DENGUE FORUM 2023

ADDRESSING THE MOSQUITO IN THE ROOM

Philippine Dengue Response Recommendations

A Collaborative Action Towards Achieving Zero Dengue Deaths

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List of Abbreviations

CESU	City Epidemiology and Surveillance Unit
CFR	Case Fatality Rate
CHED	Center for Higher Education
COE	Centers of Excellence
CPG	Clinical Practice Guidelines
DENR	Department of Environment and Natural Resources
DepEd	Department of Education
DILG	Department of the Interior and Local Government
DOH	Department of Health
DOH-EB	Department of Health – Epidemiology Bureau
DOST	Department of Science and Technology
EPDSIS	Epidemic Prone Disease Surveillance Information System
FDA	Food and Drug Administration
GIDA	Geographically Isolated and Disadvantaged Areas
HMAb	Humanized Monoclonal Antibodies
IT	Information Technology
IVM	Integrated Vector Management
LGU	Local Government Unit
PCR	Polymerase Chain Reaction
PHIC	Philippine Healthcare Insurance Corporation
PPP	Public-Private Partnership
RANBCG	RiseAboveNow Business Consulting Group
RDK	Rapid Diagnostic Kits
RITM	Research Institute for Tropical Medicine
SAGE	Strategic Advisor Group of Experts
SWS	Social Weather Stations
THPI	Takeda Healthcare Philippines, Inc.
UP-PGH	University of the Philippines – Philippine General Hospital
WHO	World Health Organization
WPR	Western Pacific Region

OVERVIEW

On September 27, 2023, RiseAboveNow Business Consulting Group (RANBCG), together with Takeda Healthcare Philippines, Inc. hosted the Dengue Forum with the theme “Addressing the “mosquito” in the room” at the Diamond Hotel Philippines, City of Manila, Philippines. The forum supports the development of a Collaborative Response Framework to Stop Dengue, which is line with the Philippine Development Plan and Sustainable Development Goals (Goal number 3). The Dengue Forum provided a platform for comprehensive information drive about the situation of dengue disease in the Philippines; status and impact of current and future Prevention and Control Programs, and the recent innovations in disease management. Aside from creating a platform to support an information drive, the forum also facilitated a call-to-action among all stakeholders to harmonize all efforts towards the goal of reducing the burden of dengue in the country.

The Dengue Forum rose to be the avenue where various stakeholders from the public and private sectors came together to discuss current challenges, innovative strategies, multi-sectoral recommendations, in line with the DOH National Dengue Prevention and Control Program. One hundred and thirty-five (135) representatives from forty-three (43) public and private institutions or organizations attended the summit, including the academe, government offices, local government units, medical societies, non-government organizations, patient groups, private companies, and research organizations.

The forum opened with a key message from the Embassy of Japan in the Philippines. Minister for Economic Affairs NIHEI Daisuke emphasized the need to adopt harmonious and coordinated actions at the national, local, and community levels to effectively address dengue infections. He highlighted the critical role of private sector, when working hand-in-hand with government, in providing support for the cause, and expressed the commitment of the Japanese government in supporting health initiatives in the Philippines. Secretary Teodoro Herbosa of the Department of Health (DOH) highlighted the relevance of the event, and the importance of developing a Philippine Collaborative Response Framework to document collaborative strategies to ensure that we will reach our goals in the prevention and control of dengue. He aligned the objectives of the forum with the DOH’s eight-point action agenda, which outlines strategic objectives for every Filipino, community, health worker, and institution.

The forum features the main plenary, which presented approaches to the management of the different aspects of dengue prevention and control by resources speakers from different sectors, and the breakout session, which allowed participants to discuss amongst themselves the challenges and opportunities for collaboration towards improving dengue-related interventions, in line with the DOH National Dengue Prevention and Control Program.

During the breakout session, the participants were divided into five groups to discuss challenges and opportunities for collaboration on five aspects of dengue prevention and control – Integrated Surveillance and Intervention Preparedness, Diagnosis and Case Management, Integrated Vector Management, Health Promotion and Advocacy, and Outbreak Response and Preventative Interventions.

Dengue: An Overview

Dengue is a mosquito-transmitted virus and the leading cause of arthropod-borne viral disease in the world. It is also known as breakbone fever due to the severity of muscle spasms and joint pain, dandy fever, or seven-day fever because of the usual duration of symptoms. Although most cases are asymptomatic, severe illness and death may occur. Dengue fever is caused by any of four distinct serotypes (DENV 1-4) of single-stranded RNA viruses of the genus Flavivirus. Infection by one serotype results in lifelong immunity to that serotype but not to others.

According to the WHO, global cases of Dengue rose ten-fold from 500,000 reported cases in 2000 to 5.2 million in 2019, affecting 129 countries. Dengue is a major arboviral disease in the Western Pacific Region (WPR). In 2023, eight countries/territories/areas in the WHO WPR reported over 500,000 cases and 750 deaths, with the Philippines reporting the highest Case Fatality Rate (CFR) of 0.34%, reporting a total of 167,355 cases and 575 deaths.

Dengue in the Philippines

Dengue is a disease endemic to the Philippines, with cases rising especially during the rainy season. From November 26, 2023 to December 2, 2023, 2,607 new dengue cases were reported, 41% less than the same period in 2022 (4,415 cases). By December 2, 2023, the total number of reported cases was 195,603 cases, 23% lower than the same period in 2022 (252,700 cases). From January 1, 2023 to December 2, 2023, there were 657 deaths (CFR 0.34%), compared to 894 deaths (CFR 0.35%) in 2022.

Notably, 70% of annual cases affect those aged 0 to19, and 56% of deaths occur among those aged 9 and below. Dengue with warning signs is the typical presentation, and Dengue 1, among 4 different strains of the virus, is the most common strain detected.

In an effort to address Dengue-related deaths, the Philippine government established the National Dengue Prevention and Control Program in 1993.

NATIONAL DENGUE PREVENTION AND CONTROL PROGRAM

Vision A dengue free Philippines

Mission Ensure healthy lives and promote well-being for all at all ages

Goal To reduce the burden of dengue disease

Objectives

1. To reduce dengue morbidity by at least 25% by 2022
2. To reduce dengue mortality by at least 50% by 2022
3. To maintain Case Fatality Rate to < 1% every year.

Indicators

$$\text{Morbidity rate} = \frac{\text{No. of suspect, probable \& confirmed cases} \times 100{,}000}{\text{total population}}$$

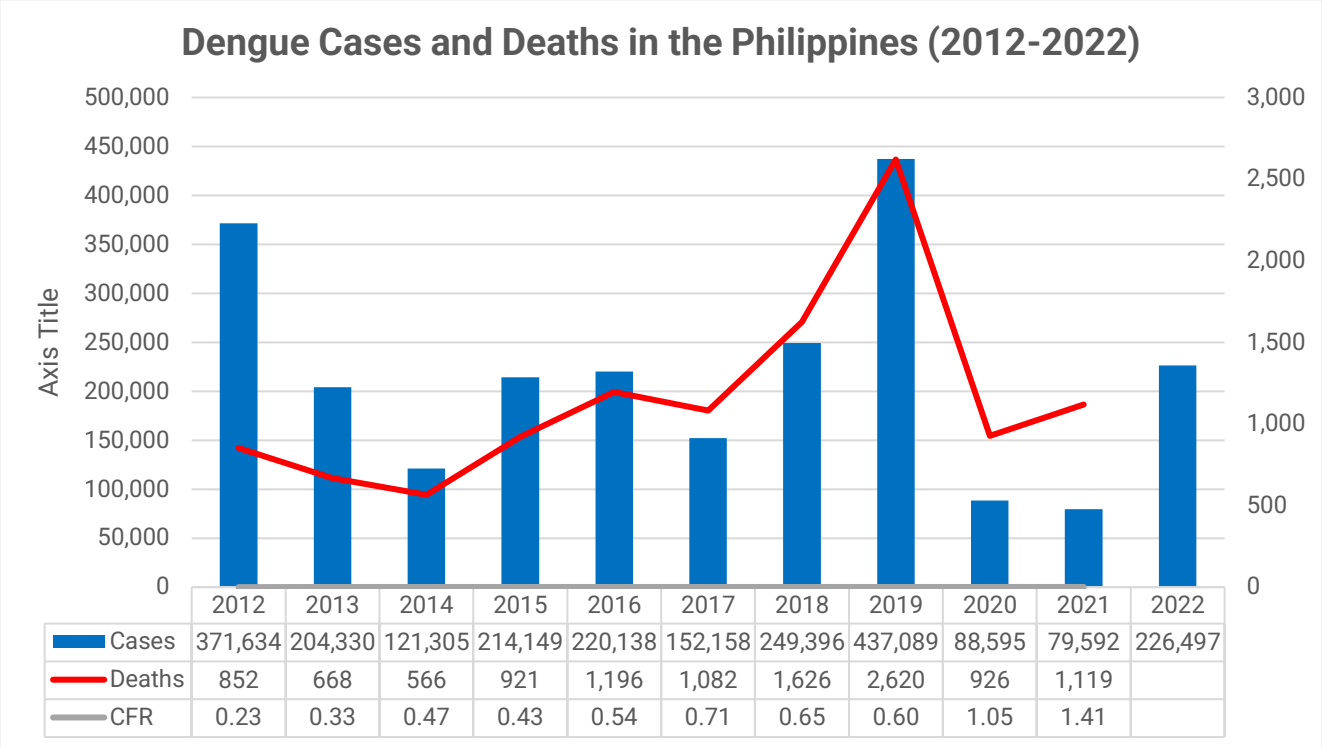
(baseline: 198.1 per 100,000 population)
(2015 data: 200,145/100,981,437 x 100,000)

$$\text{Mortality rate} = \frac{\text{No of dengue (probable \& confirmed) deaths} \times 100{,}000}{\text{total population}}$$

(baseline: 0.59 per 100,000 population)
(2015 data: 598/100,981.437 x 100,100)

$$\text{CFR} = \frac{\text{no. of dengue (probable \& confirmed) deaths} \times 100}{\text{no. of probable \& confirmed cases}}$$

As of September 9, 2023, the DOH said it has recorded 125,975 dengue cases nationwide. Reported cases of Dengue in the Philippines for the period of 2012-2022 showed a trend of a rising number of cases for a 3-year period, followed by a sharp decrease in the number of reported cases, with the highest number of reported cases and deaths reported for 2019, followed by the sharpest decline in the reported number of cases and deaths in 2020 and 2021. 2020 showed the highest CFR for the 10-year period, at 1.05%, with the lowest CFR reported at 2012 (0.23%). However, there is an expected underreporting of cases for the period of 2020 and 2021 due to the constraints experienced by the healthcare sector during the COVID-19 pandemic.



	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Cases	371,634	204,330	121,305	214,149	220,138	152,158	249,396	437,089	88,595	79,592	226,497
Deaths	852	668	566	921	1,196	1,082	1,626	2,620	926	1,119	
CFR	0.23	0.33	0.47	0.43	0.54	0.71	0.65	0.60	1.05	1.41	

Figure 1. Epidemiologic Data for Dengue in the Philippines for the 10-year period of 2012-2022.

The financial impact of dengue on patients and their families is significant. PhilHealth provides benefits for eligible patients with dengue (with or without warning) of PhP 10,000 and PhP 16,000 for severe dengue. In addition, eligible patients with non-severe dengue can receive benefits up to PhP 7,000 in primary care facilities. However, patient bills can significantly soar to PhP 50,000 or more, depending on required monitoring, blood transfusions, and complications.

Collaborative Opportunities in the Five Aspects of Dengue Prevention and Control

1. Integrated Surveillance and Intervention Preparedness
2. Diagnosis and Case Management
3. Integrated Vector Management
4. Health Promotion and Advocacy
5. Outbreak Response and Preventative Interventions

Integrated Surveillance and Intervention Preparedness

Integrated Surveillance and Intervention Preparedness is a comprehensive approach to prevent and manage dengue outbreaks. This area covers surveillance, research, and policy development / implementation. An integrated surveillance program covers the systematic collection, analysis and dissemination of data on dengue cases, deaths, serotypes, vectors, environmental / risk factors and health system capacity, as well as tools used in surveillance, such as Early Warning and Response System (EWARS) for dengue outbreaks, which is a web-based dashboard that provides real-time information and alerts.

The first recorded dengue epidemic in Southeast Asia occurred in Manila in 1954, and dengue has since remained endemic. While early detection and effective control of epidemics depend on appropriate surveillance methods, the Philippines relies on a passive surveillance method that mainly depends on case reporting from barangay/village health centers, municipal or city health offices, hospitals and clinics, and quarantine sections. This limits the reporting of cases that are clinically diagnosed without laboratory confirmation, which is only 14.3% of all dengue cases. This leaves patients with undifferentiated febrile illness or viral syndrome underreported and, thus, limits the capability to predict or control epidemics.

Research on Dengue interventions should be a holistic and transdisciplinary approach to address its social, environmental, and epidemiological dimensions. Input from different disciplines and stakeholders should be considered in the design and implementation of dengue-related projects, integrating input from different fields, such as entomology, virology, public health, sociology, and economics. Involving local communities, health authorities, and policy makers is also essential to generate more relevant and applicable knowledge and solutions that can contribute to the prevention and control of dengue in different contexts.

Policies addressing dengue-related issues and concerns should align national and local strategies. This requires coordination of multisectoral actions to ensure effectiveness of interventions, as well as the involvement of stakeholders from different levels and sectors, such as health, environment, education, and community, to ensure that the policies are evidence-based, context-specific, and responsive to the needs and challenges of the affected populations.

The struggles concerning accurate depiction of Dengue cases in the country are exacerbated by the delayed access to timely, reliable, accurate, and complete health information. This condition is further worsened by various health data coming from disparate systems that use differing formats, lacking harmonization, and putting additional strain on already compromised data quality.

In response to public health problems such as COVID-19, the Department of Health – Epidemiology Bureau (DOH-EB) implemented an initiative to improve disease surveillance through automating reports used to generate surveillance of clusters and seasonality. Drawing inspiration from this, the DOH was able to utilize the same mechanism and reporting protocol for dengue monitoring. An online information system — the Epidemic Prone Disease Surveillance Information System (EPDSIS), was implemented. This serves as a centralized database of information on reported cases, outbreaks, and other critical data. EPDSIS allows real-time data entry from reporting units that other units can also access. This ensures that the system remains responsive and up-to-date. EPDSIS also supports case-based surveillance to monitor individual cases and event-based surveillance to detect any unusual patterns that may indicate the emergence of an outbreak. The reports from the reporting units are immediately directed to the national level.

The implementation of an integrated surveillance system such as EPDSIS, however, faces several challenges. There is a lack of awareness on the existence of the EPDSIS from several offices, which poses a problem on the integrity of the data being collected. Transitioning to electronic reporting systems require complete transition by all involved offices and organizations to ensure the accuracy of data and the timeliness of reporting. In addition, there are several reporting systems being implemented, which results in fragmentation of data and the lack of standardization can lead to inefficiencies in data collection and analysis. However, despite the number of surveillance systems being implemented, these are not seamlessly adopted since it faces resistance from some stakeholders. The accuracy of data being reported is also affected because not all personnel are well-versed in utilizing computers for reporting purposes. Furthermore, majority of employees in public facilities are employed on a job order, which limits the availability of a skilled and consistent workforce. In addition, establishing effective partnerships with private stakeholders is essential for a comprehensive dengue/disease monitoring system.

However, not all private stakeholders are cooperative in sharing their data. The lack of a monitoring mechanism that ensures their compliance in reporting cases creates a gap in data completeness and accuracy.

A multisectoral collaborative effort between research/academic institutions, government offices, health facilities, and IT/software companies may be explored to address resistance in technology, as well as to develop programs that are intuitive and user-friendly. Healthcare professionals, government offices, and leaders of patient groups should have an open discussion to identify vital information to streamline case investigation forms, and develop simplified forms to encourage compliance among personnel. Training sessions and user guides may also be provided to help personnel become familiar with the system. A standardized drop-down menu for data selection may be implemented to address the issue of fragmented systems, and ensure consistency and efficiency in analyzing and managing the data. Protocols must also be established for seamless sharing of data between the public and private sectors. Promoting the use of standardized formats can also improve interoperability among different stakeholders. To address the problem of the lack of permanent positions for human resources, collaboration between the DOH and the civil service can be explored to advocate for the creation of permanent positions to ensure stability and continuity of programs. Developing continuous training programs for all personnel to keep their skills up-to-date should also be done, and may be conducted in partnerships with training/academic institutions. Moreover, to encourage continuous improvement among Epidemiology and Surveillance Unit (ESU) staff, certification levels aligned with career progression should be offered. Technical assistance from private institutions and/or training/academic institutions can also help in bridging the gap in human resources and skills necessary for the effective implementation of dengue surveillance in the country.

Diagnosis and Case Management

Under Administrative Order No. 2012-0006, the Department of Health issued the 2011 Revised Dengue Clinical Case Management Guidelines, which aims to establish a standard in the diagnosis and treatment of dengue for all public and private health facilities and other stakeholders.

The DOH, in collaboration with the WHO, conducted capacity building mission in 2018 with the primary aim of reducing CFR to 0.1% over the next four (4) years. The said capacity building mission was able to identify several gaps in clinical management of Dengue such as insufficient monitoring of Dengue patients, lack of special Dengue clinical case report form, lack of standardized mortality review forms, detailed hospital-based and central audits of mortality cases, absence of bed-side access to ultrasonography and hematocrit measurements for early detection of capillary leakage. One of the recommendations from this program was the establishment of Dengue Centers of Excellence (COEs) in tertiary hospitals that will work toward improving the clinical management of Dengue and reduce the case fatality rate below 0.1% within a 5-year period. The COEs aim to improve the management of Dengue in terms of absorptive capacity, equipment, and human resources. This will eventually transition into a facility that is capable of conducting research, generating evidence-based practices, recommending policies, proposing clinical health advocacies, and providing capacity-building and technical support for its health facility referral network.

Seven (7) tertiary hospitals were identified to pilot the implementation of COE on service capability, strategic location, manpower complement and willingness to be part of the project:

1. Jose B. Lingad Memorial Regional Hospital
2. National Children's Hospital
3. Philippine Children's Medical Center
4. San Lazaro Hospital
5. Southern Philippines Medical Center
6. University of the Philippines – Philippine General Hospital
7. Vicente Sotto Memorial Medical Hospital

Changes in dengue epidemiology in recent years led to difficulties and inconsistencies in the use of the previous dengue case definition and classification. The adoption of this new classification is deemed a solution in determining more standard, practical and appropriate management of dengue cases in the country. Likewise, this improvement is seen to improve consistency in reporting across various levels of health care facilities.

Dengue illness is categorized according to level of severity as dengue without warning signs, dengue with warning signs, and severe dengue. Dengue without warning warnings can be further classified according to signs and symptoms and laboratory tests as suspect dengue, probable dengue and confirmed dengue (see table 1).

Table 1. New Case Classification and Levels of Severity

Dengue without warning signs	Dengue with warning signs	Severe Dengue
Suspect Dengue a previously well individual with acute febrile illness of **1-7** days duration plus **two** of the following: - headache - body malaise - retro-orbital pain - myalgia - arthralgia - anorexia - nausea - vomiting - diarrhea - flushed skin - rash (petechial, Hermann's sign)	a previously well person with acute febrile illness of 1-7 days plus any of the following: - abdominal pain or tenderness - persistent vomiting - clinical signs of fluid accumulation (ascites) - mucosal bleeding - lethargy or restlessness - liver enlargement - increase in hematocrit **and/or** decreasing platelet count	**Severe Plasma Leakage** Leading to: - shock (DSS) - fluid accumulation with respiratory distress
Probable Dengue a suspect dengue case plus laboratory test: - Dengue NS1 antigen test **and** - CBC (leukopenia with **or** without thrombocytopenia) or dengue IgM antibody test (optional)		**Severe Bleeding** - As evaluated by a clinician
Confirmed Dengue a suspect or probable dengue case with positive result of viral culture **and/or** PCR **and/or** Nucleic Acid Amplification Test- Loop Mediated Amplification Assay (NAAT-LAMP) **and/or** Plaque Reduction Neutralization Test (PRNT)		**Severe Organ Impairment** - Liver: AST or ALT ≥ 1000 - CNS: e.g., seizures, impaired consciousness - Heart and other organs (i.e., myocarditis, renal failure)

NOTE: Above manifestations and/or laboratory parameters require strict observation, monitoring, and appropriate medical intervention.

Diagnosis and Case Management involves detection, treatment, and management of cases of dengue. Early diagnosis and prompt treatment of dengue cases is important in preventing severe complications and reduce mortality. This means that there should be a clear criteria and accurate methods for diagnosis based on clinical signs, laboratory tests, and epidemiological data. Guidelines for management of dengue cases are based on the severity of the condition, and includes fluid therapy, pain relief, antipyretics, and supportive care, and the indications and contraindications for hospitalization and referral of dengue cases, as well as the criteria for discharge and follow-up. In addition to diagnosis and management of the disease itself, it is important to implement strategies and interventions to improve the quality and accessibility of diagnosis and case management services, such as training, supervision, monitoring, evaluation, and feedback.

Dengue is diagnosed using different diagnostic tools for clinical, molecular, and immunological diagnosis. The most common diagnostic tools are polymerase chain reaction (PCR), dengue nonstructural protein 1 (NS1) and serological Immunoglobulin M (IgM) and Immunoglobulin G (IgG) tests. PCR tests detect the antigen and is specifically used to categorize patients with dengue fever. IgG tests detect antibodies and are used to help deduce asymptomatic and/or unreported dengue cases, or those individuals have been previously infected with dengue.

The DOH has stated that disease management and diagnosis in the Philippines usually involves public-private

partnerships (PPP). However, there is a lack of PPPs for disease management of dengue. In the primary healthcare setting, there is a centralized system of reporting for Dengue morbidity and mortality data. Data trends in the Philippines suggest that although the mortality rate of dengue is not as high as in previous decades, only cases with co-infections such as Dengue Hepatitis have poor prognosis.

Diagnosis of dengue, which is crucial in the management of the disease as early diagnosis is key in preventing dengue-related deaths, pose its own set of challenges. Diagnosis of dengue relies on laboratory tests such as CBC/platelet counts, which usually have false negative results. Notably, the use of hematocrit and white blood cell counts is not included in the current clinical practice guidelines (CPGs). Rapid Diagnostic Kits (RDK) are effective in diagnosing dengue cases, however, there are currently no FDA-approved RDKs in the country, and the budget and distribution of these kits are inadequate.

The current standard for dengue management is supportive care, as well as monitoring for central nervous system bleeding for patients with platelet counts below 10,000. Many practitioners, however, still prefer past practices, which lean towards blood transfusions. To address outdated practices in dengue management, a revision to the current CPG for dengue, which was published in 2011, is being developed. This revision is adapted to the Philippine setting, and elucidates the critical aspects of dengue management, encompassing preferred diagnostic procedures and tests, hydration recommendations, and the frequency of blood transfusions.

The lack of FDA-approved RDKs, which is considered crucial for the early detection of Dengue, as well as budgetary constraints in the procurement of these test kits, are also challenges in this area. The lack of identified diagnostic centers for dengue and the lack of awareness on the PhilHealth coverage for those who have contracted the disease were also mentioned.

Increase in awareness about existing PPP programs for dengue diagnosis and management, as well as available PhilHealth coverage, may be resolved through collaboration between government offices, local government unit (LGU), health facilities, academic institutions, and patient groups. Strengthened coordination between DOH and Food and Drug Administration (FDA) should also be promoted to ensure availability of RDKs for dengue in the Philippines. In addition, the updated CPG currently in development should coordinate with different health professional organizations, LGUs, health facilities and patient groups, to ensure that recommendations to be included are applicable in the Philippine context. Collaborative efforts between government offices, IT/software companies, public and private health facilities, private companies, and research institutions should be explored, geared towards developing interoperable information systems that integrates into the existing software of companies, strengthening existing PPPs and supporting the development of new PPPs.

Integrated Vector Management (IVM)

Vector control refers to actions used to control a “vector” (in this case the *Aedes aegypti* mosquito), which can transmit a pathogen (dengue viruses). The DOH has been focusing on environmental control measures in its dengue prevention and control initiatives, reminding citizens to make the “4 o’clock habit”, and some chemical control measures (fogging during outbreaks). Dengue control can be effectively addressed with community involvement, through community-wide health education, risk factor intervention, and efforts designed to change laws or regulatory policy in areas where health is affected.

Transmission control activities should target *Aedes aegypti* in its immature and adult stages in the household and immediate vicinity, such as schools, hospitals and workplaces. Case reports on dengue in the Philippines shows that 1 in every 3 cases of dengue are in the 5-14 age group, thus, schools have been specifically targeted by the DOH to intensify their prevention campaigns against dengue.

Integrated vector management (IVM) is a collection of strategies to optimize the use of resources for vector control. Resource Management covers optimization of efficacy, cost-effectiveness, ecological soundness and sustainability of vector control interventions. Environmental control promotes the use of a combination of methods that are appropriate and feasible for the local situation, such as environmental management, biological control, chemical control, personal protection and social mobilization. To ensure the success of any IVM program,

coordination and collaboration among different sectors and stakeholders, such as health, environment, water and sanitation, education, and members of the community, must be ensured.

The Department of Science and Technology (DOST), in line with its research agenda guidelines, have created a network of researchers who are working on dengue-related research projects. The Department of Education (DepEd) has integrated dengue prevention into the basic education curriculum. In addition, local government units have conducted needs assessment surveys on vector surveillance in their respective communities.

Despite the current programs being implemented in this area, there is a lack of data that evaluates the impact and outcomes of these IVM strategies at both the local and national level, as well as research that explores community needs on dengue vector-related issues in geographically isolated and disadvantaged areas (GIDA). There is also a general lack of data available for research, including PPP data on dengue cases, their management, and the outcome of management, which stems from the underreporting of dengue cases in the country. In addition, outcomes or recommendations of conducted researches on dengue vector control are not being translated in actual practice because most of these recommendations are not applicable in the local setting. Funding for dengue-related research also poses a challenge in this area. While funding for research is made available, in general, appropriation of funds towards impactful researches in dengue prevention and control needs to be strengthened. Public knowledge on the availability of funding for such research also needs to be augmented.

Collaborative efforts to address challenges in researches and lack of data available for research must be explored between government offices, research/academic institutions, public and private health facilities, and private companies. Expanding this through collaborative effort to target specific LGUs and academic institutions in GIDA will address the lack of research data in these areas. Furthermore, consultative meetings with members of the community should be conducted during the development of research projects to ensure applicability of recommendations that will result from the research itself. In addition, expanded partnerships are desired by different stakeholders, which can be addressed through continuous conduct of cross-sectoral discussions or fora, specifically discussing issues and challenges in dengue prevention and control.

Health Promotion and Advocacy

In June 2023, as the declared Dengue Awareness Month, the Department of Health urged the public to practice the 5S Approach to protect the community against dengue. The 5S Strategy stands for Search and destroy, Self-protection measures, Support fogging, Seek early consultation, and Sustain hydration.

Search and Destroy	Search for stagnant water where mosquitoes can breed, drain or disposed properly and keep surrounding areas clean.
Self-Protection Measures	Wear mosquito repellants, long-sleeved shirts, pants or garment that cover the skin. Make sure all windows have screens and fix any hole. Use mosquito repellant coils or sprays whenever appropriate.
Support Fogging	Fogging operations kill or 'knock-down' any adult dengue mosquitoes to try and prevent infected mosquitoes from spreading the virus.
Seek Early Consultation	Seek early medical consultation is experiencing symptoms of dengue like fever and rashes to prevent complications or mortality.
Sustain Hydration	Sustained hydration is important to prevent dengue-related deaths, especially during the first three days of fever where the risk for dehydration is high.

Health promotion and advocacy are key strategies to raise awareness, mobilize resources, and empower communities to prevent and control dengue. Interventions include activities that assess local situation and needs regarding dengue transmission, risk factors, and health outcomes, and designing, implementation, and evaluation of these programs. Interventions should be tailored to the local context and culture, and may include social mobilization, communication campaigns, education programs, and community engagement, among others. Advocacy programs include the sharing and dissemination of lessons learned and best practices with other

countries, regions, cities, and/or barangays facing similar challenges, as well as identifying and addressing the challenges and barriers that hinder the implementation and sustainability of health promotion and advocacy interventions for dengue control.

LGUs across Metro Manila, each have their own dengue health education program implemented, aimed at improving the knowledge of members of the community on how they can keep dengue away from their own homes, such as education campaigns, webinars during the pandemic, and focus group discussions to address myths vs facts. In addition, LGUs run intensified informational campaigns in mass media and social media platforms. Successful dengue prevention and control interventions have a participatory approach when coming up with dengue campaign solutions, that is, members of the community provide feedback on how to best implement community guidelines in the management of dengue.

Baguio City's Dengue Campaign, DENGUErra coordinates city-wide efforts to implement Baguio's Dengue Action Plan – Prevent, Detect, Isolate, Treat, Reintegrate, and Mainstream. These efforts strongly encourages community involvement to ensure removal of all possible breeding ground for Aedes-borne diseases, including collection and proper disposal of used tires.

The Pasig City Dengue Task Force have a well-rounded information campaign against Dengue, including coloring pads for kids, original dengue jingles, and informative videos containing information on how to effectively implement vector management protocols in their own homes. In addition, free laboratory testing for suspected dengue cases are made available across eight (8) health centers / facilities across Pasig City to facilitate early detection of Dengue.

Challenges in health promotion and advocacy interventions can be classified as either top-down, or bottom-up. Top-down challenges are those that are downloaded from management (LGU to LGU Health Department) down to the members of the community. These usually involve issues concerning lack of support or availability of resources. Bottom-up challenges refer to participation from members of the community, and the feedback they provide to management. These are concerns regarding community readiness, participation, and appropriateness of interventions.

Lack of resources available to push health promotion and advocacy campaigns are addressed through collaboration between LGUs and local schools with DOH, DepEd, DOST, non-government organizations (NGO), public and private health facilities, pharmaceutical companies, and other academic institutions. These organizations provide free resources for health education at the community level. These collaborations can be further strengthened through inter-LGU collaborations to create avenues for best practice sharing, and discussing current challenges they face and how best to overcome these challenges. Collaborative efforts between LGUs, DENR, DOH, DILG, DepEd/CHED, home owners, rotary clubs, patient groups, medical/health organizations, religious organizations, and social media personalities may also be explored to create public health education campaigns that are tailored to the members of the community. Utilizing videos that are shown in schools, hospital waiting areas, public spaces, as well as different social media platforms must also be conducted to further the reach of information campaigns. This collaborative effort can also strengthen impact measurement of health information campaigns. Impact measurement is an important component of any health promotion and advocacy intervention, which means that the success of an intervention relies on the feedback provided by the members of the community on the program or policy being implemented.

Private companies like Kao Corporation, Taisho Pharmaceuticals (Philippines), Inc., Otsuka-Solar Philippines, Inc., and Takeda have existing advocacy programs for Dengue. Kao Corporation have existing Industry-Academia-Government Collaboration that organizes efforts on community activities, education campaign, and dengue forecasting. Taisho Pharmaceuticals (Philippines), Inc. has implemented an awareness campaign for the prevention and control of Dengue, which included Run Against Dengue, trash bins donation, and distribution of Dengue Pop Materials. Otsuka-Solar Philippines Inc. ran a Dengue Caravan, which included an information campaign in 168 partnered communities, including 224 institutions, and distributed 1020 dengue kits. Takeda Healthcare Philippines, Inc. have campaigned for dengue prevention and control by hosting a Dengue Forum, which gathered various stakeholders to initiate a multi-level discussion to celebrate successful initiatives, and open the discussion to address gaps in Dengue Prevention and Control programs in the Philippines.

Outbreak Response and Preventative Interventions

Outbreak Response and Preventative Interventions include programs needed at different levels of the health system and the community to respond to outbreaks and prevent further spread of the disease. Preparedness includes development and maintenance of plans, resources, and capacities to respond effectively to dengue outbreaks, including coordination, training, logistics and evaluation, as well as the strengthening of the health system's resilience and readiness to cope with dengue outbreaks. A crucial element in outbreak response preparedness is the identification of key agencies / community groups for outbreak response, and process flows to prevent duplication of efforts. Community Management is also important during an outbreak. This includes the implementation of community-based strategies to prevent dengue cases, such as the case-area targeted interventions, which is a reactive strategy that involves mass implementation of vector control and/or prophylactic drug administration in areas where confirmed or probable dengue cases are reported. The most effective preventative intervention against dengue is vaccination. Vaccine Support ensures the equitable access and distribution of the vaccine among different regions and populations, through coordination and cooperation among different stakeholders, such as governments, health organizations, vaccine manufacturers, and civil society groups.

Dr. Anna Lisa Ong-Lim, Associate Professor and Attending Pediatrician at the University of the Philippines – Philippine General Hospital (UP-PGH), presents novel treatments for Dengue – the JNJ 1802, an antiviral molecule with potential for the prevention and treatment of dengue infection that is currently in Phase II Clinical Trial, the Humanized Monoclonal Antibodies (HMAb) 2E8 and 33D2, which demonstrates prevention of the pathologies of the Dengue virus in pre-clinical trials, and HMAb 9C7, which exhibits preventative action against all 4 serotypes of Dengue.

Dengue prevention and control interventions of LGUs follow the National Dengue Control Program of the DOH. In compliance with City Epidemiology and Surveillance Unit (CESU), initiatives and programs were enacted immediately, led by the city or municipality's dengue control coordinator. The Pasig City LGU has allotted 50 million pesos of its local budget towards the dengue control program and future initiatives involving dengue. Makati City LGU forges multiple partnerships with non-government organizations (NGOs) and private companies, to move health programs forward. Malabon City LGU highlights the spirit of "Bayanihan" as they provide assistance to adjacent cities within Metro Manila, despite the absence of an allocated budget for dengue. In the event of a dengue outbreak, different LGUs coordinate with the Research Institute for Tropical Medicine (RITM) and other hospitals to manage the spread of the disease.

Challenges related to outbreak response usually involved logistics, legislation, involvement of stakeholders, budget allocation, and resistance to the Dengue Control Program. On the other hand, challenges related to preventative interventions included vaccine hesitancy and weak public health education.

Coordination between local government units, different associations involving local schools and parent groups, medical and other health organizations, and academic institutions can address challenges related to logistics during an outbreak intervention. Consulting with subject matter experts from various fields can be explored to generate proposals that can justify an increase in budget allocation for dengue-related interventions, as well as the collective promotion of city ordinances to address the legislation problems. Partnerships with NGOs and the private sector to create incentivized programs will further improve networks and linkages, as well as promote the active participation of different stakeholders. Communication between the LGU and the Department of Interior and Local Government (DILG) has also been brought up in terms of the discussion for proper budget allocation needed by the different LGUs. Community resistance to LGU directives, specifically regarding entering within the premises of villages/subdivisions can be addressed through consultation with the respective association (i.e., homeowners of subdivisions and villages) and developing community guidelines with the leaders of these groups.

Massive public information campaigns LGUs, DENR, DOH, DILG, DepEd/CHED, home owners, rotary clubs, patient groups, medical/health organizations, private companies, and social media personalities should be explored on how to properly address vaccine hesitancy. Elevating educational campaign materials and intensifying public health education programs can address issues related to poor public health education. Integration of health education programs into school curricula could also move towards improving public health knowledge, reinforcing health-seeking behavior, and setting best health practices, in general. A public forum involving

members of the community may help address vaccine hesitancy by identifying the specific concerns of the community regarding vaccination.

A nationally representative survey by the Social Weather Stations (SWS), a private non-profit polling body, conducted in September 2020 revealed that about one-third of Filipinos demonstrate vaccine hesitancy when asked about Dengvaxia. Another survey by SWS from April to May 2021, showed that a similar share of Filipinos demonstrates hesitancy against any COVID-19 vaccine. Only around 32% of Filipinos are willing to get a COVID-19 vaccine, while 35% are undecided. Members of the population must be educated about the benefits of vaccines since immunization helps decrease the morbidity and mortality of patients infected with dengue. According to the WHO, the benefits of vaccines include the provision of protection for the population from outbreaks and reduction of the occurrence of hospitalization by lowering the severity of the disease which later on prevents death.

Dr. Rontgene Solante, Chairperson of the Section of Infectious Disease and Tropical Medicine Fellowship Program of the San Lazaro Hospital, presented the guidelines from the World Health Organization (WHO) in the clinical evaluation of vaccines against dengue: (1) should be protective of all four serotypes, (2) should provide long-term immune response, (3), should be efficacious across endemic (resident) and travelers, (4) should prevent disease across age groups, and (5) should prevent dengue regardless of previous exposure. He presents a comparison of the three dengue vaccines currently available in the market, demonstrating how the 2nd generation Dengue vaccines provide better protection against dengue as compared to the 1st generation Dengue vaccine.

In line with the Strategic Advisory Group of Experts (SAGE) on Immunization of the WHO, the introduction of the dengue vaccine in routine immunization programs was recommended in the location that poses significant public health problems due to their high transmission intensity. SAGE recommends to focus on the 6-16 years of age population group through school-based vaccination. The vaccine must be given in a two-dose schedule with a three-month interval between doses, and a one-time catch-up program must be conducted for those greater than 16 years of age. A well-designed communication strategy and community engagement will further enhance the effectiveness of the immunization program. Post-marketing studies must be conducted to determine efficacy-risk profile as well as the effectivity on other circulating serotypes of dengue virus present in the population.

Recommendations for a Collaborative Framework on Addressing Zero Dengue Deaths

To achieve lasting progress in the fight against dengue, we need to strengthen our existing efforts and embrace continuous improvement and innovation in the five key aspects of dengue prevention and control.

Dengue is a complex disease that demands a holistic response. It is, therefore, crucial to engage multiple stakeholders from different sectors in developing and implementing effective interventions. Government agencies such as DOH, DILG, FDA, and PHIC should take a central role in implementing dengue prevention and control measures. In addition, a dedicated dengue working group will be beneficial to streamline and optimize dengue initiatives, prevent overlap, and increase effectiveness. A dedicated dengue working group will also ensure that dengue prevention and control initiatives are continuously implemented.

Healthcare professionals, medical societies, and patient groups can provide valuable contribution on how to localize interventions and programs to ensure success of interventions, such as:

- Advocating for the availability and accessibility of RDKs all over the country
- Expanding implementation of the reporting and surveillance systems
- Improving data accuracy and timeliness

Collaborative efforts and constant communication between healthcare providers and other health facilities will streamline best practice sharing in the diagnosis and management of dengue.

Private companies and training and academic organizations can be tapped to assist in change management and capacity training to ensure preparedness of personnel and infrastructure and facilitate implementation of these programs. Private companies specializing in IT / software development may be tapped to assist in developing, maintaining, and implementing digital systems that can be used in:

- Surveillance
- Research
- Information and communication management

Academic and research institutions, as well as local community groups can be tapped to ensure that research data available on dengue prevention and control interventions are applicable to the local target community. Consultation meetings with members of local communities may help to identify root causes of the gaps in dengue prevention and control interventions and how to properly address them, such as:

- Vaccine hesitancy
- Effectiveness of interventions

Collaborations between these groups and local government units will drive progressive educational campaigns, and study the impact of these programs.

Finance institutions and local economists may be tapped to gain insight on:

- Maximizing available resources
- Ensuring appropriate budget allocation
- Logistics management

Conclusion

In conclusion, a strong collaboration between the public and private sectors is essential in tackling the ongoing challenges of dengue in the Philippines. It is also vital that we embrace innovative solutions that leverage technology, medicine, and best practices. The active involvement of the community can make a difference in ensuring the success of preventative measures and awareness campaigns. It is clear that to achieve zero dengue-related deaths requires a multistakeholder collaborative approach through a more effective and adaptive response.

Dengue Forum 2023 Key Stakeholders

Academic / Research Institutions

- Manila Adventist College
- Manuel S. Enverga University Foundation
- National Institutes of Health
- Research Institute for Tropical Medicine
- UP College of Pharmacy
- UP College of Public Health

Medical Societies

- Occupational Health Nurses Association of the Philippines, Inc. (OHNAP, Inc.)
- Pediatric Infectious Disease Society of the Philippines (PIDSP)
- Philippine Foundation for Vaccination (PFV)
- Philippine Society for Microbiology and Infectious Diseases, Inc. (PSMID)
- Private Hospitals Association of the Philippines, Inc. (PHAPI)
- Philippine College of Chest Physicians (PCCP)

Non-Government Organizations

- Bridge Institute
- Pharmaceutical and Healthcare Association of the Philippines (PHAP)

Private Companies

- Hi-Eisai
- Kao Corporation
- Otsuka Solar Phils Inc.
- Taisho Pharmaceuticals Philippines, Inc.
- Takeda

Patient Group

- Philippine Alliance of Patient's Organizations (PAPO)

Government Offices

- Department of Education (DepEd)
- Department of the Interior and Local Government (DILG)
- DILG – Office of the Undersecretary for Barangay Affairs (OUSBA)
- Department of Health (DOH)
- DOH – Disease Prevention and Control Bureau
- DOH – Epidemiology Bureau (DOH-EB)
- DOH – Special Concerns Team
- Department of Science and Technology (DOST)
- DOST – Philippine Council for Health Research and Development (DOST-PCHRD)
- Embassy of Japan in the Philippines
- Food and Drug Administration (FDA) – Policy and Planning Service
- Metro Manila Development Authority (MMDA)
- Philippine Amusement and Gaming Corporation (PAGCOR)
- Union of Local Authorities of the Philippines
- Vaccine Experts Panel

Local Government Units
City Health Offices / Departments

- Caloocan City
- Las Piñas City
- Makati City
- Malabon City
- City of Manila
- Pasig City
- Quezon City
- San Juan City
- Taguig City
- Valenzuela City

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