Pandemic Influenza Preparedness Framework

Partnership Contribution High Level Implementation Plan I

Final Report 2014-2017

World Health Organization

On the cover: Child with influenza-like symptoms having her temperature taken, India. © WHO/Tom Pietrasik

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WHO/WHE/IHM/PIP/2018.3

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Foreword

Few events have marked humanity as gravely as the influenza pandemic of 1918. With an estimated 50-100 million deaths, it remains one of the deadliest public health events on record.

Our highly interconnected world allows pathogens to spread at lightning speed, increasing the urgency to ensure that all countries are prepared to respond to an infectious disease outbreak wherever it may emerge. The World Health Organization works to ensure that all countries, irrespective of their income or development status, have equitable access to the medical and other counter-measures necessary to respond to pandemics.

It is for these reasons that the Pandemic Influenza Preparedness (PIP) Framework holds such importance for public health: it shows that nations can come together and solve the most difficult issues through innovative solutions; that countries will undertake the work needed to strengthen their preparedness capacities; and that partners – public, private and non-governmental – will sustain their commitment to achieving the highest level of preparedness so that our future global response is founded on solidarity and equity.

I am deeply grateful to all PIP Framework partners that have demonstrated their sustained commitment to this goal. I look forward to continuing this important work in the same spirit of partnership and solidarity.

Tedros Adhanom Ghebreyesus,
WHO Director-General

Acknowledgements

WHO thanks all stakeholders that contributed to the successful implementation of the Framework in the past four years.

This includes Member States, the Global Influenza Surveillance and Response System (GISRS), the PIP Advisory Group, influenza vaccine, diagnostic and pharmaceutical manufacturers (Industry), civil society and other organizations. WHO is thankful for the support of the GISRS network, including WHO Collaborating Centres for Influenza (CCs), WHO Essential Regulatory Laboratories (ERLs), WHO H5 Reference Laboratories, and National Influenza Centres (NICs).

We are deeply grateful to Industry and Industry Associations for their support over this time, notably through the payment of the annual Partnership Contribution that funded implementation.

We thank implementing units at WHO country offices, regional offices, and headquarters for facilitating implementation and supporting preparation of this final report.

Acronyms and abbreviations

AFR	WHO African Region
AMR	Anti-microbial resistance
AMR	WHO Region of the Americas
APSED	Asia Pacific Strategy for Emerging Diseases
ARI	Acute respiratory infection
BOD	Burden of disease
CC	Collaborating Centre
CO	WHO country office
CRP	Collaborative registration procedure
EBS	Event-based surveillance
ECN	Emergency Communications Network
EMARIS	Eastern Mediterranean Acute Respiratory Infection Surveillance
EMFLU	Eastern Mediterranean Flu Network
EMR	WHO Eastern Mediterranean Region
EQAP	External Quality Assessment Programme
EUR	WHO European Region
FAO	Food and Agriculture Organization
GISRS	Global Influenza Surveillance and Response System
HAI	Human-animal interface
HAS	Hospital admission survey
HLIP	High Level Implementation Plan
HQ	WHO Headquarters
IATA	International Air Transport Association
IDP	Institutional development plan
IDSR	Integrated Disease Surveillance and Response
IHR	International Health Regulations (2005)
ILI	Influenza-like illness
ISST	Infectious substances shipping training
IVPP	Influenza virus with pandemic potential
L&S	Laboratory and surveillance
LMIC	Low and middle-income countries
MA	Marketing authorization
MOH	Ministry of Health
NIC	National Influenza Centre
NIPH	National Institute of Public Health (Cambodia)
NRA	National Regulatory Authority
NRL	National Reference Laboratory
OIE	World Organisation for Animal Health
PAHO	Pan American Health Organization
PC	Partnership Contribution
PHEIC	Public Health Emergencies of International Concern
RT-PCR	Real-time polymerase chain reaction
PCR	Polymerase chain reaction
PIP	Pandemic Influenza Preparedness
PSC	Programme support costs
PV	Pharmacovigilance
QMS	Quality management system
RRT	Rapid response team
RSV	Respiratory syncytial virus
RO	WHO regional office
SARI	Severe acute respiratory infection
SEAR	WHO South-East Asia Region
SMTA2	Standard Material Transfer Agreement 2
SOP	Standard operating procedure
TFDA	Tanzania Food and Drugs Authority
UN	United Nations
UNICEF	United Nations Children's Fund
US CDC	United States Centers for Disease Control and Prevention
WHO	World Health Organization
WPR	WHO Western Pacific Region

Executive summary

Pandemic influenza viruses respect no borders. All countries, rich and poor, large and small, must work together to prepare for and respond to an influenza pandemic whenever it may strike. Access to life-saving interventions, notably antiviral medicines and pandemic vaccines, made available in a timely and equitable manner to all countries, is essential for response.

To address these critical matters, the 64th World Health Assembly adopted the Pandemic Influenza Preparedness (PIP) Framework in May 2011. Its key goals include improving and strengthening the sharing of influenza viruses with pandemic potential, and increasing the access of developing countries to vaccines and other pandemic related supplies.

The PIP Framework contains an innovative benefit sharing system to improve global pandemic influenza preparedness and response, with equity, partnership, and transparency at its heart. One of its components is the Partnership Contribution (PC) which is an annual cash contribution to WHO from industry partners that use the Global Influenza Surveillance and Response System (GISRS).

Between 2014 and 2017, WHO implemented the *Partnership Contribution High Level Implementation Plan I (HLIP I)*, strengthening both global and national preparedness capacities. The plan focused on five areas of work in 72 countries in the six WHO regions: laboratory and surveillance, burden of disease, regulatory capacity building, risk communications, and planning for pandemic product deployment. Twenty-one indicators were developed to measure progress during implementation.

Collaboration and partnership were key to implementation. Funds were used in synergy with other investments from government agencies globally and bilaterally, the private sector, foundations, civil society, and multi-lateral agencies. By working together, partners contributed to improved pandemic preparedness.

This report presents the achievements and impact of the work undertaken. As highlighted in the 'Summary of implementation' on pages x-xi, and in more detail throughout the report, preparedness capacities improved globally, regionally and in priority countries during the four-year implementation period. Of the 21 indicators established to monitor progress, targets for 15 (71%) indicators were met or exceeded. Notable advances were made in each area.

Laboratory and surveillance (L&S, 43 priority countries): Implementation focused on improving country capacities to detect and respond to novel influenza viruses, and to monitor influenza trends. Virus and information sharing also increased through greater global collaboration under GISRS. Key achievements include:

- 35 priority countries are now able to detect unusual respiratory disease events: this represents a five-fold increase from seven countries in 2014.
- 34 priority countries have functioning inpatient influenza surveillance: this doubled from 16 countries in 2014.
- 29 priority countries have a human-animal interagency coordination mechanism: this is four-times more compared to seven countries in 2014.
- 91 countries globally now share influenza epidemiological data through WHO FluID: this is a 65% increase from 55 countries in 2014.
- 130 countries globally now share influenza virological data through WHO FluNet: this is a 20% increase from 108 countries in 2014.
- 132 countries now routinely share seasonal influenza viruses with GISRS: this is nearly a 50% increase from 90 countries in 2014.

Burden of disease (BOD, 19 priority countries): Seasonal influenza burden estimates were derived to better understand how influenza impacts local populations. This information is important, as it can be used to design effective pandemic influenza preparedness and response policies. Key achievements include:

- Eight PIP priority countries estimated the influenza disease burden, of which three have published their findings in peer-reviewed journals.
- A new global influenza yearly mortality estimate was published by WHO.

Regulatory capacity building (REG, 16 priority countries): National regulatory capacities were strengthened to help ensure countries can access pandemic supplies in a timely manner in the event of a pandemic. Institutional development plans (IDPs) are a key foundation for regulatory capacities, and countries were supported to develop and implement these plans. Additionally, guidance was developed for all countries to improve their regulatory system readiness for pandemic preparedness. Key achievements include:

- 94% of priority countries established an IDP to build regulatory capacities.
- All priority countries with an IDP benchmarked at least one of their regulatory capacities.
- 48 targeted countries have a regulatory approach to facilitate the timely approval of pandemic influenza products during an emergency.

Risk communications (RC, 38 priority countries): At all stages of an influenza pandemic, fast, effective, and transparent risk communication can reduce morbidity and mortality. Capacities on a global scale were built through training experts for response when needed, knowledge sharing, and strengthening in-country risk communication capacities. Key achievements include:

- Risk communications IHR capacity scores increased by an average of 20% in priority countries.
- Eight influenza courses are available on the newly launched OpenWHO.org learning platform.
- A cadre of 180 communications experts were trained and are ready for emergency deployment.

Planning for deployment (DEP, 16 priority countries): Global and country supply chain systems need to be prepared to receive and distribute vaccines and pandemic products in an emergency. A global simulation tool was developed and used to identify key bottlenecks in product deployment, and to support countries in improving their national deployment processes. Key achievements include:

- World's first vaccine deployment simulation portal 'PIP Deploy' was launched.
- A global vaccine deployment simulation involving countries, manufacturers and other stakeholders was completed.

Significant progress has been made, but more work is needed to address the vast requirements for preparedness. PIP will continue to support pandemic influenza preparedness globally and will transition to the implementation of the *Partnership Contribution High Level Implementation Plan II (HLIP II)* starting in 2018.

Partnership Contribution Funds[a]

$142M Total Received

$79M **Preparedness**
Strengthening pandemic influenza preparedness in five areas of work

$36M **Response**
Set aside for a future pandemic

$13M **PIP Secretariat**
Implementing the PIP Framework

$14M **WHO PROGRAMME SUPPORT COSTS**

[a]All financial numbers, unless otherwise indicated, are as of 31 December 2017 (US$). Balance funds carried forward to the 2018-2019 biennium.

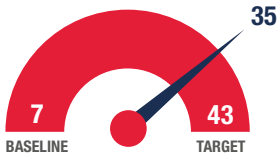
A WORLD BETTER PREPARED: ADDRESSING NEEDS GLOBALLY, REGIONALLY AND IN 72 PRIORITY COUNTRIES

PIP PC implementation across five areas of work (2014-2017)

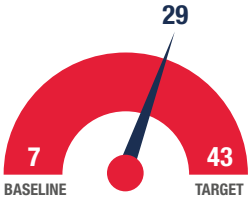
Laboratory & surveillance

Capacity to detect and monitor influenza epidemics is strengthened in developing countries that have weak or no capacity

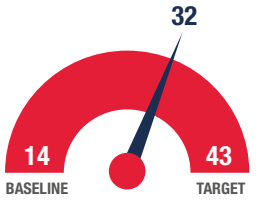
ACHIEVEMENTS



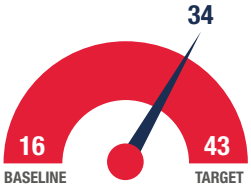
Functional event-based surveillance



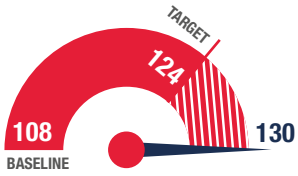
Functional HAI coordination mechanism



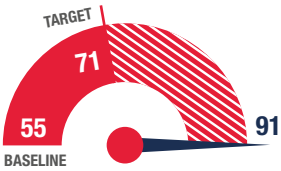
Active ILI surveillance



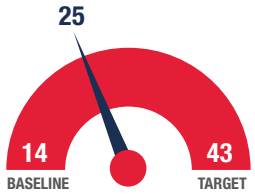
Active SARI surveillance



Consistent reporting to FluNet



Consistent reporting to FluID



National RRTs trained yearly and ready for deployment

Routine seasonal influenza virus sharing

IMPACT

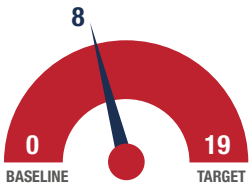
- National surveillance systems have improved to better detect and monitor influenza
- Global alert and response capacities have improved through GISRS including greater virus and information sharing

$42.9M SPENT

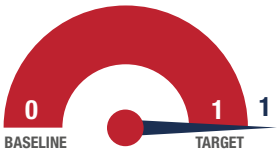
Burden of disease

National policy-makers will have influenza disease burden data needed for informed decision-making and prioritization of health resources

ACHIEVEMENTS



National disease burden estimates available



Global disease burden estimate available

IMPACT

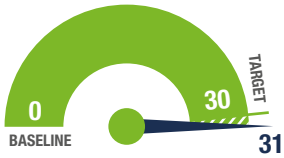
Influenza burden data are available to inform evidence-based policy

$2.1M SPENT

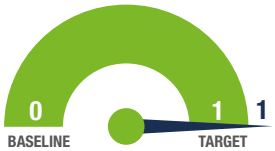
Risk communications

Global risk communications capacities are strengthened with a special focus on pandemic influenza communications

ACHIEVEMENTS



National risk communications core capacities strengthened



Emergency Communication Network established

IMPACT

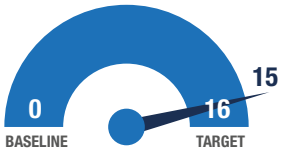
Global and national systems are available for emergency risk communications

$6M SPENT

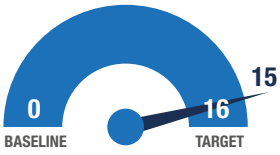
Regulatory capacity building

Countries with weak or no regulatory capacity will be able to regulate influenza products, and to accelerate their approval in case of an influenza pandemic

ACHIEVEMENTS



National IDPs established



National regulatory capacities benchmarked

IMPACT

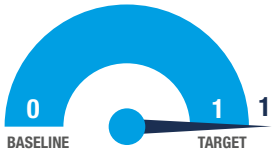
National regulatory authorities have improved capacities to better regulate products during a public health emergency

$3.3M SPENT

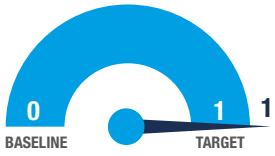
Planning for deployment

Plans for deployment of pandemic supplies will be developed and simulated

ACHIEVEMENTS



Portal for pandemic product deployment simulation developed



Simulation for pandemic product deployment conducted

IMPACT

The first global pandemic product deployment simulation was completed to improve response for when a pandemic strikes

$2.5M SPENT

The PIP Framework: working together for a safer tomorrow

There is no telling where or when the next pandemic influenza virus will emerge, nor how severe the resulting pandemic will be.

In 2003, avian influenza A(H5N1) – a virus with pandemic potential – re-emerged and caused human infections in different countries. By 2006, countries recognized the need for a formal arrangement to increase access to vaccines during influenza pandemics, particularly for countries in need. At the same time, countries recognized that ongoing, systematic virus sharing was critical for continuous global monitoring and risk assessment and to aid in developing safe and effective pandemic influenza vaccines. This started a global discussion to establish a more fair and equitable system to prepare the world for future influenza pandemics.

In 2009, the world faced an influenza pandemic due to a novel influenza A(H1N1) virus. Vaccines were in short supply, and there was slow distribution of donated vaccines to developing countries. While the exact numbers of deaths from this pandemic is unclear, estimates range from 151,000 to 575,400 in the first year alone.[2]

An after-action review of the International Health Regulations (IHR) in response to the 2009 pandemic found that the world was "ill-prepared for a severe pandemic". [3] Discussions were re-launched, and negotiations continued to create an agreement to improve preparedness for the next pandemic and increase the equity of vaccine access for all countries in need. These negotiations led to the Pandemic Influenza Preparedness (PIP) Framework.

Unanimously adopted by all 194 WHO Member States in May 2011, the PIP Framework is an international arrangement unlike any other. It establishes a unique benefit sharing system to improve global pandemic influenza preparedness and response, with equity, partnership, and transparency at its heart.

> "There is a high probability that the world will experience a severe outbreak in the next 10 to 30 years that could destabilize societies and economies; but it's anyone's guess when and where it might emerge."[1]
>
> International Working Group on Financing Preparedness

A rapid response team travels to remote villages affected by avian influenza outbreaks to actively search for cases, Lao PDR. © WHO/Jennie Musto

"The best-documented success story is the Pandemic Influenza Preparedness, or PIP, Framework. The Framework was set up in 2011 as a bold and innovative preparedness tool that puts virus sharing and benefit sharing on an equal footing."[4]

Margaret Chan,
former WHO Director-General,
in her address to the 140th
WHO Executive Board, in 2017

2007
The PIP Framework negotiations begin after A(H5N1) virus emerges, but no conclusion is reached.

2009
The first pandemic of the 21st century occurs.

2010
PIP Framework negotiations are reignited following the pandemic.

2011
The 2009 Pandemic IHR Review Committee states that "the world is ill prepared for a severe pandemic". The PIP Framework is unanimously adopted by all Member States during the World Health Assembly.

2013
The PIP Framework Advisory Group recommends capacity building across five areas of work, which is planned through the High Level Implementation Plan I (HLIP I).

2014-2017
HLIP I is implemented.

2018
Is the world better prepared?

The Partnership Contribution

The PIP Framework was developed by WHO Member States to improve global health security, by improving the sharing of influenza viruses with pandemic potential (IVPP), and increasing equitable access to pandemic influenza products for all Member States.

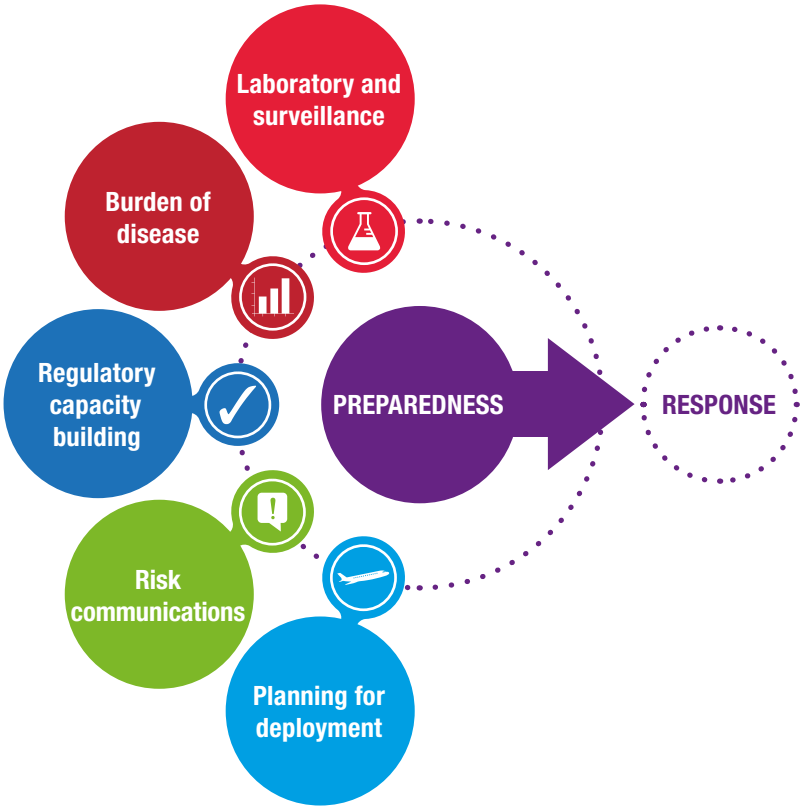
One of the most innovative aspects of the PIP Framework is its sustainable funding mechanism. Manufacturers of influenza vaccines, antivirals, and diagnostics who use the Global Influenza Surveillance and Response System (GISRS) make an annual financial contribution to WHO in exchange for use of the system.[5] This is the Partnership Contribution (PC), which provides funds that are used to build capacities for national, regional, and global pandemic influenza preparedness and response.

Most PC Funds (70%) are used to strengthen global pandemic influenza preparedness. *The High Level Implementation Plan 2013-2017 (HLIP I)*[6] was developed to guide how the PC would be used to fill the gaps in preparedness. As recommended by the PIP Advisory Group, HLIP I focused on five areas of work that complemented and built on other capacity building efforts (Figure 1). Implementation began in 2014.

> "Pandemic influenza is a most frightening global threat. The PIP Framework was developed as an innovative and ambitious instrument, inspired by the spirit of justice and equity. The PIP Framework Partnership Contribution provided by industry exemplifies these aims."

Didier Houssin,
Chair of the PIP Framework
Advisory Group (2011-2013)

Figure 1: The five areas of work under the *High Level Implementation Plan I*



PC Response Funds

A portion (30%) of PC funds are set aside to be used at the time of a pandemic. These PC funds will be used early during the response and will complement other funding.[7]

As of 31 December 2017, the available PC Response funds are **US$ 36M.**

Partnering for impact

Collaboration across sectors and partners is essential for effective and sustainable pandemic influenza preparedness at national, regional and global levels.

The PC is one part of this global investment. The generous support of government agencies globally and bilaterally, the private sector, foundations, civil society, and multi-lateral agencies all contribute towards achievements for pandemic preparedness.

By working together, partners combine their comparative advantages for success. Through building on synergies and leveraging the PC investments, PIP is generating momentum and has resulted in major gains for global pandemic preparedness and health security.

Thank you!

HLIP I implementation has benefited from the inputs of the partners who have positively engaged, supported, and provided feedback to improve implementation and preparedness. With deepest appreciation, thank you!

Training on newly developed national guideline for management of severe acute respiratory infection for over 30 intensive care specialists throughout Armenia before the start of the influenza season, Armenia. © WHO/Kristine Avetisyan

"The Partnership Contribution has been efficiently used to build national capacities, mainly in low and lower middle-income countries in such crucial fields as laboratory and surveillance, assessment of influenza burden of disease, regulatory measures and risk communication, among others. This report shows in a transparent way the outcomes accomplished so far in each one of the areas of work. We cannot forecast when and how severe will be the next pandemic, but we can assure that each country worldwide will be better prepared due to the PIP Framework and its Partnership Contribution."

Jarbas Barbosa,
Chair of the PIP Framework
Advisory Group (2016)

"The HLIP I constituted a big step towards ensuring the world is prepared for the next influenza pandemic; in an era of fast-emerging, quick-spreading epidemics and pandemics, the work of the WHO and the PIP Framework in ensuring global health security and contributing to public health has never been more relevant."

Influenza Vaccine Supply (IVS) Group of Manufacturers,
International Federation of Pharmaceutical Manufacturers & Associations (IFPMA)

Hand washing as part of infection prevention and control practices. © WHO

Implementing the Partnership Contribution for global progress

Developing sustainable change

Improved surveillance enables burden of disease estimation

Strong influenza surveillance is a vital foundation for pandemic preparedness. Countries can use surveillance data to estimate influenza disease burden. When some countries initiated work on these estimations, they realized that their surveillance systems were not equipped to deliver the data needed. Some issues were with the types of data available, or the processes for selecting and testing influenza cases. As a result, these countries prioritized surveillance system strengthening. Improved surveillance has countless benefits for pandemic preparedness, and notably has enabled countries to estimate burden of disease. This information ultimately helps countries make evidence-based policy decisions to support effective influenza preparedness and response.

> "Many countries in less-resourced settings where data were previously lacking have now developed surveillance systems to measure burden of disease."

Vernon Lee, Director,
Communicable Diseases Division,
Ministry of Health, Singapore,
and Member of BOD Steering Committee

Sustainable influenza clinical management in low-resource settings

Treating severe cases of influenza is challenging in many countries. Countries like Uzbekistan and Viet Nam are developing solutions. Both countries established national standards for clinical management.

Uzbekistan worked with international experts to develop the *National Guidance on Treatment of Patients in Critical Conditions due to Influenza*, and implemented trainings on these guidelines across the country. Viet Nam also worked with experts to develop a curriculum on severe acute respiratory infection (SARI) clinical management that was implemented in trainings for over 300 health workers.

Both of these initiatives have been sustained; in Uzbekistan the trainings will become part of curricula for postgraduate clinicians in intensive care departments, while the training in Viet Nam was certified by the Ministry of Health (MOH) for continuing medical education. As a result, these countries have set national standards for treating patients with severe influenza infections. During a future pandemic, the health workforce will be ready to implement these practices.

> "The impact of the *National Guidance on Treatment of Patients in Critical Conditions due to Influenza* will be invaluable. It is designed for clinicians providing care for critically ill patients (adults, children and pregnant women) with severe acute respiratory infections, including for medical facilities with limited resources."

Gulya Khamraeva and Marianne Krasnenkova,
Associate Professors, Institute of Postgraduate
Medical Education, Uzbekistan

Integrating influenza in national budgets

PIP has created a movement across many countries that previously did not prioritize influenza as a public health concern. While many countries are challenged with constrained budgets, PIP has kick-started influenza capacity building and policy-makers are seeing the value. Many countries have now integrated influenza activities into their national health and laboratory budgets:

91%

of L&S PIP priority countries have reported integrating PIP-funded laboratory and surveillance activities into their national plans for longer-term sustainability.

TAJIKISTAN

PIP funds originally supported the transportation of clinical samples from sentinel sites to the National Influenza Centre (NIC), the development of a new data management system, and the monitoring of influenza surveillance system performance. These are now funded by the national budget.

CAMBODIA

Surveillance site staff are covered in full by the government, and surveillance activities will be integrated into the government's budget.

UZBEKISTAN

The national budget now supports sentinel surveillance.

ARMENIA

PIP previously funded sentinel surveillance, a data management system and laboratory PCR testing. These are now primarily financed by the State.

NEPAL

Influenza surveillance and response has been added as a line item into the national budget.

VIETNAM

Starting in February 2018, the government will support data entry from SARI surveillance into FluID. Previously, PIP funds were used for training laboratory staff, but now this will be supported from in-country government and national institute budgets.

GHANA

Sentinel sites now regularly ship specimens to the capital, Accra. This was originally funded by PIP, but has since been funded through health facility budgets.

TURKMENISTAN

The government now supports procurement of influenza diagnostic materials, and funds sentinel surveillance.

INDONESIA

The government now covers influenza sample shipment and monitors surveillance system performance.

Leveraging the Partnership Contribution for global impact

Institutionalising risk communications for all outbreaks

During the 2009 influenza pandemic, risk communication was not well understood. WHO and many countries had limited systems for communicating risk to the public, highlighting the need for embedding risk communications in the response from very early on. PIP provided an opportunity to build the field of risk communication and strengthen global and national capacities to communicate risk in any health emergency.

Using the PIP risk communication project as a lever, for the first-time ever WHO has mainstreamed risk communications, integrating it as a public health intervention in any emergency response. The PIP risk communication project supported countries to build their capacity and to strengthen areas that allowed people at risk to take informed decisions to protect their health in any epidemic or pandemic. Today, unlike in 2009, countries and responding agencies consider the risk communication needs as a core intervention in a disease outbreak.

At WHO, the Emergency Response Framework now has a section dedicated to risk communication, and the WHO Incident Management System dedicates space for risk communications expertise and financial resources. The project allowed WHO to leverage additional stakeholder investments into risk communications - operational partnerships with UNICEF, the Red Cross, and many international agencies now jointly support national capacity building and response. In the first year of the project, PIP funds paid for 100% of WHO's risk communication work. By the third year, PIP investment covered only 25%, and PIP funds helped to garner the remainder of stakeholder support required. With this tremendous success and diversified funding sources for risk communications, PIP funds continue to be leveraged to fill critical global gaps for pandemic influenza preparedness.

Communicating risk

PIP catalysed the development of the first evidence-based WHO guidance on communicating risk in an emergency.[8]

A growing community of practice around burden of disease

Global momentum has been created for estimating influenza disease burden. WHO is encouraging countries to estimate their influenza burden to inform programmatic decisions. More public health practitioners are getting involved to understand burden of disease, and are leveraging PIP investments to interpret, publish, and use the data. WHO has also engaged academia and other partners to identify the key questions that need to be addressed and to develop the methods for countries to generate the answers.

This global push is creating a better understanding of influenza's impact in countries and within different populations, and has led to a new global mortality estimate for influenza. Increased momentum for estimating burden helps countries and organizations to identify high-risk populations for infection and severe outcomes.

Disease burden information will inform pandemic planning in areas such as health service delivery and clinical management, and will help in the selection of priority population subgroups for vaccination.

Risk communications training, Kenya. © WHO

Influenza preparedness advances IHR core capacities

Although the objective of all PIP investments is to strengthen global pandemic influenza preparedness, the impact has been greater. HLIP I targeted pandemic influenza preparedness by focusing on five areas of work. These contributed to capacity building objectives for six of eight IHR core capacities:

- Surveillance
- Response
- Preparedness
- Risk communication
- Human resources
- Laboratory

As can be seen in Figure 2 and Figure 3, IHR core capacities – the key elements for all country health emergency preparedness – improved in countries that received PIP funds. The average IHR core capacity scores for PIP recipient countries increased from the baseline, which was measured before HLIP I started. Major progress was made in risk communications where the average score increased by 20%, as well as preparedness and human resources where both average scores increased by 11%. When looking at all countries globally (Figure 3), countries that were targeted with PIP funds for improved pandemic influenza preparedness made similar or greater gains in their overall IHR core capacity scores. These findings highlight the collateral benefit of investing in pandemic influenza preparedness. These results alongside the investments made by countries and other partners showcase PIP's broader positive contribution for enhanced emergency readiness.

What is the IHR?

The IHR (2005) is a legally-binding international instrument. It requires WHO Member States to build core capacities to detect, assess and report public health events, and to respond promptly and effectively to public health risks and Public Health Emergencies of International Concern (PHEIC).

> "Efficient global health crisis management can only be ensured through compliance with the International Health Regulations."[9]
>
> Berlin Declaration of the G20 Health Ministers, 2017

Figure 2: Changes in PIP priority country IHR core capacity scores

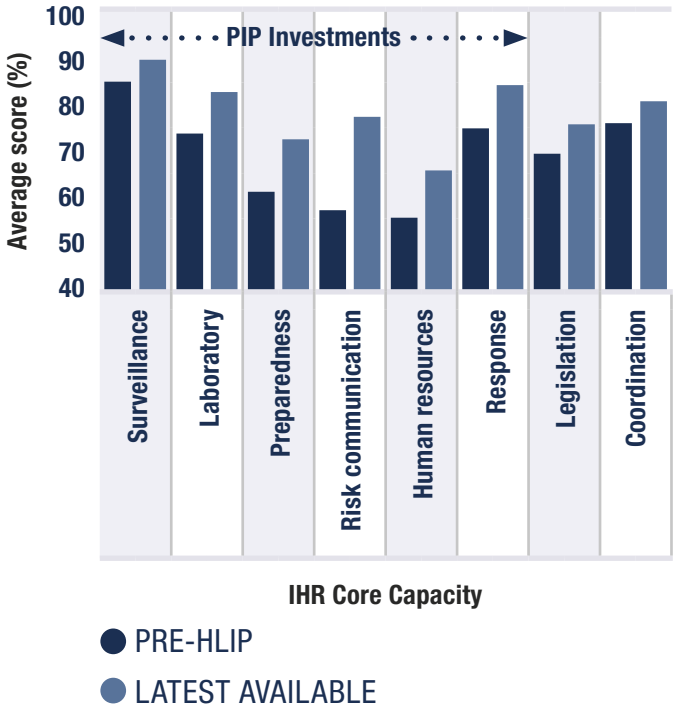
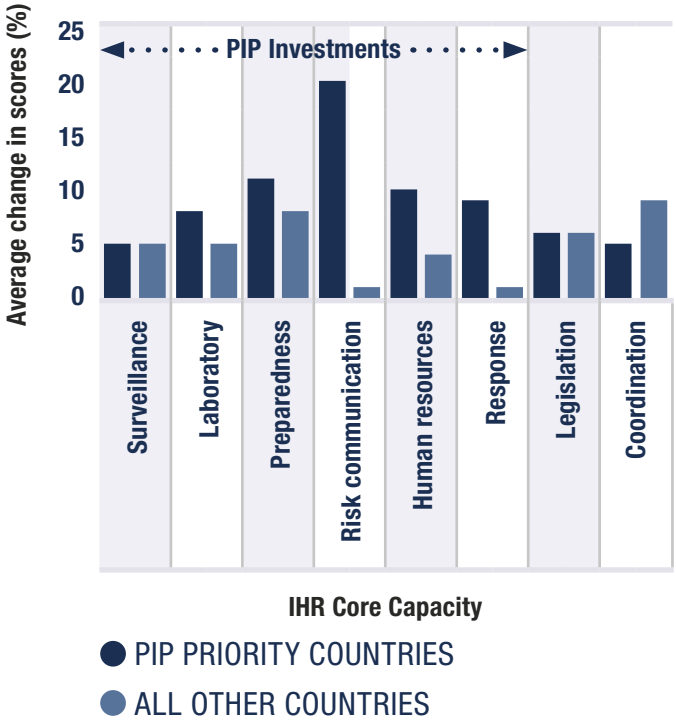


Figure 3: Average change in all country IHR core capacity scores



Notes:

- PIP funds corresponded to six of the eight IHR core capacities except Legislation and Coordination
- Figures 2 and 3 compare the HLIP I baseline average score (2013 or 2012 data) to the latest available score (2016 or 2015 data)

> PIP has improved IHR core capacities specifically on real-time surveillance and laboratory capacity."

Vida Mmbaga,
Influenza Surveillance Coordinator,
Ministry of Health, Tanzania

> Laboratory standard operating procedures (SOPs) have been developed, which helped to strengthen IHR laboratory capacities, and also to implement international standards and WHO recommendations."

Gurbangul,
Head, High Dangerous Diseases Department,
Ministry of Health, Turkmenistan

Investing in influenza "value for money" in emergency preparedness

> PIP has improved IHR core capacities, especially event-based surveillance. The influenza surveillance training was an opportunity to enhance laboratory practices."

Ezzine Hind,
Head, Epidemic Disease Services,
Ministry of Health, Morocco

> Training of rapid response teams and surveillance activities have resulted in increases in IHR core capacity scores."

Bouaphanh Khamphaphongphane,
Chief, Epidemiology Unit,
Ministry of Health, Lao PDR

Population movement contributes to disease spread.
© WHO/Tom Pietrasik

Laboratory & surveillance

$42.9M

Why is it important for pandemic preparedness?

A timely and effective response to an influenza pandemic relies on country capacities to rapidly detect a novel influenza virus. Once detected, countries and other stakeholders can perform risk and severity assessments, implement early response measures, and inform the composition of a vaccine. Pandemic preparedness also requires routine monitoring of seasonal influenza, which provides baseline data to assess the importance and potential impact of a newly emerged virus. For this reason, seasonal influenza monitoring is an important foundation for pandemic preparedness and response.

To conduct effective monitoring, countries require laboratory capacities for routine diagnostic testing and surveillance systems, such as for influenza-like illness (ILI) or severe acute respiratory infections (SARI). Information gathered through detection and monitoring needs to be shared globally to support risk management. Viruses must also be shipped and shared with the WHO Collaborating Centres (WHO CCs) of GISRS. Global data and virus sharing improves international surveillance, and provides information that creates the foundation for effective and informed preparedness and response measures.

What did HLIP I aim to do?

Output 1
Detection

Strengthen national capacities to detect respiratory disease outbreaks due to a novel virus.

Output 2
Monitoring

Strengthen national capacities to monitor trends in circulating influenza viruses.

Output 3
Global collaboration

Strengthen global collaboration, through the sharing of information and viruses, and improve the quality of the system (i.e. GISRS).

65 years of GISRS

At the 2017 Global NIC Meeting, 98 representatives of GISRS laboratories and national epidemiology institutions gathered with other partners to mark the 65th anniversary of GISRS. Pandemic influenza preparedness priorities were discussed and advanced. This included NIC influenza surveillance to detect unusual respiratory events, and virus sharing to facilitate GISRS' role in pandemic detection, risk assessment, and response. This forum stimulated Member State and other stakeholder collaboration and active participation in GISRS.

"WHO CCs and other partners work with NICs to strengthen laboratory capacities and influenza virus characterization. This engagement fosters a strong collaborative spirit, an active involvement with GISRS, and many opportunities for virus sharing."

Patrick Reading,
Professorial Fellow,
WHO Collaborating Centre,
Melbourne, Australia

GISRS
GLOBAL INFLUENZA SURVEILLANCE & RESPONSE SYSTEM

What is GISRS?

GISRS is a global network of 114 National Influenza Centres (NICs), six WHO CCs, four Essential Regulatory Laboratories, and 13 WHO H5 Reference Laboratories.

GISRS monitors the evolution of influenza viruses and provides recommendations in areas including laboratory diagnostics, vaccines, antiviral susceptibility and risk assessment. It also serves as a global alert mechanism for the emergence of pandemic influenza.

In 2017 alone, 40,000 specimens were shared with WHO CCs from over 110 countries, and 3,500,000 specimens were tested.

Global National Influenza Centre meeting. © WHO

Output 1: Detection

$14.9M

Detecting novel influenza viruses requires surveillance and laboratory capacities. National event-based surveillance (EBS) is needed to detect respiratory disease events from a variety of information sources including at the human-animal interface (HAI) and through the media or the informal health sector. In laboratories, staff need to have the skills to accurately identify influenza viruses from specimens tested. After detection, rapid response teams (RRTs) can investigate, respond, and control respiratory disease outbreaks, which provides decision-makers with information for further preventive action.

5x increase in the number of PIP priority countries with EBS.

7 → 35 **COUNTRIES**

4x as many PIP priority countries have a coordination mechanism between public health and animal health sectors.

7 → 29 **COUNTRIES**

"Motivation and professional capacity of the national staff has improved due to number of professional development opportunities provided by the PIP program including international workshops, trainings, meetings, materials."

Liana Torosyan,
Head of Department of Epidemiology of Especially Dangerous and Airborne Diseases, National Centre of Disease Control and Prevention, Ministry of Health, Armenia

Examples of improved HAI coordination for better preparedness and response:

Americas

In the Region of the Americas, the Regional Office supported eight countries, including five PIP priority countries* as well as three other countries** to establish intersectoral work plans that strengthen surveillance for zoonotic influenza.

Nepal

The National Country Plan for influenza promoted a 'One Health' approach, and Nepal conducted a joint training of veterinary and human health workers. When avian influenza was later detected, the outbreak was quickly contained.

Egypt

After detecting human cases of avian influenza virus infection in Egypt, a pandemic influenza risk assessment was completed involving both the public health and animal health sectors.

*Chile, Costa Rica, Dominican Republic, Ecuador, and Suriname

**Colombia, Jamaica, and Panama

During 2014-2017, **EQAP was conducted 4x** (see Table 1 for results):

- In 2017, **133 countries** participated in EQAP.
- **86%** of participating countries correctly identified all influenza viruses.
- **34 PIP priority countries** participated in the 2017 panel of which **88%** correctly identified all influenza viruses.

Table 1: Global EQAP results from 2014-17

	2014	2015	2016	2017
Number of participating laboratories	156	153	151	160
% laboratories identifying all influenza viruses	71%	82%	87%	87%
% laboratories identifying all H5 viruses	83%	89%	93%	93%

Three PIP priority countries established RRTs that can respond to influenza-related events.

33 → **36 COUNTRIES**

69% of PIP priority countries sustained existing RRTs through refresher trainings in 2017.

Over 2,700 rapid responders were trained in 2016-17 alone.

What are rapid response teams?

Rapid response teams (RRTs) are multidisciplinary teams that are ready to respond on a 24-hour basis to a public health event.

WHO's External Quality Assessment Programme (EQAP)

$500K[10]

Due to the continuous threat of pandemic influenza, quality laboratory diagnostics are essential to accurately detect emerging influenza viruses. In 2007, WHO initiated EQAP for GISRS and other national influenza laboratories that perform polymerase chain reaction (PCR) diagnosis. EQAP helps laboratories monitor and improve influenza diagnosis quality and performance standards.

"Are a laboratory's influenza PCR test results accurate and reliable? The WHO EQAP helps answer this question. Based on yearly results, we follow up with laboratories to identify gaps and take corrective action. With support from PIP, WHO works with laboratory staff to provide training and revisit protocols for improved performance. This process ensures correct identification of influenza viruses with pandemic potential."

Dmitriy Pereyaslov,
Technical Officer,
Health Emergency Programme,
WHO Regional Office for Europe

Achievements

Countries have built their EBS systems, enhanced quality virus detection, and established and maintained RRTs. This improved national capacities to detect and respond to respiratory disease events, including through coordinated efforts at the HAI.

Output 2: Monitoring

$10.1M

Countries need to establish or strengthen their surveillance systems to monitor influenza disease activity. In low-resource settings, options include establishing sentinel ILI or SARI surveillance systems, where data are collected from a small number of healthcare facilities to produce trends and assess transmission patterns. Sentinel surveillance systems can provide timely and high-quality epidemiological and virological information to support decision-makers in influenza control and pandemic preparedness.

Over **2x** as many PIP priority countries have functioning **ILI** surveillance.

14 → 32 **COUNTRIES**

Over **2x** as many PIP priority countries have functioning **SARI** surveillance.

16 → 34 **COUNTRIES**

65% more countries globally are consistently sharing influenza epidemiological data through WHO FluID.

55 → 91 **COUNTRIES**

7 countries reported to FluID for the first time.

20% more countries globally are consistently sharing influenza virological data through WHO FluNet.

108 → 130 **COUNTRIES**

5 countries reported to FluNET for the first time.

Review of severe acute respiratory infection surveillance records at a sentinel hospital, Indonesia. © WHO/Gina Samaan

Why is consistent data sharing important?

Consistent means that countries report data most weeks of the influenza season. Routine data availability means that situational analyses and risk assessments are up to date. These are critical for global and national preparedness.

Achievements

Countries have established and enhanced influenza surveillance systems to monitor and report virological and epidemiological trends on circulating influenza viruses.

Output 3: Global collaboration

$17.9M

Global collaboration is improved by strengthening GISRS. This includes increasing ways for countries to participate in GISRS, as well as expanding the network of laboratories globally. Through more participation, data and virus sharing increases. This provides better evidence for preparedness measures and response decisions, to ensure authorities can act appropriately when necessary.

3 new NICs were recognized by WHO in 2014-2017: Montenegro, United Republic of Tanzania, and Zambia.

- **114 countries** now have WHO recognized NICs.

47% increase in all countries globally that routinely share seasonal influenza viruses with GISRS.

90 → **132** COUNTRIES

- **20% increase** in PIP priority countries that routinely share viruses.

PIP funds supported activities to facilitate virus sharing, strengthen GISRS, and improve benefit sharing:

- **WHO Shipping Fund Project ($961 K):** NICs and other laboratories were supported to share influenza viruses quickly and safely up to four times per year (see Table 2).
- **Infectious Substances Shipping Training (ISST):** This training programme assists laboratory staff to understand and comply with international regulations for transporting dangerous goods, including influenza viruses. With the support of PIP funds, 615 laboratory staff were trained and certified from 108 countries between 2014-2017.
- **Influenza Virus Traceability Mechanism (IVTM):** This system tracks where PIP biological materials have been sent. WHO uses IVTM to identify manufacturers and other institutions accessing these materials. Agreements are then signed with these entities to enable vaccine and other benefits to be available at the time of a pandemic. Seventy-six agreements, known as SMTA2s, were signed between 2014-2017.[11]

Why is seasonal influenza virus sharing important?

When countries share seasonal influenza viruses, they contribute to global surveillance and influenza vaccine development, and they show their capability to also share influenza viruses with pandemic potential when the need arises.

Table 2: Number of influenza specimen shipments

	2014	2015	2016	2017
Virus shipments made using Shipping Fund Project (SFP)	123	147	230	243

Improved global platform for influenza data sharing

'FluMart' is a platform for sharing influenza-related data, which houses information from FluNet and FluID. It was launched by WHO's Global Influenza Programme, and was designed to increase the simplicity of data sharing, enhance usability, and increase the interface with regional platforms. Its implementation has led to more countries reporting their data to FluNet and FluID (see *Output 2, p15*). FluMart is an organizational success and is sustained by WHO.

Achievements

Information and virus sharing has increased, which has strengthened GISRS.

Bringing together detection, monitoring and global collaboration: Cambodia's story

Having experienced outbreaks of avian influenza A(H5N1) virus, Cambodia prioritized pandemic influenza preparedness through building laboratory and surveillance capacities.

Surveillance capacities that were supported by PIP include:

- Early warning alert and response RRT trainings;
- Exercises for HAI intersectoral coordination to maximize operational readiness;
- Supportive supervision visits to all 15 sentinel sites to improve surveillance; and
- Establishing influenza epidemic alert thresholds to interpret seasonal influenza trends, thereby improving data utilization.

Laboratory capacities were also supported. WHO CCs provided mentorship and training at the National Institute of Public Health (NIPH) to introduce virus isolation and sequencing capacities. PIP also helped facilitate participation in regional and global GISRS activities, and 100 seasonal influenza viruses were shipped to WHO CCs in 2017.

Sample collection training at a health centre, Cambodia. Photo credit: Yi Seng Doeurn

Outbreak response in action: Health workers are ready to respond

On 6 December 2017, the Ministry of Agriculture informed the Ministry of Health about a disease outbreak with 1,739 chicken deaths on a poultry farm in Kampong Cham province. Within 24 hours a preliminary risk assessment was conducted, prompting a joint investigation by the public health and animal health sectors.

The RRT visited healthcare facilities near the affected village to review patient records and surveillance data, and to train healthcare workers in sample collection.

A health education campaign was conducted in the affected village. The signs and symptoms of avian influenza were explained using posters and demonstrations, and individuals learned when to seek treatment. Community members were also taught what to do with sick or dead birds.

The investigation identified 13 suspected human cases. Samples were collected from the suspected cases and sent to NIPH for testing. All samples were negative for avian influenza A(H5N1) virus.

THE IMPACT IS CLEAR. TOGETHER, NATIONAL COMMITMENT, PARTNERSHIPS AND RESOURCES CAN IMPROVE PREPAREDNESS.

"The enhanced human surveillance supported by PIP funds during the poultry outbreak was crucial to monitor for human infection. Ultimately, no human cases were found."

Ly Sovann, Director,
Communicable Disease Control Department
Ministry of Health, Cambodia

"WHO's support helped our laboratory to improve global health security."

Chin Savuth, Deputy Chief,
NIPH, Cambodia

Impact: How did preparedness improve?

Across the globe, national capacities to detect and monitor influenza, and to share data and viruses have improved. With on-the-ground detection through EBS, sentinel influenza surveillance and RRTs, coupled with better laboratory detection as evidenced by improved EQAP scores, countries have enhanced capacities to detect novel influenza viruses in a timely fashion. Improvements in ILI and SARI surveillance across PIP priority countries support continuous monitoring of influenza trends, with more epidemiological and laboratory data – as well as viruses – shared globally, since 2014. With increased virus and information sharing, as well as collaborative opportunities across regional and global forums, countries are more engaged with GISRS, and this system continues to grow.

Overall, the substantial amount of work in countries, regionally and globally ensures that risk management operations are better informed and that global solidarity in pandemic preparedness continues.

Sustainable change

PIP stimulated improvements in national influenza laboratory and surveillance systems. As a result, a number of countries have already incorporated pandemic preparedness activities in their national budgets *(see Integrating Influenza in National Budgets on p7 for more)*. This will have a strong positive and long-term impact on preparedness and response in the event of a future pandemic.

Participants enjoy a training workshop on avian influenza at a health clinic, Indonesia. © WHO

Burden of disease

$2.1M

Why is it important for pandemic preparedness?

To protect a country's health and economy during a pandemic, it is important that authorities allocate sufficient resources and plan appropriate intervention strategies capable of limiting the spread of disease and minimizing the health and economic impacts. To design effective pandemic influenza preparedness and response policies, decision-makers need to know how seasonal influenza impacts local populations, regions, and economies – that is, its burden of disease (BOD).

While it may sound simple, developing national and global estimates for disease, meaning morbidity and mortality, and economic burden is complex. It takes time to gather the relevant data, and analyze and publish the findings.

What did HLIP I aim to do?

Output 1
National estimates

Develop representative influenza disease burden estimates in countries and regions.

Output 2
Global estimates

Develop a global estimate of influenza disease burden.

Output 1: National estimates

$1M

National disease burden estimates are used by authorities to better understand the societal impact - both health and economic - of influenza. The information serves as an important evidence-base for pandemic planning. Authorities analyse the risk within a population to prioritize the allocation of resources and plan countermeasures such as vaccine and clinical management strategies.

8 PIP priority countries estimated their influenza disease burden, of which three were published in peer-reviewed journals.

- **3** were published in peer-reviewed journals: Costa Rica, Egypt, and Senegal.
- **5** completed estimates and are pending publication: Albania, Cambodia, Chile, Indonesia, and Madagascar.

See Indonesia's story on p22.

33 additional countries estimated their influenza burden and shared this information with WHO.

Doctors examining a patient receiving oxygen therapy, Nepal. © WHO/Tom Pietrasik

Regional efforts on BOD

The WHO Regional Office for the Americas estimated the total number of influenza-associated respiratory hospitalizations in the Americas. A manuscript was submitted for peer-reviewed publication. Once published, countries in the region will benefit from the information as it can support national evidence-based policy development.

Standardized tools, training and advocacy materials were developed:

An **economic burden manual** was published. Two countries, Madagascar and Romania, piloted the manual and are currently in the process of estimating influenza-associated economic burden.

Training courses on estimating influenza disease burden were launched on OpenWHO: **280 people** have already completed these online courses.

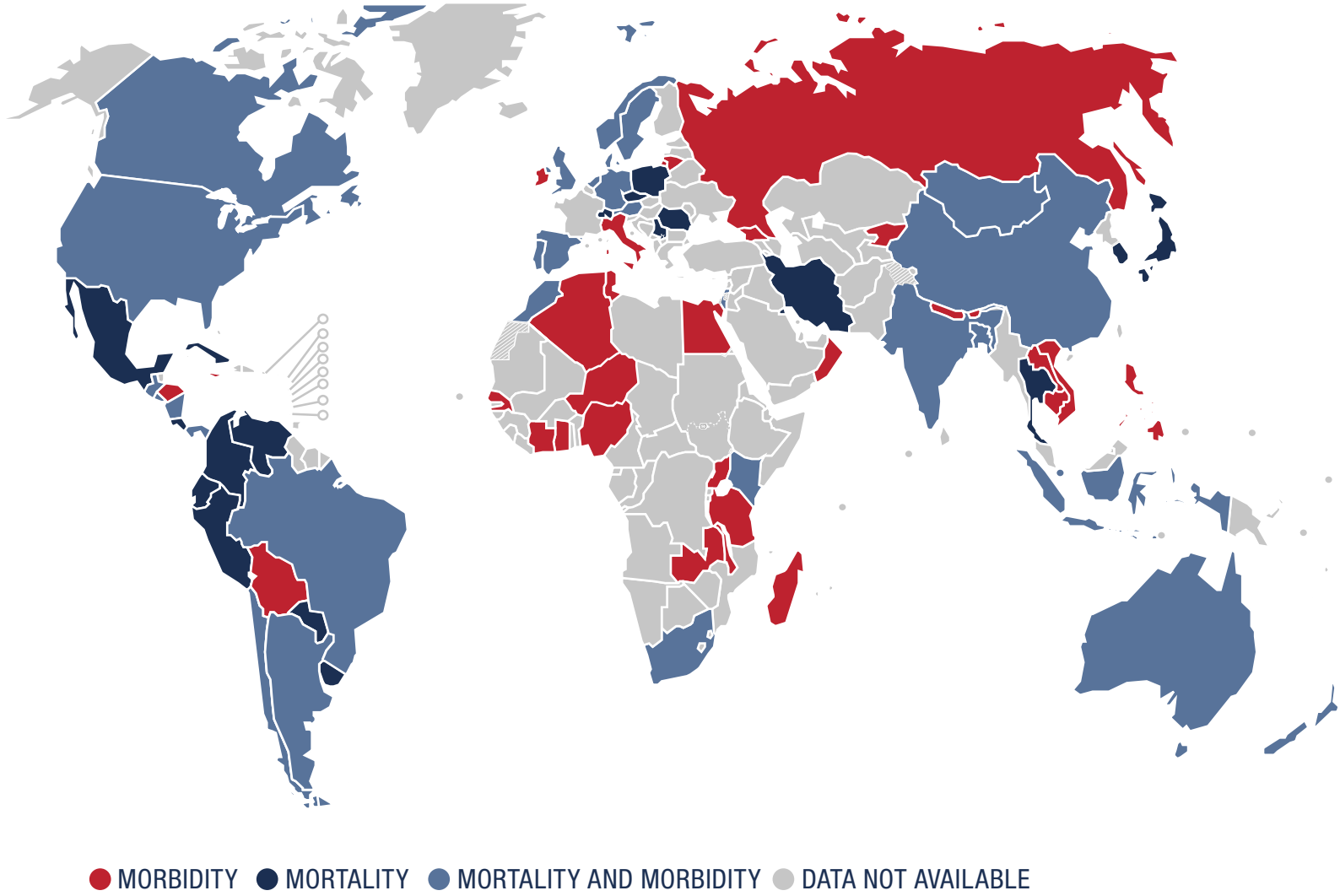
See p33 for details on OpenWHO.

Two advocacy infographics were published to raise awareness on the: (1) Importance of measuring influenza burden of disease, and (2) Estimate of respiratory deaths due to seasonal influenza.[12]

Knowledge sharing

A special edition of the Influenza and Other Respiratory Viruses journal was sponsored, which shared **18 population-specific burden estimates** including estimates from Asia, Africa, Europe, and the Americas. There is now a better global picture of overall burden estimate, including more about the deaths, hospitalization, and illness caused by influenza (see Figure 4).

Figure 4. Countries with burden of disease estimates that have agreed to share data for the global estimate for influenza mortality and influenza associated hospitalizations, as of February 2018.



Achievements

More countries now have influenza disease burden estimates enabling evidence-based policy development.

Estimating influenza burden in Indonesia

Indonesia's story to estimate influenza disease burden is one of commitment, collaboration and success. The Indonesian MOH built a new sentinel SARI surveillance system in 2013. The system, called SIBI, included six geographically dispersed sites and was designed to monitor influenza disease trends. Leveraging knowledge, guidance, and various resources, Indonesia went on to finalize its disease burden estimates four years later.

2014

- A national BOD team involving the NIC, the MOH, WHO, and US CDC was established to start the process for estimating influenza burden in Indonesia.
- Using WHO's manual for estimating influenza burden, the team decided that hospital admission surveys (HAS) were needed to estimate the surveillance sites' catchment populations.

2015

- Surveillance sites were routinely visited by the national and provincial SIBI surveillance managers to maintain case detection, data quality, and to start the HAS.

2016

- The HAS was completed.
- Influenza burden was estimated using three years of SARI surveillance data and HAS findings.

2017

- A manuscript was accepted for peer-reviewed publication. The study found that the incidence of influenza-associated hospitalizations was highest in children aged <5 years.

Participants learning to pack specimens during an influenza surveillance training, Indonesia. © WHO/Endang Wulandari

Data validation of severe acute respiratory infection case information at a sentinel site, Indonesia. © WHO/Gina Samaan

Output 2: Global estimates

$1.1M

Global disease burden estimates can drive global, regional and national policy development on influenza prevention and control. A number of factors need to be considered when estimating global burden including the availability of data from a variety of countries, and the population and risk groups assessed. Even though estimating global burden is challenging, the information can underpin pandemic preparedness decisions including the use of countermeasures and allocation of resources.

"The BOD work under PIP has produced notable successes, such as the first global death estimates for influenza in more than a decade. These estimates will allow for policy-makers to have the best data for decisions. The group has also spurred the creation of national disease burden in many countries, and is now turning its attention to ensuring that these data are actually used to drive policy for influenza and pandemic prevention."

Joe Breese, Associate Director of Global Health Affairs, US CDC, Influenza Division, and Chair of BOD Steering Committee

WHO now estimates that 290,000-650,000 respiratory deaths occur each year associated with seasonal influenza.

3 systematic literature reviews that contribute to the evidence-base on influenza burden globally and particularly in low and middle-income countries (LMICs) were completed:

Global burden of influenza associated mortality.[13]

Risk factors for serious outcomes associated with influenza in high income countries compared to LMICs.[14]

Influenza burden estimates compared to respiratory syncytial virus (RSV) in children.

Achievements

A global estimate of influenza burden was updated and published.

Impact: How did preparedness improve?

The evidence-base to support influenza preparedness policy has increased. Decision-makers have more influenza burden estimates to inform their actions, including priorities for how health resources are best used. Countries that previously lacked influenza burden information have either developed estimates, or are currently working towards estimates using the new tools available. Finally, countries are sharing their burden information and are working together in new ways. As a result, this information and collaboration led to an improved estimate of the global influenza burden.

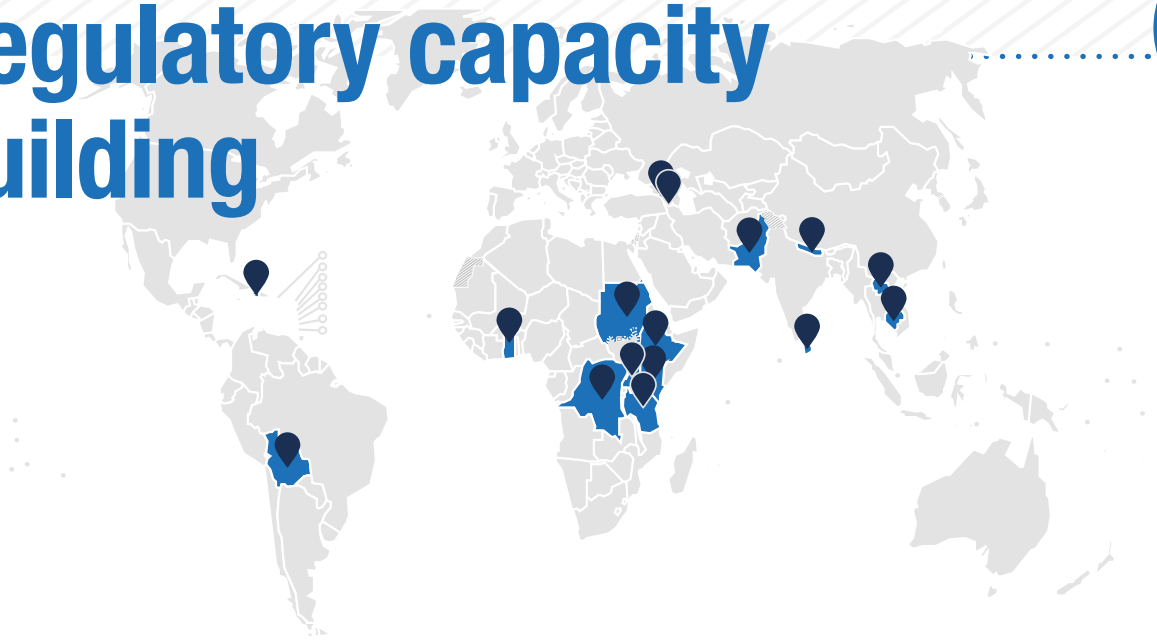
Sustainable change

The burden estimates are an important step in understanding impact and developing prevention policies in countries. The tools developed now enable countries to estimate influenza burden in a cost-effective way without large, expensive studies. This information is used to drive public health policy.

Child with a runny nose, Nepal. © WHO/Tom Pietrasik

Regulatory capacity building

$3.3M



Why is it important for pandemic preparedness?

National regulatory requirements for product approval can be a significant limiting factor in the optimal and timely deployment of vaccines and other products during an influenza pandemic. Engaging National Regulatory Authorities (NRAs) in the inter-pandemic period, supporting their regulatory preparedness plans, and strengthening necessary regulatory capacities will help reduce or eliminate country-specific regulatory delays during a pandemic.

What did HLIP I aim to do?

Output 1
Guideline development

Develop guidelines on regulatory preparedness for non-vaccine producing countries that enables them to expedite approval of influenza vaccines in response to a pandemic emergency.

Output 2
NRA capacities

Strengthen NRA capacities to regulate influenza products including vaccines, antivirals and diagnostics.

Output 3
Accelerated approval

Incorporate regulatory processes to accelerate approval of influenza vaccines, antivirals and diagnostics during a public health emergency into deployment plans for pandemic influenza products.

Output 1: Guideline development

$220K

Guidelines on regulatory pandemic preparedness for non-vaccine producing countries can improve processes that will expedite approval during an emergency. In 2009, many non-vaccine producing countries found the process for approving pandemic products unclear. They requested straight-forward guidance on the identification of appropriate regulatory pathways for marketing authorization of pandemic influenza vaccines.

New regulatory guidance for non-vaccine producing countries was published.

A major step was achieved in helping countries prepare for regulatory approval during a pandemic through publishing the *WHO Guidelines on regulatory preparedness for provision of marketing authorization of human pandemic influenza vaccines in non-vaccine-producing countries*.[15]

Non-vaccine producing countries can select from a number of options including the WHO Prequalification (PQ) programme. Globally, nearly two-thirds (60%) of NRAs accept PQ as the basis for vaccine approval for use. Another option is to use the WHO collaborative registration procedure (CRP).

Making the regulatory guidance available was an important first step. The guidelines were translated into five of the six official UN languages. Next, countries must operationalize and link their regulatory plan to other aspects of pandemic influenza preparedness. This will be a major focus of future PIP investments.

Catalysing donor interest

PIP has helped WHO leverage funding from other partners in sustainable development. For example, much-anticipated QMS guidelines are scheduled for submission to the Expert Committee on Specifications for Pharmaceutical Preparations (ECSPP) for endorsement in October 2019, and funding for this was catalyzed from additional donors. This is with thanks to the momentum created by PIP and other initiatives.

A patient receiving a seasonal influenza vaccination, South Africa.
© WHO/Isadore Brown

Achievements

WHO guidelines on regulatory preparedness for provision of marketing authorization of human pandemic influenza vaccines in non-vaccine-producing countries were published.

Output 2: NRA capacities

$2.9M

Strong NRA capacities are needed to regulate influenza products including vaccines, antivirals and diagnostics. An Institutional Development Plan (IDP) outlines the approach a country will take in order to develop these capacities. Elaborating an IDP results in a detailed plan of action to sustain strengths and address gaps. Implementing an IDP means that countries strengthen their regulatory system and related functions. This will support timely approval of assured-quality, safe and efficacious medical products for responding to public health emergencies, including pandemic influenza.

15 out of 16 PIP priority countries established IDPs containing activities to strengthen regulatory preparedness for pandemic influenza products.

All 16 PIP priority countries have improved at least one of the three NRA capacities (Figure 5).

Global and in-country regulatory capacity building activities were conducted to prepare NRAs for an efficient and effective response to pandemic influenza:

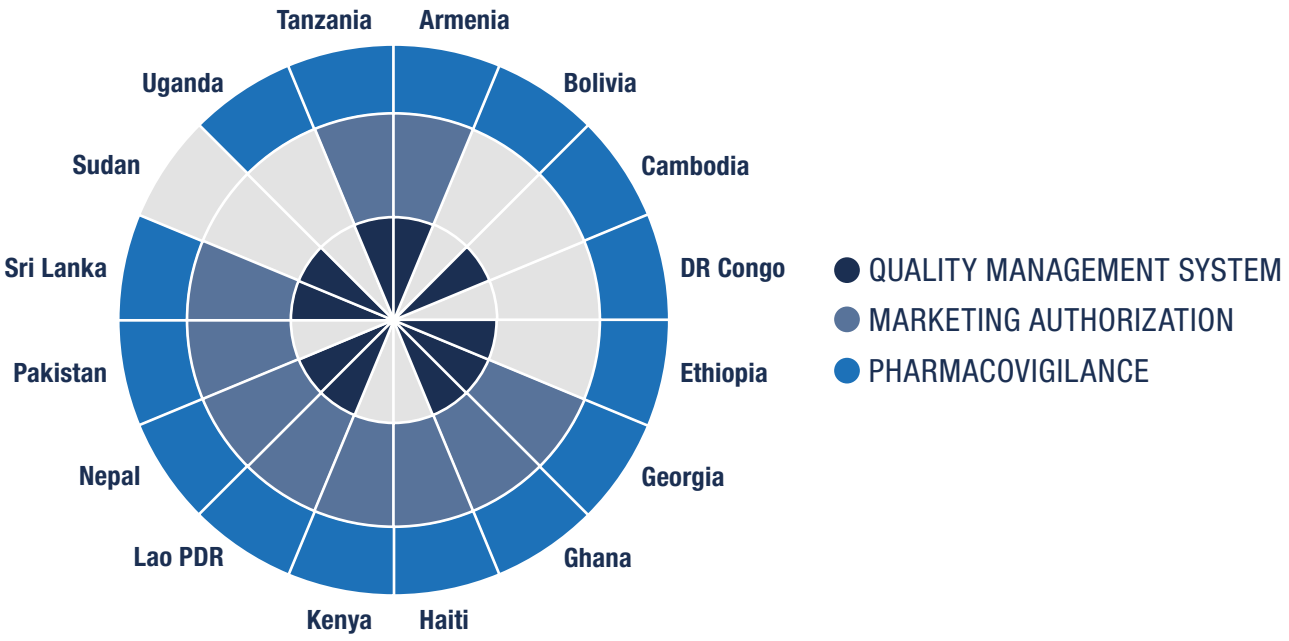
- **33 NRAs** attended QMS workshops.
- **10 NRAs** attended WHO courses on product evaluation of influenza vaccines.
- **15 NRAs** attended PV trainings.

Three key regulatory capacities

PIP funds supported countries in strengthening three key regulatory capacities relevant to pandemic influenza preparedness:

- **Quality management systems (QMS):** A formalized regulatory system that documents processes, procedures, and responsibilities for achieving quality policies and objectives.
- **Marketing authorization (MA):** The process to assess and license a medical product including during an emergency.
- **Pharmacovigilance (PV):** A system to detect, assess, monitor, and prevent adverse effects of pharmaceutical products.

Figure 5: Three NRA capacities were strengthened in PIP priority countries



The Global Benchmarking Tool was used by WHO to assess the status of regulatory systems and their functions in **11 out of 16 priority countries.**

Of the three countries that benchmarked the same regulatory capacity twice, all countries have improved implementation of indicators. Countries advanced within a maturity level or moved to a higher maturity level (Figure 6).

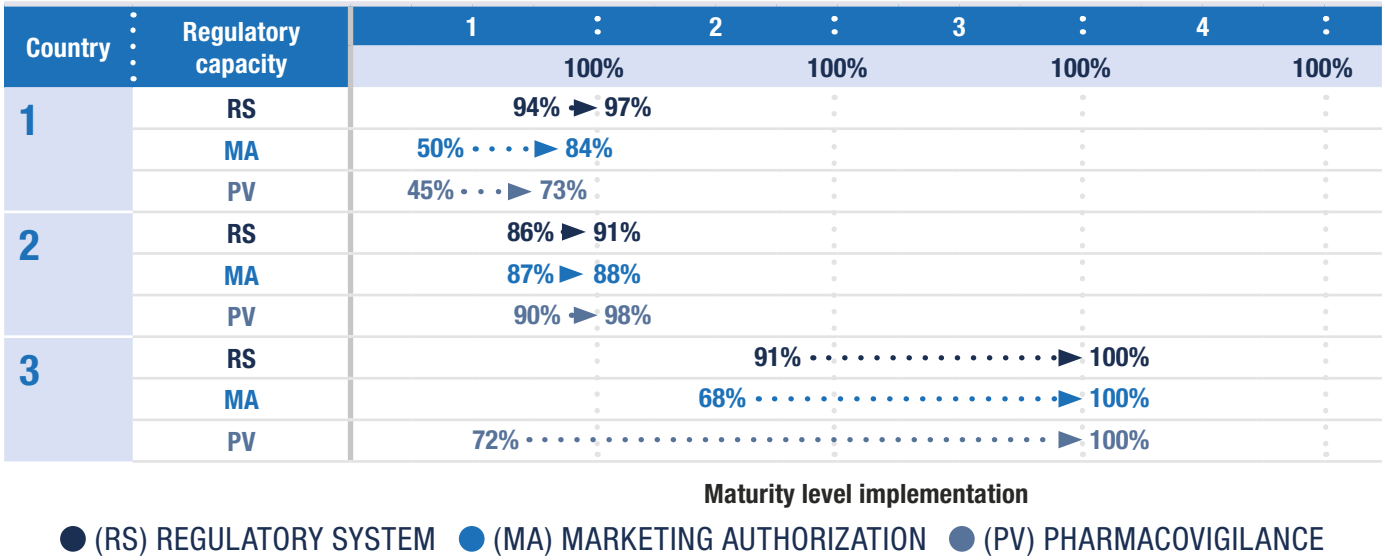
The Global Benchmarking Tool

The tool is used to ascertain the maturity level of national regulatory systems. An increase in maturity level indicates that a country would be better prepared to assure the quality, safety, and efficacy of medical products including pandemic influenza products.

"Through the long-term availability of PIP investments and the collaborative effort, we have ensured continuity of our program and engagement with the target countries year after year, thereby growing a critical mass of in-country competence on pharmacovigilance."

Shanti Narayan Pal,
WHO group lead for
medicines safety and vigilance

Figure 6: Improvements in the maturity level of three regulatory capacities as assessed using the Global Benchmarking Tool



Achievements

Established IDPs are being implemented and countries are increasing their regulatory maturity.

Output 3: Accelerated approval

$190K

During a pandemic, countries need to approve vaccines and other products for use quickly. However, many NRAs have limited resources and procedures for regulatory oversight. To overcome these challenges, countries have a number of options for timely approval of pandemic products. This includes reliance on rigorous decisions of other NRAs, accepting WHO prequalified products, participation in the CRP, or implementing regional regulatory harmonization procedures.

All 48 PIP priority countries have an accelerated approach for regulatory approval:

- **60%** accept WHO prequalification evaluations.
- **40%** participate in the WHO CRP.[16]
- Some countries use a combination of these or other accelerated approval approaches.

Increasing regulatory efficiency

WHO's country support for accelerated approval helps enable NRAs to: a) benefit from the work already carried out by WHO to ensure the quality, safety and efficacy of products according to international standards; and b) strengthen their own regulatory oversight processes, in line with international best practices. Applying these procedures enables timely approval for use, minimizes duplication, and saves NRA resources.

Building a pharmacovigilance system to ensure the safety of medical products in Guyana

Guyana has sought to establish a National Centre for PV since 2007. Such a centre would help the country ensure the safety of medical products, including influenza vaccines and other products.

In 2013, the Government Analyst Food and Drug Department (GA-FDD) incorporated this vision into its IDP, and turned to WHO for support in building the system and staff capacities.

In September 2016, WHO supported Guyana to organize in-country training targeting health-care professionals to introduce PV, its impact on patient health and quality of care, the role of various stakeholders, and the process for reporting adverse events. WHO and its network of experts also provided support to GA-FDD staff on how to establish and operate a national PV system.

During an influenza pandemic, post-marketing surveillance focused on pharmacovigilance will be critical for the successful roll-out of vaccine, but building a national PV system is a long-term commitment. WHO's assistance, including PIP support since 2014, has helped Guyana to develop and implement a step-wise plan that lays the building blocks for years to come.

Achievements

NRAs in priority countries are incorporating pandemic influenza planning in their regulatory work, which will facilitate timely approval of products during a future pandemic.

Impact: How did preparedness improve?

NRAs in PIP priority countries have improved key regulatory capacities - regulatory systems, marketing authorization, and pharmacovigilance - which promote their pandemic influenza preparedness. The foundations have been set for countries to operationalize their pandemic regulatory preparedness when the need arises.

Sustainable change

The WHO guideline published provides countries with critical information to prepare for an influenza pandemic now and in the long run. The approaches adopted by countries to accelerate approval for pandemic influenza products are used for regulatory oversight of other products including during public health emergencies. Adopting well-established approaches will enable countries to practice regulatory oversight, and will maximize the efficiency and sustainability of regulatory preparedness for pandemic influenza.

Q&A with Hiiti Sillo, Director General of the Tanzania Food and Drugs Authority

What was your role in regulatory capacity building?

I supervised and managed the implementation of PIP funded activities within TFDA including implementation of the IDP.

What are you proud of as a result of PIP support?

First of all, I was proud of the outcome of the rapid benchmarking conducted in November 2016. The results clearly indicated the strengths and areas for improvement. WHO provided specific recommendations that, if implemented, would allow TFDA to reach maturity level 3 within two to three years, contrary to WHO expectations of five years. Some activities were quickly implemented in 2017 with the PIP funds. I was also very proud of the level of implementation of the QMS as a major component supporting the TFDA regulatory system.

Have there been broader benefits of the PIP support?

PIP funds have helped to strengthen regulatory systems for all medical products in Tanzania. Furthermore, additional training, learning, and capacity building opportunities have been opened for TFDA staff.

What do you hope to do in the future to prepare for an influenza pandemic?

At the time of 2016 benchmarking, TFDA did not have any influenza vaccine registered. It is necessary to build capacity for assessors to evaluate vaccines. For emergency use of pandemic influenza vaccines however, TFDA has already adopted the 'WHO collaborative registration procedure', which has enhanced Tanzania's preparedness.

Anything else?

The PIP implementation of regulatory capacity building has tremendous potential to strengthen regulatory systems in low-to-middle-income countries.

Hiiti Sillo, Former Director General, Tanzania Food and Drugs Authority

Risk communications

$6M

Why is it important for pandemic preparedness?

At all stages of an influenza pandemic, fast, effective, and transparent risk communication can reduce morbidity and mortality. Many countries lack policies, procedures and skills that are needed to communicate risk during an emergency. Globally, emergency risk communications systems and resources are limited despite the massive needs and requests from countries. Increased national and global capacity for risk communications can help improve emergency management, as well as health outcomes.

What did HLIP I aim to do?

Output 1
Knowledge sharing

Increase access to risk communications training and platforms, enabling all countries to respond more effectively to a potential influenza pandemic or other Public Health Emergencies of International Concern (PHEIC).

Output 2
Country risk communication capacity

Establish risk communications capacity in priority countries with little or no capacity.

Output 3
Global surge capacity

Operationalize the global Emergency Communications Network (ECN) and the network of social scientists (SocialNET) to provide support to countries before, during and after public health emergencies.

Output 1: Knowledge sharing

$2.9M

Improved access to risk communications training and knowledge-sharing platforms will increase workforce and national capacities to implement risk communication measures in an emergency.

WHO's **first-ever evidence-based guideline** on emergency risk communications was published, including in all six official UN languages and Portuguese.

"As a result of PIP implementation in the last few years (2014-2017), I am proud of the first guidelines on emergency risk communication. Despite this guiding document being propelled by pandemic flu as the most likely threat to face the world, as a practical evidence-based framework it can effectively help address any sort of public health emergency of national or international concern."

Mohamed Nour, Public Health Expert, Ministry of Public Health, Qatar and Member of WHO's Expert Group for Influenza Research Agenda

The Emergency Communications Network is trained to respond to emergencies. Photo credit: Violaine Martin

OpenWHO: An online knowledge transfer platform was launched with eight influenza courses now available. This is a highly accessible learning platform, which is freely available across the world in several languages. It has wide-ranging benefits – programmes and initiatives outside of influenza have benefited from the emergency preparedness resources.

10,000+ people from 190 countries have taken OpenWHO courses on pandemics and risk communication.

2,300 public health practitioners from 125 countries joined online risk communication trainings.

Screen shot of 'Preparing for pandemics' channel on OpenWHO. © WHO

OpenWHO: Life-saving knowledge at your fingertips

During a pandemic, it is essential to have trusted and accessible channels to communicate with responders, health care workers, and the public. During inter-pandemic periods, accessible and accurate information can enhance personnel skills. PIP funds played an important role in helping WHO establish a new platform for both of these needs – the OpenWHO platform.

OpenWHO was launched in 2017. It is an online source of training videos, courses, live briefings and exchange forums. This platform compiles pandemic influenza resources, and hosts a variety of other learning materials. In just nine months, more than 13,000 users from around the globe registered for 30 different courses, ranging from Risk Communications to Pandemic Influenza Severity Assessment. This platform hosts over 200 videos, with one in three viewers from the Africa region.

Achievements

Risk communications guidance, trainings and platforms were launched and utilized by public health professionals globally.

Output 2: Risk communications capacity

$2.3M

Establishing risk communications capacity in priority countries means that countries increase their national preparedness, and improve their systems in line with the IHR core capacity requirements.

350 public health practitioners from **32 countries** were trained at **10 sub-regional workshops**, with country-level follow-up to develop emergency risk communications systems.

20% average increase in risk communications IHR capacity scores in PIP priority countries.

Risk communications is a priority under the IHR, and targeting these capacities prepares countries for an emergency. PIP funds supported global experts to work with countries to develop national risk communication plans, test country risk communications capacities, and conduct IHR evaluations.

See p9 for more improvements on IHR core capacities.

A social mobilization expert speaks to students about health messaging. © WHO/ Pippa Haughton

Developing risk communications in West Africa

After a number of recent outbreaks including seasonal influenza, cholera, Lassa fever and the largest outbreak of Ebola ever-documented, countries in West Africa needed new tools for outbreak-response. PIP funds empowered countries in West Africa to institutionalize risk communications and to forward-plan for future outbreaks and emergencies.

"The West African Health Organization has taken advantage of PIP, which trained communication and surveillance officers from the 15 countries in the Economic Community of West African States (ECOWAS) through a four-day regional workshop in July 2017. This training gave us the opportunity to support existing risk communication efforts in the region, identify needs, and encourage the development of robust planning, training, and advocacy. The PIP funds allow us to initiate discussions and collaboration among ECOWAS Members States and intensify advocacy at a strategic level in the region."

Kuassi Virgil Lokossou,
Project Officer, Epidemics Control,
West African Health Organization

Achievements

Risk communications capacities were established in PIP priority countries.

Output 3: Global surge capacity

$840K

A global surge capacity for risk communications will support countries with public health emergencies. This capacity was developed through the **Emergency Communications Network (ECN)** and was diversified through **SocialNet.**

The Emergency Communications Network (ECN) was established and operationalized.

- **180 members trained** with a pandemic focus.
- **Over 70%** of the ECN was deployed for capacity-building and response missions.
- All country requests for support were responded to **within 72 hours.**
- WHO deployed experts from the ECN to respond to **8 public health emergencies.**

SocialNet was established to have a global cadre of anthropologists and social scientists trained and ready to support countries during emergencies.

- **24 members** trained with a pandemic focus.
- WHO deployed experts from the SocialNET to respond to **5 public health emergencies.**

Emergency Communications Network (ECN)

ECN is designed to build a cohort of competent and trusted communication officers. The ECN is available to all countries before, during, and after public health emergencies, including an influenza pandemic.

Achievements

Global surge capacity for emergency risk communications established and used by countries.

SocialNet is transforming emergency response teams

While medical anthropologists and social scientists have been part of outbreak response teams in the past, these professionals are not systematically embedded into response operations. They often face barriers to integrate their inputs into emergency response and decision-making.

WHO's SocialNet fills this gap. Through SocialNet, social science experts are equipped to rapidly advocate, educate, and convince decision-makers on the strategies needed during an emergency, and to help embed them into the response. WHO now has 24 members of SocialNet. Members are ready to deploy and help shape the response to include to the social and cultural needs and preferences of affected populations. This resource will be invaluable during a future influenza pandemic as it will assist countries to apply sensitive and effective pharmaceutical and non-pharmaceutical interventions at the community level.

"I had the opportunity to participate in the first pre-deployment WHO SocialNet training. This training truly equipped me with essential knowledge and practical work, which allowed me to confidently be deployed into the field. It also gave me the confidence needed as a non-medic to engage in a meaningful and valuable way to enrich the response."

Adama Thorlie,
WHO social science consultant
and social mobilization expert

Impact: How did preparedness improve?

Risk communication capacities are being built into national and global systems, with global tools and surge capacity available for use during a public health emergency. Thanks to the publication of guidance documents and the creation of OpenWHO, countries will be able to exchange information and receive training more rapidly during a pandemic. PIP investments have helped mainstream risk communications in national and international emergency responses thereby contributing to better influenza pandemic preparedness.

Sustainable change

The systems, tools and country-level plans are available for use now and during any public health emergency. The PIP Funds have catalysed other donor investments and recognition by many Member States towards the importance of risk communications in public health security.

Training in emergency risk communication for nearly 100 senior government officials from Caribbean countries and territories, Barbados. © WHO

Planning for deployment

$2.5M

Why is it important for pandemic preparedness?

During a pandemic, countries without purchasing power or production capacity rely on donations to access pandemic products such as vaccines. Factors that can delay deployment include multiple sources of vaccines and other products, changes or bottlenecks in the supply chain, and limited logistical capacity to receive and distribute products at country level.

Supply chains must be able to come together very quickly, with manufacturers, suppliers, governments, civil society, and commercial transporters consolidating their efforts into a common approach that moves products from the countries where they are produced or stockpiled to the countries where they are needed. By preparing deployment systems globally and in-country, countries will be able to receive and distribute vaccines and other pandemic products more efficiently and effectively.

What did HLIP I aim to do?

Output 1
Common deployment approach

Develop a common approach to manage deployment operations, and share it with stakeholders and deployment partners.

Output 2
Country deployment tools

Simplify and update country deployment readiness systems.

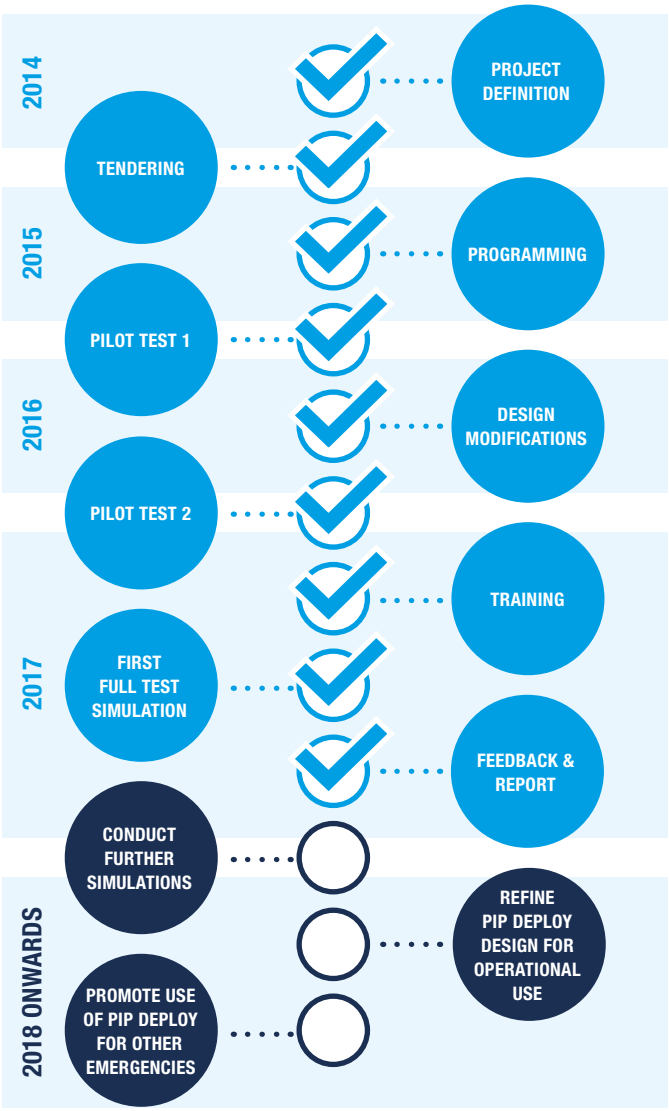
Output 1: Common deployment approach

$1.9M

A common approach will help manage deployment operations among global stakeholders and national authorities. For this, a global simulation portal 'PIP Deploy' was developed.

- **1st global simulation portal** was designed and developed (Figure 7).
- 1st global **simulation was conducted** in 2017 with:
  - **5** countries
  - **3** manufacturers
  - **1** donor
  - **1** freight forwarder
  - **2** civil society organizations

Figure 7: PIP Deploy development timeline

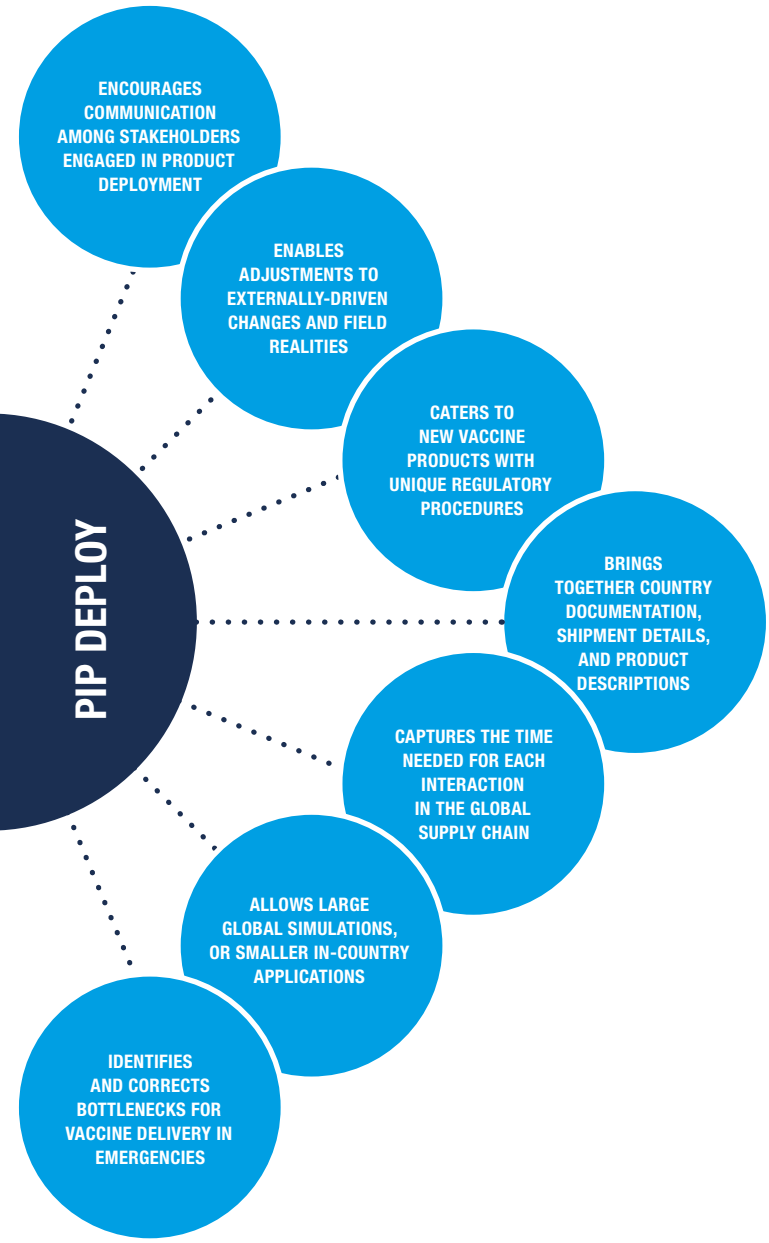


What is PIP Deploy?

PIP Deploy is an online coordination and simulation portal that enables stakeholders to practise the operational steps and interactions needed to deploy donated vaccines (Figure 8). It was built to closely match real-world operations. Simulations using PIP Deploy help stakeholders test three key steps in the supply chain – product supply, allocation and delivery – to help identify strengths and opportunities for improvements. This allows stakeholders to practise important aspects of the deployment process before a pandemic.

> "Strange feeling to be in a simulation! For a freight forwarder, it is like being dressed up, but with nowhere to go. It was an excellent opportunity to practise and make all of the mistakes possible in a dry run. To have a chance to practise and find our weak spots was very valuable. Of those that we found on the freight forwarding side, we saw a number of situations with voluminous products that would have been impossible to ship without some form of alternative plan. The best part of this in a real situation is the country profile information."
>
> PIP Deploy simulation participant, freight forwarder

Figure 8: PIP Deploy allows for real-time simulation that mimics emergency deployment scenarios



Participating in the simulation increases real-life preparedness

A few weeks after the PIP Deploy simulation finished, cases of influenza A(H1N1)pdm09 virus infection were detected at a boarding school in southern Ghana. Two students died from the infection within days of outbreak detection. Alarm bells were raised and the Government requested WHO support. WHO mobilized and deployed influenza vaccine to Ghana within 48 hours of receiving the request. Typically, countries take far longer to achieve a "ready to deploy" status; however, Ghana had developed a 'country profile' as part of the PIP Deploy simulation. The country profile contained the information needed to deploy vaccines rapidly, including consignee details, port of entry, cold chain storage capacity, and regulatory/marketing authorization. As a result, stakeholders including WHO and the freight forwarder had the necessary information to quickly deploy the vaccine and to bolster the national response to the outbreak.

"It was valuable to have the information in the PIP Deploy country profile as there was an actual outbreak shortly after the simulation. Having spent time on this helped in reducing the time in a real response."

Hilary Kahume Njenge,
PIP Deploy simulation participant,
Technical Officer for Emergency Preparedness,
Ghana WHO Country Office

Achievements

PIP Deploy is the first global vaccine deployment simulation portal. Engaging in simulations to test and improve the process will streamline real-world pandemic product deployment.

Output 2: Country deployment tools

$600K

Clear and updated country deployment plans are critical for an efficient and effective response to a pandemic. WHO guidance and tools help countries update their plans. This includes sharing lessons learnt and highlighting the considerations needed to improve the quality of pandemic product deployment plans. This knowledge lays the groundwork to improve operational readiness.

A **model country recipient agreement** was updated by WHO.

This provides the framework for individual agreements between WHO and each country that will receive donated pandemic vaccines or medicines. This agreement manages the legal terms and conditions associated with all donations at the time of a pandemic. Having these agreements in place now will reduce bottlenecks during a pandemic.

National vaccine deployment plans (NVDPs) were analysed to identify key areas to improve future preparedness planning.

Two analyses of NVDPs were done. In 2015, 71 NVDPs from the 2009 pandemic were analyzed. In 2016, a second analysis examined eight plans that were developed or updated since 2010.

What was found? Plans adequately described the target populations and costs associated with deployment, but lacked details on critical logistical procedures including cold chain integrity, waste management and deployment timelines.

To help countries address the gaps identified, WHO published *A checklist for pandemic influenza risk and impact management: building capacity for pandemic response.*[17] This document highlights key logistical considerations for developing or updating deployment plans as part of the overall pandemic preparedness planning process.

Stock and warehouse management. © WHO/Lisa Hedman

Achievements

Tools were developed that can assist countries to update their national pandemic product deployment plans.

Impact: How did preparedness improve?

Deploying pandemic products necessitates effective communication and coordination between the different supply chain stakeholders. The tools and support from this area of work have provided new avenues to bring these groups together and to refine deployment planning processes. Preparing agreements and procedures, and practising coordination will reduce bottlenecks at the time of a pandemic. This way, critical response supplies that have been donated to WHO can more quickly and efficiently reach vulnerable countries and populations.

Sustainable change

The guidance and tools can be used in preparing for and responding to influenza and other public health emergencies. Countries can use these resources to update and test all-hazard preparedness and emergency response plans. This is in line with the IHR (2005) core capacity requirements to periodically review, exercise and update preparedness and response plans.

Product deployment during the 2009 H1N1 pandemic, Mexico. © WHO/Harold Ruiz

Regional and country implementation

Child with a respiratory illness at a health centre. © WHO/Tom Pietrasik

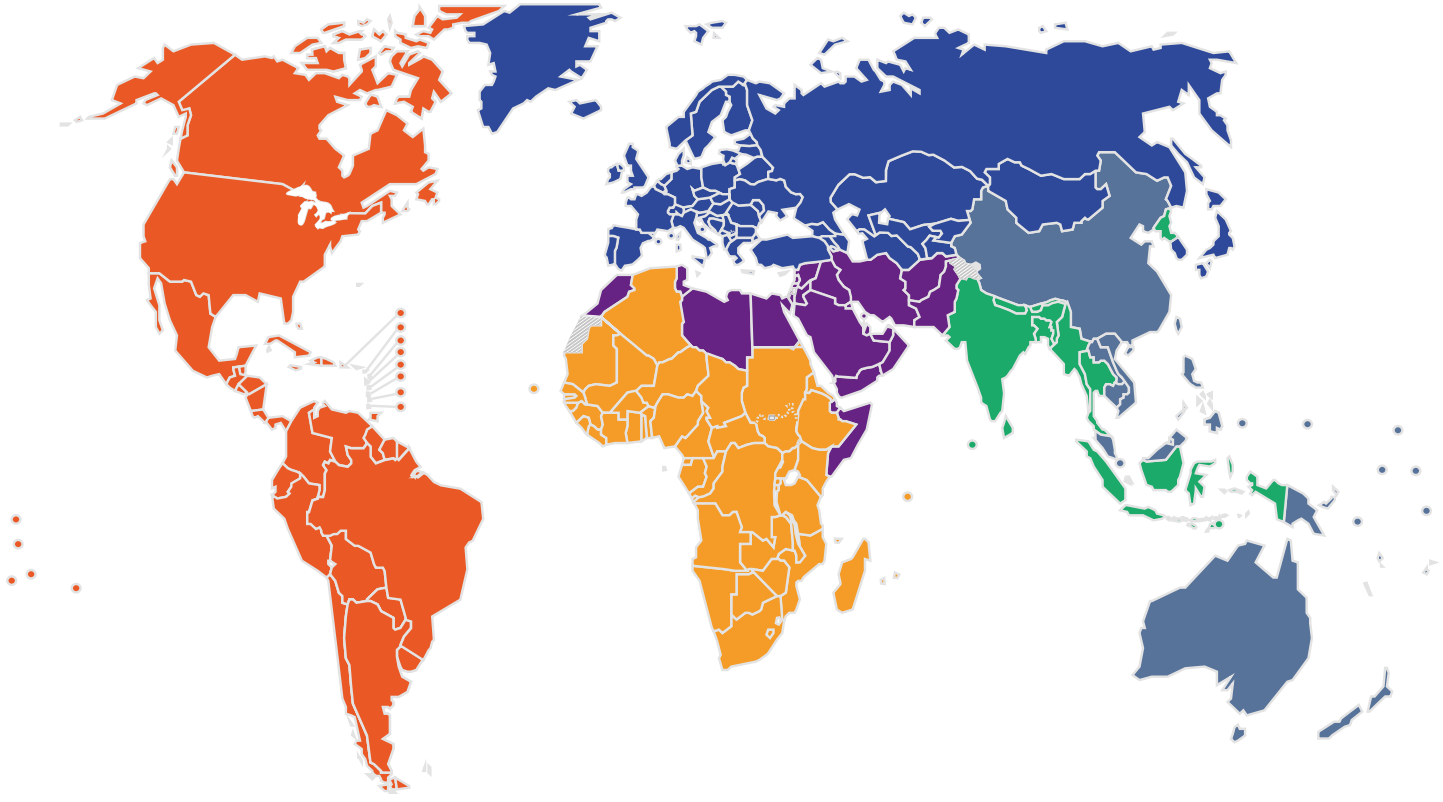
Laboratory & surveillance capacity building: regions and countries

Most PIP funds were invested in strengthening laboratory and surveillance systems, with implementation at global, regional and country level.

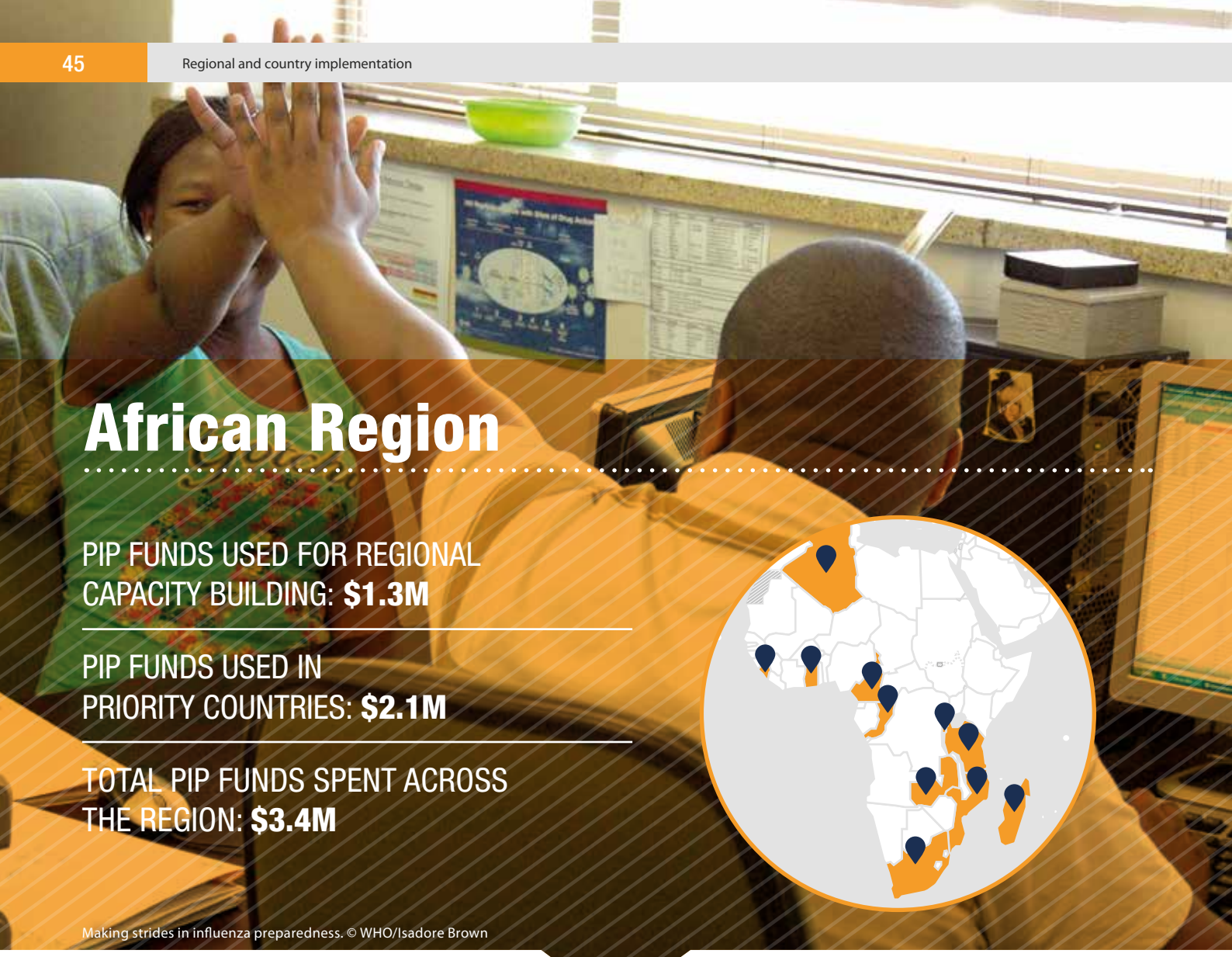
For regional and country level implementation, Regional Offices worked actively with all countries in their regions (Figure 9) to broaden engagement in and improve national pandemic influenza preparedness. In addition, priority countries were identified,[18] and targeted by Regional Offices to strengthen L&S capacities according to the local needs and context of each country.

The following section provides an overview of major accomplishments across regions and in priority countries receiving PIP funds.[19]

Figure 9: The six WHO regions



Workers at a commercial poultry farm, Indonesia. © WHO/Jonathan Perugia



African Region

PIP FUNDS USED FOR REGIONAL CAPACITY BUILDING: **$1.3M**

PIP FUNDS USED IN PRIORITY COUNTRIES: **$2.1M**

TOTAL PIP FUNDS SPENT ACROSS THE REGION: **$3.4M**

Making strides in influenza preparedness. © WHO/Isadore Brown

Across the African Region, countries prioritized and advanced epidemiological and virological surveillance capacities. These capacities are vital under the IHR (2005), as well as the *Integrated Disease Surveillance and Response* (IDSR), which is the regional framework for surveillance and response.

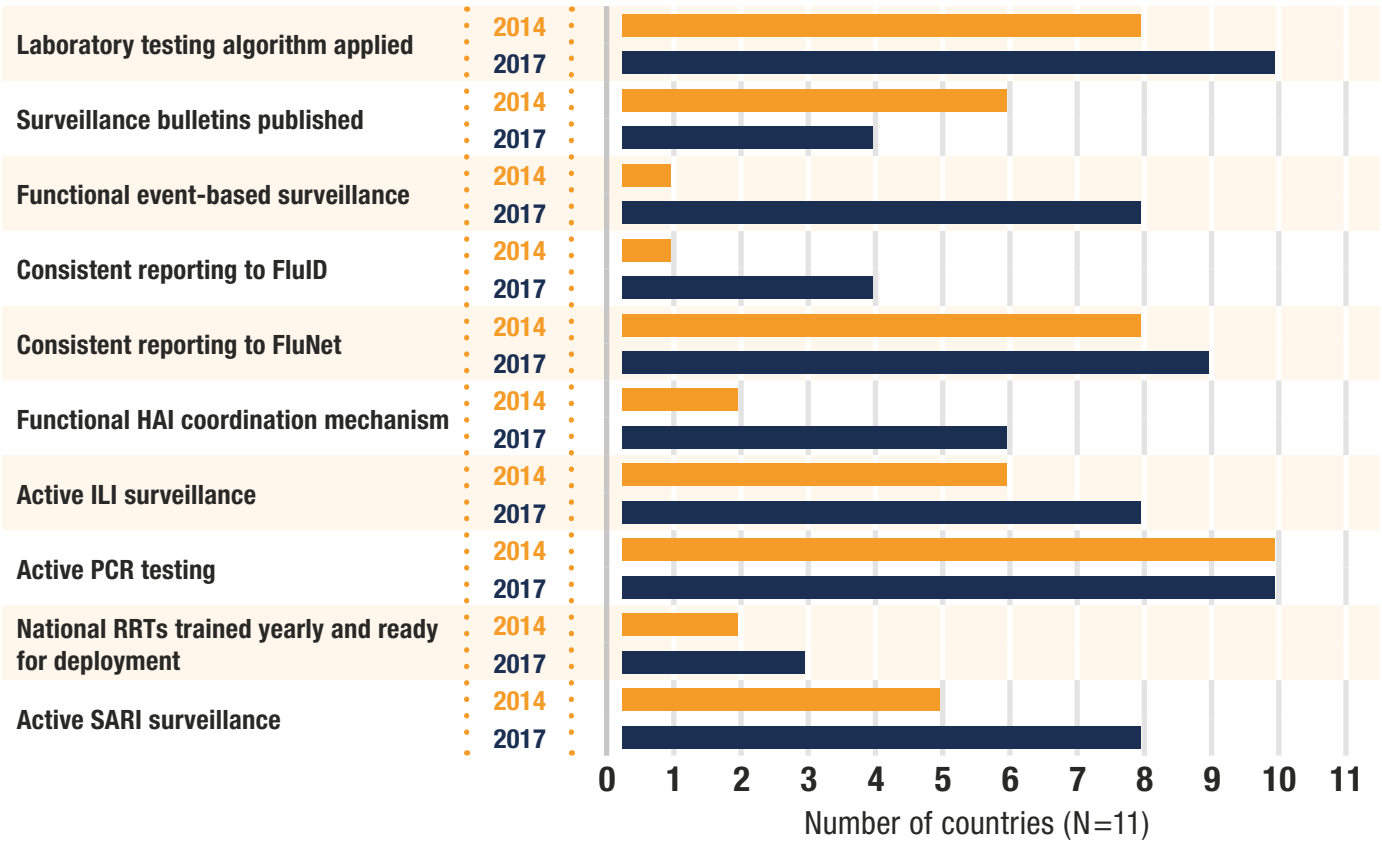
Several manuals, protocols and trainings were developed to guide countries to implement influenza surveillance. A *Community-based Surveillance Training Manual*[20] was developed, and a *Protocol for national influenza sentinel surveillance*[21] was updated and made available in three languages. A training programme that integrated this guidance was rolled-out to cover the three key elements of surveillance: epidemiology, virology, and data management. By the end of 2016, 12 countries had been trained. Together, these guidelines and training enabled countries to have a solid foundation for building robust and sustainable influenza surveillance.

The Regional Office also supported outbreak response capacities by developing the *Protocol for the investigation of acute respiratory illness outbreaks of unknown etiology*.[22] This was used by the Central African Republic and Kenya during SARI events in 2016, and by Cameroon during an avian influenza A(H5N1) outbreak in the same year. PIP funds were also used to support emergency response to influenza outbreaks in Ghana, Senegal and Swaziland.

A number of laboratory capacities were supported to enable countries to advance laboratory-based influenza surveillance and GISRS participation. Continuity of surveillance was enhanced by the annual provision of essential consumables and laboratory reagents to all 11 PIP priority countries. As the availability of these products is highly limited in the region, a unified regional supply system enabled countries to regularly test and then share surveillance data through FluNet. Sustained testing has also helped to improve the quality of laboratory surveillance, as evidenced by the participation and good performance on EQAP of several countries in the region. Furthermore, the regional support facilitated countries to engage in GISRS, where six out of the 11 PIP priority countries shared viruses with WHO CCs in 2017 namely, Algeria, Cameroon, Ghana, Madagascar, the United Republic of Tanzania, and South Africa.

The systematic regional roll-out of surveillance, laboratory, and response support has helped countries to generate and share quality data. As a result, the regional Influenza Bulletin is published weekly and circulated to all country focal points, and supports situational awareness and risk assessment. Thanks to the enhanced capacities, better up-to-date information is available on influenza, which supports early notification of, and a quick response to, a virus with pandemic potential.

Progress in key capacities for PIP priority countries in the Region (2014-2017)



Performance against indicators for all 47 countries in the Region (2017)

FluID	9%	countries consistently shared epidemiological data through WHO FluID
FluNet	47%	countries consistently shared influenza virological data through WHO FluNet
Virus sharing	43%	countries routinely shared seasonal influenza viruses with GISRS

Cameroon

POPULATION: **23,344,000**

TOTAL PIP FUNDS SPENT IN COUNTRY: **$250K**

NATIONAL INFLUENZA CENTRE: **YES**

Coordination between animal and human health sectors operationalized

An outbreak of avian influenza A(H5N1) was detected in poultry in September 2016. A RRT was mobilized to control the outbreak in birds and to identify and prevent infection in humans. Coordination between the human health and animal health sectors was integral to the investigation. While the animal health authorities were controlling disease spread among poultry, the human health team visited affected farms to screen for people with influenza-like symptoms, to conduct serosurveillance, and to enhance awareness and disease prevention through risk communication. Ultimately, no human cases were identified during the outbreak. Since animal influenza viruses have pandemic potential, the capacity to respond to animal influenza outbreaks is critical for pandemic preparedness. Through the support of PIP, this capacity was excercised in Cameroon.

Congo

POPULATION: **4,620,000**

TOTAL PIP FUNDS SPENT IN COUNTRY: **$270K**

NATIONAL INFLUENZA CENTRE: **NO**

Influenza surveillance and capacities for monitoring influenza trends expanded

Using PIP funds, three sentinel surveillance sites for influenza were established, and training was provided to both laboratory and surveillance officers. Country-wide surveillance improved with the establishment of a sample transport system and the setup of a new internet network to facilitate information sharing.

Teams are now better equipped to collect specimens, analyze data, and provide feedback on influenza virus circulation through surveillance reports. With greater commitment to influenza surveillance, data are also being shared internationally through FluNet.

Ghana

POPULATION: **27,410,000**

TOTAL PIP FUNDS SPENT IN COUNTRY: **$430K**

NATIONAL INFLUENZA CENTRE: **YES**

Data management streamlined disease surveillance

The national health information management system was modified to capture the epidemiological characteristics of acute respiratory disease cases. This has allowed influenza sentinel sites to report directly into the information system. This also enables the NIC to integrate the laboratory and epidemiological data from these cases to provide a more comprehensive picture of influenza and other respiratory disease activity in the country. A key benefit of this streamlined system is that the data can be accessed from any administrative level - district, regional or national - which increases the timeliness of data sharing and encourages broader use across the country.

Signficant progress achieved in surveillance

Ghana utilized PIP funds to enhance the quality of the influenza surveillance system. The surveillance protocol was updated, messaging groups were established for rapid information sharing, and meetings were held across sectors to discuss surveillance findings including zoonotic influenza. Information is currently shared through the Ghana Weekly Epidemiological Report, which is a surveillance report on priority diseases that is publically available. As a result of these investments, there was a five-fold increase in SARI and ILI samples sent from sentinel sites to the NIC from 2015 to 2017.

"Over the last few years there has been more than a five-fold increase in samples from sentinel sites reaching the NIC for testing."

Sally-Ann Ohene,
Disease Prevention and Control Officer,
WHO Country Office, Ghana

Outbreak response capacities in action

In 2017, a boarding school in southern Ghana discovered febrile illness among its students, and two deaths were reported within a week. A RRT was mobilized to conduct investigations. Specimens were rapidly collected and sent to the NIC where they tested positive for influenza A(H1N1) pdm09. The RRT provided technical guidance on case management for seasonal influenza, facilitated further laboratory investigations, and shared health messages with the school and neighbouring communities about preventing and controlling influenza. International action helped vaccines to be deployed within 48 hours of the request - *see 'Participating in the simulation increases real-life preparedness' on p39* for more on this quick deployment. This comprehensive and rapid response prevented further transmission and contained the influenza outbreak. The capacities used in this outbreak will help the country to respond to outbreaks of influenza viruses with pandemic potential when needed.

"The capacities built at the sentinel sites play a pivotal role in influenza outbreaks in the country, where they serve as the first line of call. For example, the sentinel site, Kumasi South Hospital, was the first point of call during the influenza A (H1N1)pdm09 outbreak among students of Kumasi Academy in November 2017."

Elijah Paa Edu-Quansah,
Senior Research Assistant
and Field Epidemiologist,
National Influenza Centre, Ghana

Madagascar

POPULATION: **24,200,000**

TOTAL PIP FUNDS SPENT IN COUNTRY: **$80K**

NATIONAL INFLUENZA CENTRE: **YES**

Influenza surveillance data used to establish epidemic thresholds

The national ILI and SARI surveillance systems have been an important source of influenza disease trends for public health decision-makers in Madagascar. The weekly data from 54 ILI sentinel sites and 18 SARI sentinel sites provide information on virus circulation and seasonal fluctuations in disease activity. The NIC plays an important role in sustaining the quality of surveillance, and PIP has helped strengthen these systems through activities including sentinel site planning and monitoring.

Based on the surveillance data that have become available in recent years, Madagascar is in the process of establishing epidemic thresholds for influenza. Epidemic thresholds are important to compare disease severity between years and can be used to determine what is normal/expected, versus what is unusual or more severe. During a pandemic, these thresholds and baselines for seasonal influenza will help public health authorities to assess severity and to take the necessary response measures as the event unfolds.

Laboratory staff processing influenza specimens. © WHO/Harold Ruiz

Mozambique

POPULATION: **27,978,000**

TOTAL PIP FUNDS SPENT IN COUNTRY: **$100K**

NATIONAL INFLUENZA CENTRE: **NO**

A dual approach to influenza surveillance

Mozambique has implemented a sentinel influenza surveillance system in Maputo City with two SARI surveillance sites and one ILI surveillance site to provide quality data. Surveillance staff were provided with training and supplies to facilitate their work in influenza case identification, specimen collection, and data reporting. This sentinel system supplements the nationwide EBS used to detect influenza and other respiratory disease events, including those at the human-animal interface. The two systems are now recognized as key sources of accurate and timely information on circulating influenza viruses in the country.

Provincial Surveillance and Response Teams (SRTs) established

Using PIP funds, six of the 10 provinces established provincial SRTs. Twenty-five staff were trained to detect, monitor and respond to influenza disease events. They were also provided with logistical support to facilitate rapid coordination. These teams benefit pandemic preparedness by being part of the national early warning alert and response system, which also advances Mozambique's implementation of IHR (2005) core capacities.

Improved laboratory capabilities

At the national laboratory, staff were certified as shippers by completing ISST, which enables them to ship samples to WHO CCs and improve participation in GISRS. Importantly, PIP funds also helped set up a laboratory quality management system (LQMS) to help control, assure, and manage the quality of the laboratory's activities. Tangible progress is being achieved, as measured by the WHO LQMS audit checklist.

Mozambique shares their pandemic influenza preparedness experiences during a regional meeting, Ghana. © WHO

Provincial Surveillance and Response Team analyzing the respiratory illness records from logbooks during a site visit and training, Mozambique. Photo credit: Gabriela Pinto

Sierra Leone

POPULATION: **6,453,000**

TOTAL PIP FUNDS SPENT IN COUNTRY: **$120K**

NATIONAL INFLUENZA CENTRE: **NO**

Surveillance was re-established after the Ebola outbreak

PIP support and capacity building was interrupted early by the Ebola outbreak, which took place from 2014 to 2015. During this time, sentinel surveillance was halted, supplies weren't regularly procured, sample testing was interrupted, and there was a reduced health workforce. Despite the devastation, sentinel surveillance was restarted after the outbreak, and the health workforce at all four sentinel sites were trained on data collection and specimen handling. Surveillance data collection and advocacy materials were provided, monthly supportive supervision visits were conducted by the national team, and quarterly sentinel surveillance review meetings were held with all sentinel sites. Laboratories were also provided with supplies and training. These efforts have improved surveillance quality and maximized commitment. Currently, ILI and SARI surveillance are functional and Sierra Leone contributes to GISRS; a major accomplishment in a short time period considering the impact of the Ebola outbreak on Sierra Leone.

Individuals gathered at a community centre for health education, Sierra Leone.
© WHO/Gina Samaan

Q&A with Florence Max-Macarthy, Ministry of Health and Sanitation, Sierra Leone

What is your role in the implementation of PIP?

I serve as the focal point for influenza surveillance to oversee the smooth functioning of the system.

What are you especially proud of as a result of PIP implementation?

Surveillance for influenza is now seen as part of routine activities at the sentinel sites, and both clinical and laboratory personnel are now becoming conversant with the case screening protocols.

What have been the broader benefits of PIP funds?

Capacity building of personnel involved in surveillance, and the availability of a forum to discuss surveillance findings and to provide supportive supervision.

Florence Max-Macarthy,
Senior Public Health Sister, Disease Prevention and Control, Ministry of Health and Sanitation, Sierra Leone

United Republic of Tanzania

POPULATION: **53,470,000**

TOTAL PIP FUNDS SPENT IN COUNTRY: **$430K**

NATIONAL INFLUENZA CENTRE: **YES**

Improved surveillance quality and timeliness

Tanzania used PIP funds to add three new sentinel surveillance sites, review the national influenza surveillance protocol to update data collection procedures, and facilitate national surveillance managers to conduct 12 supportive supervision visits to sites to troubleshoot activities and orient new staff. Together, these activities have positively impacted the surveillance system with increased case enrollment. Additional equipment and data management training has also helped surveillance site staff to upload their data into the national database, which has increased system timeliness and accuracy.

Increased surveillance efficiency

Influenza surveillance was integrated into the national IDSR reporting system with weekly reporting from sentinel SARI sites into IDSR. This integration has helped build core capacities for real-time surveillance under IHR (2005), and will maximize system sustainability. Other system efficiencies are also being operationalized. For example, the influenza surveillance protocols are being adapted for the surveillance of other viral diseases such as dengue fever and chikungunya. The national team plans to establish sentinel surveillance for these diseases at the existing influenza sentinel sites, preventing redundancies in data management and specimen transportation.

Progress towards system sustainability

The cost of laboratory-based influenza surveillance is considerable when factoring in the need for reagents, consumables and specimen transportation. Tanzania transitioned its specimen transportation system from staff delivering specimens to the NIC by public buses, to the use of a courier (Expedited Mail Service). This has reduced the turnaround time for transportation from an average of five days to two days, and lowered overall costs. The government has now started to cover the cost of specimen transportation from sentinel sites near the NIC, however, further external resources remain necessary to fund courier services from distant sites.

Rising case enrollment

By training 375 healthcare workers in sentinel influenza surveillance, case enrollment increased by 65% between 2013 and 2017.

Demonstration on influenza laboratory specimen collection at a sentinel site, Tanzania. © WHO

Influenza training at a sentinel site extended to nursing students, Tanzania. © WHO

Zambia

POPULATION: **16,212,000**

TOTAL PIP FUNDS SPENT IN COUNTRY: **$370K**

NATIONAL INFLUENZA CENTRE: **YES**

Expanded sentinel surveillance

In 2017, Zambia expanded their surveillance system by adding three additional sentinel sites. Site selection involved consultation with animal health authorities to identify high-risk locations for influenza events at the human-animal interface. The staff at the new sites were trained on case detection, specimen collection and handling, and data management. The addition of these sites was a major achievement that expanded ILI and SARI surveillance in high-risk areas, improved geographic representation by bringing the total number of sentinel sites up to nine, and operationalized One Health surveillance by bringing the animal and public health sectors together in preparedness for influenza viruses with pandemic potential.

Decision-making supported through better data management

All Zambian sentinel sites received computers and data management software. Trainings were conducted on data collection and analysis, and a Supervisory Visit Checklist was developed in November 2016 and was used after trainings to help sites ensure quality of these capacities. These activities will better support decision-making in the future.

Big plans for the recently WHO-recognized NIC

Zambia's newly WHO-recognized NIC at the University Teaching Hospital Virology Laboratory is continually expanding its range of capacities. Staff benefited from ISST to ensure the availability of certified shippers in-country, and there are plans to train staff in virus sequencing. The expanding capabilities and the recent NIC recognition by WHO will increase Zambia's participation in GISRS and contribution to global pandemic preparedness.

Hand hygiene at a health care facility. © WHO/Isadore Brown

Clinical management of influenza, South Africa. © WHO/Isadore Brown

Region of the Americas

PIP FUNDS USED FOR REGIONAL CAPACITY BUILDING: **$3.6M**

PIP FUNDS USED IN PRIORITY COUNTRIES: **$2.9M**

TOTAL PIP FUNDS SPENT ACROSS THE REGION: **$6.5M**

Response to the 2009 H1N1 pandemic, Mexico. © WHO/Harold Ruiz

In the Region of the Americas, the Pan American Health Organization (PAHO) has used PIP funds to advance influenza surveillance. Notably, SARINet was introduced, which is a regional network of more than 600 hospitals and 30 laboratories. This collaborative network supports countries to strengthen their surveillance systems, promotes influenza virus sharing, provides support on vaccine effectiveness and timing, and facilitates effective use of data for policy-making. SARINet provides countries with technical expertise, as well as support for data management and analysis. This network allows PIP priority countries (as well as other countries in the Americas) to share best practices and to access regional support, including during emergencies.

Using PIP funds, PAHO also developed and disseminated several documents that have advanced surveillance. This includes new influenza surveillance standards, a laboratory assessment tool and a sentinel site assessment tool. These regional guidance tools have proved beneficial for countries to achieve international standards with respect to sample collection and shipment, operation of sentinel sites, and laboratory capabilities. Countries were also supported to develop intersectoral work plans that have strengthened surveillance at the human-animal interface.

Assessing national capacities

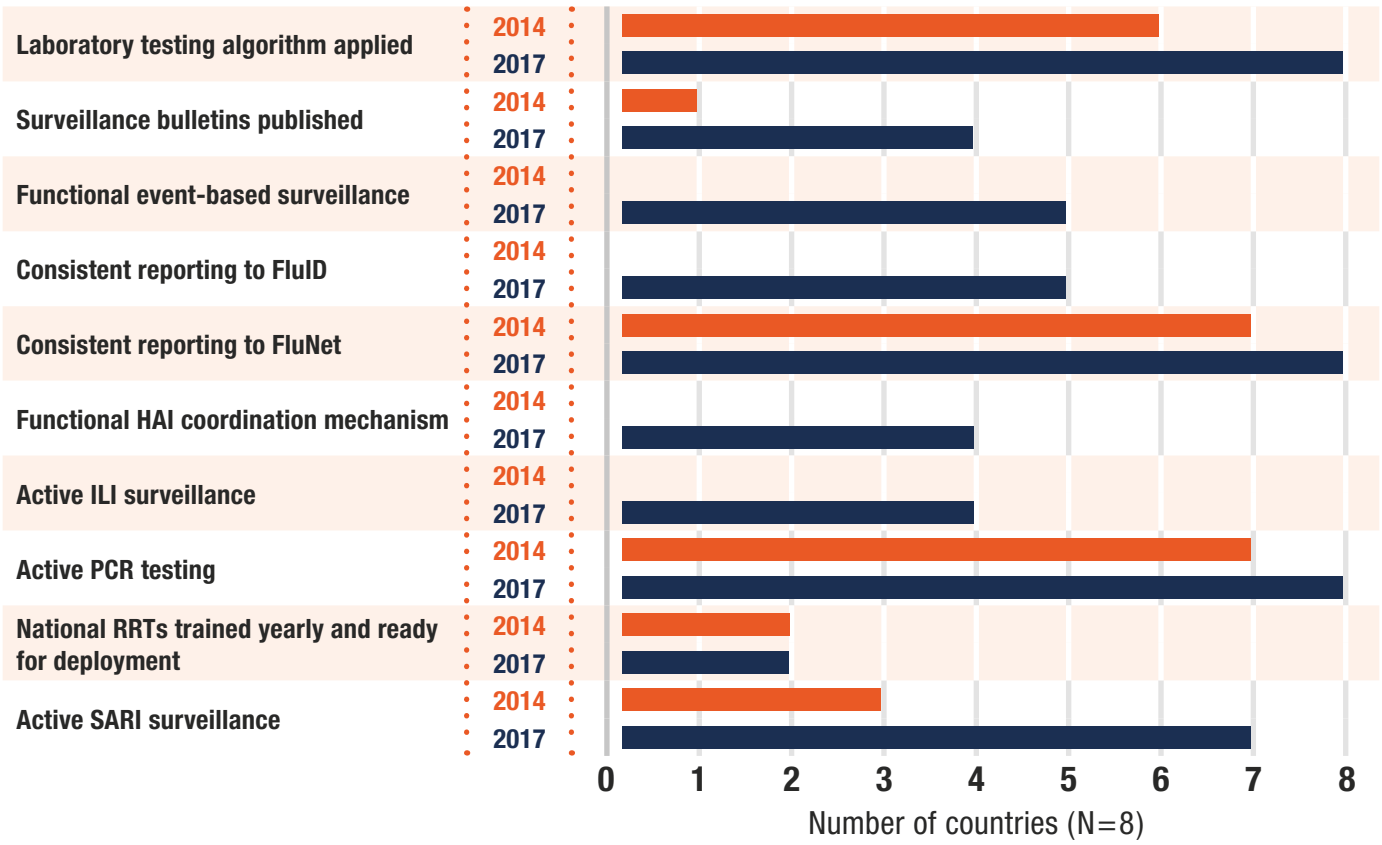
In 2016-2017 alone, PAHO undertook 22 surveillance site assessments and 11 laboratory assessments to build national capacities.

PAHOFlu was developed and implemented in several countries, which has advanced sentinel surveillance and data reporting. PAHOFlu is an information system that enables countries to integrate their SARI laboratory and epidemiological data, and stores current and historical epidemiological and laboratory data at a national level. It allows for automatic generation of weekly monitoring reports based on WHO and PAHO standards, and in both English and Spanish. The system also transmits data electronically to FluNet and FluID in a timely manner. The reports generated from the system support continuous influenza monitoring and evidence-based decision-making across the Americas.

Surveillance was improved due to new analyses that helped inform planning and capacity building. First, a regional landscape analysis of laboratory and surveillance capacities was completed. This identified laboratory and surveillance gaps and needs according to regional and international standards. Using this information, PAHO was able to better direct resources and tailor interventions across countries. Second, PAHO also conducted an analysis of genetic sequences from four countries. This informed a technical report for the Southern Hemisphere vaccine strain selection meeting in 2017, and made a valuable contribution towards better vaccine development.

PIP support also helped facilitate a range of other activities in the Americas, which have improved overall emergency preparedness. There are several examples of this including: better outbreak investigation and control due to RRT trainings; improved laboratory capacities that supported actions during the Zika outbreak in 2016-2017; and enhanced surveillance which has led to better data and reporting for other respiratory infections.

Progress in key capacities for PIP priority countries in the Region (2014-2017)



Performance against indicators for all 35 countries in the Region (2017)

FluID	49%	countries consistently shared epidemiological data through WHO FluID
FluNet	74%	countries consistently shared influenza virological data through WHO FluNet
Virus sharing	83%	countries routinely shared seasonal influenza viruses with GISRS

Plurinational State of Bolivia

POPULATION: **10,725,000**

TOTAL PIP FUNDS SPENT IN COUNTRY: **$270K**

NATIONAL INFLUENZA CENTRE: **NO**

Expanded SARI surveillance

Since 2014, Bolivia has established 10 sentinel SARI surveillance sites. This has advanced influenza monitoring and surveillance throughout the country, such as through better epidemiological information and improved identification of circulating viruses on an annual and seasonal basis. Importantly, SARI sentinel surveillance was incorporated into the national health system to facilitate long-term sustainability.

Enhanced capacities at the national reference laboratories

The national reference laboratories (NRLs) have undergone several capacity assessments and have increased their performance, including in the area of diagnostic capacities. This effort has improved capabilities to correctly detect influenza as well as other respiratory pathogens.

Preparedness for unusual disease events

Bolivia conducted workshops where primary care physicians were trained to address unusual respiratory events as they emerge. This work has built momentum, leading to increased interest in learning how to react to these respiratory disease events at both the national and local levels.

Training for primary care doctors on detecting and responding to unusual respiratory disease events, Plurinational State of Bolivia. © WHO

Chile

POPULATION: **17,948,000**

TOTAL PIP FUNDS SPENT IN COUNTRY: **$690K**

NATIONAL INFLUENZA CENTRE: **YES**

Strengthened laboratory capacities

Chile undertook a range of activities to enhance laboratory capacities, such as immunofluorescence training for respiratory viruses, and procurement of laboratory equipment and reagents. SARI, ILI and laboratory surveillance were better integrated, improving analysis capacities and facilitating epidemiological information sharing on a weekly basis.

On-the-ground support for surveillance sites and enhanced data

Surveillance officers from national, regional, and local levels visited SARI and ILI sites. During these visits, officers evaluated the quality and timeliness of surveillance activities as well as personnel skills. The visits raised awareness among sentinel site surveillance staff about good data management and analysis at a local level, which consequently improved surveillance capacities and data quality. These on-site visits also complemented other ongoing activities, such as implementing PAHOFlu at all SARI sites.

Improved virus sharing

In 2017, Chile shared 150 positive influenza samples with GISRS.

National meeting to review and update influenza surveillance practices

In November 2017, approximately 80 representatives working in the area of national surveillance gathered to discuss several topics, including subnational surveillance, experiences and lessons learned from respiratory disease outbreaks, and results of laboratory testing. Training was also conducted on WHO severity indicators and alert thresholds. This meeting helped Chile maintain up to date surveillance protocols and practices.

Health education materials used during the 2009 H1N1 pandemic. © WHO/Harold Ruiz

Costa Rica

POPULATION: **4,808,000**

TOTAL PIP FUNDS SPENT IN COUNTRY: **$70K**

NATIONAL INFLUENZA CENTRE: **YES**

PAHOFlu enabled national information sharing

Costa Rica initiated the use of PAHOFlu which has helped streamline data collection and analysis, improve information sharing, and integrate national and epidemiological laboratory data. Importantly, PAHOFlu has facilitated communication and reporting between departments in the Costa Rican government. This improved national influenza surveillance.

Strengthened laboratory capacities

With support from PAHO, Costa Rica utilized PIP funds to strengthen national laboratory capacities. Training was provided in genetic sequencing and virus culture techniques. As a result, laboratory workers are now able to diagnose influenza, which will help the country to more rapidly identify the virus and respond at the time of a pandemic.

Sentinel influenza surveillance sites evaluated

WHO recommends that influenza surveillance systems be periodically evaluated to maximize performance and data quality. PIP funds supported a comprehensive evaluation of sentinel surveillance sites across the country. This identified issues to be addressed and resulted in an updated list of sentinel sites in Costa Rica.

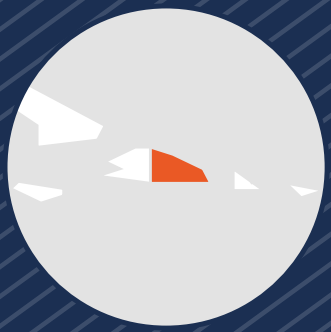
Processing specimens for influenza diagnostic testing at a national laboratory. © WHO/Harold Ruiz

Dominican Republic

POPULATION: **10,528,000**

TOTAL PIP FUNDS SPENT IN COUNTRY: **$240K**

NATIONAL INFLUENZA CENTRE: **NO**



National priorities adjusted to include pandemic influenza preparedness

In recent years, the Dominican Republic has undergone significant changes within the MOH, including the creation of a National Health Service. During this transformation, PIP funds were leveraged to highlight influenza preparedness as a priority. As a result, the country has developed a single reference centre for influenza. While PIP funds previously supported routine monitoring visits to sentinel sites, this is now a part of the MOH's operating budget. This is an important achievement as it furthers the sustainability of influenza preparedness in the country.

Improved diagnostic capacities

With the support of PIP funds, infrastructure at the virology unit in the NRL has improved. Specifically, new equipment was acquired and supplies were procured. Better infrastructure has enabled laboratory staff to gain new skills; for example, individuals responsible for diagnosing respiratory illnesses have been trained on molecular biology techniques thereby improving the laboratory's capacity to detect an influenza virus.

SARI surveillance procedures updated and implemented

With PIP support, the country updated and standardized influenza surveillance case definitions, procedures and protocols. The Dominican Republic also adapted an instrument for the evaluation of SARI surveillance, which the MOH uses in its monitoring visits to sentinel sites.

Q&A with Delia Nais Castillo, Ministry of Health, Dominican Republic

What is your role in PIP implementation?

I am responsible for the surveillance of influenza and other respiratory viruses.

What are you especially proud of as a result of PIP implementation?

I am proud of having participated in updating surveillance procedure documents and adapting an instrument for the evaluation of SARI hospital surveillance. I feel that with this update, surveillance has been strengthened and formalized both in practice and at the institutional level.

What have been the broader benefits of PIP funds?

The biggest benefits of the PIP funds have been primarily in the areas of laboratory and epidemiological surveillance. In the laboratory area, the infrastructure of the national reference laboratory's virology unit was improved and molecular biology techniques for the diagnosis of respiratory viruses were updated. In the area of epidemiology, two major benefits were the updating of SARI surveillance procedures and the adaptation and implementation of an evaluation instrument for hospital SARI surveillance.

What do you hope to do in the future to prepare for an influenza pandemic?

In 2017, I had the experience of leading the rapid response team to respond to three outbreaks of avian influenza in different parts of the country. This provided me with further evidence of the need to prioritize and strengthen human-animal surveillance in the country.

Delia Nais Castillo,
Medical Epidemiology Analyst,
Ministry of Health,
Dominican Republic

Ecuador

POPULATION: **16,144,000**

TOTAL PIP FUNDS SPENT IN COUNTRY: **$360K**

NATIONAL INFLUENZA CENTRE: **YES**

Strengthened laboratories for SARI surveillance

One of Ecuador's major achievements was strengthening the SARI laboratory component of the influenza surveillance network. Supplies were purchased for the NIC, and PIP resources supported quality and performance evaluations of national laboratories. Strengthening laboratory capacities for surveillance has resulted in high-quality virological information being integrated with epidemiological surveillance data, and reports are now sent to FluNet via PAHOFlu.

Enhanced capacities for intersectoral coordination and surveillance

Personnel from the animal health and public health sectors participated in a training workshop that was supported by PIP funds. The workshop aimed to enhance capacities at the human-animal interface by creating the opportunity for national authorities to meet and build a solid foundation for human-animal interface policies, including those on intersectoral coordination and joint surveillance.

Haiti

POPULATION: **10,711,000**

TOTAL PIP FUNDS SPENT IN COUNTRY: **$310K**

NATIONAL INFLUENZA CENTRE: **NO**

Expanded epidemiologic surveillance

Prior to HLIP I, Haiti had four sentinel surveillance sites in the country's capital, Port au Prince. However, with increasing evidence of influenza in other parts of the country, epidemiological surveillance was implemented in two additional provinces. These new sites are functional and send samples to the National Laboratory, where they are tested. PIP funds also supported training for national authorities in SARI surveillance, and in the detection of unusual respiratory illness. These training sessions have helped maintain and enhance Haiti's routine surveillance, and this will better prepare the country if pandemic influenza emerges.

Moving towards NIC recognition

Fulfilling the terms of reference to become a WHO-recognized NIC is a considerable investment. In Haiti, laboratory personnel were trained on biosafety and molecular diagnostic techniques. PIP funds also helped to provide reagents and other supplies. Increased capacities are evident due to the growing number of samples tested. As a result of this work, the National Laboratory has begun the process for NIC recognition, and is committed to continue strengthening capacities to achieve this goal.

Nicaragua

POPULATION: **6,082,000**

TOTAL PIP FUNDS SPENT IN COUNTRY: **$620K**

NATIONAL INFLUENZA CENTRE: **YES**

Better capacity to diagnose influenza

PIP funds have helped to improve diagnostic capacities at the NRL and sentinel sites. This was achieved by increasing the number of sites across the country that can conduct PCR analysis, acquiring new equipment and supplies, and training staff. Additionally, a new sentinel unit was established in the north of the country, comprised of two SARI sites and one ILI site. Furthermore, infrastructure at another sentinel site was improved by adding a laboratory for immunofluorescence that enables the diagnosis of influenza and other respiratory viruses. These achievements have improved laboratory surveillance, and increased national capacities to correctly diagnose influenza, which is needed to detect seasonal and pandemic viruses.

Enhanced outbreak response

Capacities for responding to influenza events or unusual disease events have improved as a result of better communication and collaboration between human and animal sectors. Notably, the human surveillance sector has begun to participate actively in animal sector outbreak response drills. The country's decision-makers have also become more involved in risk communication for national and international outbreaks, which improves outbreak awareness, preparedness and response.

Influenza data reporting capacity established

With support from the Regional Office, Nicaragua has developed a template for more timely and consistent reporting of influenza surveillance data. This is a highly useful resource to consistently report data, and to inform national and regional situational analyses and risk assessments. All sentinel sites are also now developing weekly influenza reports.

Preparing to receive donated supplies during the 2009 H1N1 pandemic. © WHO/Harold Ruiz

Suriname

POPULATION: **543,000**

TOTAL PIP FUNDS SPENT IN COUNTRY: **$380K**

NATIONAL INFLUENZA CENTRE: **NO**

Enhanced virological surveillance

Several activities have improved virological surveillance in Suriname. Laboratory staff were trained on virus isolation, infectious sample shipping, and real-time PCR (RT-PCR). As a result, Suriname has sent its first shipment of samples to the WHO CC at US CDC, and consistently reported to FluID and FluNet since 2015. Three hospitals were designated as SARI sites, and ILI was reintroduced at an outpatient clinic. Staff training on SARI and ILI surveillance improved awareness, detection, and investigation of unusual respiratory events. Finally, a team from PAHO evaluated two of the SARI sentinel hospitals, and provided recommendations and technical support to strengthen quality of case identification, data collection and reporting. Together these accomplishments improved virological surveillance and have increased country capacities to detect, monitor, and respond to influenza.

"With PIP funds, we achieved considerable laboratory strengthening as several persons were trained in biosafety, shipping of biological substances, virus isolation and more. This resulted in improved biosafety procedures in the laboratory, the presence of an IATA certified shipper, and expanded laboratory diagnostic techniques."

Malti Adhin,
Head of the Molecular Laboratory,
Institute for Biomedical Sciences,
AdeK Universiteit van Suriname

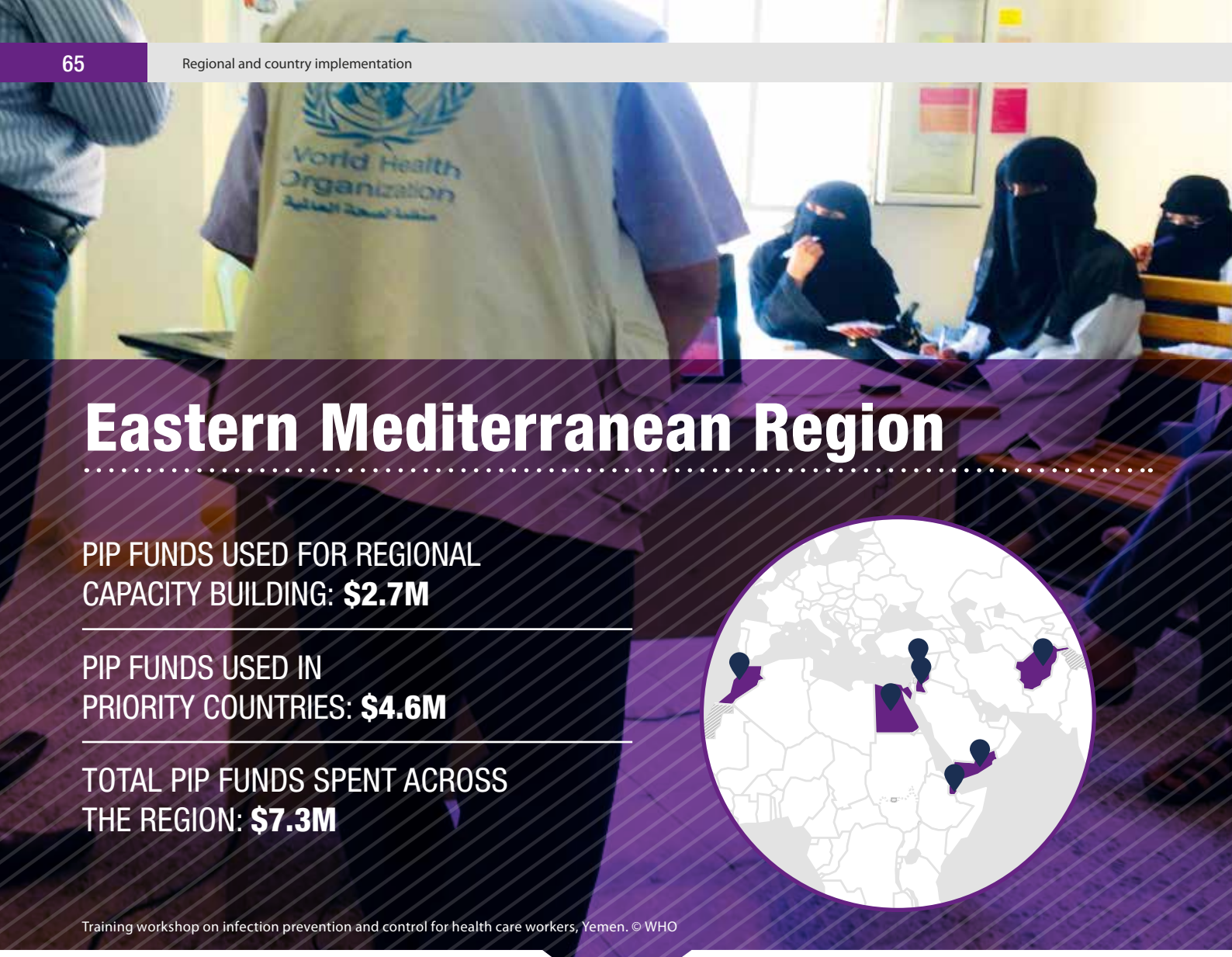
"I believe that establishing partnerships and increasing the awareness among stakeholders, are the most important cornerstones on which to build pandemic influenza preparedness. PIP has done this exactly. I hope to not only support Suriname but also other countries in the future with the experience that I have gained during these three years."

Robert Mohamed,
Medical Doctor,
PAHO-Suriname Country Office

Response teams trained for influenza outbreaks

A five-day training course for RRTs brought together sixty-three participants from different geographical areas, disciplines and sectors. This was also the first time that the regional IHR, Emergency Operations Centre, and influenza teams came together. These groups shared their experiences and helped strengthen the RRTs to prepare for, respond to, and recover from, an acute health event. The training focused on unusual respiratory events, and included a two-day simulation on pandemic influenza. The workshop was evaluated with a pre- and post-knowledge questionnaire, and the result indicated a 40% increase in knowledge.

Specimen collection from a patient. © WHO/Harold Ruiz



Eastern Mediterranean Region

PIP FUNDS USED FOR REGIONAL CAPACITY BUILDING: **$2.7M**

PIP FUNDS USED IN PRIORITY COUNTRIES: **$4.6M**

TOTAL PIP FUNDS SPENT ACROSS THE REGION: **$7.3M**

Training workshop on infection prevention and control for health care workers, Yemen. © WHO

The Regional Office for the Eastern Mediterranean supported countries to improve pandemic influenza preparedness through regional and global collaboration. One of the most notable achievements was the commitment of Member States to enhance epidemiological and virological influenza surveillance. Six PIP priority countries in the Eastern Mediterranean have successfully established and sustained an extensive network for SARI and ILI surveillance, and improved their influenza diagnostic capacities. This progress is evidenced by five NICs from PIP priority countries that have performed and achieved a 100% score on the latest EQAP. As a result of the stronger surveillance capacities, the number of shipments and influenza isolates shared with WHO CCs increased. This has meant that PIP priority countries are actively contributing to the global vaccine virus selection process and are informing better seasonal vaccine composition. Countries/areas in the region have also improved their surveillance; 19 out of 22 countries/areas have functioning influenza surveillance systems, and some countries/areas are establishing baseline and epidemic thresholds.

Having disease trends and thresholds enables use of surveillance data for evidence-based disease control measures.

Another success was improved data management and sharing which was achieved through developing and maintaining the Eastern Mediterranean Flu Network (EMFLU). This is a web-based regional platform for countries/areas to share epidemiological and virological influenza data. EMFLU also links with the country and the global platforms FluNet and FluID. Currently, 14 countries/areas in the region including six PIP priority countries are using EMFLU for data entry, management, and sharing. As a result, countries/areas have rapid access to analyses on influenza trends, geographical distribution, intensity and impact. The analyses enable countries/areas to advocate for continued influenza surveillance and better pandemic influenza preparedness policies.

Capacity building for influenza preparedness has also advanced IHR core capacities to directly improve monitoring and response for high-threat pathogens.

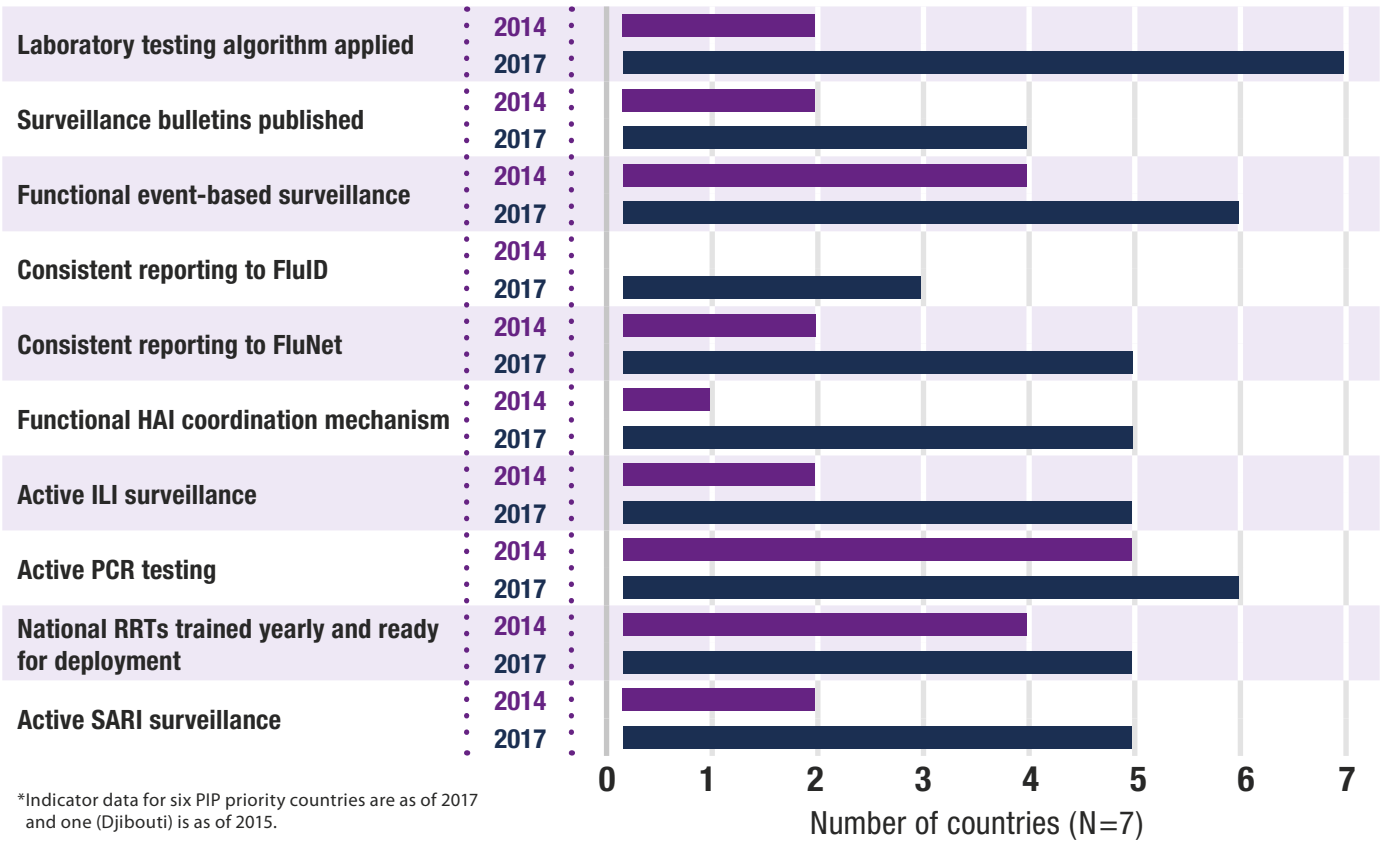
For example, all PIP priority countries improved their ability to diagnose circulating influenza strains, and in this process improved laboratory surveillance for other IHR notifiable diseases like Middle East Respiratory Syndrome coronavirus (MERS-CoV). RRTs have also been trained to investigate and respond to potential epidemics of emerging and re-emerging infectious diseases.

Moreover, the expanded influenza surveillance system in PIP priority countries has indirectly helped the national and regional collaboration among public health professionals in human, animal, and environmental health sectors through increased information sharing, which enhances preparedness for influenza and other outbreak-prone diseases.

Pandemic preparedness planning

Advanced planning is critical to minimize the impact of influenza pandemics. A desk review of six PIP priority country pandemic preparedness plans was conducted in the Eastern Mediterranean Region. Read the findings in the recently published peer-reviewed article: *Distressed setting and profound challenges: Pandemic influenza preparedness plans in the Eastern Mediterranean Region.*[23]

Progress in key capacities for PIP priority countries in the Region (2014-2017)*



*Indicator data for six PIP priority countries are as of 2017 and one (Djibouti) is as of 2015.

Performance against indicators for all 21 countries in the Region (2017)

FluID	**14%**	countries consistently shared epidemiological data through WHO FluID
FluNet	**52%**	countries consistently shared influenza virological data through WHO FluNet
Virus sharing	**57%**	countries routinely shared seasonal influenza viruses with GISRS

Sharing information to strengthen GISRS – the EMARIS Network meeting

The 4th meeting of the Eastern Mediterranean Acute Respiratory Infection Surveillance (EMARIS) Network was held in combination with the first scientific conference on acute respiratory infections (ARIs) in the Eastern Mediterranean region. This was held in Jordan in December 2017.

The EMARIS meeting allowed NICs, WHO CCs, and other network institutions to review progress made in surveillance and response capacities for seasonal and pandemic influenza. The meeting covered progress and challenges in influenza surveillance, action points to overcome challenges, and ways to improve collaboration between countries largely for pandemic influenza preparedness.

The scientific conference brought together 150 young scientists, health researchers, and public health professionals from 20 countries, to present their latest research findings on ARIs, influenza surveillance, laboratory detection, and collaboration at the human-animal interface. Thirty-eight abstracts were presented, and will be published in a special issue of *The Journal of Infection and Public Health*.

Group discussion at the EMARIS Network meeting. © WHO

Poster presentation session at the EMARIS Network meeting. © WHO

Q&A with Amal Barakat, WHO Regional Office for the Eastern Mediterranean

What is your role in PIP implementation at WHO?

I work closely with the NICs and other influenza laboratories throughout the region to expand their testing strategies for influenza and other respiratory viruses. This includes providing technical guidance, mentoring, training and follow-up to EQAP. I also support NICs in virus shipment, specimen collection, and transportation.

What are you specifically proud of as a result of PIP implementation?

The functionality of 16 NICs and three influenza laboratories in the region, including six NICs in PIP countries. NICs in the priority countries are able to perform RT-PCR, influenza virus isolation, antigenic characterization, and detection of novel viruses. For example, Afghanistan, Morocco, Jordan and Egypt NICs can perform RT-PCR and cell culture in-house, and Morocco and Egypt NICs can additionally perform sequencing. The results speak for themselves - EQAP performance for from all NICs in the region improved from 80% to 100% score.

How did you advocate for improved influenza pandemic preparedness?

Surveillance remains the critical source of information for proper public health planning including pandemic preparedness. Improving the functionality of NICs will help them play a frontline role in the response to the pandemic or other public health emergencies.

Amal Barakat,
Laboratory Consultant, WHO Regional Office for the Eastern Mediterranean

Afghanistan

POPULATION: **32,527,000**

TOTAL PIP FUNDS SPENT IN COUNTRY: **$1.2M**

NATIONAL INFLUENZA CENTRE: **YES**

Influenza surveillance established

Nine ILI and SARI sentinel or surveillance sites were established across all regions of Afghanistan. Site staff were trained in case identification, data collection, and specimen handling and shipment. The surveillance sites now also serve as the platform for other respiratory disease surveillance including RSV. Together with strengthened laboratory diagnostic capacities, Afghanistan is now sharing virological and epidemiological data on the regional (EMFLU) and global surveillance data platforms (FluNet and FluID).

Restored involvement in GISRS

After a five-year hiatus for several activities at the NIC due to country conflict, laboratory capacities are being re-established. Currently the NIC is capable of detecting and diagnosing all circulating influenza viruses including novel viruses. SOPs for quality control and good laboratory practices were developed, and capacities for cell-culture and virus isolation were built. The channel for shipping influenza isolates to the WHO CC at US CDC has also been re-established. NIC achievements enriched the quality and volume of data available for national decision-makers, including on antiviral susceptibility. This also increased the availability of viruses for GISRS to inform twice-yearly vaccine strain selection.

RRTs established across the country

With the help of PIP funds, over 130 individuals were trained for RRTs, which are now available in all of Afghanistan's 34 provinces. These RRTs function as outbreak investigation and response teams for influenza, as well as for other outbreak-prone diseases.

> "Despite complex challenges and ongoing chronic conflict in the country, Afghanistan has been able to achieve most of its objectives for implementation of the PIP Framework."

Mohammad Hafiz Rasooly,
National Influenza Surveillance Coordinator, Ministry of Public Health, Afghanistan

National Influenza Centre staff performing virus isolation procedure, Afghanistan. © WHO/Prasanna Yergolkar

Pandemic and epidemic preparedness and response training for rapid response teams, Afghanistan. © WHO/Mohammad Nadir Sahak

Djibouti

POPULATION: **888,000**

TOTAL PIP FUNDS SPENT IN COUNTRY: **$60K**

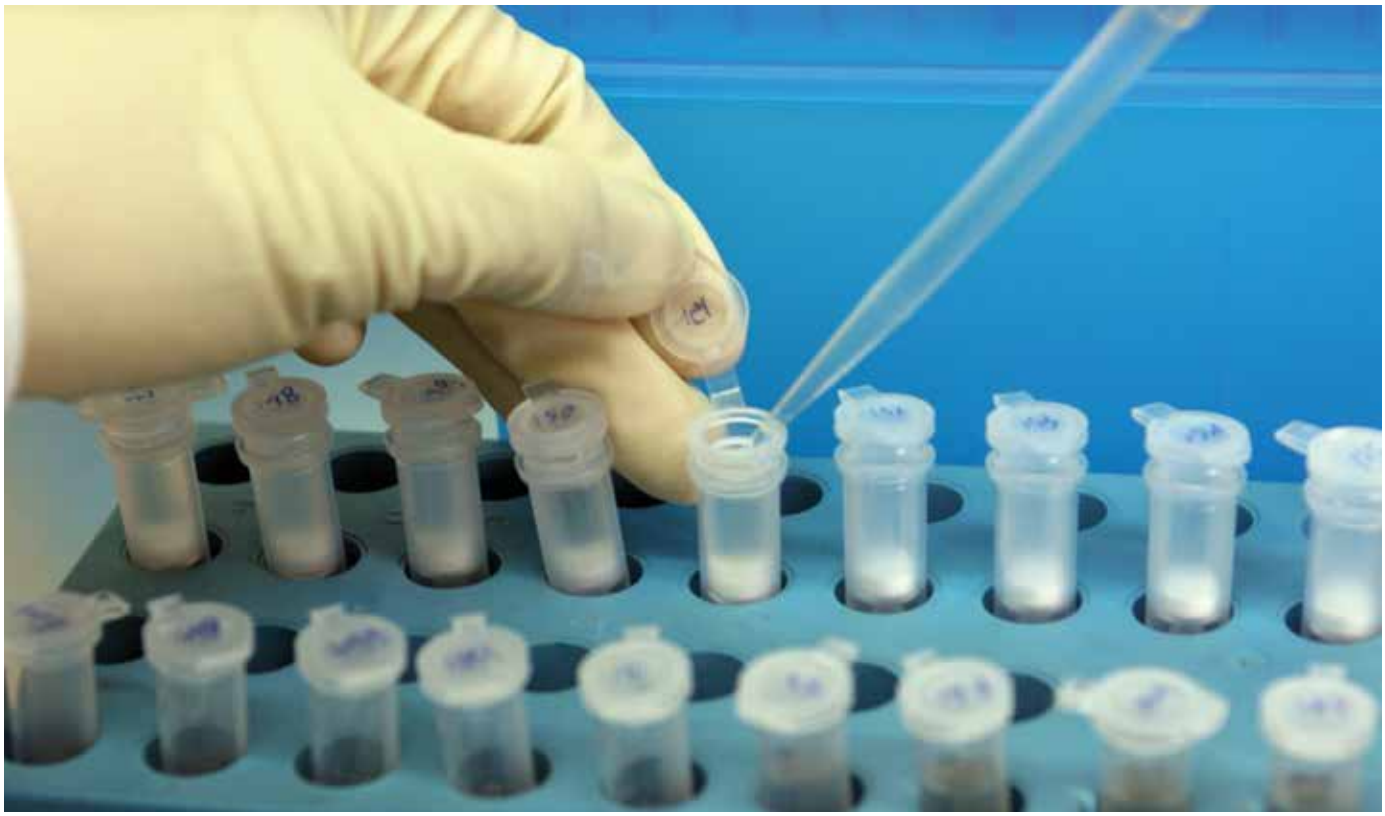
NATIONAL INFLUENZA CENTRE: **NO**

Regional knowledge sharing enhanced national surveillance

Djibouti received support from the WHO Regional Office for the Eastern Mediterranean and technical experts from Morocco to improve their surveillance system. In 2014, Moroccan experts visited Djibouti to help assess the influenza surveillance capacities. This led to several accomplishments. An action plan was generated, national commitment to influenza increased, and SARI surveillance was initiated. This progress led to a greater number of sentinel surveillance sites, with three added in 2014 and four added in 2015. Finally, staff at the National Institute of Public Health were trained on influenza data management, analysis, and interpretation. These investments improved the representativeness of influenza surveillance and the capacity for feedback, monitoring and risk assessment.

Improved laboratory skills and networking

Several trainings and investments improved laboratory skills. Staff were trained on detecting influenza and other respiratory viruses using RT-PCR, virus sequencing and hemagglutination inhibition assay. Djibouti was able to send samples for analysis to the NIC in Morocco, which then facilitated sharing of the isolates with WHO CCs for further testing and consideration in vaccine strain selection. Thanks to regional collaboration, Djibouti was able to share specimens with GISRS.



Testing for avian influenza. © WHO/Gary Hampton

Egypt

POPULATION: **91,508,000**

TOTAL PIP FUNDS SPENT IN COUNTRY: **$940K**

NATIONAL INFLUENZA CENTRE: **YES**

Improved sustainable influenza preparedness

PIP funds helped to mobilize strong commitment within the Egyptian Ministry of Health and Population. Activities to strengthen influenza surveillance and pandemic preparedness included organizing 30 training workshops for health care workers, holding meetings with key stakeholders to update the national pandemic influenza preparedness plan, and conducting seven training sessions for surveillance officers and five for local surveillance staff on new surveillance methodologies. Designated staff for epidemiological surveillance at the district and governorate levels were also trained on outbreak investigation and disease control. EBS was established in 2015, which is a testimonial to the capacity building success and the broader impact of pandemic influenza preparedness for strengthening IHR core capacities.

A One Health approach promoted across the country

Animal and human health sectors were brought together to identify unusual influenza events and take joint action. A platform – 'Four Way Linking' – that connects animal and human health data and risk assessment was applied, ultimately increasing intersectoral coordination. This was also enhanced through quarterly meetings between sectors. As a country that experiences sporadic avian influenza events, these efforts will continue to support authorities in effective programming for challenges at the human-animal interface.

Enhanced analyses to support decision-making

Egypt adopted a number of WHO-recommended methods for influenza surveillance data analysis. A key success was that statistical methods were applied to assess seasonal influenza severity, specifically epidemic and intensity thresholds. This will enable Egypt to assess severity according to WHO protocols during a future pandemic.

Control of avian influenza in poultry. © WHO/Jonathan Perugia

Jordan

POPULATION: **10,154,934**

TOTAL PIP FUNDS SPENT IN COUNTRY: **$790K**

NATIONAL INFLUENZA CENTRE: **YES**

Enhanced coordination at the HAI

A collaborative technical committee of human and animal health professionals was established to enhance zoonotic disease surveillance, data sharing, and joint response. PIP funds helped to catalyze the One Health approach in Jordan, by providing resources for the development of a One Health Framework linking disease control and prevention at the human-animal interface.

EBS established to improve detection and monitoring capacities

EBS for ARI was established to improve detection of influenza viruses with pandemic potential and other outbreak-prone diseases. This included establishing EBS procedures and electronic reporting tools, as well as training to increase knowledge and implementation of EBS in all hospitals. EBS will increase the sensitivity of the surveillance system to provide early warning and consequently rapid response to any acute respiratory infection that is potentially a threat to the population.

Pandemic influenza preparedness and response integrated with national emergency plans

Jordan has faced a number of emergency response priorities including a huge number of refugee populations and their pressing health needs. In the face of such challenges, Jordan updated its Pandemic Preparedness and Response Plan, and integrated this within the Jordan Emergency Operation Plan. This ties influenza planning to other emergency management frameworks. The key benefit of this approach is that expectations and potential actions between all levels of government are better aligned – from municipal, to governorate, to national. In the event of an emergency, including an influenza pandemic, the country is better prepared to direct government resources for a coordinated response.

“Jordan is one of the PIP priority countries in the region with the capacity to detect, monitor and share novel influenza viruses.”

Nader Sheikh Ali,
Surveillance Officer,
WHO Country Office, Jordan

“Pandemic influenza preparedness is a broad topic that requires intersectoral participation, as well as adequate surveillance, response, and laboratory capacities. When pandemic influenza preparedness is improved, several aspects of the IHR core capacities are improved such as surveillance, response, lab capacity, zoonotic diseases, biosecurity and biosafety.”

Ghazi Kayali,
Chief Executive Officer of Human Link,
consultant on OneHealth

Lebanon

POPULATION: **5,851,000**

TOTAL PIP FUNDS SPENT IN COUNTRY: **$690K**

NATIONAL INFLUENZA CENTRE: **YES**

Improved SARI surveillance and sustainability

Lebanon established sentinel SARI surveillance in 2014. An expert group was convened to advise on scientific aspects of SARI surveillance. The process led to a surveillance protocol and the selection of the two pilot sentinel sites. Training was provided on data collection, reporting and basic data analysis at the pilot sites. With this demonstrated proof-of-concept and the MOH's desire to estimate influenza disease burden, sentinel surveillance expanded to include 11 sentinel sites in the six districts of Lebanon. Over time, reliance on PIP funds reduced as Memoranda of Understanding were developed between the Ministry of Public Health (MoPH) and each sentinel site to incorporate SARI surveillance into routine MoPH functions. The MoPH also incorporated costs for training and specimen transportation from sentinel sites to the NIC into its own budget. This steady approach towards building the surveillance system, along with strategic planning, will enhance surveillance sustainability for years to come.

A successful response to an outbreak of avian influenza

Influenza response plans were tested, and found to be highly effective, after avian influenza was detected at a chicken farm.

On 20 April 2016, a farm in the Beqaa region reported mass chicken deaths with symptoms resembling avian influenza. Specimens were tested and avian influenza A(H5N1) virus was confirmed.[24] Within 24 hours, the outbreak response plan was activated. Thousands of birds were culled and disposed, and samples were taken from the region and across the country. A total of 185 exposed persons were identified: 180 received prophylaxis; 181 were monitored daily; and 41 suspected symptomatic cases were reported. With PIP support, all of the specimens collected were tested at the NIC using PCR, and were found to be negative. This efficient effort resolved the outbreak within six weeks. Findings and lessons learnt were published in a peer-reviewed journal.[25]

Q&A with Mona Al Buaini, National Influenza Centre, Lebanon

What is your role in PIP implementation?

I am responsible for assuring quality in the detection of influenza viruses and to improve capacities to detect, monitor and share influenza viruses.

What are you especially proud of as a result of PIP implementation?

A number of achievements: virus sharing with WHO CCs, weekly reporting to FluNet, strong bonds between the SARI surveillance focal points and the NIC team, and advancing NIC capacities from simple PCR techniques to advanced laboratory-based surveillance including virus cell-culture and sequencing.

What have been the broader benefits of PIP funds?

The NIC team's capacities have increased as a result of training in techniques such as culture, sequencing, biosafety measures, and use of infection prevention for better laboratory practice.

Mona Al Buaini, Director,
National Influenza Centre, Lebanon

Morocco

POPULATION: **34,378,000**

TOTAL PIP FUNDS SPENT IN COUNTRY: **$590K**

NATIONAL INFLUENZA CENTRE: **YES**

RRTs prepared to respond

PIP support has strengthened Morocco's RRTs with 21 teams trained, including three national, 12 regional, and six provincial RRTs. These are multi-disciplinary teams that consist of the head of the Prefectural/Provincial Epidemiology Unit, a laboratory technician, a doctor, an environmental health technician, and a communications officer. This contributes to Morocco's goal of establishing 96 RRTs to cover the whole country.

Enhanced disease surveillance to detect and monitor influenza

In 2014, integrated ILI and SARI virological and epidemiological sentinel surveillance was established. Quality surveillance activities at Morocco's eight sentinel sites were supported through the regular organization of progress review meetings, capacity building sessions on influenza surveillance (including establishing epidemic thresholds), and laboratory training to facilitate diagnostics and biosafety. The eight sites benefited from improved communication across the laboratory network as well as improved outbreak preparedness. Protocols for event-based SARI surveillance, including coordination between the human and animal health sectors, were developed to build bridges between stakeholders involved in preparedness.

> "The broader benefit of PIP has been strengthened capacity for detection of emerging viruses that can constitute a public health emergency at the national and regional level, as well as the establishment of a network of laboratories that will coordinate actions in case of a pandemic or public health emergency."

Fatima El Falaki, Scientist,
National Institute of Hygiene,
Ministry of Health, Morocco

Rapid response team training organized by the Ministry of Health, in collaboration with the National School of Public Health and WHO, Morocco. © WHO

Meeting on influenza procedures among surveillance officers, clinicians and administrators from three sentinel sites, Morocco. © WHO

Yemen

POPULATION: **26,832,000**

TOTAL PIP FUNDS SPENT IN COUNTRY: **$290K**

NATIONAL INFLUENZA CENTRE: **NO**

Enhanced influenza surveillance despite adversity

With a complex emergency and disrupted healthcare services, preparedness is key to supporting vulnerable populations. Yemen established four SARI and ILI sentinel sites that are distributed geographically. These sites are part of Yemen's early warning system (eDEWS). eDEWS collates surveillance data on 31 outbreak-prone diseases from 1,982 healthcare sites, and it relies on mobile cellular reporting to maximize the speed and efficiency of data collection, analysis, and public health response to disease events. Influenza and ARI data from the four sentinel sites feed into the eDEWS weekly surveillance bulletin to facilitate national monitoring and to help protect Yemen's population from spreading influenza outbreaks and respiratory infections.

Influenza laboratory services boosted

The central public health laboratory continued to test for influenza as a result of the supplies, equipment and training provided using PIP funds. Staff were trained in PCR, virus culture, and laboratory biosafety. This has enabled the laboratory to provide the necessary diagnostic support when events were identified through eDEWS, as well as to inform regional and global situational analyses on influenza transmission.

Rapid response capacity maintained for respiratory disease events

PIP funds supported trainings for Yemen's national RRT and SARI/ILI focal points on SARI/ILI case management and infection control measures. The funds were additionally used to train local healthcare workers and 115 RRT members on early detection, recognition and response to respiratory disease outbreaks. The country also established a multisectoral coordination mechanism involving community leaders to address disease events including at the human-animal interface. These measures advance Yemen's pandemic influenza preparedness, and will also serve the country for other outbreak-prone diseases.

Training workshop on data management for severe acute respiratory infection focal points, Yemen. © WHO

European Region

PIP FUNDS USED FOR REGIONAL CAPACITY BUILDING: **$3.8M**

PIP FUNDS USED IN PRIORITY COUNTRIES: **$3.5M**

TOTAL PIP FUNDS SPENT ACROSS THE REGION: **$7.3M**

Presentation at a joint WHO Regional Office for Europe and European Centre for Disease Prevention and Control meeting on influenza surveillance. © WHO

The WHO Regional Office for Europe used PIP funds to advance country laboratory and surveillance capacities in four complementary areas: laboratory, surveillance, outbreak investigation, and clinical management.

The Regional Office mentored and provided peer-support to both PIP priority countries and non-PIP countries to improve several laboratory capacities. Training courses were organized regionally and in collaboration with WHO CC London, and focused on areas such as influenza virological techniques and laboratory quality management. In 2017 alone, regional trainings were held for 23 specialists from 14 NICs to expand their knowledge on virus isolation and antigenic characterization, 25 laboratory specialists achieved certification as infectious substances shippers after attending WHO's ISST, and eight specialists from four NICs attended one to two week courses at the WHO CC that were tailored to their specific needs. From 2014 to 2017, more than 300 laboratory specialists in the region were trained through 36 trainings, and more than 100 national experts were certified as infectious substances shippers. Additionally, new virus isolation capacities were introduced in two PIP priority countries (Armenia and Turkmenistan).

Increased virus sharing

Since 2014, seven additional countries shared viruses with GISRS, bringing the total to 46 European countries sharing influenza viruses in 2017.

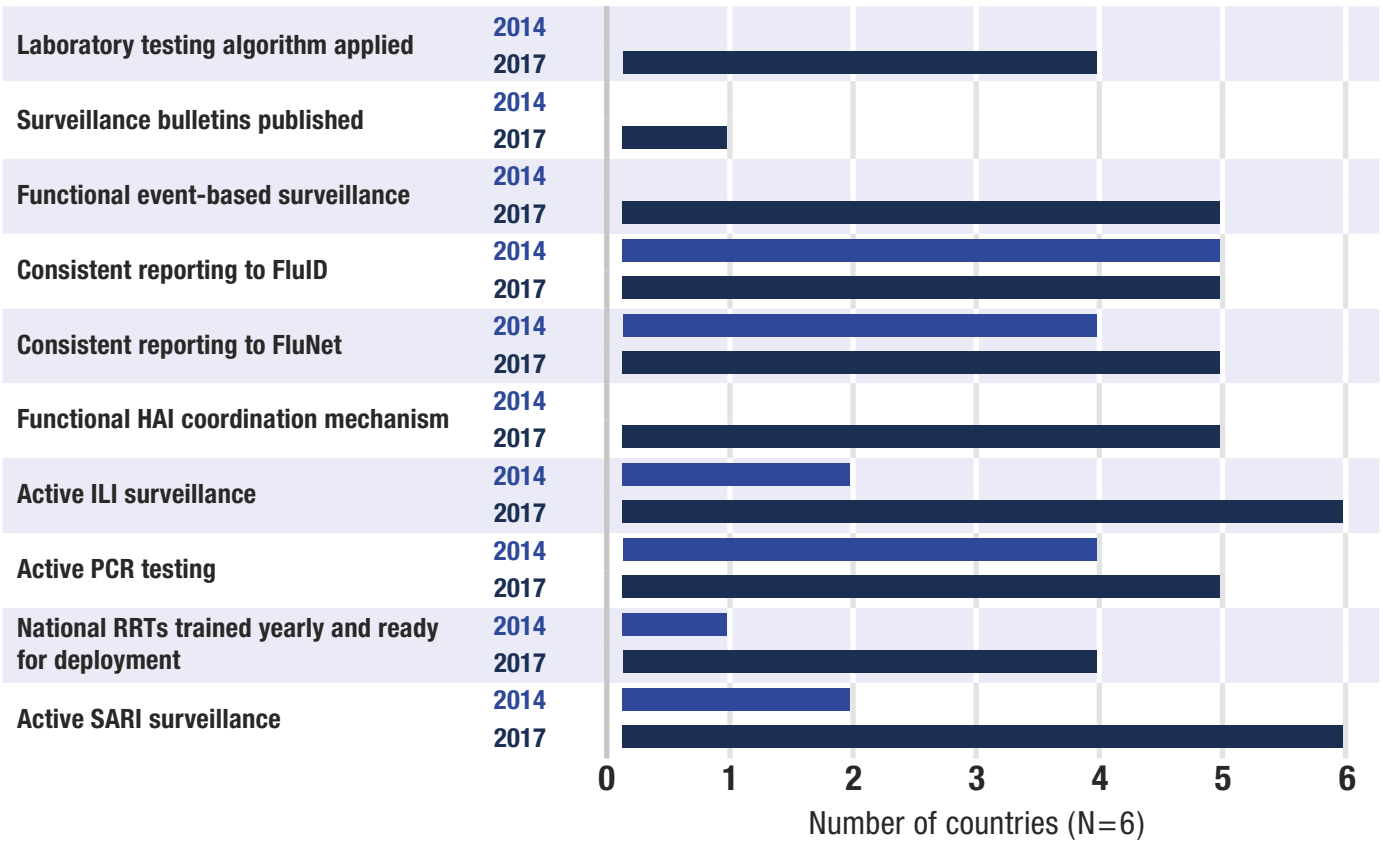
Notable progress was achieved in the area of influenza surveillance. During the 2016-2017 influenza season, 48 of the 50 countries in the Region that are performing influenza surveillance consistently reported epidemiological and virological data to the regional influenza surveillance platform (The European Surveillance System, or TESSy) as well as global influenza surveillance platforms (FluNet and FluID). Based on surveillance data submitted to TESSy, the joint influenza update, Flu News Europe, from the WHO Regional Office for Europe and European Centre for Disease Prevention and Control (ECDC) was published on a weekly

basis in English and Russian throughout the influenza season. Coordinated influenza surveillance between animal and health sectors also improved in PIP priority countries through a series of national intersectoral meetings. This gave countries a forum to share updates on the epidemiological situation, address any challenges and solutions, and engage multiple surveillance stakeholders.

Five PIP priority countries in the Region enhanced clinical management and outbreak investigation through guideline development and training. The Regional Office supported PIP priority countries to develop and roll-out national guidelines on outbreak investigation and response and SARI clinical management. More than 100 members of RRTs were trained in outbreak investigation and response, and over 200 adult and paediatric intensivists received clinical management training. These capacities are vital for investigating and controlling outbreaks of influenza viruses with pandemic potential.

The guidelines developed in each country are also applicable to the investigation and response for other infectious disease outbreaks, which has advanced IHR core capacities in these countries. Sustainability of these capacities is being built by integrating the training curricula into post-graduate education courses.

Progress in key capacities for PIP priority countries in the Region (2014-2017)



Performance against indicators for all 53 countries in the Region (2017)

FluID	**87%**	countries consistently shared epidemiological data through WHO FluID
FluNet	**91%**	countries consistently shared influenza virological data through WHO FluNet
Virus sharing	**89%**	countries routinely shared seasonal influenza viruses with GISRS

Collaborative discussion at a joint WHO Regional Office for Europe and European Centre for Disease Prevention and Control meeting on influenza surveillance. © WHO

Joint WHO Regional Office for Europe and ECDC Influenza Surveillance Meetings

With partial support from PIP funds, two joint WHO Regional Office for Europe and ECDC influenza surveillance meetings were held in 2014 and 2016. These convened national experts and key stakeholders from 53 Member States, including national focal points for influenza surveillance, and representatives from WHO CCs. Regional project teams, such as the European Influenza Monitoring of Vaccine Effectiveness (I-MOVE), the Vaccine European New Integrated Collaboration Effort (VENICE), and the European Monitoring of Excess Mortality for Public Health Action (EuroMoMo) attended this meeting, as did international partners including US CDC.

The meetings facilitated the coordination of influenza surveillance activities in the Region, and provided a platform for discussing technical and operational issues for influenza surveillance, seasonal influenza vaccination, risk assessment, and outbreak response. These meetings provided an excellent opportunity to maintain and strengthen contributions to the Flu News Europe bulletin. They also strengthened pandemic preparedness by encouraging collaboration and information-sharing among influenza network members in Europe and beyond.

Armenia

POPULATION: **3,018,854**

TOTAL PIP FUNDS SPENT IN COUNTRY: **$700K**

NATIONAL INFLUENZA CENTRE: **NO**

Improved surveillance highlighted by the weekly bulletin

Armenia now has a sentinel influenza surveillance system that supports weekly data collection and reporting. Activities that led to this well-functioning surveillance system included: an evaluation of existing surveillance, the introduction of pilot sentinel surveillance sites, the development of an electronic data management system designed specifically for ARI and influenza surveillance, and training staff on data collection and analysis. Notably, these activities were initially funded by PIP and are now partly financed by the state. Using the improved influenza sentinel surveillance system, national experts can automatically generate an ARI/influenza bulletin on a weekly basis, which informs decision-making among health authorities.

National Virology Laboratory worked towards WHO NIC recognition

Substantial work was done to strengthen the National Virology Laboratory in Armenia. Several trainings were conducted, including on shipment of infectious substances, laboratory quality management, PCR testing, virus isolation (a brand new capacity for the laboratory), biosafety, and biosecurity. After these trainings, the Regional Office visited the laboratory in 2017 to conduct an on-site assessment. The Regional Office found that the National Virology Laboratory satisfied the requirements for a WHO NIC, and recommended that the laboratory be recognized as a NIC by WHO.

The WHO Regional Office for Europe visit to the Armenian National Virology Laboratory to recommend it become a WHO-recognized National Influenza Centre. © WHO/Nune Doylan

> “Laboratory practices of the National Virology Laboratory have substantially improved. This sets high standards for other laboratories, and other laboratories of our National Reference Laboratory will become motivated to receive international accreditations.”

Liana Torosyan,
Head of Department of Epidemiology of Especially Dangerous and Airborne Diseases, National Centre of Disease Control and Prevention, Ministry of Health, Armenia

Kyrgyzstan

POPULATION: **5,940,000**

TOTAL PIP FUNDS SPENT IN COUNTRY: **$490K**

NATIONAL INFLUENZA CENTRE: **YES**

National electronic influenza surveillance system developed

A new national electronic system for influenza surveillance was developed and implemented; it provides automated data updates on respiratory infections from hospitals, which has facilitated accurate and reliable data reporting and analysis. Additionally, health workers and epidemiologists were trained in data collection, analysis, and reporting, and can utilize this system. This has been a big step forward in advancing national surveillance in Kyrgyzstan.

Enhanced NIC laboratory skills

Several activities strengthened laboratory capacities and ensured that the NIC remained highly functioning. First, there was an assessment of the laboratory service capacity. Second, technical support was provided by laboratory specialists from other European countries. Third, laboratory SOPs were developed for PCR, quality control and biosafety. Fourth, a manual was developed on the collection and transportation of specimens from sentinel surveillance sites to the NIC. Finally, courses were conducted on PCR, transport of infectious materials, molecular methods, and virus isolation and characterization. These activities greatly improved laboratory skillsets, and ensure that the NIC contributes to national surveillance and GISRS.

Outbreak investigation and response capacities enhanced

With support from PIP funds, a *National Guideline on Outbreak and Investigation Responses of Communicable Diseases* was developed, and included training modules for infectious disease outbreak response. A three-day training for implementing the guidelines was conducted for national staff. It included training of national trainers who will conduct training at sub-national levels in the coming year.

Equipment handover for Kyrgyzstan's new electronic influenza surveillance system. © WHO/Almaz Zhumaliev

Tajikistan

POPULATION: **8,742,800**

TOTAL PIP FUNDS SPENT IN COUNTRY: **$780K**

NATIONAL INFLUENZA CENTRE: **NO**

Influenza surveillance established and viruses shared

In 2014, Tajikistan had no operational influenza surveillance system. With the support of PIP funds, sentinel surveillance was established for both ILI and SARI. This included developing two ILI/SARI sites, improving laboratory staff surveillance capacities, and establishing a new national influenza data management system. A WHO mission to Tajikistan in 2017 found that influenza surveillance is operational, and that professionals including doctors, epidemiologists, laboratory and monitoring specialists are actively engaged. Furthermore, the system has become more sustainable, with integration of PIP activities into the State Sanitary and Epidemiological Surveillance Service. Overall, this is a substantial development for Tajikistan that advanced in-country preparedness.

As a result of capacities established, Tajikistan now shares influenza viruses with WHO CCs.

Weekly influenza data published

National electronic data reporting was developed. Both virological and epidemiological data are now reported weekly and data are published in a national influenza bulletin. Data are also shared with WHO and published in *Flu News Europe*. These achievements are a result of continued support through PIP in the area of data management and bulletin development.

Enhanced outbreak response capacities

The outbreak response capacities in Tajikistan were strengthened with support from PIP funds through the development of the *National Guideline on Outbreak and Investigation Responses of Communicable Diseases*. This was coupled with extensive training of national RRTs, who will also cascade the training further to regional and local levels. In total, more than 50 national and regional experts were trained, and the national core trainers successfully held their first sub-national training. Enhanced capacities in Tajikistan strengthen not only pandemic preparedness but also the ability to respond to any infectious disease outbreak, thereby improving national IHR core capacities.

“When PC fund implementation in Tajikistan began, the country had no influenza operational surveillance capacity. PIP funds have helped establish operational and functional sentinel surveillance for influenza. Through daily technical support and work with PIP focal points, all involved specialists are advocating for improvements of the influenza pandemic preparedness in the country.”

Abdulakhad Safarov, PIP National Professional Officer, WHO Country Office, Tajikistan

Laboratory staff processing influenza specimens, Tajikistan.
© WHO/Hamidov Zafarjon

Turkmenistan

POPULATION: **5,374,000**

TOTAL PIP FUNDS SPENT IN COUNTRY: **$720K**

NATIONAL INFLUENZA CENTRE: **NO**

Laboratory capacities improved through SOP development and training

Laboratory SOPs were developed and implemented in Turkmenistan. Laboratory specialists were trained in virus isolation and cell culture (a new capacity in Turkmenistan), and the national influenza laboratory subsequently and successfully implemented these skills. As an illustration of achievements supported by PIP funds, for three years in a row Turkmenistan has achieved 100% correct results in the EQAP on influenza virus detection using PCR. Furthermore, PIP initially supported the purchase of laboratory supplies and test kits, but in a move towards sustainability the government now supports most procurement.

New electronic system for improved surveillance

Turkmenistan used PIP funds to introduce and sustain a national electronic data management system in October 2016. This system facilitates surveillance activities, and was made possible by the purchase of supporting technology such as computers, printers, and servers. PIP funds further supported a follow-up mission with international experts, and user feedback was incorporated which led to system improvements. This electronic system improves surveillance data quality and allows for a weekly bulletin to be developed and distributed.

“With the support of PIP funds, an electronic program on epidemiological surveillance of influenza and ARI was introduced, which facilitated and automated the process of collecting and analysing data on influenza and ARI at all levels (national, regional, peripheral). The project was piloted in 2016, and since, positive feedback was received from specialists using it. In a short period of time for implementation, significant and impressive results have been achieved.”

Gurbangul, Head of High Dangerous Diseases Department, Ministry of Health, Turkmenistan

Monthly bulletin development process, Turkmenistan.
© WHO/Ayjeren Myratdurdyyeva

Specialists meeting with sentinel surveillance site staff, Turkmenistan.
© WHO/Ayjeren Myratdurdyyeva

Uzbekistan

POPULATION: **29,894,000**

TOTAL PIP FUNDS SPENT IN COUNTRY: **$770K**

NATIONAL INFLUENZA CENTRE: **NO**

Guidance developed for clinical management

Uzbekistan developed the *National Guidance on Treatment of Patients in Critical Conditions due to Influenza*, which provides guidance for managing severe forms of respiratory illness and will be included in the training curriculum for post-graduate medical education. Trainings based on these guidelines were also conducted. *See the story 'Sustainable influenza clinical management in low-resource settings' on p6 for more on this accomplishment.*

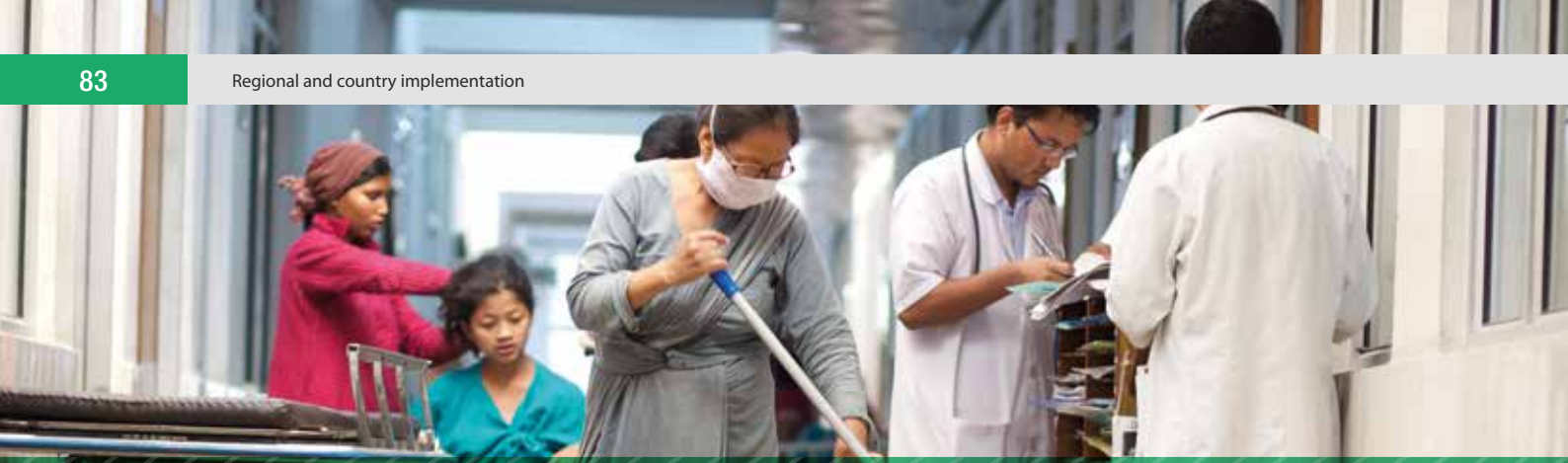
Influenza surveillance enhanced

A considerable number of activities were conducted from 2014-2017 that improved Uzbekistan's surveillance capacities. Notably, the national sentinel surveillance guidelines were revised to enhance the quantity and quality of data collected. Uzbekistan is contributing to regional and global influenza surveillance by submitting data to TESSy, which has enabled data analysis and dissemination through *Flu News Europe*.

Supplies and training strengthened laboratory capabilities and capacities

PIP funds helped procure laboratory supplies for specimen collection, storage, and transportation. Additional procurement support helped build capacities for molecular identification of influenza viruses, cell culture, virus isolation, and hemagglutination inhibition testing. By having the supplies to function and expand capacities, this support helped sustain Uzbekistan's national influenza laboratories. In addition to procurement, PIP funds supported key training for laboratory personnel and infectious substances shippers. In 2016 and 2017, Uzbekistan had 100% correct results in EQAP, confirming the value of capacity building efforts.

Clinical management training course, Uzbekistan. © WHO



South-East Asia Region

PIP FUNDS USED FOR REGIONAL CAPACITY BUILDING: **$1.5M**

PIP FUNDS USED IN PRIORITY COUNTRIES: **$5.1M**

TOTAL PIP FUNDS SPENT ACROSS THE REGION: **$6.6M**

Maintaining hygiene at a hospital. © WHO/Tom Pietrasik

PIP has supported efforts across the South-East Asia Region to strengthen influenza surveillance in all PIP priority countries. PIP funds were used in synergy with other resources and donor investments to focus on countries with limited capacities. As a result, infrastructure has been improved and human resource capacity has increased through trainings and mentoring support.

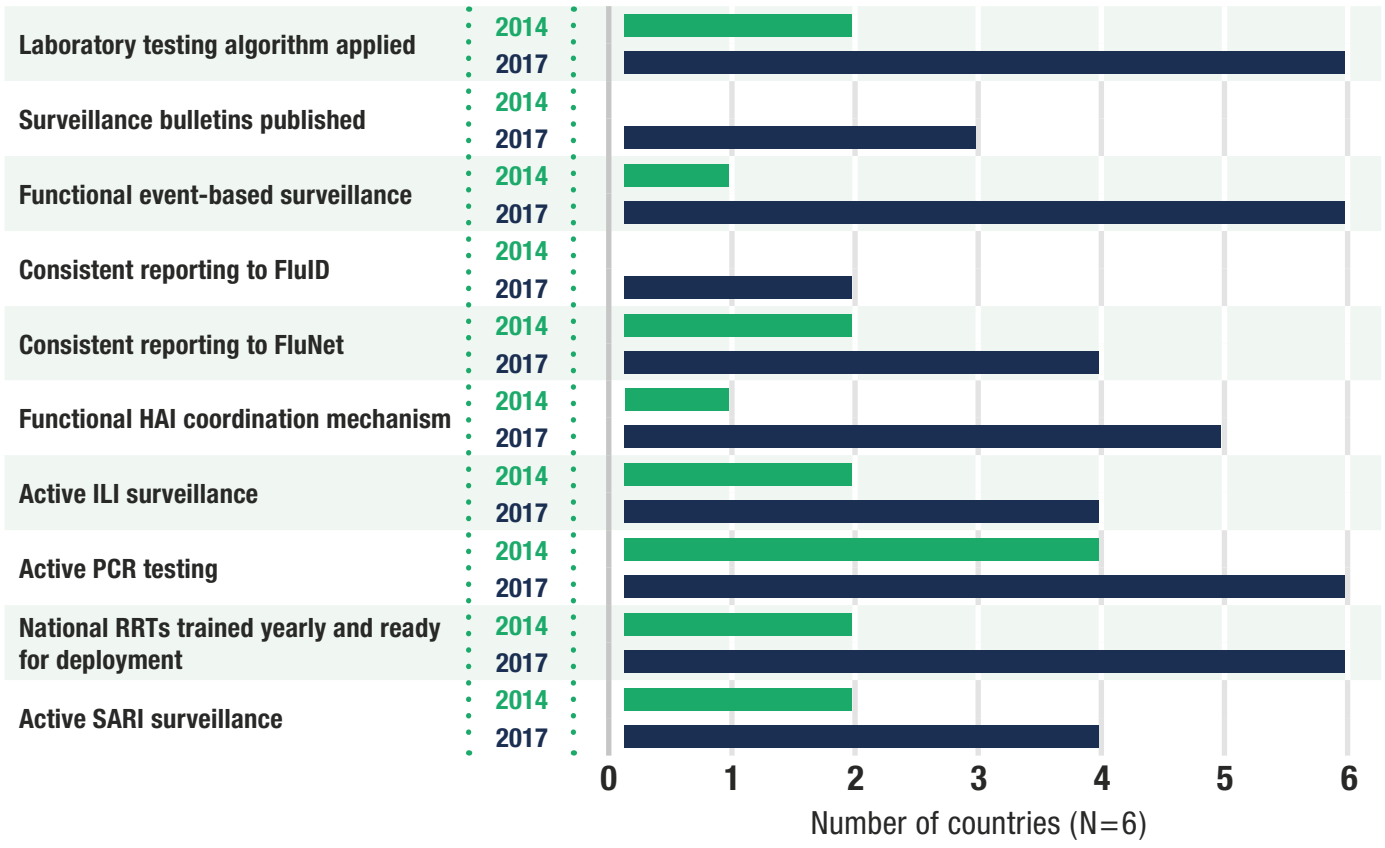
This has led to successes such as newly established surveillance systems, increased laboratory capabilities, consistent seasonal influenza virus sharing by most countries in the Region, as well as improved capacities for data management and reporting. Currently, all countries in the Region report virological data to FluNet, which assists in developing situational analyses and risk assessments.

Countries in the South-East Asia Region took several measures to improve planning and coordination for outbreak response. A One Health approach was used by many countries to advance national pandemic planning and enhance coordination between human and animal sectors. All PIP priority countries conducted RRT trainings to improve the quality and timeliness of outbreak response. In some countries, these capacities were operationalized when avian influenza outbreaks occurred. Capacities that had been developed proved effective with well-facilitated response and control measures. Together, regional and national efforts have enhanced pandemic influenza preparedness, as well as IHR core capacities for detecting and responding to all public health emergencies.

Exercising pandemic influenza containment, Indonesia. © WHO/Endang Wulandari

Attending to an influenza patient, Nepal. © WHO/Tom Pietrasik

Progress in key capacities for PIP priority countries in the Region (2014-2017)



Performance against indicators for all 11 countries in the Region (2017)

FluID	36%	countries consistently shared epidemiological data through WHO FluID
FluNet	82%	countries consistently shared influenza virological data through WHO FluNet
Virus sharing	82%	countries routinely shared seasonal influenza viruses with GISRS

Bangladesh

POPULATION: **160,707,634**

TOTAL PIP FUNDS SPENT IN COUNTRY: **$670K**

NATIONAL INFLUENZA CENTRE: **YES**

Upgraded laboratory capacities and virus sharing

Laboratories in Bangladesh gained capacities for sequencing as well as virus isolation. There were also investments for new equipment. Over 72 medical technologists were trained on laboratory techniques, including safe sample collection, handling, and transport. These efforts have increased the ability for laboratories in Bangladesh to diagnose influenza, and to share samples in-country and globally with GISRS through WHO CCs.

Improved outbreak response

There was substantial work that enhanced RRTs, including training for over 250 people. This has led to better detection and response for not only influenza, but also other diseases such as dengue fever and chikungunya. Infection control procedures also improved, such as through the correct use of personal protective equipment (PPEs), which is critical to protect health workers in any infectious disease outbreak. These investments will help Bangladesh respond to influenza outbreaks as well as other outbreak-prone diseases, in a manner that is safe and effective.

Chicken at a live bird market. © WHO /Jonathan Perugia

Democratic People's Republic of Korea

POPULATION: **25,155,000**

TOTAL PIP FUNDS SPENT IN COUNTRY: **$990K**

NATIONAL INFLUENZA CENTRE: **YES**

Improved laboratory capabilities

PIP funds are the fourth largest source of external support to the Democratic People's Republic (DPR) of Korea's MOH, and the impact on laboratory capabilities has been substantial. To facilitate laboratory-based influenza surveillance, training was provided in diagnostic techniques including virus isolation. PIP funds helped to improve laboratory infrastructure and equipment, and to supply reagents and consumables. This has enabled the NIC to conduct regular influenza testing and reporting, and to share information globally through WHO FluNet.

Training physicians on influenza surveillance standards, Democratic People's Republic of Korea. © WHO

Operationalized laboratory surveillance

DPR Korea has a network of 42 sentinel sites in their surveillance system. Before investments in laboratory and sentinel site capacities, the surveillance system was primarily based on clinical data alone. However, several achievements have facilitated the country to shift to a laboratory-based system, which provides more pathogen-specific information that integrates with existing epidemiological data. For example, the WHO influenza surveillance standards were incorporated into national guidance, sentinel site staff were trained in specimen collection and handling, and equipment was provided for data management and analysis. These changes have improved the quality and availability of influenza surveillance data, as well as data for other outbreak-prone diseases.

Outbreak response capacities built and tested

PIP funds were used to establish and maintain RRTs in DPR Korea. While these have been built to respond to influenza, RRTs are also able to investigate and respond to other respiratory infections. The impact of this support was evident in recent events. During seasonal rains resulting in floods, ARIs were monitored as part of the emergency response. Thirty RRTs were mobilized to conduct surveillance and to report on disease activity to inform any necessary control measures. These teams were effectively able to monitor respiratory infections while navigating an emergency flooding situation. This work showed that these teams are successfully integrated into the broader emergency preparedness context, and are ready to respond to influenza, ARIs or other diseases such as measles, polio and rubella.

Indonesia

POPULATION: **257,564,000**

TOTAL PIP FUNDS SPENT IN COUNTRY: **$1.2M**

NATIONAL INFLUENZA CENTRE: **YES**

Preparedness plans tested through simulation

Steps have been taken in Indonesia to improve pandemic influenza and emergency planning. First, Indonesia adopted WHO's Pandemic Influenza Risk Management (PIRM) approach by linking the national influenza pandemic preparedness plan to the country's broader disaster management plan. Second, provincial plans were also developed in four provinces, by adapting the national plan to local contexts. These plans have since been tested. In September 2017, a full-scale influenza pandemic exercise was conducted using a whole-of-society approach to risk management. This involved 800 participants from 100 organizations at all levels; local to national. The hypothetical scenario was the spillover of avian influenza from wild bird to domestic poultry, then to humans, which finally evolved to cause human-to-human transmission. Capacities tested included: animal health detection and response, command and coordination, resource mobilization including access to emergency funds, medical response, surveillance (including at live bird markets), pharmaceutical interventions, and non-pharmaceutical interventions including risk communications. This was a massive initiative, and over 500 national and international observers gained valuable insight from this simulation to further improve and update preparedness plans.

Sustainable surveillance established

As the world's fourth most populous nation, Indonesia has an extensive and functional influenza surveillance network comprising 27 ILI sentinel sites, six SARI sentinel sites, six regional laboratories, and a NIC. With PIP support, capacities were developed within this network. This included training for sentinel site staff on influenza surveillance, case identification, sample collection and shipment, data reporting, and data analysis. Laboratory staff were trained in *Good Laboratory Practices* and *Laboratory Quality Management Systems*, which are global standards for assuring quality operations. Influenza surveillance review meetings and site monitoring were also conducted to share information and ensure good practices were maintained. This work has helped increase staff competencies to collect and test samples, and communicate results to stakeholders. While PIP assisted in catalyzing surveillance, it is now sustained by the MOH. This demonstrates national commitment for influenza surveillance into the future.

Q&A with Christina Widaningrum, Ministry of Health, Indonesia

What is your role in PIP implementation?

My role is to implement the national programme for preparedness and response for acute respiratory infections, including influenza surveillance and influenza pandemic preparedness. PIP is supporting the national programme for pandemic influenza preparedness and influenza surveillance.

What are you especially proud of as a result of PIP implementation?

The contingency planning funded by PIP has mapped the multi-sector resources for supporting preparedness and response to pandemic influenza.

What have been the broader benefits of PIP funds?

The 6 C's; improved communication, coordination, collaboration, cooperation, contribution, and commitment for pandemic preparedness.

Christina Widaningrum,
Chief of Acute Respiratory Infections Subdirectorate,
Ministry of Health, Indonesia

Myanmar

POPULATION: **52,885,000**

TOTAL PIP FUNDS SPENT IN COUNTRY: **$440K**

NATIONAL INFLUENZA CENTRE: **YES**

Enhanced detection and monitoring in sentinel surveillance

PIP support contributed to six new SARI and ILI sentinel surveillance sites, bringing the total in Myanmar to eight. Surveillance also improved due to several additional accomplishments including better laboratory capacities such as for specimen collection and transportation, new surveillance guidelines, new national biosafety and biosecurity guidelines, and increased staff competencies to manage data and share viruses with WHO CCs. These developments have improved Myanmar's timely detection and effective monitoring of influenza viruses.

"By strengthening influenza surveillance and response in context of overall public health emergency management, Myanmar can prevent, detect and respond to all public health events."

Nyan Win Myint, Deputy Director, Central Epidemiology Unit, Department of Public Health, Myanmar

Laboratory capacities enabled successful outbreak identification

Myanmar has integrated their laboratory and epidemiological surveillance capacities. As a result, Myanmar has improved early detection for SARI and ILI, developed standard practices for specimen collection and transportation, and procured essential reagents and equipment for timely diagnosis. These capacities have since come together for a successful response. From July to September 2017, Myanmar reported an increase in seasonal influenza activity raising concerns of an outbreak. Due to the previous capacity building work, the NIC was able to correctly identify the subtype and report the findings to stakeholders including WHO. This informed appropriate response measures, and showed the effectiveness of virus detection and identification in Myanmar.

Better intersectoral preparedness for health emergencies

PIP funds supported Myanmar to develop a One Health strategic plan. This plan brings together different sectors to monitor trends on zoonotic influenza and other diseases. Building collaboration between sectors has facilitated work outside influenza, including for antimicrobial resistance (AMR) surveillance. Additionally in 2017, Myanmar underwent a Joint External Evaluation (JEE) of its IHR core capacities, which provided additional direction and support for intersectoral collaboration and joint planning for all health emergencies.

Participants at a meeting to discuss capacities to prevent, detect and rapidly respond to public health risks, Myanmar. © WHO

Nepal

POPULATION: **28,514,000**

TOTAL PIP FUNDS SPENT IN COUNTRY: **$670K**

NATIONAL INFLUENZA CENTRE: **YES**

Improved clinical management capacities

Nepal made significant strides to improve clinical management for SARI. Approximately 35 clinicians across Nepal were trained on clinical management, and additional trainings took place with nurses and public health professionals. The bulk of the clinical training was related to triage, infection control, and surge capacity procedures. However, there were also additional efforts to integrate clinical management into the hospital emergency preparedness and response procedures, which will be critical if a future influenza pandemic occurs.

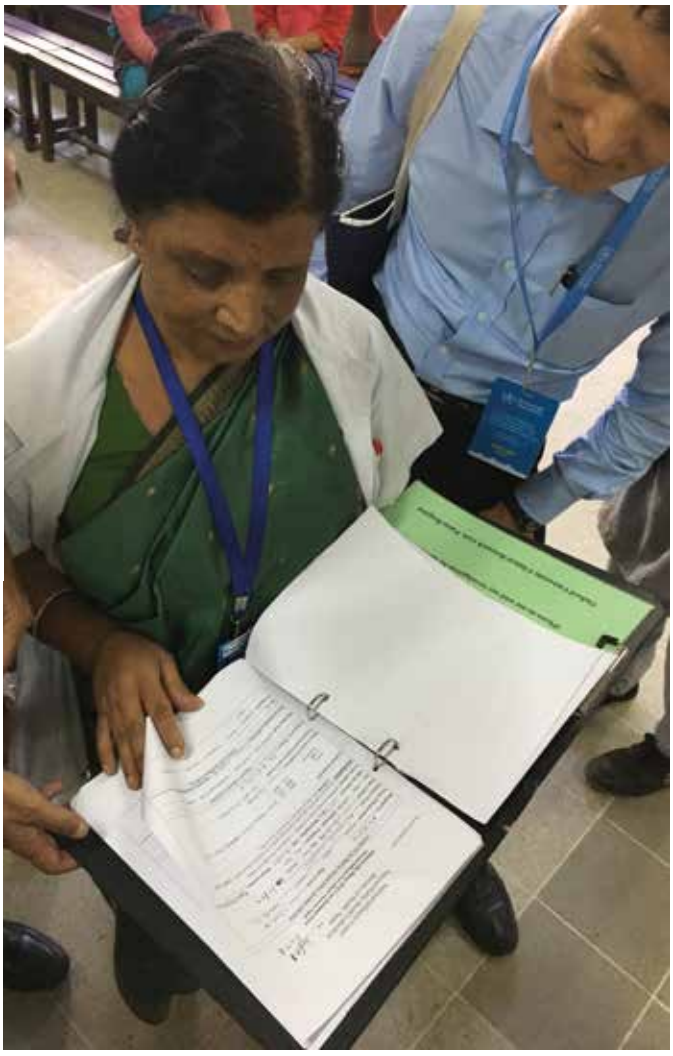
Enhanced surveillance and laboratory systems

PIP funds supported Nepal to establish SARI and ILI surveillance sites. Sentinel site staff were trained in data collection and safe handling of specimens.

Virus isolation capacities were established, and a cadre of staff were certified as shippers to send influenza specimens to WHO CCs. In 2017, a thorough review of the surveillance and laboratory system helped Nepal to consider the next steps to improve surveillance, which includes a need for improved data analyses and better information sharing through surveillance bulletins. These are future directions to continuously enhance national preparedness.

One Health operationalized

Working with WHO and the Food and Agriculture Organization (FAO), Nepal used a One Health approach, and initiated joint training of veterinary and human health professionals in field epidemiology. Results from two pilot trainings showed that the bonds between the two sectors were strengthened for influenza preparedness, as well as other intersectoral priorities such as AMR surveillance.



Hospital staff explaining the influenza case data collection form, Nepal. © WHO

Timor-Leste

POPULATION: **1,185,000**

TOTAL PIP FUNDS SPENT IN COUNTRY: **$1.1M**

NATIONAL INFLUENZA CENTRE: **NO**

Influenza surveillance established for the first time

PIP funds have transformed influenza surveillance in Timor-Leste. Following independence in 2002, much of the country's health infrastructure was in poor shape. In 2014, the first SARI surveillance sites were established. Since 2015, PIP funds supported training of health staff on laboratory techniques and SARI surveillance processes. Currently, there is a network of eight functional sites, including five ILI sites and three SARI sites. Influenza surveillance data are now regularly collected and specimens are tested for influenza.

Participation in global surveillance

The progress made in recent years to build surveillance and laboratory capacities has catalyzed national momentum for influenza preparedness. In November 2017, as a result of the influenza surveillance capacities established, Timor-Leste commenced reporting of virological data to FluNet. With this achievement, Timor-Leste has joined global surveillance efforts.

Intersectoral planning and RRTs for emergencies

Timor-Leste developed an all-hazards health emergency preparedness and response plan that includes pandemic influenza. The plan triggered improved coordination and joint training among relevant sectors, and 30 professionals were trained for intersectoral RRTs. To improve outbreak detection, municipal level staff were provided with basic epidemiological skills. All of these activities have strengthened and coordinated outbreak surveillance and response capacities, not just for influenza, but also for other outbreak-prone diseases.

Surveillance system strengthening training on severe acute respiratory infection and influenza-like illness, Timor-Leste. © WHO/Jermias Da Cruz

Western Pacific Region

PIP FUNDS USED FOR REGIONAL CAPACITY BUILDING: **$1.9M**

PIP FUNDS USED IN PRIORITY COUNTRIES: **$6.7M**

TOTAL PIP FUNDS SPENT ACROSS THE REGION: $8.6M

Rapid response team reviewing health center records for influenza-like illness cases, Lao PDR. © WHO

Surveillance systems in the Western Pacific Region were enhanced to support better public health decisions. To improve information sharing, the Region launched an online influenza dashboard in 2017.[26] The dashboard is publically accessible, updated weekly, and linked directly to global surveillance systems. This dashboard captures public health events from a variety of sources, and has led to risk assessments that better link influenza surveillance findings with public health action. The Regional Office has worked with Member States to promote more regular and timely sharing of influenza viruses. Through active follow-up of zoonotic influenza cases and reporting of influenza events in line with the IHR (2005), national focal points have improved the timeliness of IHR (2005) notifications, which are central for fast and effective risk assessment and decision-making. These capacities are critical in the Western Pacific Region, where there is high-risk for influenza viruses with pandemic potential.

Laboratory capacities improved through several training workshops supported by GISRS, which focused on skills such as PCR testing, sequencing, bioinformatics, virus isolation, data management and analysis, and biosafety. These skills have also strengthened GISRS by improving the number, quality, and frequency of virus samples shared.

Enhancing these laboratory capacities is in line with the Asia Pacific Strategy for Emerging Diseases (APSED, 2010), a regional framework for building generic preparedness capacities for emerging disease threats. Combining the work to improve pandemic influenza preparedness with directions set by APSED assures that capacity building in the Region is strategic to meet high-priority needs for influenza, and other health emergencies.

EQAP as a model

The WHO EQAP for the detection of influenza viruses by PCR was used as a model for a new external quality assessment (EQA) for arboviruses in the Region. This began with dengue virus in 2013 and was expanded in 2016 to a global EQA that includes Chikungunya, Zika and yellow fever viruses. EQAP is one example of how influenza preparedness has served as a model for other disease programmes without the additional investment of PIP funds.

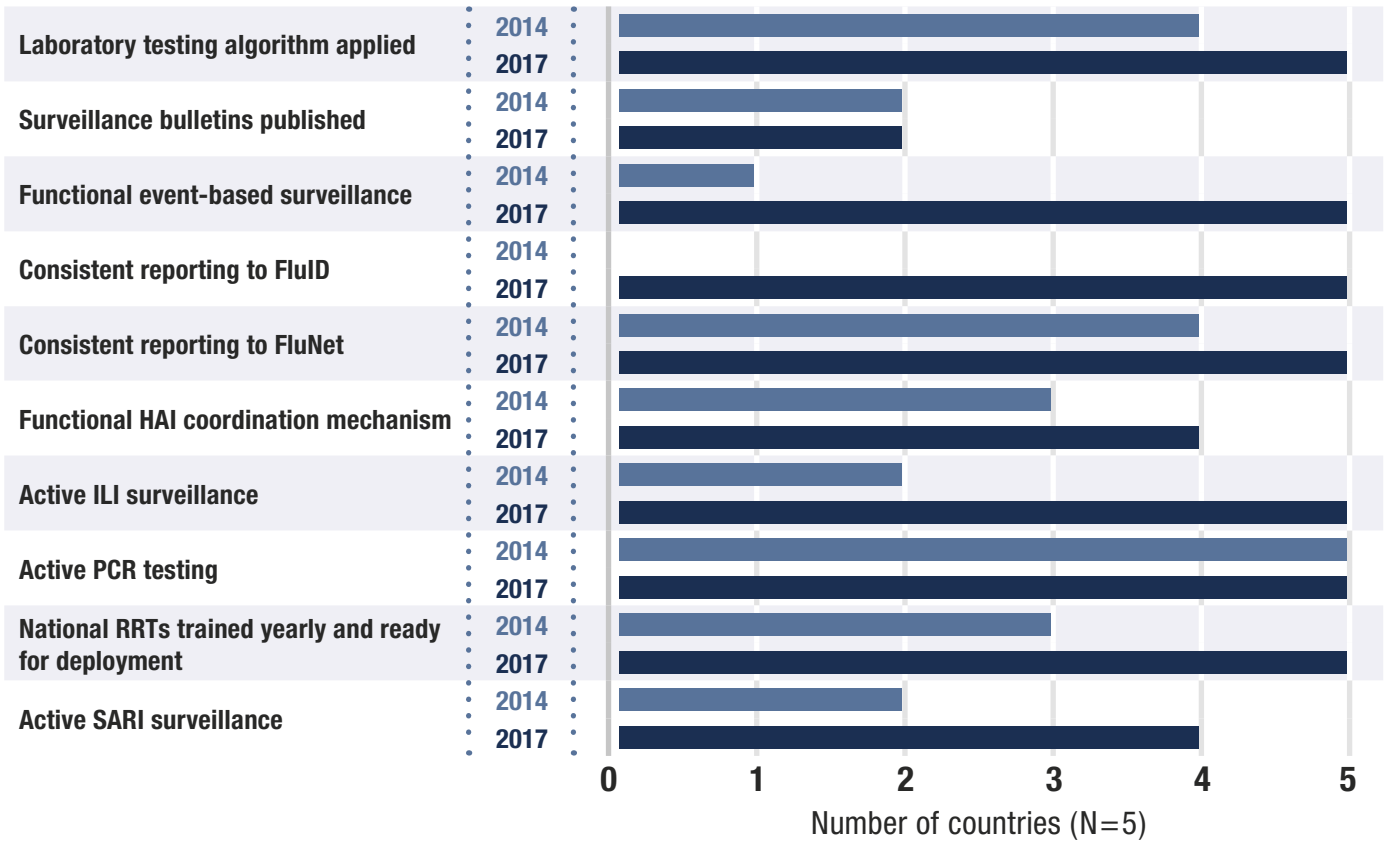
A regional EBS system was established, which captures and synthesizes information about potential outbreaks from multiple sources to optimize sensitivity, specificity, and timeliness of detection.

In 2017, the regional EBS system detected 269 influenza related events. Of these, 121 were related to animal infection with avian influenza, 88 were related to human infection with avian influenza, 13 of which were reported in IVTM, and 60 were related to seasonal influenza. Pulling on multiple data sources, the system facilitates robust risk assessment to inform timely decision-making and public health action.

EBS system in action

The Regional Office conducted a pandemic risk assessment for A(H7N9) virus in China. Information was synthesized from numerous sources: national surveillance data, IHR notifications, WHO CC laboratory findings, clinical data, disease trends in animal populations from FAO and OIE, live bird trade industry data, and scientific literature. In light of this infomation, the Regional Office was able to assess the pandemic likelihood and potential impact of the virus within contextual vulnerabilities, and determined there had been no significant change in transmissibility and the fatality rate. These findings were consolidated and guided WHO recommendations to support national and global preparedness measures.

Progress in key capacities for PIP priority countries in the Region (2014-2017)



Performance against indicators for all 27 countries in the Region (2017)

FluID	63%	countries consistently shared epidemiological data through WHO FluID
FluNet	52%	countries consistently shared influenza virological data through WHO FluNet
Virus sharing	56%	countries routinely shared seasonal influenza viruses with GISRS

Cambodia

POPULATION: **15,578,000**

TOTAL PIP FUNDS SPENT IN COUNTRY: **$1.9M**

NATIONAL INFLUENZA CENTRE: **YES**

Strengthened intersectoral coordination for controlling avian influenza outbreaks

As part of improving avian influenza detection and response, Cambodia conducted a tabletop exercise in 2017. This brought together animal and human health professionals at hospital, district, provincial, and national levels. The exercise refreshed detection and response skills for RRTs, and strengthened intersectoral awareness and coordination for events at the human-animal interface.

See the story on p17 for a more details on Cambodia's improved preparedness and response.

Enhanced SARI sentinel surveillance

Cambodia's SARI surveillance system has eight sentinel sites dispersed geographically throughout the country. Through training, supervisory visits and coordination between sentinel sites, laboratories, and public health units, the quality and timeliness of surveillance data have greatly improved. From 2014 to 2017, Cambodia has increased their detection and virus characterization on a yearly basis. This system now provides critical information on seasonality, influenza disease burden, and viruses circulating in the country. Decision-makers can use this up-to-date information for better decisions and policy development.

Rapid response team and applied epidemiology teams reviewing patient records from hospital logbooks at a hospital, Cambodia. © WHO/Vanra leng

Sentinel surveillance staff collecting a respiratory specimen from a child, Cambodia. © WHO/Vanra leng

Fiji

POPULATION: **892,000**

TOTAL PIP FUNDS SPENT IN COUNTRY: **$1M**

NATIONAL INFLUENZA CENTRE: **YES**

Preparedness capacities tested

In January 2017, Fiji's Ministry of Health and Medical Services (MOHMS) collaborated with WHO to hold a two-day tabletop simulation (PanStop) to assess government capacities to detect, assess, and respond to an influenza pandemic. This simulation brought together over ten agencies from health, agriculture, foreign affairs, police and military, in order to focus on multisectoral collaboration. It allowed the agencies to work together to identify strengths that could be leveraged for pandemic preparedness, and identified areas for future improvement.

Training conducted for stronger outbreak investigation and response

Between July and August 2015, multiple three-day workshops were held in several regions across Fiji. The workshops supported members of local outbreak response teams to develop practical skills in outbreak investigation, documentation, and reporting. Moreover, in November 2017, MOHMS facilitated a four-day multidisciplinary training to enhance skills in communication, surveillance, epidemiology, laboratory principles, and outbreak response. These trainings have improved national knowledge and preparedness for influenza, and led to recommendations for the next steps to develop surveillance and response measures in Fiji.

Enhanced NIC capacities assist participation in GISRS

With WHO CC support, Fiji's NIC gained capacities for cell culture and virus isolation. WHO CC staff helped the NIC to develop plans to improve laboratory workflow, and to identify the reagents, supplies, and equipment needed to enhance laboratory capabilities. PIP funds were used to purchase a RT-PCR machine and a -80°C freezer for specimen storage. In 2015 and 2017, NIC staff were trained and certified as infectious substances shippers, which sustained Fiji's capacities to share influenza viruses with WHO CCs. These investments improved national laboratory preparedness in Fiji and increased its participation in GISRS.

Participants learning data management skills at a district outbreak response training, Fiji. Photo credit: MoHMS

Deputy Secretary of Public Health at the Ministry of Health and Medical Services (MoHMS) giving the opening address at an epidemiology-laboratory and rapid response team training, Fiji. Photo Credit: MoHMS

Lao People's Democratic Republic

POPULATION: **6,802,000**

TOTAL PIP FUNDS SPENT IN COUNTRY: **$1.6M**

NATIONAL INFLUENZA CENTRE: **YES**

Successful intersectoral outbreak response

Lao People's Democratic Republic (PDR) has demonstrated an increase in the country's capacity to respond to potential avian influenza outbreaks. In 2017 alone, six highly pathogenic avian influenza outbreaks were investigated in poultry using a multi-disciplinary approach, and no human cases were detected. Two avian influenza simulation exercises were also conducted with approximately 100 participants from the animal and human sectors.

Strengthened data sharing

Over the past five years, Lao PDR strengthened its laboratory and surveillance capacities, including for SARI/ILI surveillance, EBS, laboratory diagnostic techniques, and RRTs. This has enabled Lao PDR to improve the quality of surveillance data and to share results globally since 2016. In 2017, an integrated influenza bulletin was developed and published on a weekly basis and distributed widely. As a result, country data are now more available both nationally and globally.

"As a result of PIP implementation, I am particularly proud of strengthening influenza surveillance capacity at the country level by increasing community and clinician awareness, training multi-disciplinary RRTs, and improving laboratory capacity. This improved country capacity strengthens regional preparedness not only for influenza but other emerging infectious diseases."

Bouaphanh Khamphaphongphane,
Chief of Epidemiology Unit, National Centre for Laboratory & Epidemiology, Ministry of Health, Lao PDR

Activating new national response plans

In October 2016, the national Department of Livestock and Fisheries (DLF) notified the national Department of Communicable Diseases Control (DCDC) of a H5N1-positive poultry flock in Luang Prabang. This activated the Joint National Preparedness and Contingency Plan for Avian Influenza, which was operationalized for the first time. The next day a joint investigation team was deployed that, in line with the plan, consisted of representatives from DLF, DCDC, the National Centre for Laboratory and Epidemiology, WHO, FAO, as well as field epidemiology trainees. Poultry flocks in affected farms were culled, and enhanced surveillance for human infection was carried out in the affected villages for two weeks. During this period, 10 ILI cases were identified, but after testing it was confirmed that none were positive for influenza. This was a multidisciplinary approach that controlled an outbreak, which had the potential to become far more dangerous.

Mongolia

POPULATION: **2,969,000**

TOTAL PIP FUNDS SPENT IN COUNTRY: **$1.2M**

NATIONAL INFLUENZA CENTRE: **YES**

New regional virology labs established

During the 2009 pandemic, the NIC in Mongolia was overwhelmed by 200 to 300 samples that were being received daily. To prevent overburdening the NIC in the future, PIP funds were used to strengthen local surveillance and detection capacities. Regional virology labs were established in four provinces, and staff were trained to identify new and emerging diseases. Now, with four fully operational laboratories, the network across the country can monitor circulating influenza viruses at a national and local level, while simultaneously reducing the workload of the NIC.

Coordinated pandemic preparedness and response with an updated legal framework

In 2015, the Mongolian MOH led a multisectoral assessment of surveillance and response. It was concluded that among sectors, there was no formal coordination mechanism for event and information sharing or risk assessment. The lack of a formalized procedure could prevent an efficient response. As a result, legal frameworks were substantially adjusted to align with the IHR (2005), including a new regulation to ensure information exchange between sectors, which should facilitate rapid response during a public health emergency. More specifically for influenza, EBS was expanded beyond the human health sector to include emergency management and veterinary sectors.
As a result, MOH decision-makers are now able to use multiple sources of data/information including clinical and laboratory data, wild bird surveillance findings, and information from the media to supplement data received from ILI and SARI sentinel sites. A dashboard was developed to provide real-time data on outbreaks and emergencies, and data are available for decision-making within two hours of event verification.

Disease detectives trained

Public health officers who have managed outbreak and emergency response know the time pressures involved. Large amounts of raw data arrive from different sources and are often unorganized. Supported by PIP, Mongolia's Field Epidemiology Training Program (MFETP) is helping national and provincial epidemiologists, laboratory staff, clinicians and researchers to learn new analytical skills and to apply innovative software in data analysis. In 2016, MFETP introduced its trainees to 'EpiInfo™7', which is a free software used worldwide for outbreak data management and analysis. In 2017, as part of their leadership training, a three-day workshop was held in Ulaanbaatar to help 16 public health practitioners to improve their skills in coordination, communication, and visualization. MFETP is an investment in future public health leaders, including those who will be at the forefront of preparedness and response for pandemic influenza.

"The capacity of sub-national virology laboratory staff has been strengthened significantly in the last 4 years. Practical refresher trainings for the provincial laboratory that were started with PIP funds have become a routine activity.

Human resource capacity is vital for pandemic preparedness – the capacity is not all about sophisticated equipment, you need the system and people to make changes."

Badarch Darmaa,
Head of NIC Mongolia, National Centre for Communicable Diseases, Mongolia

Viet Nam

POPULATION: **93,448,000**

TOTAL PIP FUNDS SPENT IN COUNTRY: **$1M**

NATIONAL INFLUENZA CENTRE: **YES**

Enhanced virus isolation

The greatest impact on pandemic preparedness in Viet Nam as a result of the PIP funds has been strengthening the laboratory system. While several capacities were improved, including specimen collection and transportation and implementation of modern diagnostic techniques, one of the most notable achievements was advanced virus characterization at NICs. Before 2014, there were challenges with identifying and subtyping influenza. Since then, several training sessions were held for laboratory staff to learn virus isolation, identification, and characterization skills. NICs have also increased their capacities for virus isolation and genome analysis for subtype identification, due to bioinformatics trainings. Viet Nam has since identified the country's first human case of A(H3N2)v, a type of swine influenza, in the north of the country. The impact of investments have been clear; at the National Institute of Hygiene and Epidemiology (NIHE), there was an increase in the rate of influenza isolation from 61% in 2014 to 77% in 2017.

SARI surveillance in border provinces established

With neighboring countries detecting cases of avian influenza, sentinel SARI surveillance sites were established in border provinces. PIP support has helped improve an extensive amount of health worker capacities, including: case identification; information sharing; data reporting; sample collection, storage, and transportation; laboratory testing; case investigation; and response. Staff can now appropriately respond to SARI cases, including suspected cases of avian influenza infection.

Clinical management training incorporated into higher education curricula

As a leading hospital in Viet Nam, the National Hospital for Tropical Disease (NHTD) was tasked to strengthen the clinical management practices for ARIs in the national network of hospitals from 2014 to 2017. With the support of PIP, NHTD worked with international leading experts on SARI clinical management to train 300 healthcare staff from almost all 63 provincial hospitals, as well as a few district hospitals across the country. The training curricula was certified by the MOH as continuing medical education, and it has now become an official function of NHTD to train hospitals in SARI case management. This process has embedded SARI clinical management in medical training, sustaining continued professional development of medical personnel in Viet Nam.

"What's next? We need to strengthen the capacity for district hospitals in responding to pandemic influenza, as they are the first line of defense. Training should also emphasize collaboration between clinical and public health spheres in reporting and responding to potential influenza outbreaks, and improving knowledge on infection prevention and control to stop outbreaks in healthcare settings."

Nguyen Van Kinh,
Deputy Director,
National Hospital for
Tropical Diseases, Viet Nam

Woman with acute respiratory disease symptoms. © WHO/Tom Pietrasik

What's Next?

There is no telling where the next pandemic influenza virus will emerge. All countries must be ready to respond when it does.

PIP supported developing countries to strengthen preparedness capacities in five key areas: laboratory and surveillance, burden of disease estimation, regulatory preparedness, planning for pandemic product deployment, and risk communications. By strengthening capacities, PIP contributed to pandemic influenza preparedness as well as global health security. Significant progress has been made, but more work is needed. This is why PIP will continue to support pandemic influenza preparedness globally.

"The requirements for preparedness are complicated. At a minimum, countries need a solid legal and regulatory foundation, adequately trained and equipped public health workforce, strong surveillance and response framework, functional national public health laboratories, and robust multi-sectoral coordination."[27]

International Working Group on Financing Preparedness

School children learning about influenza prevention, South Africa. © WHO/Isadore Brown

"HLIP I has made the PIP Framework's performance transparent, visible and measurable to Member States, industry, civil society and other partners. Lessons learnt from HLIP I in terms of achievements and gaps guided the development of HLIP II, which includes process measures to enable better monitoring of progress. It also synergizes with other programmes for strengthening preparedness and response to help countries achieve IHR 2005 core capacities."

Mahmudur Rahman,
Chair of the PIP Framework
Advisory Group (2017-2019)

Transitioning to HLIP II

A second High Level Implementation Plan (HLIP II) was developed to guide PIP investment priorities from 2018-2023.[28] Influenza surveillance systems, knowledge and capacities for a timely and appropriate response to pandemic influenza will continue to be established and strengthened. HLIP II will build on each of the five areas of work to fill some of the gaps that remain in global preparedness, and will introduce an additional area of work, Influenza Pandemic Preparedness Planning.[29]

Laboratory & surveillance

Support countries to improve their laboratory and surveillance system capacities, and to actively participate in GISRS.

Burden of disease

Develop national, regional and global influenza burden estimates, and focus on ensuring that they are communicated in an effective manner so that estimates are used by decision-makers.

Regulatory capacity building

Improve regulatory systems and processes that facilitate timely access to pandemic influenza products including antivirals, diagnostics and vaccines.

Risk communications and community engagement

Refine interventions to include social and behavioral science-based risk reduction strategies, while placing a direct focus on exercising capacities for seasonal influenza to improve preparedness for pandemic influenza.

Planning for deployment

Support the development and review of global and national plans for pandemic product deployment, and assist countries in developing and sustaining influenza vaccine procurement and production policies.

Influenza pandemic preparedness planning

A new area of work to support countries to further develop their pandemic influenza preparedness plans. Plans will link progress made under the other HLIP II Outputs.

Endnotes

1 International Working Group on Financing Preparedness. From Panic and Neglect to Investing in Health Security: Financing Pandemic Preparedness at a National Level. 2017 (http://documents.worldbank.org/curated/en/979591495652724770/pdf/115271-REVISED-FINAL-IWG-Report-3-5-18.pdf, accessed 24 August 2018).

2 Past Pandemics [website]. Centers for Disease Control and Prevention. 2017 (https://www.cdc.gov/flu/pandemic-resources/basics/past-pandemics.html, accessed 24 August 2018).

3 Implementation of the International Health Regulations (2005): Report of the Review Committee on the Functioning of the International Health Regulations (2005) in relation to Pandemic (H1N1) 2009. Report by the Director-General. Geneva: World Health Organization; 2011 (A64/10; http://apps.who.int/gb/ebwha/pdf_files/WHA64/A64_10-en.pdf, accessed 24 August 2018).

4 Chan, M. Address to the Executive Board at its 140th session. Geneva: World Health Organization; 2017 (http://www.who.int/dg/speeches/2017/140-executive-board/en/, accessed 24 August 2018).

5 See: Pandemic influenza preparedness framework for the sharing of influenza viruses and access to vaccines and other benefits, sections 6.14.1 and 6.14.2 (http://apps.who.int/iris/bitstream/handle/10665/44796/9789241503082_eng.pdf;jsessionid=B020FE13FC3994BA0CF53C2093774FC5?sequence=1, accessed 24 August 2018).

6 Pandemic Influenza Preparedness Framework Partnership Contribution Implementation Plan 2013 – 2016. Geneva: World Health Organization; 2015 (http://www.who.int/entity/influenza/pip/pip_pcimpplan_update_31jan2015.pdf?ua=1, accessed 24 August 2018).

7 See: Guiding Principles for use of PIP Partnership Contribution "Response" Funds. 23 October 2014 (http://www.who.int/influenza/pip/guiding_principles_pc_response_funds.pdf?ua=1, accessed 24 August 2018).

8 Communicating risk in public health emergencies: a WHO guideline for emergency risk communication (ERC) policy and practice. Geneva: World Health Organization; 2017. Licence: CC BY-NC-SA 3.0 IGO.

9 Berlin Declaration of the G20 Health Ministers: Together Today for a Healthy Tomorrow. Berlin: G20 Germany; 2017.

10 Participation and performance on EQAP reflects country level laboratory capacities. The results are reported in Output 1 (Detection) to highlight country level progress. The funding for EQAP was under Output 3 (Global Collaboration) as WHO headquarters administered the funding each year.

11 More information about SMTA2 can be found here: http://www.who.int/influenza/pip/smta2/en/.

12 Burden of Disease infographics are available at: http://www.who.int/influenza/surveillance_monitoring/bod/MeasuringBOD_Infographic.pdf?ua=1 and http://www.who.int/influenza/surveillance_monitoring/bod/WHO-INFLUENZA-MortalityEstimate.pdf?ua=1.

13 Iuliano AD, Roguski KM, Chang HH, Muscatello DJ, Palekar R, Tempia S et al. Estimates of global seasonal influenza-associated respiratory mortality: a modelling study. Lancet. 2018;391:1285-1300. doi: 10.1016/S0140-6736(17)33293-2.

14 Coleman BL, Fadel SA, Fitzpatrick T, Thomas SM. Risk factors for serious outcomes associated with influenza illness in high- versus low- and middle-income countries: Systematic literature review and meta-analysis. Influenza Other Respir Viruses. 2018;12:22-29. doi:10.1111/irv.12504.

15 Guidelines on regulatory preparedness for provision of marketing authorization of human pandemic influenza vaccines in non-vaccine-producing countries. WHO Expert Committee on Biological Standardization, Sixty-seventh report; WHO Technical Report Series No.1004, Annex 7. Geneva: World Health Organization; 2017 (http://apps.who.int/medicinedocs/documents/s23326en/s23326en.pdf, accessed 24 August 2018).

16 List of countries participating in WHO's CRP is available at: https://extranet.who.int/prequal/content/collaborative-registration-faster-registration.

17 A checklist for pandemic influenza risk and impact management: building capacity for pandemic response. Geneva: World Health Organization; 2018 (http://apps.who.int/iris/bitstream/handle/10665/259884/9789241513623-eng.pdf;jsessionid=2C4D6737B64718CD80B4F71AC69582D7?sequence=1, accessed 24 August 2018).

18 For more information on country prioritization see: www.who.int/influenza/pip/pip_pc_ga.pdf?ua=1 and www.who.int/influenza/pip/benefit_sharing/PCCountryPrioritizationCriteria.pdf?ua=1.

19 Of the 43 L&S priority countries, country specific reports were not prepared for four countries that received no or minimal PIP funds (Algeria, Burundi, South Africa and Ukraine). However, these countries reported against relevant indicators, which are presented throughout the report.

20 Integrated Diseases Surveillance and Response in the African Region Community-based Surveillance (CBS) Training Manual. Brazzaville: WHO Regional Office for Africa; 2015 (ISBN: 978-929023298; www.afro.who.int/sites/default/files/2017-06/community-based-surveillance_idsr_training-manual.pdf, accessed 24 August 2018).

21 Protocol for national influenza sentinel surveillance. Brazzaville: WHO Regional Office for Africa; 2015 (ISBN: 978- 929023288-9; www.afro.who.int/sites/default/files/2017-06/97892%2090232889.pdf, accessed 24 August 2018).

22 Protocol for the investigation of acute respiratory illness outbreaks of unknown etiology. Brazzaville: WHO Regional Office for Africa; 2016 (ISBN: 978-929023300-8; https://www.afro.who.int/sites/default/files/2017-06/protocol-for-the-investigation-of-acute-respiratory-illness-outbreaks-of....pdf, accessed 24 August 2018).

23 Malik MR, Ul Haq Z, Saeed Q, Riley R and Khan WM. Distressed setting and profound challenges: Pandemic influenza preparedness plans in the Eastern Mediterranean Region. Journal of Infection and Public Health, 11 (2018) 352–356 doi: 10.1016/j.jiph.2017.09.018.

24 Ibrahim E, Sirawan A, El-Bazzal B, El Hage J, Abi Said M, Zaraket H, Kandeil A, Ali MA, Kayali G. 2016. Complete genome sequence of the first H5N1 avian influenza virus isolated from chickens in Lebanon in 2016. Genome Announc 4(5):e01062-16.

25 Farah Z, Khatib O, Hamadeh S, Ahmad K, El-Bazzal B, Zalloua P, Ammar W, Ghosn N. 2018. Containment of Highly Pathogenic Avian Influenza A(H5N1) Virus, Lebanon, 2016. Emerging Infectious Diseases 24(2): 374-376. doi: 10.34201/eid2402.171276.

26 Hamid S, Bell L, Dueger E. Digital dashboards as tools for regional influenza monitoring. Western Pac Surveill Response J. 2017 August;8(3). Doi: 10.5365/wpsar.2017.8.2.003.

27 International Working Group on Financing Preparedness. From Panic and Neglect to Investing in Health Security: Financing Pandemic Preparedness at a National Level. 2017 (http://documents.worldbank.org/curated/en/979591495652724770/pdf/115271-REVISED-FINAL-IWG-Report-3-5-18.pdf, accessed 24 August 2018).

28 Partnership Contribution (PC) Preparedness High-Level Implementation Plan II 2018-2023. Geneva: World Health Organization; 2018 (WHO/WHE/IHM/PIP/2018.1). License: CC BYNC-SA 3.0 IGO.

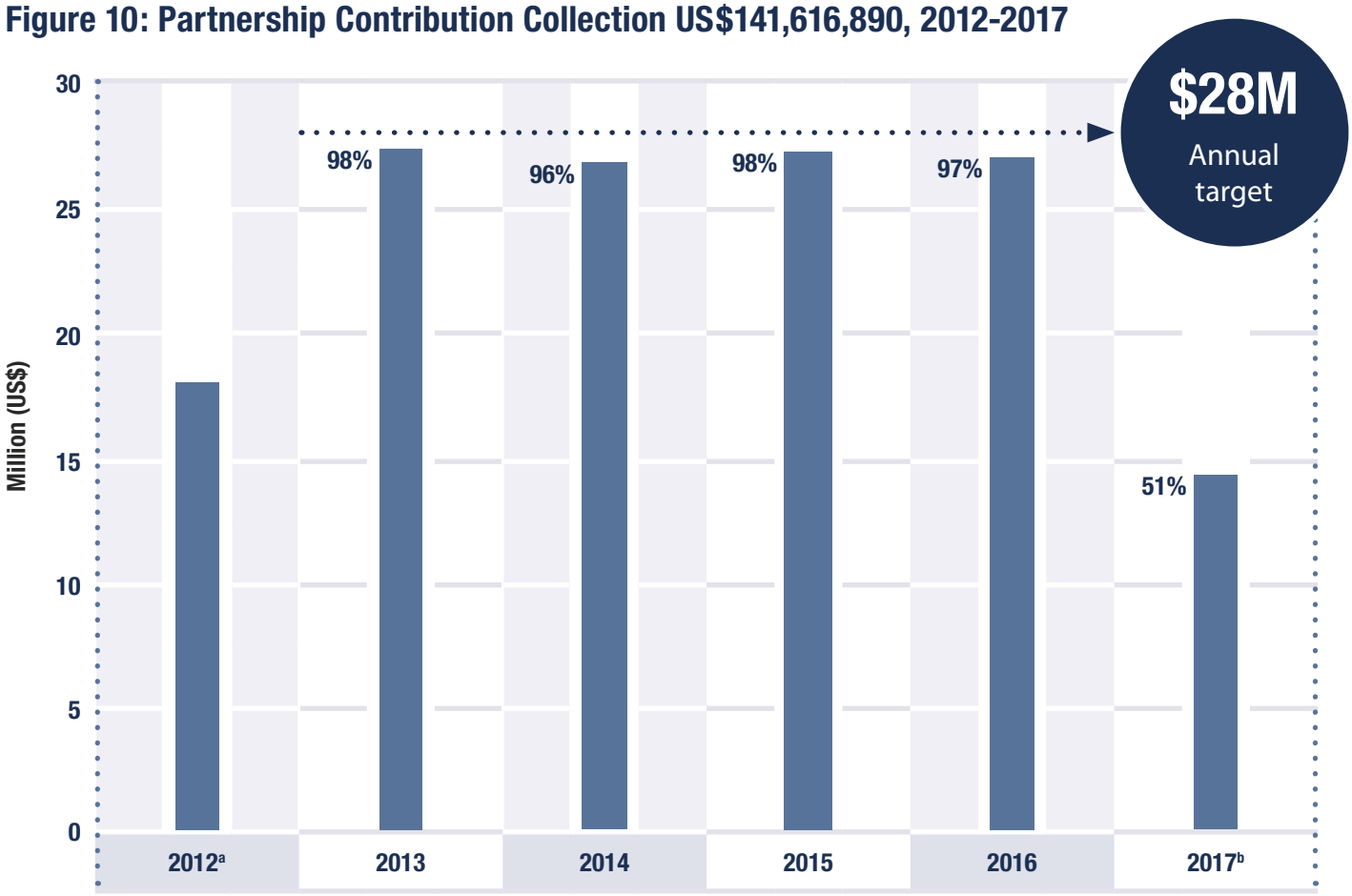
29 Pandemic Influenza Preparedness Framework Partnership Contribution Implementation Plan: Analysis of Gaps and Needs for the PIP PC Implementation. Geneva: World Health Organization; 2017 (http://www.who.int/entity/influenza/pip/benefit_sharing/PIP_GapAnalysis2017.pdf?ua=1, accessed 24 August 2018).

Appendices

Training in specimen collection from patients with severe acute respiratory infection in Armenia. © WHO/Kristine Avetisyan

Appendix A: Financial report

Figure 10: Partnership Contribution Collection US$141,616,890, 2012-2017



a Voluntary contribution made by seven manufactures prior to full implementation of the PC formula in 2013.

b Amount received through 31 December 2017. PC collection for 2017 is in process.

Table 3: Partnership Contribution received from each manufacturer, 2012-2017

Manufacturer	Total Revenue (US$)
Adimmune Corporation	65,543
Alere Inc.	117,159
Baxter International Inc.	209,205
Becton Dickinson and Company (BD)	311,432
Beijing Tiantan Biological Procucts Co, Ltd .	235,234
Cadila Healthcare Ltd. (R&D Center)	12,716
Cepheid	10,591
Changchun Institute of Biological Products Co., Ltd.	208,231
China National Biotec Group	20,000
CSL Limited	2,667,744
Denka Seiken Co., Ltd.	2,171,983
DiaSorin Molecular LLC	29,692
Fast Track Diagnostics	10,592
Fluart Innovative Vaccines LTD	233,772
Focus Diagnostics, Inc.	83,845
Glaxosmithkline (GSK)	35,511,253
Government Pharmaceutical Organization (GPO)	10,591
Green Cross Corporation	1,642,363
Hoffmann - La Roche and Co., Ltd.	33,335,432
Indevr, Inc.	7,439
Institute of Vaccines and Medical Biologicals (IVAC)	10,592
Kaketsuken	2,997,703
Kitasato Daiichi Sankyo Vaccine Co. Ltd .	1,642,403
Lanzhou Institute of Biological Products	2,173
Medicago Inc.	7,439
Medimmune	5,160,761
Nanosphere Inc.	10,322
NPO Petrovax Pharm	7,792
Novartis	15,292,741
Omninvest Vaccine Manufacturing, Researching & Trading Ltd.	149,442
Princeton Biomeditech Corporation	10,591
Protein Sciences Corporation	4,944
PT Bio Farma (Persero)	4,984
QIAGEN	61,512
Quidel Corporation	8,136
Response Biomedical Corporation	5,417
Research Foundation for Microbial Diseases of Osaka University	1,288,541
Saint-Petersburg Scientific Research Institute of Vaccines & Sera	86,816
Sanofi Pasteur	31,468,521
Serum Institute of India Ltd.	35,623
Seqirus	3,779,042
Shanghai Institute of Biological Products Co., Ltd.	482,969
Sinovac Biotech Ltd.	482,969
Takeda Pharmaceuticals Internatioanl GmbH	10,591
The Research Foundation for Microbial Disease of Osaka University	1,694,489
UMIN Pharm INC.	2,799
Vabiotech	12,761
Total Revenue	**141,616,890**

Table 4: Fund allocation and expenditure (US$) 1 January 2013 - 31 December 2017 (based on funds received 1 December 2012 – 31 December 2017)[a]

Area of work	Output	Total allocated 2013-2017	Total expenditure 2013-2017[b]	Expenditure 2013	Expenditure 2014-15	Expenditure 2016-17	Implementation (%)	Balance
Laboratory & surveillance	Detection capacity	15,915,313	14,875,150	-	6,010,781	8,864,369	-	1,040,163
	Monitoring capacity	12,072,005	10,128,011	-	4,552,791	5,575,220	-	1,943,994
	Strengthening networks	19,624,963	17,942,936	-	7,315,677	10,627,259	-	1,682,027
	Sub-total	**47,612,281**	**42,946,097**		**17,879,249**	**25,066,848**	**90%**	**4,666,184**
Burden of disease	Regionally representative estimates	1,702,827	1,012,912	-	609,710	403,202	-	689,915
	Global estimates	1,872,132	1,100,713	-	23,396	1,077,317	-	771,419
	Sub-total	**3,574,959**	**2,113,625**	**-**	**633,106**	**1,480,519**	**59%**	**1,461,334**
Regulatory capacity building	Guidelines	317,282	217,466	-	89,481	127,985	-	99,816
	Targeted training	3,803,408	2,916,739	-	1,003,531	1,913,208	-	886,669
	Common approach for accelerated approval	253,556	194,398	-	24,416	169,982	-	59,158
	Sub-total	**4,374,246**	**3,328,603**	**-**	**1,117,428**	**2,211,175**	**76%**	**1,045,643**
Risk communications	Training on risk communication	2,990,037	2,879,453	-	1,720,799	1,158,654	-	110,584
	Support to priority countries	3,048,923	2,249,099	-	1,066,349	1,182,750	-	799,824
	Emergency communications network	843,489	842,578	-	562,822	279,756	-	911
	Sub-total	**6,882,449**	**5,971,130**	**-**	**3,349,970**	**2,621,160**	**87%**	**911,319**
Planning for deployment	Deployment operations	2,468,777	1,887,245	-	473,687	1,413,558	-	581,532
	Country readiness	1,103,856	614,012	-	201,829	412,183	-	489,844
	Sub-total	**3,572,633**	**2,501,257**	**-**	**675,516**	**1,825,741**	**70%**	**1,071,376**
Total for Preparedness (net of PSC for 2014-2017)		**66,016,568**	**56,860,712**	-	**23,655,269**	**33,205,443**	**86%**	**9,155,856**
Unallocated funds for Preparedness[c]		12,937,971	-	-	-	-	-	12,937,971
PSC (13%) on Preparedness funds		10,264,090	7,391,893	-	3,075,185	4,316,708	-	2,872,197
Grand total for Preparedness (including PSC 13%, 2014-2017)		**89,218,629**	**64,252,605**	**-**	**26,730,454**	**37,522,151**	**84%[d]**	**24,966,024**
PIP Secretariat (net of PSC)		10,985,968	9,798,593	929,290	3,277,278	5,592,025	-	1,187,375
Unallocated funds for PIP Secretariat[c]		1,546,510	-	-	-	-	-	1,546,510
PSC (13%) on PIP Secretariat funds		1,629,222	1,273,817	120,808	426,046	726,963	-	355,405
Grand total for Secretariat (including PSC 13%, 2013-2017)		**14,161,700**	**11,072,410**	**1,050,098**	**3,703,324**	**6,318,988**	**88%[e]**	**3,089,290**
Response funds (including PSC 7%, 2012-2017)		**38,236,561**	**-**	**-**	**-**	**-**	**-**	**38,236,561**
Grand total for PIP		**141,616,890[f]**	**75,325,015**	**1,050,098**	**30,433,778**	**43,841,139**	**85%[g]**	**66,291,875[h]**

a Funds unallocated/not implemented as at 31 December 2017 will be carried over to the 2018-2019 biennium.

b Expenditure for the PIP Secretariat is for the period 2013-17 and for Preparedness 2014-17.

c Unallocated funds include Partnership Contribution received after allocations for implementation of 2017 work plans were made.

d Calculated on funds allocated only i.e. US$ 76,280,658 (US$ 89,218,629 minus unallocated funds US$ 12,937,971).

e Calculated on funds allocated only i.e. US$ 12,615,190 (US$ 14,161,700 minus unallocated funds US$ 1,546,510).

f Total Partnership Contribution received (1 December 2012 - 31 December 2017).

g Calculated on funds allocated for Preparedness and PIP Secretariat only i.e. US$ 88,895,848 [(US$ 89,218,629 - US$ 12,937,971) + (US$ 14,161,700 - US$ 1,546,510)].

h This number includes Response Funds (US$ 38,236,561) which will only be used at the time of a pandemic.

Table 5: Area of work annual expenditures (US$, net of PSC), 2014-2017

Area of work	Output	Expenditure 2014	Expenditure 2015	Expenditure 2016	Expenditure 2017	Total expenditure 2014-17
Laboratory & surveillance	Detection capacity	1,341,714	4,669,067	4,282,318	4,582,051	14,875,150
	Monitoring capacity	1,067,486	3,485,305	1,808,721	3,766,499	10,128,011
	Strengthening networks	1,940,738	5,374,939	5,029,411	5,597,848	17,942,936
	Sub-total	**4,349,938**	**13,529,311**	**11,120,450**	**13,946,398**	**42,946,097**
Burden of disease	Regionally representative estimates	94,254	515,456	289,316	113,886	1,012,912
	Global estimates	-	23,396	436,200	641,117	1,100,713
	Sub-total	**94,254**	**538,852**	**725,516**	**755,003**	**2,113,625**
Regulatory capacity building	Guidelines	29,210	60,271	127,206	779	217,466
	Targeted training	74,779	928,752	1,033,555	879,653	2,916,739
	Common approach for accelerated approval	-	24,416	19,982	150,000	194,398
	Sub-total	**103,989**	**1,013,439**	**1,180,743**	**1,030,432**	**3,328,603**
Risk communications	Training on risk communication	459,913	1,260,886	557,485	601,169	2,879,453
	Support to priority countries	143,549	922,800	460,209	722,541	2,249,099
	Emergency communications network	209,807	353,015	61,482	218,274	842,578
	Sub-total	**813,269**	**2,536,701**	**1,079,176**	**1,541,984**	**5,971,130**
Planning for deployment	Deployment operations	-	473,687	844,778	568,780	1,887,245
	Country readiness	48,861	152,968	148,180	264,003	614,012
	Sub-total	**48,861**	**626,655**	**992,958**	**832,783**	**2,501,257**
Total for Preparedness		**5,410,311**	**18,244,958**	**15,098,843**	**18,106,600**	**56,860,712**

Figure 11: Expenditures across each area of work by biennium (US$, net of PSC), 2014-2017

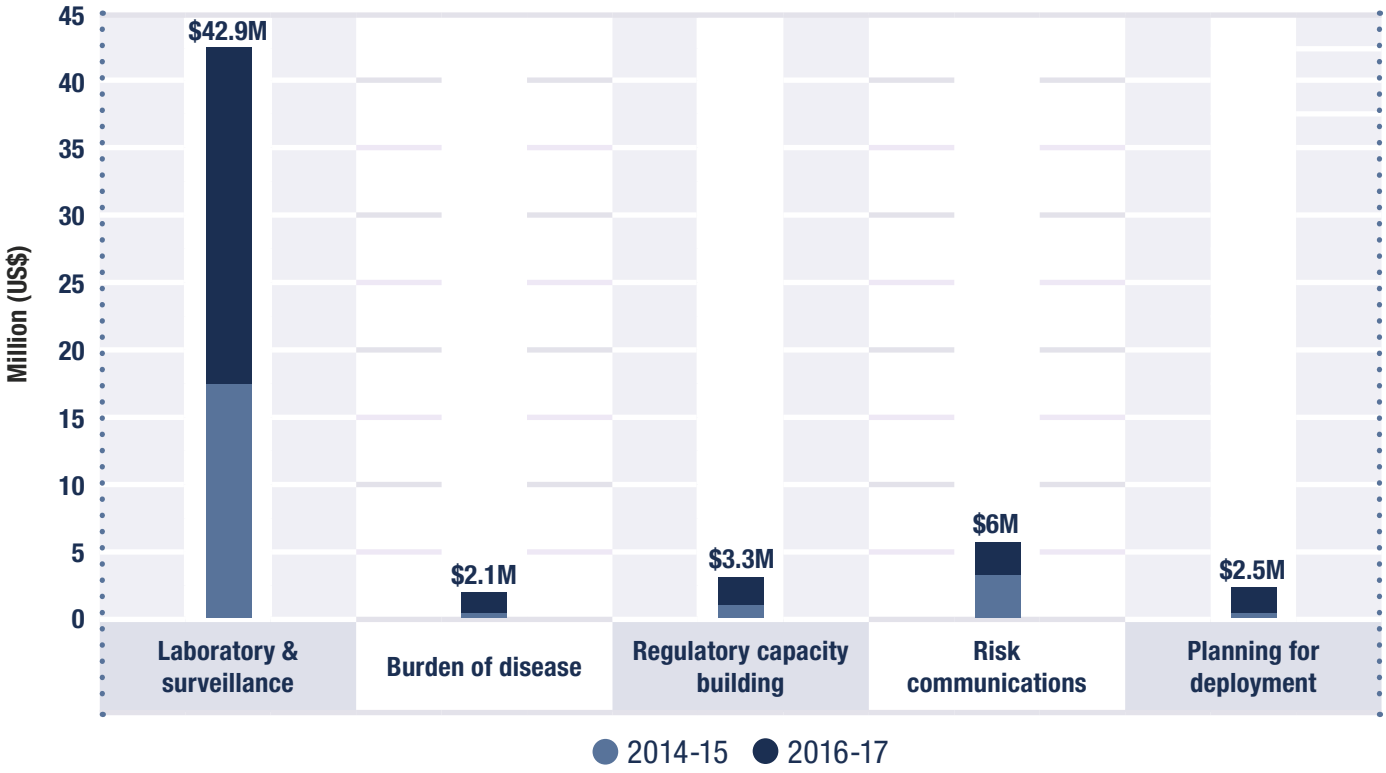
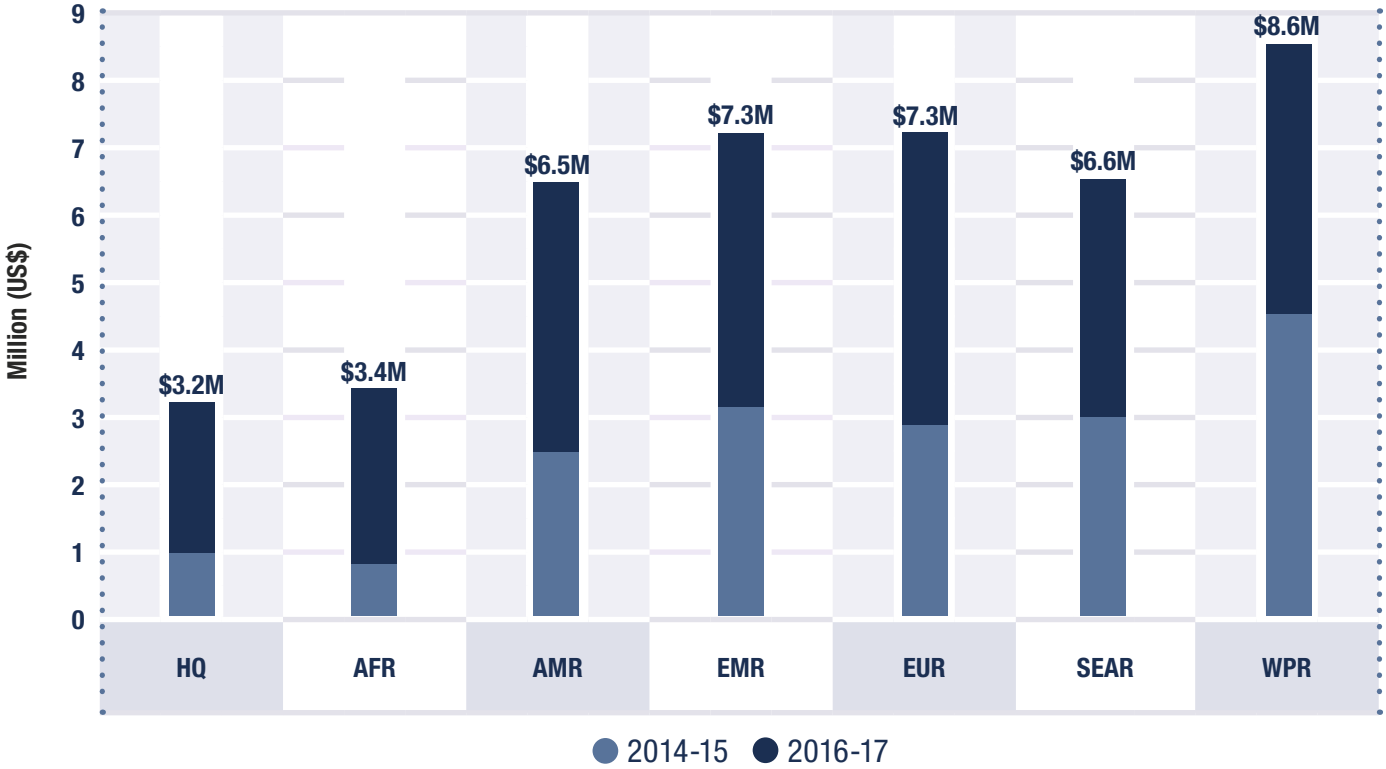


Figure 12: Lab and surveillance expenditures by major office (US$, net of PSC), 2014-2017



World Health Organization

Pandemic Influenza Preparedness (PIP) – Secretariat, Preparedness and Response
Interim Financial Statement as at 31 December 2015
(expressed in US dollars)

	Secretariat (10%)	Response (30%)	Preparedness (70%)	Total
Revenue				
Receipts from:				
Adimmune Corporation	6,554	17,697	41,292	65,543
Alerre Inc.	7,809	21,083	49,196	78,088
Baxter International Inc.	20,921	56,485	131,799	209,205
Beijing Tiantan Biological Procucts Co. Ltd.	14,952	40,370	94,196	149,518
Cadila Healthcare Ltd. (R&D Center)	492	1,330	3,102	4,924
Cepheid	280	756	1,763	2,799
Changchun Institute of Biological Products Co., Ltd.	14,952	40,370	94,196	149,518
China National Biotec Group	2,000	5,400	12,600	20,000
CSL Limted	174,434	470,974	1,098,940	1,744,348
Denka Seiken Co. Ltd.	129,577	349,859	816,338	1,295,774
Focus Diagnostics, Inc.	8,385	22,639	52,821	83,845
Glaxosmithkline (GSK)	2,417,209	6,526,465	15,228,419	24,172,093
Government Pharmaceutical Organization (GPO)	281	756	1,763	2,800
Green Cross Corporation	102,386	276,443	645,034	1,023,863
Hoffmann - La Roche and Co. Ltd.	1,496,464	4,040,454	9,427,727	14,964,645
Indevr, Inc.	499	1,346	3,139	4,984
Institute of Vaccines and Medical Biologicals (IVAC)	280	756	1,763	2,799
Kaketsuken	190,555	514,498	1,200,497	1,905,550
Kitasato Daiichi Sankyo Vaccine Co. Ltd.	70,731	190,974	445,605	707,310
Lanzhou Institute of Biological Products	217	587	1,369	2,173
Medicago Inc.	498	1,346	3,139	4,983
Medimmune	249,198	672,831	1,569,937	2,491,966
Nanosphere Inc.	499	1,346	3,140	4,985
Novartis	1,529,273	4,129,040	9,634,428	15,292,741
Omninvest Vaccine Manufacturing, Researching & Trading Ltd.	14,943	40,350	94,149	149,442
Princeton Biomeditech Corporation	280	756	1,763	2,799
Protein Sciences Corporation	495	1,334	3,115	4,944
PT Bio Farma (Persero)	499	1,346	3,139	4,984
QIAGEN	280	756	1,763	2,799
Quidel Corporation	281	756	1,763	2,800
Response Biomedical Corporation	542	1,463	3,412	5,417
Saint-Petersburg Scientific Research Institute of Vaccines & Sera	3,079	8,314	19,398	30,791
Sanofi Pasteur	1,705,703	4,605,398	10,745,928	17,057,029
Serum Institute of India Ltd.	2,784	7,515	17,533	27,832
Shanghai Institute of Biological Products Co., Ltd.	24,920	67,283	156,994	249,197
Sinovac Biotech Ltd.	24,920	67,283	156,994	249,197
Takeda Pharmaceuticals Internatioanl GmbH	545	1,468	3,425	5,438
The Research Foundation for Microbial Disease of Osaka University	169,449	457,512	1,067,528	1,694,489
UMIN Pharm INC.	280	756	1,763	2,799
United States - Becton Dickinson and Company (BD)	28,143	75,987	177,302	281,432
Vabiotech	497	1,342	3,130	4,969
Total Revenue	8,416,088	22,723,424	53,021,302	84,160,814
Expenditure				
2012-2013	1,050,098			1,050,098
2014-2015	3,703,324	-	26,730,454	30,433,778
Total Expenditure	4,753,422	-	26,730,454	31,483,876
Balance as at 31 December 2015	**3,662,666**	**22,723,424**	**26,290,848**	**52,676,938**

I certify that the above statement reflects correctly the revenue and expenditure recorded in the WHO Global Accounting System.

Jane Stewart
Director Accounts
14 February 2018

WORLD HEALTH ORGANIZATION DIRECTOR ACCOUNTS ORGANISATION MONDIALE DE LA SANTÉ

AN - 60478, 61722 and 60856 - 31.12.2015 consolidated ICFS

Statement of Financial Performance-by Donor/Award Entity : 'WHO' , From date : '01-DEC-2012 , To date : '31-DEC-2013' , Award Number : 60478

Sum of Expense	
Expense Type	**Total (USD)**
Staff Costs	806,106
Contractual Service, General	54,904
Travel	64,670
General Operating Costs	3,610
Programme support costs (PSC)	120,808
Total	**1,050,098**

Statement of Financial Performance-by Donor/Award Entity : 'WHO' , From date : '01-JAN-2014 , To date : '31-DEC-2015' , Award Number : 60478

Sum of Expense	
Expense Type	**Total (USD)**
Staff Costs	2,031,186
Equipment, Vehicles and Furniture	21,133
Contractual Services	648,513
Travel	505,648
General Operating Costs	70,797
Programme support costs (PSC)	426,046
Total	**3,703,324**

Statement of Financial Performance-by Donor/Award Entity : 'WHO' , From date : '01-JAN-2014' , To date : '31-DEC-2015' , Award Number : 61722

Sum of Expense	
Expense Type	**Total (USD)**
Staff Costs	5,441,263
Medical Supplies and Materials	2,259,740
Equipment, Vehicles and Furniture	414,378
Contractual Services	7,960,953
Travel	4,177,045
Transfers and Grants	2,755,967
General Operating Costs	645,924
Programme support costs (PSC)	3,075,185
Total	**26,730,454**

World Health Organization

Pandemic Influenza Preparedness (PIP) – Secretariat, Preparedness and Response

Interim Financial Statement as at 31 December 2017

(expressed in US dollars)

	Secretariat - 10%	Response - 30%	Preparedness - 70%	Total
Opening Balance - 1 January 2016	3,662,666	22,723,424	26,290,848	52,676,938
Revenue				
Receipts from:				
Alere Inc	3,907	10,549	24,615	39,071
Becton Dickinson and Company (BD)	3,000	8,100	18,900	30,000
Beijing Tiantan Biological Products Co.Ltd	8,572	23,144	54,000	85,716
Cadila Healthcare Ltd (R&D Center)	780	2,103	4,909	7,792
Cepheid	780	2,103	4,909	7,792
Changchun Institute Of Biological Products Co., Ltd	5,871	15,853	36,989	58,713
CSL Limited	92,341	249,317	581,739	923,397
Denka Seiken Co. ltd.	87,622	236,576	552,011	876,209
DiaSorin Molecular LLC	2,969	8,017	18,706	29,692
Fast Track Diagnostics	1,060	2,860	6,672	10,592
Fluart Innovative Vaccines LTD	23,378	63,118	147,276	233,772
GlaxoSmithKline (GSK)	1,133,916	3,061,573	7,143,671	11,339,160
Government Pharmaceutical Organization (GPO)	778	2,104	4,909	7,791
Green Cross Corporation	61,850	166,995	389,655	618,500
Hoffmann-La Roche and Co Ltd	1,837,079	4,960,112	11,573,596	18,370,787
Indevr, Inc.	246	662	1,547	2,455
Institute Of Vaccines And Medical Biologicals (IVAC)	779	2,104	4,909	7,792
Kaketsuken	109,215	294,882	688,056	1,092,153
Kitasato Daiichi Sankyo Vaccine Co. ltd.	93,509	252,475	589,109	935,093
Medicago Inc	247	662	1,547	2,456
Medimmune	266,880	720,575	1,681,340	2,668,795
Nanotherapeutics Inc	534	1,441	3,362	5,337
NPO Petrovax Pharm	780	2,103	4,909	7,792
Princeton Biomeditech Corporation	780	2,103	4,909	7,792
Qiagen	5,871	15,853	36,989	58,713
Quidel Corporation	533	1,441	3,362	5,336
Research Foundation for Microbial Diseases of Osaka University	128,854	347,906	811,781	1,288,541
Saint Petersburg Scientific Research Institute of Vaccines and Sera	5,602	15,127	35,296	56,025
Sanofi Pasteur	1,441,149	3,891,102	9,079,241	14,411,492
Seqirus	377,904	1,020,341	2,380,797	3,779,042
Serum Institute of India Ltd.	779	2,103	4,909	7,791
Shanghai Institute Of Biological Products Co., Ltd.	23,378	63,118	147,276	233,772
Sinovac Biotech Ltd	23,378	63,118	147,276	233,772
Takeda Pharmaceuticals International GmbH	514	1,392	3,247	5,153
Vabiotech	779	2,104	4,909	7,792
Total Revenue	5,745,612	15,513,137	36,197,327	57,456,076
Expenditure				
2016-2017	6,318,988	-	37,522,151	43,841,139
Balance as at 31 December 2017	**3,089,290**	**38,236,561**	**24,966,024**	**66,291,875**

I certify that the above statement reflects correctly the revenue and expenditure recorded in the WHO Global Accounting System.

Jane Stewart
Director Accounts

21 May 2018

WORLD HEALTH ORGANIZATION DIRECTOR ACCOUNTS ORGANISATION MONDIALE DE LA SANTÉ

AN – 60478, 61722 and 60856 – 31.12.2017 – Interim.doc

Statement of Financial Performance-by Donor/Award Entity : 'WHO' , From date : '01-JAN-2016 , To date : '31-DEC-2017' , Award Number : '60478'

Sum of Expense	
Expense Type	**Total (USD)**
Staff Costs	4,281,338
Medical Supplies and Materials	4,738
Equipment, Vehicles and Furniture	14,409
Contractual Services	674,770
Travel	546,085
General Operating Costs	70,685
Programme Support Costs (PSC)	726,963
Total	**6,318,988**

Statement of Financial Performance-by Donor/Award Entity : 'WHO' , From date : '01-JAN-2016' , To date : '31-DEC-2017' , Award Number : '61722'

Sum of Expense	
Expense Type	**Total (USD)**
Staff Costs	8,340,338
Medical Supplies and Materials	2,560,822
Equipment, Vehicles and Furniture	429,441
Contractual Services	10,989,566
Travel	5,129,003
Transfers and Grants	4,108,036
General Operating Costs	1,648,237
Programme Support Costs (PSC)	4,316,708
Total	**37,522,151**

Appendix B: Target countries by area of work

Table 6: Laboratory & surveillance: 43 PIP priority countries

Area of work :	Country		
Laboratory & surveillance	Afghanistan	Egypt	Nicaragua
	Algeria	Fiji	Sierra Leone
	Armenia	Ghana	South Africa
	Bolivia (Plurinational State of)	Haiti	Suriname
	Bangladesh	Indonesia	Tajikistan
	Burundi	Jordan	Timor-Leste
	Cambodia	Kyrgyzstan	Turkmenistan
	Cameroon	Lao People's Democratic Republic	Ukraine
	Chile	Lebanon	United Republic of Tanzania
	Congo	Madagascar	Uzbekistan
	Costa Rica	Mongolia	Viet Nam
	Democratic People's Republic of Korea	Morocco	Yemen
	Djibouti	Mozambique	Zambia
	Dominican Republic	Myanmar	
	Ecuador	Nepal	

Table 7: Burden of disease: 19 PIP priority countries[a]

Area of work :	Country		
Burden of disease	Albania	Georgia	Oman
	Armenia	Indonesia	Republic of Moldova
	Cambodia	Kyrgyzstan	Senegal
	Chile	Lao People's Democratic Republic	Serbia
	Costa Rica	Madagascar	Ukraine
	Croatia	Mongolia	
	Egypt	Nepal	

a After the baseline was set in 2013, five new PIP target countries were added to receive PC support for BoD estimation

Table 8: Regulatory capacity building: 16 PIP priority countries

Area of work	Country		
Regulatory capacity building	Armenia	Ghana	Sri Lanka
	Bolivia (Plurinational State of)	Haiti	Sudan
	Cambodia	Kenya	Uganda
	Democratic Republic of the Congo	Lao People's Democratic Republic	United Republic of Tanzania
	Ethiopia	Nepal	
	Georgia	Pakistan	

Table 9: Risk communications: 38 PIP priority countries

Area of work	Country		
Risk communications	Afghanistan	Kazakhstan	Saint Vincent and the Grenadines
	Bangladesh	Kenya	Senegal
	Barbados	Lao People's Democratic Republic	Seychelles
	Bhutan	Lebanon	Sudan
	Burkina Faso	Mauritania	Suriname
	Cambodia	Mexico	Timor-Leste
	Dominica	Mongolia	Turkey
	Ecuador	Mozambique	Ukraine
	Egypt	Nepal	Uzbekistan
	Fiji	Pakistan	Viet Nam
	Gabon	Panama	Yemen
	Honduras	Republic of Moldova	Zimbabwe
	Indonesia	Saint Lucia	

Table 10: Planning for deployment: 16 PIP priority countries

Area of work	Country		
Planning for deployment	Armenia	Ghana	Sri Lanka
	Bolivia (Plurinational State of)	Haiti	Sudan
	Cambodia	Kenya	Uganda
	Democratic Republic of the Congo	Lao People's Democratic Republic	United Republic of Tanzania
	Ethiopia	Nepal	
	Georgia	Pakistan	

Appendix C: Output indicator results by area of work

Table 11: Laboratory & surveillance

Outcome: Capacity to detect and monitor influenza epidemics is strengthened in developing countries that have weak or no capacity

Target: At least 35 developing countries will have the capacity to detect and/or monitor influenza outbreaks and to participate in regional and global networks for the sharing of information and viruses

HLIP I - Laboratory & surveillance indicators		Baseline (2014)	Results (2015)	Results (2016)	Results (2017)	Target
Output 1: National capacities to detect respiratory disease outbreaks due to novel virus is strengthened - 43 PIP priority countries						
Indicator 01.1	Number of countries with an established and functioning event based surveillance system	7	12	27	35	43
Output 2: National capacities to monitor trends in circulating viruses is strengthened - 43 PIP priority countries						
Indicator 02.1	Number of countries able to consistently[a] report and analyse virological data[b]	26	29	34	36	35
Indicator 02.2	Number of countries able to consistently[a] report and analyse epidemiological data[c]	5	11	19	24	17
Output 3: Global collaboration through the sharing of information and viruses, is strengthened and the quality of the system is improved (PCR detection quality assurance) - Globally						
Indicator 03.1	Number of countries that participated in EQAP and scored 100%[d]	109	103	117	114	120
Indicator 03.2	Number of countries sharing virus with WHO Collaborating Centres, H5 Reference laboratories and Essential Regulatory Laboratories at least once a year in the past two years (1 January 2016 to 31 December 2017)[e]	90	127	127	132	108
Indicator 03.3	Number of countries that consistently[a] reported epidemiological data to regional or global platforms[c]	55	66	75	91	71
Indicator 03.4	Number of countries that consistently[a] reported virological data to a global platform[b]	108	106	125	130	124

a Consistently means that country reported at least 60% of the weeks during the influenza season.

b Data source: FluNet http://www.who.int/influenza/resources/charts/en

c Data source: FluID http://www.who.int/influenza/resources/charts/en

d Data source: External Quality Assessment Project (EQAP)

e Data source: Vaccine Composition Meetings and Shipping Fund Project. This result does not include areas and territories.

Table 12. Burden of disease

Outcome: National policy makers will have influenza disease burden data needed for informed decision-making and prioritization of health resources

Target: All 6 WHO regions develop regional representative burden of disease data to guide developing countries' policy making

HLIP I - Burden of disease indicators		Baseline (2014)	Results (2015)	Results (2016)	Results (2017)	Target
Output 1: Derive regionally representative influenza disease burden estimates from selected countries						
Indicator 01.1	Number of PIP priority countries with published burden of disease estimates	0	2	2	3[a]	19
Output 2: Develop a global estimate of influenza disease burden derived from national estimates						
Indicator 02.1	Global estimate of influenza disease burden derived from national estimates published	0	0	0	1[b]	1

a In total, eight PIP priority countries estimated influenza disease burden but only three were published in 2014-2017 (Costa Rica, Egypt and Senegal). The remainder are in the publication process (Albania, Cambodia, Chile, Indonesia and Madagascar). An additional 33 countries estimated influenza disease burden and shared information with WHO.

b Estimate of influenza deaths due to respiratory disease.

Table 13: Regulatory capacity building

Outcome: Countries with weak or no regulatory capacity will be able to regulate influenza products including vaccines, antivirals and diagnostics, and to accelerate national approval of these commodities in case of an influenza pandemic

Target: At least 16 countries will have improved their regulatory capacity to oversee influenza products including vaccines, antivirals and diagnostics, and to accelerate national approval registration of these commodities in case of an influenza pandemic

HLIP I - Regulatory capacity building indicators		Baseline (2014)	Results (2015)	Results (2016)	Results (2017)	Target
Output 1: Develop guidelines on regulatory preparedness for non-vaccine producing countries that enables them to expedite approval of influenza vaccines used in national immunization programs and/or deployed by United Nations agencies in response to a pandemic emergency						
Indicator 01.1	Regulatory preparedness guidelines endorsed by the WHO Expert Committee on Biologicals Standardization (ECBS)	0	0	1	1[a]	1
Output 2: NRA capacity to regulate influenza products including vaccines, antivirals and diagnostics is strengthened						
Indicator 02.1	Number of countries which developed regulatory capacity to oversee influenza products including vaccines, antivirals and diagnostics in case of a pandemic as per the WHO NRA assessment and IDP elaboration and implementation	0	1	1	1[b]	16
Output 3: Regulatory processes to accelerate approval of influenza vaccines, antivirals and diagnostics during a public health emergency are incorporated into deployment plans for pandemic influenza products						
Indicator 03.1	Number of countries with a common approach for accelerated regulatory approval of influenza products in a public health emergency (WHO Collaborative Registration Procedure)	0	14	14	19[c]	48

a The Guidelines on regulatory preparedness for provision of marketing authorization of human pandemic influenza vaccines in non-vaccine-producing countries were endorsed by WHO ECBS in October 2016.

b Of the 16 PIP priority countries, one country has acceptable capacity in the three areas of assessment specified for this indicator: regulatory systems, marketing authorization and pharmacovigilance. For 14 other PIP priority countries, Institutional Development Plans (IDP) were developed and continue to be implemented noting that enhancing regulatory capacity is a long-term investment.

c All 48 targeted countries have a regulatory approach to facilitate the timely approval of pandemic influenza products during an emergency. Of the 48, 19 selected the WHO Collaborative Registration Procedure specified in this indicator. https://extranet.who.int/prequal/content/collaborative-registration-faster-registration.

Table 14: Risk communications

Outcome: Global risk communications capacities are strengthened with a special focus on pandemic influenza communications

Target: The number of countries that self-report at least 50% of the IHR risk communications milestones increases from 100 to 120 countries

HLIP I - Risk communications indicators		Baseline (2014)	Results (2015)	Results (2016)	Results (2017)	Target
Output 1: Access to risk communications training and platforms is increased enabling all countries to respond more effectively to a potential influenza pandemic or other Public Health Emergencies of International Concern (PHEIC)						
Indicator 01.1	Tools and web-based risk communications training material accessible to Member States in all language versions and Portuguese	0	0	194	194	194
Indicator 01.2	Number of registered users of online material on IHR/ OpenWHO platform	0	513	858	8,720	500
Indicator 01.3	Number of trainings completed on risk communications IHR/OpenWHO platform	0	96	161	3,667	200
Output 2: Risk communications capacity is established in priority countries with little or no capacity						
Indicator 02.1	Targeted Member States will have benefited from IHR risk communications capacity strengthening	0	17	24	31	30
Output 3: Global Emergency Communications Network (ECN) operationalized to provide support to countries before, during and after public health emergencies						
Indicator 03.1	Proportion of requests for risk communications surge support responded to within 72 hours by WHO	0	100%	100%	100%	80%

Table 15: Planning for deployment

Outcome: Plans for deployment of pandemic supplies including vaccines, antivirals and diagnostics, will be developed and regularly updated

Target: National plans for 16 countries are developed and updated through simulation exercises every 2 years

HLIP I - Planning for deployment indicators		Baseline (2014)	Results (2015)	Results (2016)	Results (2017)	Target
Output 1: A common approach to manage deployment operations is developed and shared with stakeholders and deployment partners						
Indicator 01.1	A common deployment approach is developed with multiple deployment stakeholder endorsement	0	0	0	1	1
Indicator 01.2	Number of trainings and simulation exercises with deployment stakeholders	0	0	0	15[a]	8
Output 2: Country deployment readiness systems are simplified and updated						
Indicator 02.1	Model country recipient agreement is revised and updated	0	0	1	1	1
Indicator 02.1	Number of countries and partners accessing web-based planning tools	0	0	0	14[b]	16

a Fourteen entities were trained (Afghanistan, Bermuda, Ghana, Jamaica, Jordan, Indonesia, Myanmar, Nigeria, Tanzania, two manufacturers, two civil society partners, one donor agency) and one simulation exercise was conducted.

b Fourteen deployment stakeholders accessed web-based planning tools (10 countries, two civil society partners, one freight company and one donor agency).

Appendix D: Laboratory & surveillance capacity indicator results

All PIP priority countries

Figure 13: Output 1 - Detection capacity

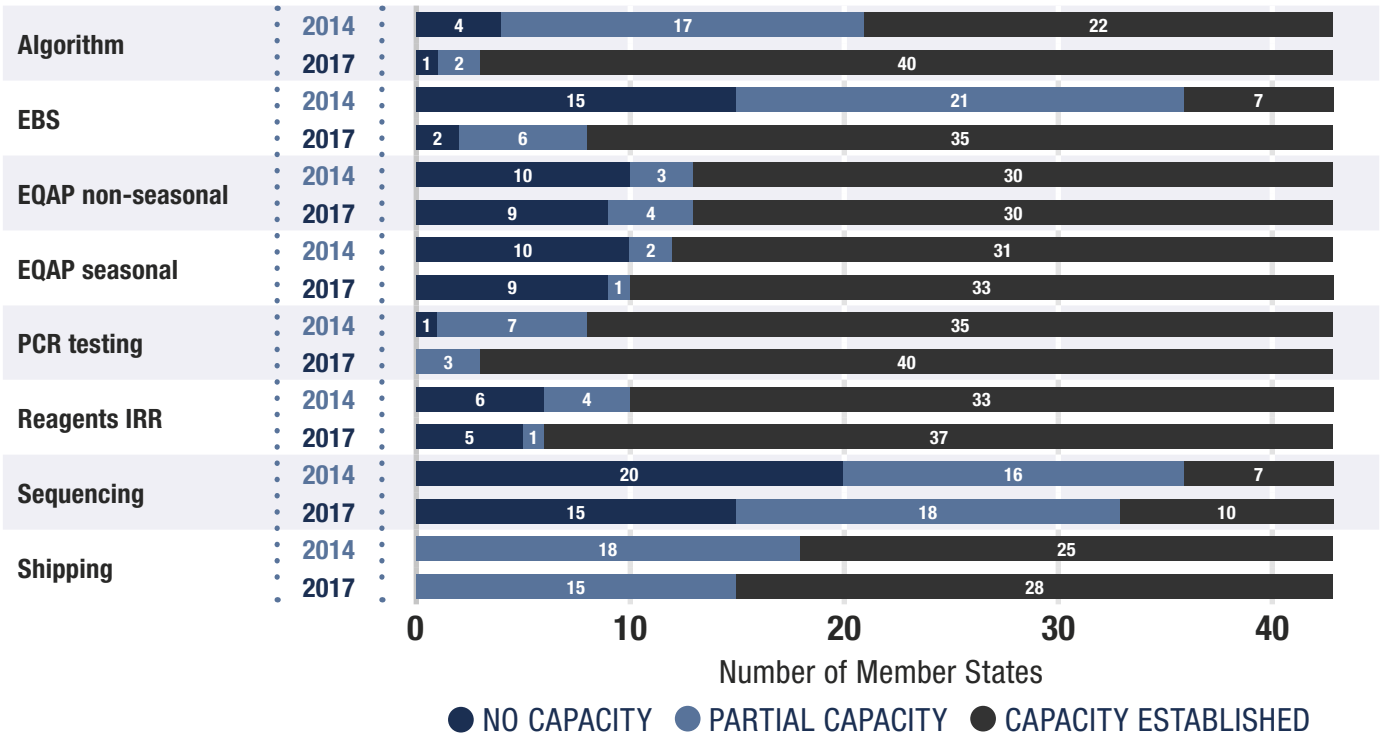


Figure 14: Output 2 - Monitoring capacity

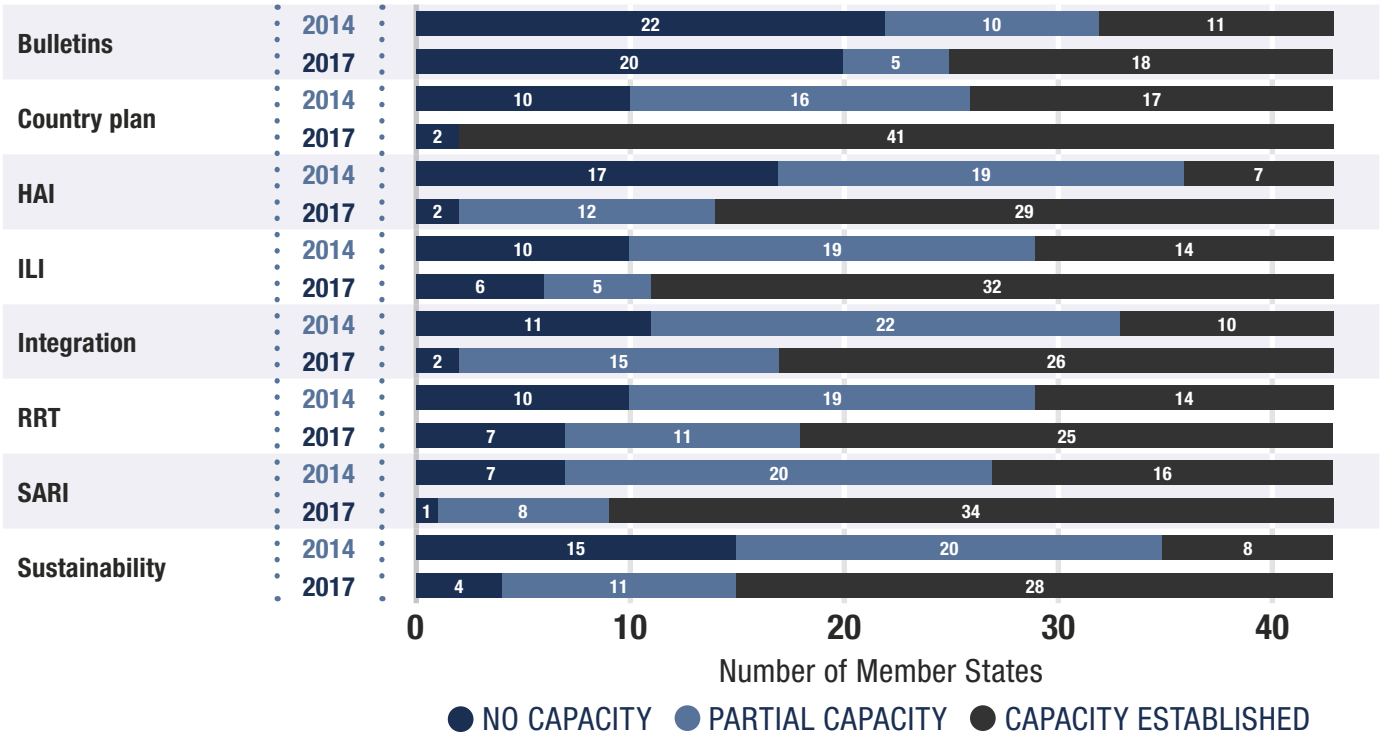
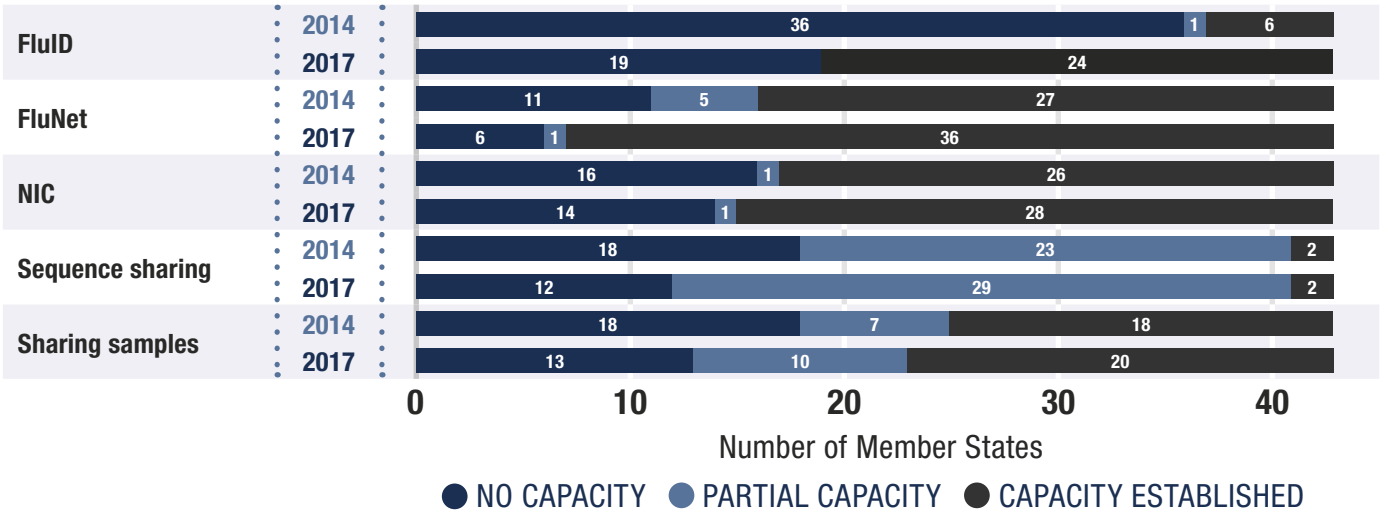


Figure 15: Output 3 - Sharing capacity & strengthening networks



Appendix E: Definitions for the laboratory & surveillance capacity indicators

Capacity indicator	Reporting party	Indicator rationale	No capacity	Partial capacity	Capacity established
Output 1: Detection capacity					
Algorithm for laboratory detection of unusual influenza viruses	RO/CO	This indicator measures laboratory preparedness for detection of influenza viruses with pandemic potential.	No laboratory algorithm established.	Informal laboratory guidance or algorithm existing, but not formally documented and/or not strictly put in use.	Algorithm established, formally documented and strictly put in use.
National "Early Warning" systems or EBS	RO/CO	This indicator measures the status of a national system to identify unusual or unexpected illness events. These systems are often called Event Based Surveillance (EBS) or "early warning" systems and use multiple sources of official and unofficial reports, including media reports.	No national Early Warning System such as EBS.	Planning to establish a national Early Warning System, e.g. relevant definitions, protocols, procedures and targeted training materials etc. under development.	Functional national Early Warning System with relevant definitions, protocols and procedures etc. in place.
PCR testing	RO/CO	This indicator measures the country's status with regards to the ability to perform influenza PCR testing.	No influenza PCR testing ability.	Potential influenza PCR testing ability, e.g. having PCR machine and reagents, but no evidence of functioning.	Influenza PCR testing actively being performed with evidence of reporting.
PCR quality for non-seasonal influenza viruses	HQ	This indicator measures the quality of the PCR testing to detect non-seasonal influenza viruses with pandemic potential based on the performance in the last panel of the WHO Influenza PCR EQAP.	No laboratory participated in the last WHO Influenza PCR EQAP.	At least one national laboratory participated but none achieved a 100% score on non-seasonal viruses in the last WHO influenza PCR EQAP.	At least one national laboratory participated and achieved a score of 100% on non-seasonal viruses in the last WHO influenza PCR EQAP.
PCR quality for seasonal influenza viruses	HQ	This indicator measures the quality of the PCR testing to detect seasonal circulating viruses based on the performance in the last panel of the WHO Influenza PCR EQAP.	No laboratory participated in the last WHO Influenza PCR EQAP.	At least one national laboratory participated but none achieved a 100% score on seasonal viruses in the last WHO influenza PCR EQAP.	At least one national laboratory participated and achieved a score of 100% on seasonal viruses in the last WHO influenza PCR EQAP.
Registration in IRR or receiving kits from WHO CCs	HQ	This indicator measures a country's access to reagents through registration in the IRR or by agreement with a WHO CC, or through using WHO CC established SOPs with in-country capacity to synthesize/order/import primers etc.	Not registered in IRR, and no agreement with WHO CCs, and no other sources available for primers and other reagents.	Registered in IRR or agreement with WHO CCs but no reagents received in the past 18 months, and no other sources available for primers and other reagents in the past 18 months.	Registered user of IRR or agreement with WHO CCs with reagents received in the past 18 months; or reagents received from other sources in the past 18 months.
Sequencing	RO/CO	This indicator measures sequencing capabilities for influenza viruses.	No equipment and no sequencing capacity available.	Sequencing equipment and potential capacity available, but not functioning in the past 12 months.	Influenza virus genes sequenced in the past 12 months.
Shipping capacity	HQ	This indicator measures a country's ability to ship influenza clinical specimens/virus isolates with pandemic potential out of the country to a GISRS-associated WHO CC with appropriate ISST (Infectious Substance Shippers Training) and export permit for such materials.	No ISST in the past 2 years and no valid export permit.	ISST received in the past 2 years or valid export permit in place, but not both.	ISST received in the past 2 years and valid export permit in place.

Capacity indicator	Reporting party	Indicator rationale	No capacity	Partial capacity	Capacity established
Output 2: Monitoring capacity					
Human Animal interface (HAI) coordination	RO/CO	This indicator measures the extent to which animal and human health authorities coordinate activities in response to influenza-related events of potential public health significance.	No evidence of coordination.	Ad-hoc coordination i.e. joint meetings, sharing of information and joint investigation, but no documented functional coordination mechanism in place.	Documented functional coordination mechanism in place.
Bulletins - Regular Influenza surveillance reports	RO/CO	This indicator measures the extent to which the data collected through influenza surveillance is collated into routine bulletins and shared in the public domain.	In the past 12 months no bulletin/report published in the public domain.	In the past 12 months bulletins/reports published in the public domain during the influenza season but less than once a month.	In the past 12 months bulletins/reports published in the public domain at least monthly during the influenza season.
Country implementation plan	RO/CO	This indicator measures the degree to which the country is actively participating in the planning for the work to be accomplished. Ideally this plan would be a MOH Plan or it could be developed by the CO and agreed to by the MOH. It can be simple but should contain activities for targeted improvements, timelines and budgets.	Discussion with MOH not yet started.	The plan being discussed between WHO CO/RO and MOH and is under review.	An implementation plan agreed between MOH and WHO CO/RO in place.
ILI national surveillance	RO/CO	This indicator measures the country's status with regard to the existence of a national surveillance system where patients with non- severe respiratory diseases such as ILI or similar are medically attended at an outpatient or provider setting. As a routine during the flu season, samples should be collected from a subset of patients and sent to a laboratory for diagnosis of influenza. This should be done as defined in the WHO Global Epidemiological Surveillance Standards for Influenza.	No ILI surveillance (no active sites providing data or samples in the past 12 months)	ILI surveillance existing but with gaps in collecting data routinely* and submitting samples regularly** to a laboratory in the past 12 months. *19 or more weeks during the northern hemisphere influenza season (week 40–week 20) or 13 or more weeks during the southern hemisphere season (week 18–week 40), or 32 weeks or more during the whole year for countries with year-round surveillance. **ideally on a weekly basis, however no later than 1 month after collection of samples.	ILI surveillance being carried out, samples being collected routinely* and sent to a laboratory regularly** in the past 12 months. *19 or more weeks during the northern hemisphere influenza season (week 40– week 20) or 13 or more weeks during the southern hemisphere season (week 18–week 40), or 32 weeks or more during the whole year for countries with year-round surveillance. **ideally on a weekly basis, however no later than 1 month after collection of samples.
Integration of laboratory and epidemiologic data	RO/CO	This indicator measures whether laboratory and epidemiologic surveillance data are linked and integrated to produce surveillance updates.	No linkage of laboratory with epidemiologic data.	Laboratory and epidemiologic data shared informally but no reports of integrated laboratory and epidemiologic data.	Surveillance reports with integrated laboratory and epidemiological data published.
Rapid Response Team Training	RO/CO	This indicator measures RRT training delivered through this project. The purpose of the training is to ensure that RRTs are trained and ready to respond to unusual events including human cases/clusters of infection with novel influenza viruses and outbreaks of severe respiratory diseases.	No RRT established.	RRT established, but no training in the past 12 months.	RRT established and trained in the past 12 months.

Capacity indicator	Reporting party	Indicator rationale	No capacity	Partial capacity	Capacity established
SARI national surveillance	RO/CO	This indicator measures the country's status with regard to the existence of a national surveillance system where hospitalized patients with severe respiratory disease such as SARI are medically attended. As a routine, samples should be collected ideally from all or a subset of patients and sent to a laboratory for diagnosis of influenza. This should be done as defined in the WHO Global Epidemiological Surveillance Standards for Influenza.	No SARI surveillance (no active sites providing data or samples in the past 12 months)	SARI surveillance existing but with gaps in collecting data routinely* and submitting samples regularly** to a laboratory in the past 12 months. * 32 weeks or more in a year. **ideally on a weekly basis, however no more than 1 month after collection of samples.	SARI surveillance being carried out, samples being collected routinely* and sent to a laboratory regularly** for diagnosis of influenza in the past 12 months. * 32 weeks or more in a year. **ideally on a weekly basis, however no more than 1 month after collection of samples.
Sustainability (evidence of)	RO/CO	This indicator measures the integration of this project into an overall national plan to increase the chance for long term sustainability of the capacity building efforts. The high level activities of this project can be part of a national plan for surveillance, preparedness and response, etc.	No integration in a national plan/ national plans.	Agreed to be part of a national plan/national plans with integration under development.	Integrated with a national plan/ national plans.
Output 3: Sharing capacity					
NIC status	HQ	This indicator measures progress towards a country-designated and WHO-recognized NIC.	No NIC designated by country.	NIC designated by country, pending WHO recognition.	NIC recognized by WHO.
Reporting epidemiologic surveillance data to WHO through FluID and/ or regional databases (Epidemiological Data)	HQ	This indicator measures the regularity of reporting epidemiologic data to WHO through FluID and/or RO Databases.	No report in the past 12 months.	Reports submitted for <20 weeks in the northern hemisphere season (week 40-week 20), or for <13 weeks in the southern hemisphere season (week 18-week 40), or for <32 weeks during the whole year for countries with year-round surveillance in the past 12 months.	Reports submitted for 20 or more weeks during the northern hemisphere season (week 40-week 20), or for 13 or more weeks during the southern hemisphere season (week 18-week 40), or for 32 or more weeks during the whole year for countries with year-round surveillance in the past 12 months.
Reporting laboratory surveillance data to WHO through FluNet and/ or regional databases (Virological Data)	HQ	This indicator measures the regularity of reporting virological data to WHO through FluNet and/or RO Databases.	No report in the past 12 months.	Reports submitted for <20 weeks in the northern hemisphere season (week 40-week 20), or for <13 weeks in the southern hemisphere season (week 18-week 40), or for <32 weeks during the whole year for countries with year-round surveillance in the past 12 months.	Reports submitted for 20 or more weeks during the northern hemisphere season (week 40-week 20), or for 13 or more weeks during the southern hemisphere season (week 18-week 40), or for 32 or more weeks during the whole year for countries with year-round surveillance in the past 12 months.
Sharing/using sequence data	HQ	This indicator measures sharing of influenza virus genetic sequences for use globally.	No sequences shared.	Country's sequences being uploaded by a WHO CC to a publicly accessible database in the past 12 months.	Country uploading sequences to a publicly accessible database in the past 12 months.
Sharing samples with WHO CCs	HQ	This indicator measures a country's sharing virus isolates and/or clinical specimens with WHO CCs.	No shipment in the past 12 months.	One shipment in the past 12 months.	At least 2 shipments in the past 12 months.

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