pleasure in welcoming you to Issue 4 Volume 7 of the Uganda National Institute of Public Health (UNIPH) Quarterly Epidemiological Bulletin.

We aim to inform the district, national, and global stakeholders on disease outbreak investigations, public health surveillance, and interventions undertaken in detecting, preventing, and responding to public health events in Uganda.

In this issue, we present a variety of articles including; methanol poisoning following alcohol consumption, factors associated with acute watery diarrhoea among under 5s, risk factors for death among children with severe malaria, trends and spatial-distribution of: pneumonia among under 5s, air quality in Kampala city, and cervical cancer in Uganda, COVID-19 impacts on: all cause mortality in Regional Referral Hospitals, and gender based violence among adolescent girls and young women, risk factors for death among hospitalized pregnant women with COVID-19, Lost to follow up among HIV+ patients on tuberculosis preventive treatment, and rapid ART initiation following rollout of Point of Care Early Infant Diagnosis testing.

Should you have any questions or require additional information related to articles in this bulletin please contact us on: jzalwango@musph.ac.ug, hnelly@musph.ac.ug, OR lbulage@musph.ac.ug

We hope you find this information valuable and we shall appreciate any feedback from you.

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Inside this issue:

Figure 2: Cover page and front matter of Uganda's PHB

IDSR Article Overview

The overview of an IDSR article includes two items: an introductory paragraph with a list of featured diseases and conditions, and a highlights box with key takeaways.

Introductory Paragraph

Text Box 1 provides a template for language to include in the introductory paragraph of the overview section. It includes the following elements:

1. Article objective (i.e., an explanation of why IDSR data are published in the PHB)
2. A description of the data (e.g., timeframe of data (i.e., epidemiological week(s)), percentage of districts reporting)
3. A description of how data are collected and analyzed
4. A list of featured diseases or conditions

Dissemination of Integrated Disease Surveillance and Response (IDSR) data informs national strategies and policies and strengthens public health systems to detect, respond, and prevent disease outbreaks and other public health threats. IDSR data are collected at the community and district level health facilities and reported to the national level for analysis and dissemination. This IDSR article provides data for XX reportable diseases and events for epidemiological week XX (dates), collected from XX% (XXXX/XXXX) of public and private health facilities nationwide. This IDSR article also features X [LIST DISEASES/CONDITIONS].

Text Box 1: IDSR article introductory paragraph template

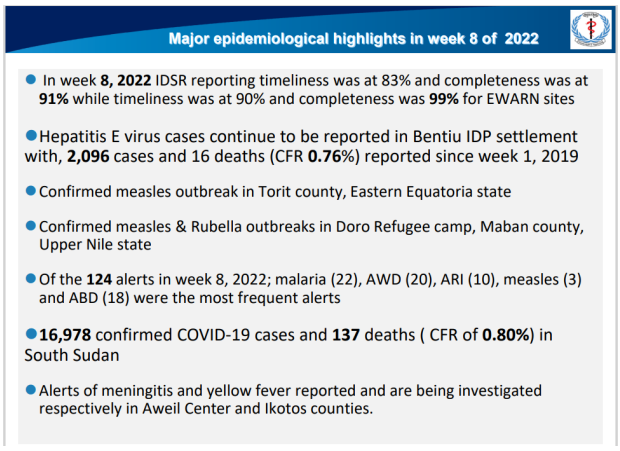
Highlight Box

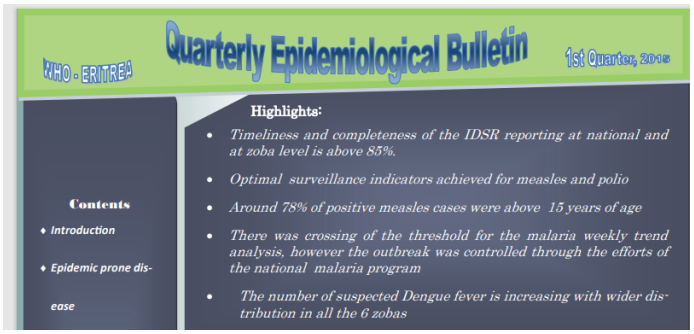
A "highlight" box presents a bulleted list of the most critical outcomes of the week and recommendations and resources for action. It should be concise and include no more than five bullets. Text Box 2 provides a template for language to include in a highlight box. The highlight box can be positioned/formatted according to the PHB's style guide. Figures 3a and 3b are the highlight boxes published in the PHBs of South Sudan and Eritrea, respectively.[7,8]

Highlights

- All districts and regions have timeliness and completeness rates above XX% which is [Above/below] the national target
- During the epidemiological week XX, Y cases were reported for Z disease
- Region X saw the highest number of suspected cases for disease X. Only X cases were confirmed.
- For more information on how to prevent and treat disease X, please visit [name of website].

Text Box 2: Highlights Box Template





Figures 3a and 3b: Highlight boxes of the South Sudan and Eritrea's PHB

A few characteristics of the highlight boxes presented as Figures 3a and 3b need further discussion.

- The number of bullets is limited to six, which is good. If the list is too long, it will be difficult for the reader to understand what information to prioritize.
- South Sudan's highlight box includes several acronyms that may not be familiar to the reader. Acronyms, abbreviations, and initialisms should be spelled out, or a list of should be provided in the front matter section of the PHB.
- South Sudan's highlight box includes both numerators and denominators of the percentages, which provides context to facilitate reader comprehension.
- Both highlight boxes provide data on timeliness and completeness, which gives the reader context on the quality of the data.

Completeness and Timeliness

Data on timeliness and completeness of reports are collected to assess quality of the reporting system at all levels. Reports submitted on time increases the feasibility of detecting and responding to potential health threats. If reports are incomplete or not submitted, then the aggregated information for district or regional levels is also incomplete and does not provide an accurate representation of the situation. There are several measures of timeliness, but for the purpose of presenting the information in an IDSR article, timeliness is the percentage of reporting sites that submitted reports on time at the district or regional level. Completeness captures the percentage of reporting sites submitting complete health data regardless of when reports were submitted. The targeted rate established by the WHO Regional Office for Africa is 80%.[9] Figure 4 provides formulas for calculating both timeliness and completeness.[10]

N = Number of health facilities expected to submit reports

T = Total health facilities submitting reports on time ("on time" is a measure established by each country in accordance with timelines set by WHO Regional offices)

L = Total health facilities submitting reports late

W = Total health facilities not reporting

100*T/N = Timeliness of reports

100*(N-W)/N = Completeness of reports

Figure 4: Formulas for calculating timeliness and completeness

Figure 5 is a template for presenting timeliness and completeness data in a table. A table is the preferred method for presenting the information because when presented in order of magnitude by percentage complete, the reader can easily understand which regions are missing data and therefore, not presenting an accurate picture of potential health threats.

Table X. Report on completeness and timeliness by region for epidemiological week XX

Region	Expected reports (N)	Completeness (%)	Timeliness (%)
Region 1	22	90	90
Region 2	42	90	90
Region 3	31	86	86
Region 4	24	85	70
Region 5	59	82	80
National	178	92	84

Figure 5: Template for presenting timeliness and completeness data in an IDSR article.

Text Box 3 provides an example of how to summarize data presented in the table.[8] The text should:

- State the number of health facilities expected to report (i.e., establishes the denominator for the rates)
- Describe how the data are collected
- Include dates data were collected
- Define reports considered on time, late, or incomplete
- Summarize the data without repeating all of the information included in the table.

Nationally, there are 175 health facilities and 3 referral hospitals reporting to the integrated disease surveillance and response system. The reports are received and collated at the district and then regional levels before they are submitted to Ministry of Health (MOH) Headquarters. The timeliness and completeness of weekly reports are the main surveillance system indicators. Each health facility has to report within five days of the end of the week. Reports submitted between 5 - 10 days are considered late, and reports submitted after 10 days are considered missing. Table X summarizes the timeliness and completeness rates for all regions. All regions, except Region 4, had timeliness and completeness rates above 80%, which is the target established by the MOH.

Text Box 3: Template for language to summarize completeness and timeliness data

Figure 6a is a bar chart summarizing Zambia's timeliness data for epidemiological week 33 in 2022.[11] The differences in timeliness rates across regions is difficult to decipher because the dataspace is cluttered, the number of reporting sites is emphasized over the rates, the rates are not presented in order of magnitude, and the proximity of the bars underscores the difference between the number of expected

reports and timeliness rates – two different variables with different measurements. Also, a separate figure is necessary to summarize completeness rates. In this case, a table is more efficient and effective in helping the reader to understand the information.

Figure 6b is bar chart that summarizes Tanzania's timeliness and completeness data for July-December 2019.[12] The structure of this figure compares completeness with timeliness rates for each region instead of effectively comparing rates across regions. Again, a table would have been more effective and taken up less space on the page.

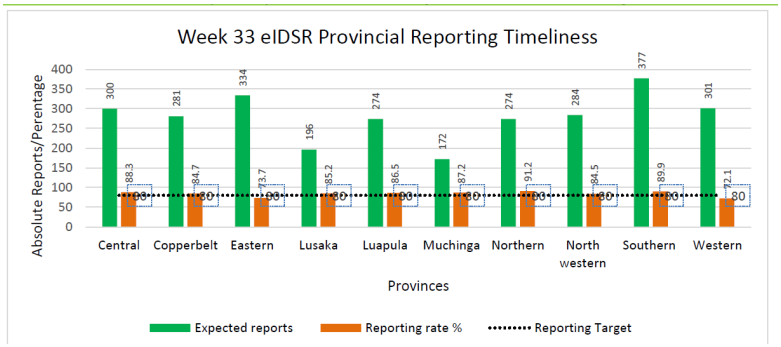


Figure 6a: A bar chart summarizing Zambia's timeliness data by province for epidemiological week 33 in 2022. This figure is an example of how not to present data.

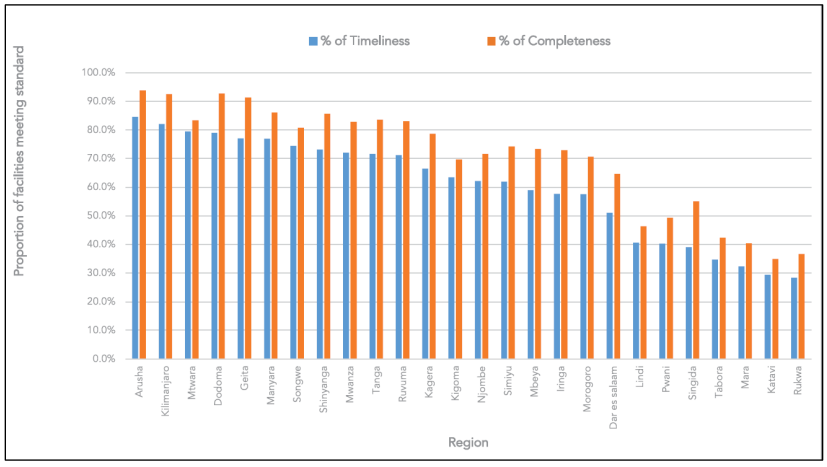


Figure 6b: A bar chart summarizing Tanzania's timeliness and completeness rates by region for July-December 2019 (epidemiological weeks 27-52). This figure is an example of how not to present data.

Featured Diseases

Avoid presenting data of different diseases or conditions in the same table or figure. The exception is a reference table, which is discussed in the next section of this guide. Figure 7 is a bar chart published in the *Ghana Weekly Epidemiolocal Report.*[5] The presentation of the data in this figure could be misleading because it provides no context of what is a potential outbreak or a public health threat. A reader looking at Figure 7 might assume that there is an outbreak of influenza-like illness, and the nine cases of suspected polio is of less concern than the diseases listed above it, which is most certainly not the intention of the figure.

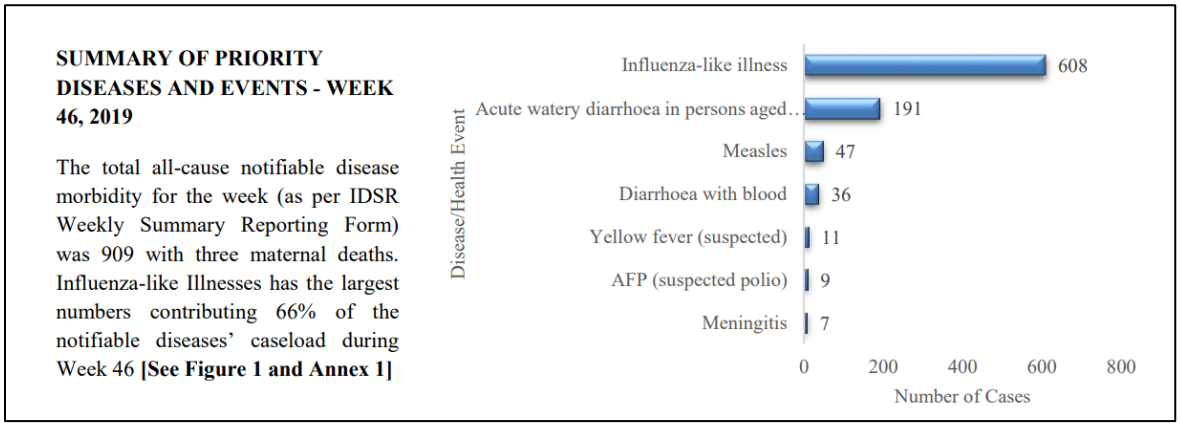


Figure 7**:** Figure presented in the Ghana Weekly Epidemiological Record of the seven diseases with the highest number of reported cases in epidemiological week 46 of 2019. This figure is an example of how not to present data in an IDSR article.

Number of cases is not the only criterion for featuring a disease in an IDSR article. Select diseases or events to feature using the following considerations:[13]

- Is an outbreak or unusual health event suspected?
- Were there any unexpected increases in cases (spikes in cases)?
- How does the observed situation compare to previous observation time periods this year or the previous year?
- What are the disease trends for the reporting period? Improving? Stable? Worsening?
- What is the burden of disease? (Incidence, prevalence, mortality)
- What period (seasonality) is it occurring? Is the period approaching?
- What is the potential for spread of the disease if a public health concern?

Once selected, each featured disease should have its own section that:

- Describes the disease or condition and why it is a public health concern
- Summarizes epidemiological data in tables and figures
- Provides recommendations and resources for action.

We recommend using the same style of tables and figures across diseases, articles, and PHB issues to facilitate reader comprehension. The *WHO Weekly Epidemiological Record* is an example of a PHB that uses the same templates of figures and tables for all articles. The styles and colors used also serve to brand the publication.

Description of disease or condition

The description of the disease provides context for the reader to understand the potential public health impact and the need for surveillance. It is limited to one paragraph and answers the following questions:

- How does the disease affect the population?
    - What is the impact on humans (i.e., life-threatening disease)?
    - What are the symptoms associated with infection?
    - Who are the most vulnerable populations?
    - Why is surveillance necessary?
- What is the disease incidence/prevalence in the district/region/country?
    - What are the estimates on the number of confirmed cases and deaths in a defined reporting period?
- What are the modes of transmission (e.g., waterborne, parasite, contact with infected human or animal)?
- Is the disease preventable and/or curable?

Text Box 4 provides an example of a description of a featured disease, polio, that addresses the questions listed above.[14-16] The WHO and CDC websites, which were sources for Text Box 4, provide descriptions and recommendations for prevention and treatment for most diseases and conditions. Remember to cite the source(s) of your information.

Poliomyelitis (polio) is a highly infectious viral disease that largely affects children under 5 years of age. The virus is transmitted by person-to-person spread mainly through the fecal-oral route or, less frequently, by a common vehicle (e.g., contaminated water or food). The virus multiplies in the intestine, from where it can invade the nervous system and cause paralysis. In 1988, the World Health Assembly adopted a resolution for the worldwide eradication of polio. The African Region was officially certified as poliovirus-free on August 25, 2020, but surveillance activities continue until polio is globally eradicated. The number of AFP cases reported each year is used as an indicator of a country's ability to detect polio. Zambia's surveillance system needs to be sensitive enough to detect at least one AFP case per 100,000 children under 15 years. Accordingly, health staff are required to report every case of AFP in children under 15 years of age. Zambia's AFP rate as of epidemiological week 1 of 2023 is 3/100,000. A total of 367 AFP cases was reported across 10 provinces during the previous 12 months. No confirmed cases of poliomyelitis were reported.

Text Box 4: An example of a description of a featured disease in an IDSR article.

Summary of epidemiological data

When best practices are used, [17] tables and figures can tell stories of who, where, and when. Tables summarize who is affected (e.g., age, sex, education, occupation). Maps show where populations are affected, and trendlines are used to represent when populations were affected.

Tables summarize large amounts of information that is easy to understand. IDSR articles include tables that provide data on the number of suspected and confirmed cases and deaths. Figure 8 is a template for summarizing cases by district and region. The title should state who, what, when, and where. List only the districts with reported cases because a table with rows and rows of zeros is not helpful. Each table should be accompanied by no more than three sentences summarizing the salient points. Table footnotes should be included to define any terms or acronyms used. The reader should be able to understand the table without referring to the text.

Table X: Weekly and annual cumulative cases of diseases X by district and region for epidemiological week X

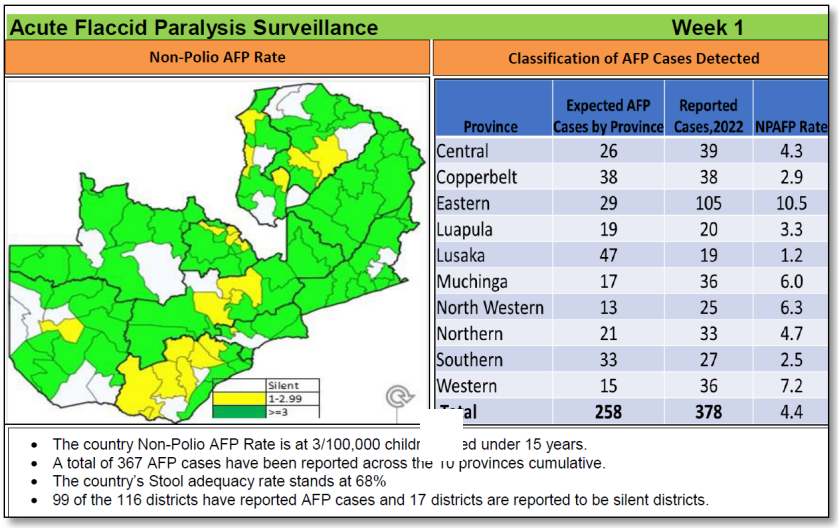
Region	District	Epidemiological Week X			Previous 52 Epidemiological Weeks (Cumulative)		
		Suspected*	Confirmed†	Deaths	Suspected	Confirmed	Deaths
Region 1	District 1	0	0	0	0	0	0
	District 2	0	0	0	0	0	0
Region 2	District 1	0	0	0	0	0	0
	District 2	0	0	0	0	0	0
Region 3	District 1	0	0	0	0	0	0
	District 2	0	0	0	0	0	0
Region 4	District 1	0	0	0	0	0	0
	District 2	0	0	0	0	0	0
Region 5	District 1	0	0	0	0	0	0
	District 2	0	0	0	0	0	0
Total		0	0	0	0	0	0

*Suspected – [provide case definition of disease]

†Confirmed – [provide explanation of how cases were confirmed]

Figure 8*:* Template for summarizing cases by district and region in a table

The purpose of a map is to show the geographic location of events or attributes. A type of map commonly used in epidemiology is an area map, which is used to show rates of a disease or health condition in districts, regions, or other administrative levels by using different shades or colors. Figure 9 is a combined area map and table that summarizes non-polio acute flaccid paralysis (NPAFP) rates by regions in Zambia for Epidemiological Week 1 of 2023. [11] The table and map complement the description of polio and surveillance activities presented in Text Box 4.



Province	Expected AFP Cases by Province	Reported Cases,2022	NPAFP Rate
Central	26	39	4.3
Copperbelt	38	38	2.9
Eastern	29	105	10.5
Luapula	19	20	3.3
Lusaka	47	19	1.2
Muchinga	17	36	6.0
North Western	13	25	6.3
Northern	21	33	4.7
Southern	33	27	2.5
Western	15	36	7.2
Total	**258**	**378**	4.4

Figure 9. Area map and table summarizing non-polio AFP rates by region in Zambia for Epidemiological Week 1 of 2023.

The Figure 9 table can be improved by defining the acronyms, AFP and NPAFP, and listing the regions in order of magnitude of the NPAFP rate so readers can easily identify low-performing regions. The Figure 9 map can be improved by including the names of the regions, defining the term, silent, and providing a rationale for using the rate of 3 as the threshold for distinguishing between yellow and green districts.

To show trends over time, use a figure like the one presented in Figure 10.[8] This figure puts the number of cases reported in context for the reader by telling a story. The reader can see that after almost crossing the threshold for declaring an outbreak at epidemiological week 7, measures were put in place that successfully reduced the number of cases between epidemiological weeks 9 and 17. Figure 10 can be improved by including a label for the X axis (e.g., epidemiological weeks) and removing the gridlines to avoid cluttering the dataspace. The text that accompanies this figure should emphasize the downward trend in cases and highlight what actions were implemented by health authorities to achieve success. The figure presents national data. If only a few regions were driving the case numbers up or down, that information should be included in the article.

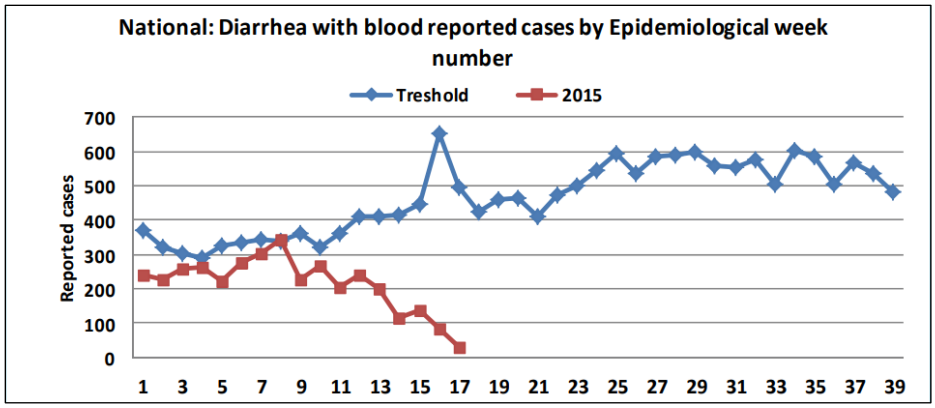


Figure 10: Trend lines showing the number of reported cases of diarrhea with blood and the threshold for declaring an outbreak

Recommendations and Resources for Action

If the trend line in Figure 10 showed an upward trajectory, the IDSR article would include recommendations for action by the health authorities and the public. When providing recommendations for action:

1. Check with subject matter experts to confirm that the recommendations are appropriate and resources are available for implementation
2. Clearly describe the recommended action.
3. Provide as much information as necessary without overwhelming the reader
4. State who should be responsible for the action (e.g., health officials, the public, populations of specific regions or districts)
5. Define medical terms and avoid using acronyms and abbreviations
6. Provide resources for more information, including links to webpages of the MOH, NPHI, CDC or WHO
7. Include phone numbers of helplines.

Table of Reported Cases/Events

This section of the IDSR article provides a complete list of reported diseases as a reference table, which means the diseases are listed in alphabetical order so the reader can easily find the data of interest. Figure 11 is the list of reported cases and events in a table format published in the *Ghana Weekly Epidemiological Report.*[5] Note that the diseases are listed in alphabetical order, all acronyms are defined, and the table provides context by including data for the previous epidemiological week and previous 52 weeks. The table follows all best practices for creating a table except that all numbers should be aligned on the one column or decimal point (i.e., aligned to the right instead of centered). Figure 12 is template that can be used to create a similar table in an IDSR article.

ANNEX 1: SUMMARY OF REPORTED CASES/ EVENTS: WEEK 46 (WEEK ENDING 17 NOVEMBER 2019)

Disease/Health Event (suspected/confirmed)	Week 45			Week 46			Cumulative to Week 46		
	Cases (susp)	Deaths	CFR (%)	Cases (susp)	Deaths	CFR (%)	Cases (susp)	Deaths	CFR (%)
AFP (suspected polio)	14	0	0	9	0	0	566	0	0
Acute haemorrhagic fever syndrome	0	0	0	0	0	0	0	0	-
Adverse events following immunization	0	0	0	0	0	0	281	0	0
Anthrax	0	0	0	0	0	0	0	0	-
Acute watery diarrhoea in persons aged ≥5 years	510	0	0	191	0	0	41,118	0	0
Cholera	0	0	0	0	0	0	0	0	-
Dengue fever	0	0	0	0	0	0	0	0	-
Diarrhoea with blood	36	0	0	36	0	0	1,840	0	0
Dracunculiasis (Guinea worm)	0	0	0	0	0	0	0	0	-
Influenza-like illness	934	0	0	608	0	0	21,629	0	0
Maternal deaths	-	2	-	-	3	-		93	-
Measles	50	0	0	47	0	0	2,193	0	0
Meningitis	17	0	0	7	0	0	869	23	2.7
Neonatal tetanus	0	0	0	0	0	0	12	3	25.0
Plague	0	0	0	0	0	0	0	0	-
Public health event of international concern (PHEIC)	0	0	0	0	0	0	0	0	-
Human rabies	0	0	0	0	0	0	8	8	100
SARS	0	0	0	0	0	0	0	0	-
Smallpox	0	0	0	0	0	0	0	0	-
Yellow fever (suspected)	14	0	0	11	0	0	3,005	0	0
NATIONAL TOTAL	**1,575**	**2**	**0.1**	**909**	**3**	**0**	**71,521**	**127**	**0.1**

***CFR does not include maternal deaths**

Figure 11: Summary of nationally reported cases by disease or events in Ghana for epidemiological week 46 – week ending 17 November 2019.

Table X. Number of nationally reported cases by disease/event for Epidemiological Week XX

Disease/Event	Epidemiological Week XX				Epidemiological Week XX				Cumulative to Week XX (previous 52 weeks)			
	Cases Suspected	Confirmed	Deaths	CFR	Cases Suspected	Confirmed	Deaths	CFR	Cases Suspected	Confirmed	Deaths	CFR
AFP (suspected polio)	0	0	0	0	0	0	0	0	0	0	0	0
Acute hemorrhagic fever syndrome	0	0	0	0	0	0	0	0	0	0	0	0
Adverse event following immunization	0	0	0	0	0	0	0	0	0	0	0	0
Anthrax	0	0	0	0	0	0	0	0	0	0	0	0
Acute water diarrhea in persons aged ≥5	0	0	0	0	0	0	0	0	0	0	0	0
Cholera	0	0	0	0	0	0	0	0	0	0	0	0
Dengue Fever	0	0	0	0	0	0	0	0	0	0	0	0
Dracunculiasis (Guinea Worm)	0	0	0	0	0	0	0	0	0	0	0	0
Influenza like illness	0	0	0	0	0	0	0	0	0	0	0	0
Maternal deaths	0	0	0	0	0	0	0	0	0	0	0	0
Measles	0	0	0	0	0	0	0	0	0	0	0	0
Meningitis	0	0	0	0	0	0	0	0	0	0	0	0
Neonatal deaths	0	0	0	0	0	0	0	0	0	0	0	0
Plague	0	0	0	0	0	0	0	0	0	0	0	0
Public health event of international concern (PHIEC)	0	0	0	0	0	0	0	0	0	0	0	0
Human rabies	0	0	0	0	0	0	0	0	0	0	0	0
Severe Acute Respiratory Syndrome	0	0	0	0	0	0	0	0	0	0	0	0
Smallpox	0	0	0	0	0	0	0	0	0	0	0	0
Yellow Fever	0	0	0	0	0	0	0	0	0	0	0	0
National Total	0	0	0	0	0	0	0	0	0	0	0	0

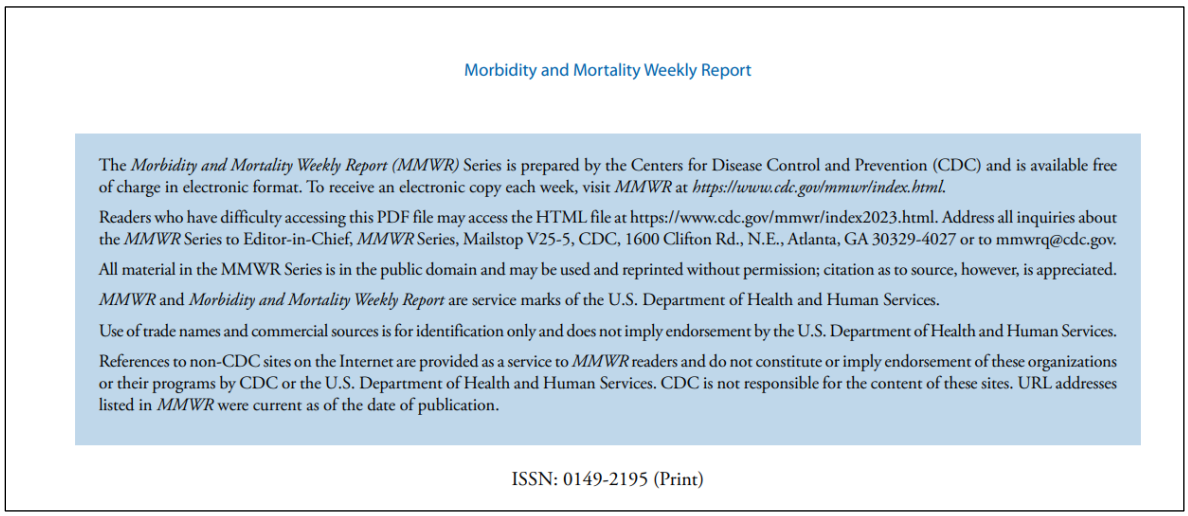
Figure 12: Template for creating reference tables of diseases and events

Back Page

The back page can be used to provide the following additional information about the PHB. Figure 13 is the back page of CDC's *Morbidity and Mortality Weekly Report* (MMWR).[18] It includes:

- The copyright policy
- Access policy
- Contact information
- The ISSN
- Links to the webpage.

Other PHBs use the back page to provide names of the editorial staff and board members and instructions on how to cite articles.



Morbidity and Mortality Weekly Report

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Figure 13: MMWR's back page

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