

“Rapid Risk Assessment, Acute Events of the Potential Public Health Concern”

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Introduction

- The Detection, Verifications and Risk Assessment (DVA) teams in the Health Emergency Information & Risk Assessment (HIM) departments of the WHO Health Emergencies Programme (WHE) at regional and HQ level
- Identified on a routine basis categorise events through epidemic intelligence (EI) activities as :
substantiate, discard, monitor, inform, alert, respond or close.
- Some events require a **rapid risk assessment (RRA)** and may constitute an emergency necessitating immediate **grading and response.**

Risk

- Depends on the likelihood of transmission in the population (**probability**) and the severity of disease (**impact**).
- Influenced by the context or broad environment in which the threat occurs including political, public, media interest and perception of risk.

Probability x impact = risk ← context

Aims of Rapid Risk Assessment

- **To assess the risk** of an acute public health event
- **To document** the summarised information of a RRA of acute events of potential public health concern at one particular point in time
- **To inform and support** decision making of senior management regarding acute events of potential public health concern
- **To identify and initiate** response mechanisms to
 - Reduce the impact of the event on human health
 - Reduce negative social and economic consequences
- **To share** Rapid Risk assessment with key stakeholders and partners

Assessment – Risk Assessment

- Objective (s)
- Method

- Conclusion
- Recommendations

- Risk question(s)
- Method
 - Hazard assessment
 - Exposure assessment
 - Context assessment
- Risk characterization
- Recommendations



Objectives of Rapid Risk Assessment

- **To assess** the risk posed by an acute public health event to negatively impact human health
- **To categorize** the risk as low, moderate, high or very high, using the Hazard, Exposure and Context approach
- **To agree** on specific actions to be taken - based on the outcome of the risk assessment
- **To identify** communications/ information products to be shared, and to which stakeholders

Definition

- **Rumor:** An event either reported through any channel other than the IHR National Focal Point or other competent authority.
- **Triage:** Sorting the information collected in the detection step to identify any signals that may be of public health importance. This selection step needs to be conducted by epidemiologically skilled personnel.
- **Daily event monitoring:** early identification of potential health hazard that may represent a risk to health that will be collected from media monitoring and verify by DVA.
- **Signal:** A signal is a piece of information selected in the EBS process that may be of PH importance and therefore needs to be verified for its authenticity and conformity, by actively cross-checking the validity of the information with reliable sources.
- **Event:** An event is a signal that has been verified. All events need to be risk assessed by skilled epidemiologists, routinely by conducting an initial risk assessment and if required by conducting a formalized rapid risk assessment.

Definition

- **Notification:** a formal notifying or informing of events or threat concerning public health emergency through an official channel, eg. HQ, RO, CO, MS, IHR to DVA for verification process.
- **Verification:** The continuous provision of information to DVA by HQ, RO, CO, MS, IHR, and focal from SE WHE & WCO for confirming the status of an event within the territory or territories of the Member State.
- **Alert:** An alert comes from an event which is defined as a signal that has been verified. All events need to be risk assessed by skilled epidemiologists, routinely by conducting an initial risk assessment and if required by conducting a formalized rapid risk assessment.
- **Initial Risk Assessment:** Routinely conducted risk assessments of all events detected during Event Based Surveillance, with no formalized documentation template. The initial risk assessment may be conducted several times for the same event if changes to the epidemiological are reported. The initial risk assessment will be used to categorize the event (discard, substantiate, monitor, inform, alert, respond or close), which is described in more detail in this document.

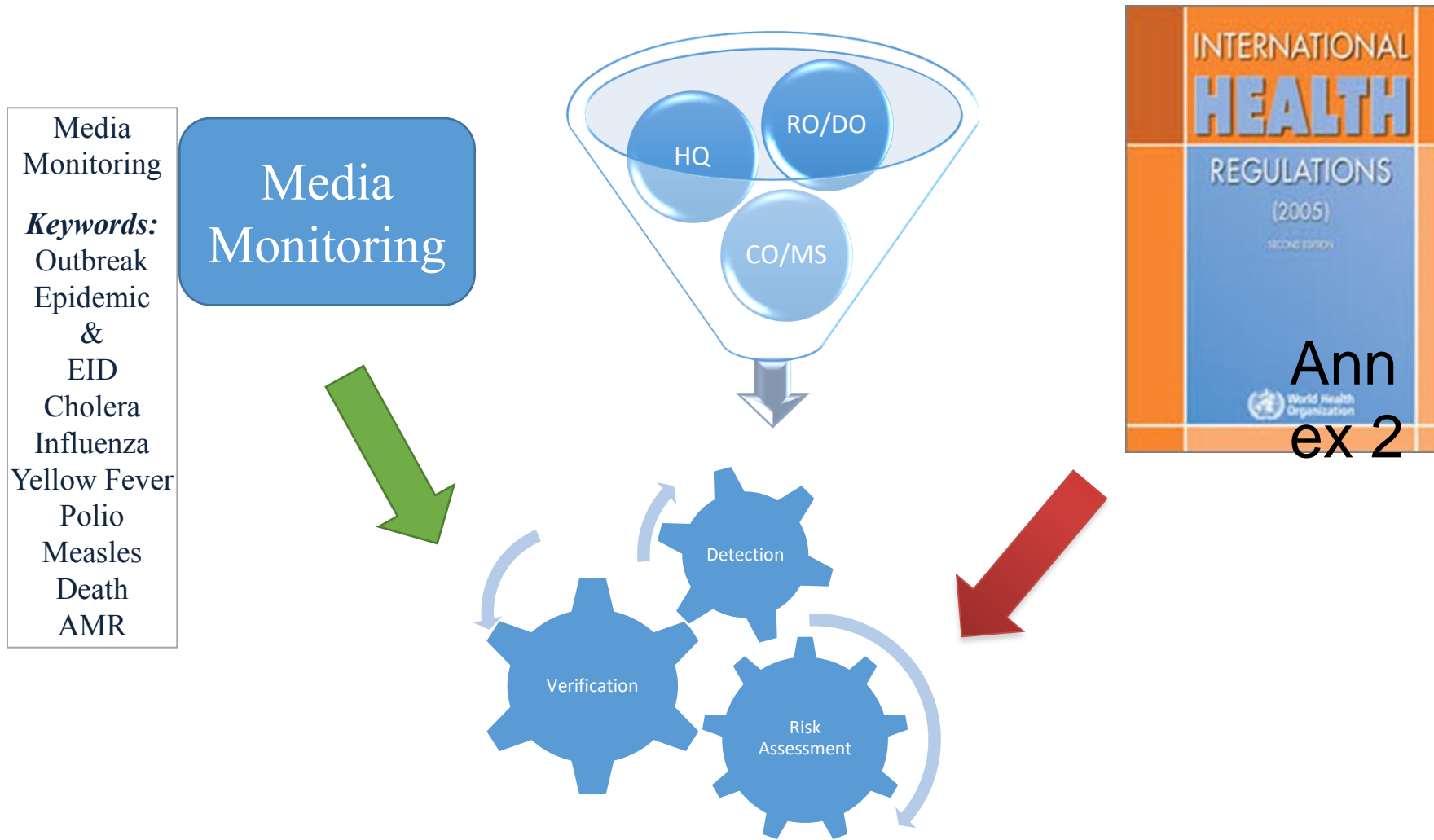
Definition

- **Rapid risk assessment (RRA):** An event categorized as “alert” or “respond” requires the formalised rapid risk assessment to be conducted by WHO, using the template for “Rapid risk assessment, acute event of potential public health concern”.
- **Earthquake:** An earthquake (also known as a quake, tremor or temblor) is the shaking of the surface of the Earth, resulting from the sudden release of energy in the Earth's lithosphere that creates seismic waves..
- **Cyclone:** In meteorology, a cyclone is a large scale air mass that rotates around a strong center of low atmospheric pressure. A cyclone differs from a hurricane or typhoon only on the basis of location. A hurricane is a storm that occurs in the Atlantic Ocean and northeastern Pacific Ocean, a typhoon occurs in the northwestern Pacific Ocean, and a cyclone occurs in the south Pacific or Indian Ocean.
- **Flood:** An overflow of a large amount of water beyond its normal limits, especially over what is normally dry land. DVA will inform to EMO by email about all floods potentially may harm the human settlements and/or public health risk in the SEA member states.

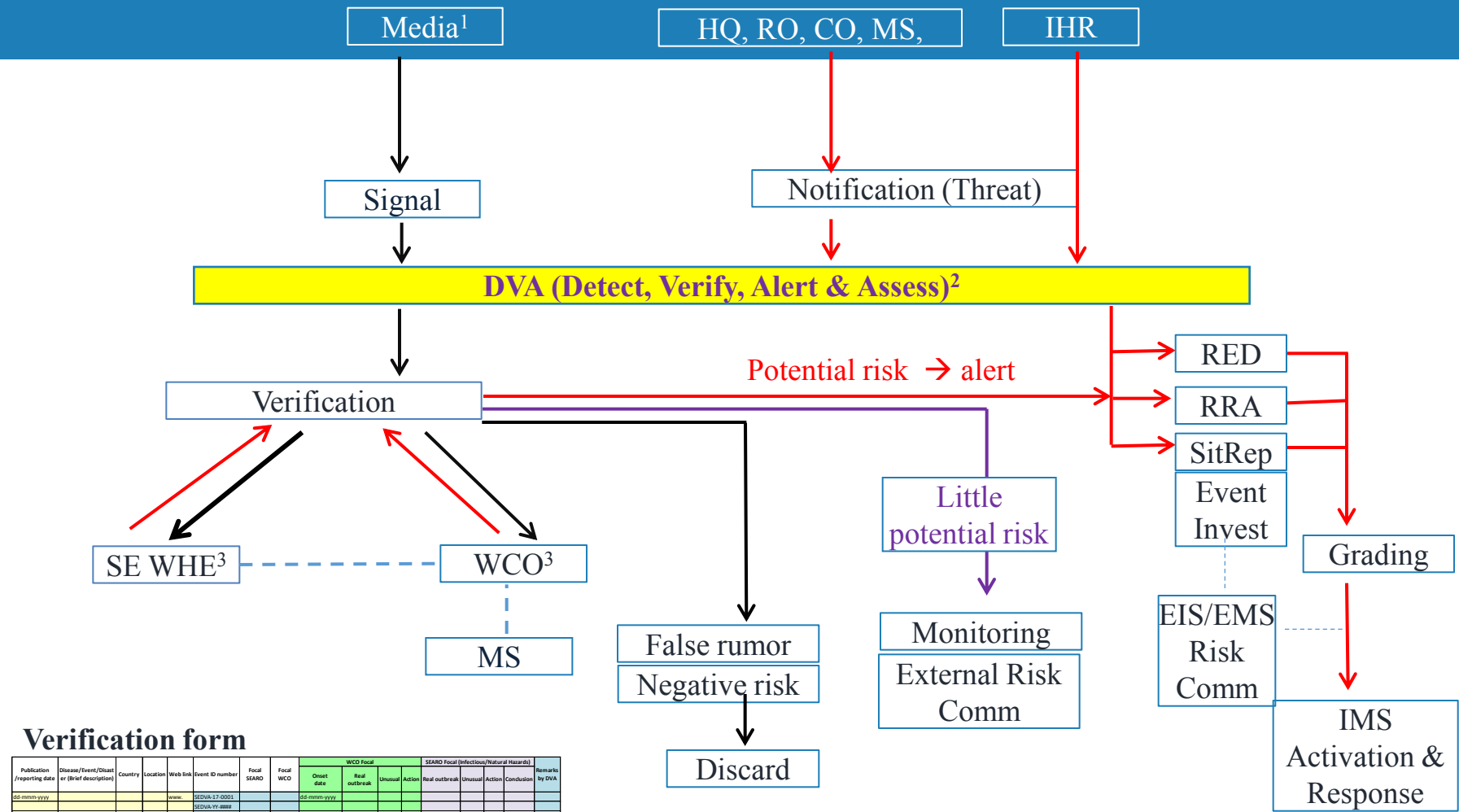
Scope

- The process signal from media monitoring, report & notification received and determining signals for verification of the event if necessary.
- The process for requesting verification of any event not notified through official channels. This process is usually triggered by media monitoring originated from outsourced service, member states, HQ, RO, CO, and online social medias, blogs, discussion and search engine etc.
- The process for notification and communication of risk assessment after detection of significant event
- The process of receiving natural hazards information from media monitoring & notification from stakeholders for reporting to EMO

Primary Information Sources



Information Sources



Verification form

Publication /reporting date	Disease/Event/Disaster (Brief description)	Country	Location	Web link	Event ID number	Focal SEARO	Focal WCO	WCO focal				SEARO focal (Infectious/Natural Hazards)				Remarks by DVA
								Start date	Real outbreak	Unusual	Action	Real outbreak	Unusual	Action	Conclusion	
dd-mm-yyyy				www	SE/DVA/17-0001			dd-mm-yyyy								
					SE/DVA/17-0002											
					SE/DVA/17-0003											
					SE/DVA/17-0004											
					SE/DVA/17-0005											

Outsourced company
 SE WHE DVA
 WCO focal person
 SEARO focal person

¹ Outsource / DVA team
² Event screening by Triage
³ Verification Form

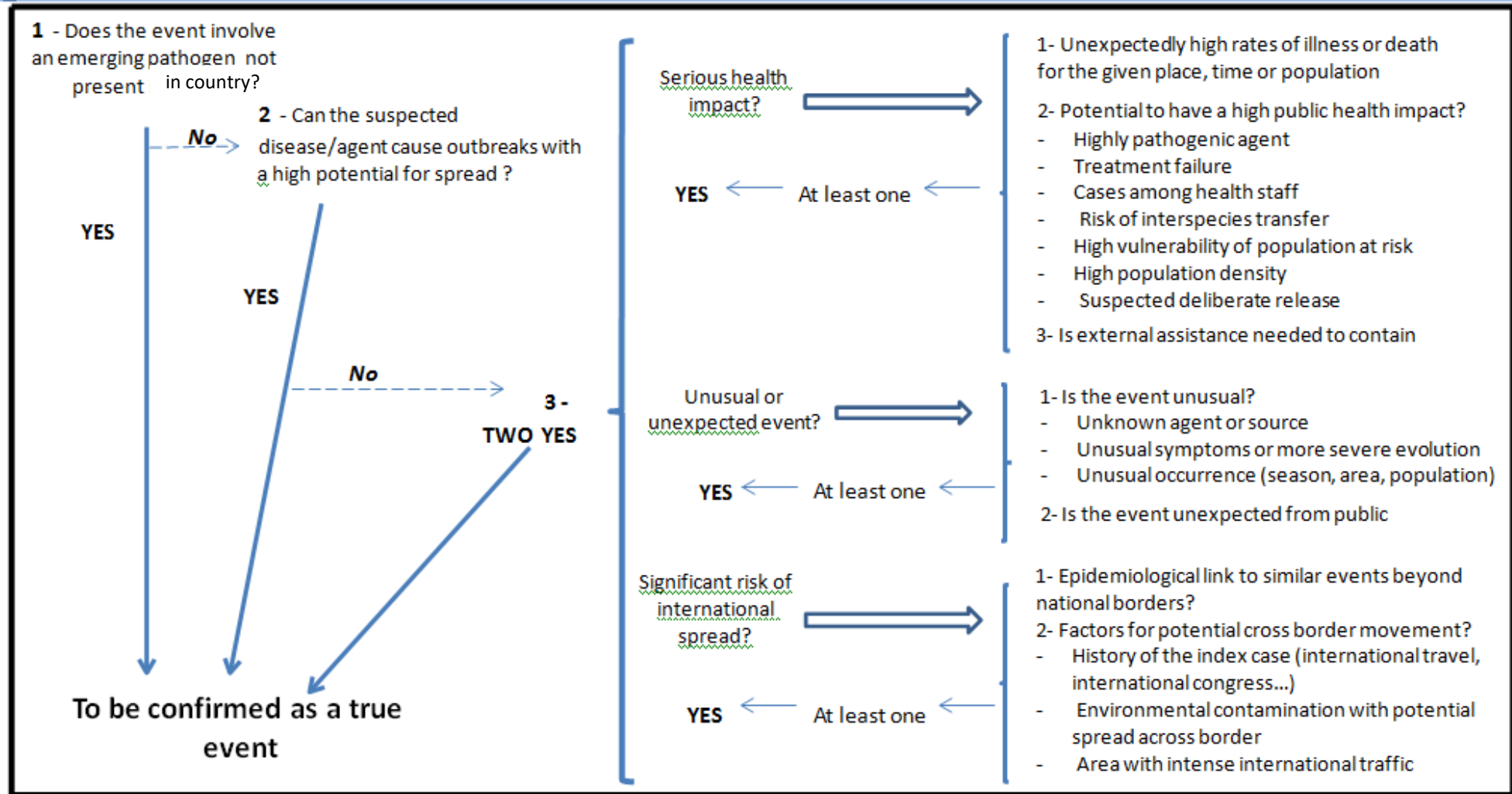
Event Detection

Process: Systematic review of informal and formal reports and maintenance of log recording significant incidents which are then followed up.

Sources of information:

- Media search (informal news reports, press report, bulletins)
- Internet reporting (international websites, national websites)
Complaints (hotline)
- Public health incidence and IBS to detect clusters of cases with similar clinical signs and symptoms: Surveillance networks, Laboratory reports, Clinicians, Primary care, etc.
- Reports from other Ministries (Ministry of Health, Ministry of agriculture, Ministry of environment and wild life, ...)

Series of questions to assess public health importance based on the decision instrument of the IHR



Event Verification

When: the occurrence, nature, or cause and extent of a potential public health event are not known, or where the sources of the report require substantiation.

How: a specially assembled team will deploy to the event location for verification, in-depth investigation and, as required, risk assessment.

Who: comprised of experts from the country, regional or global levels, including from technical networks and partners such as GOARN.

- Information is reviewed continuously to identify signals or events that require further verification or immediate action.
- may take between a few hours to several, days depending on context

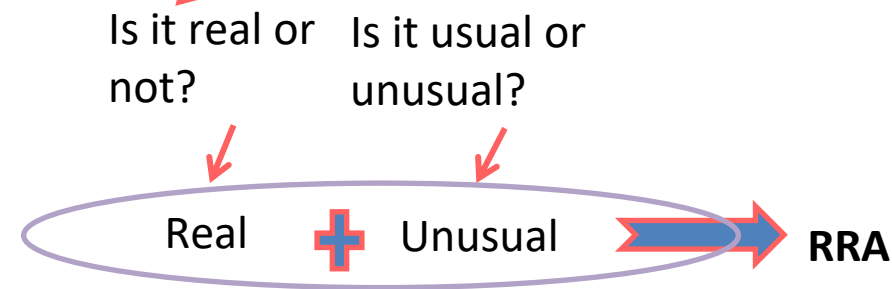
Different actions may be taken as a result of the IRA

Outcome	Assessment	Management decision	Communication
Reported event is a false rumour	Discarded from RRA		Risk communication about the event may be needed to address the public perception of risk.
Confirmed event but considered to be negligible potential risk for public health	Discarded from RRA		Risk communication about the event may be needed to address the public perception of risk.
Confirmed event but considered to be of little potential risk for public health	Discarded from RRA	Monitoring of the situation	Risk communication about the event may be needed to address the public perception of risk.
Confirmed event with public health significant but not falling under DVA responsibilities	Discarded from RRA	Forwarding the incident to the relevant group for further actions	
Confirmed event with public health significance	RRA done within the group and their network contacts.	Depending on the outcome of the RRA, the group may act as risk managers or refer issues to other groups for risk management action.	Communication about the conclusion and the recommendations of the RRA

Verification Template

Publication /reporting date	Disease/Event/Disaster (Brief description)	Country	Location	Web link	Event ID number	Focal SEARO	Focal WCO	WCO Focal				SEARO Focal (Infectious/Natural Hazards)				Remarks by DVA
								Onset date	Real outbreak	Unusual	Action	Real outbreak	Unusual	Action	Conclusion	
dd-mmm-yyyy				www.	SEDVA-17-0001			dd-mmm-yyyy								
					SEDVA-YY-####											

	Outsourced company
	SE WHE DVA
	WCO focal person
	SEARO focal person



Daily Verification Information

A	B	C	D	E	F	G	H	I	J	K	L				M				N	O	P			Q	R	S
Col n iled by	Publication /reporting date	Disease/Event/Disaster (Brief description)	Country	Location	Web link	Category	Event ID number	Initial action by DVA	Focal SEARO	Focal WCO	WCO Focal assessment				SEARO Focal (Infectious/Natural Hazards)											
											Onset date	Real outbreak	Unusual	Action	Real outbreak	Unusual	Action	Conclusion								
DVA	21- ق. ا. -2017	CHEMICAL CONTAMINATION	Myanmar		http://www.mizzimaburmese.com/article/28441	Chemical	SEDVA/07/20170622	Update																		
DVA	22- ق. ا. -2017	HAND, FOOT AND MOUTH DISEASE	Thailand	Sa Kaeo	https://www.thairath.co.th/content/980213	Infectious disease	SEDVA/01/20170623																			
DVA	23- ق. ا. -2017	50-yr-old man dies of swine flu; death toll rises to eight, Mumbai	India	Maharashtra	http://timesofindia.indiatimes.com/city/mumbai/50-yr-old-man-dies-of-swine-flu-death-toll-rises-to-eight/articleshow/59276343.cms	Infectious disease	SEDVA/02/20170516	Update																		
DVA	22- ق. ا. -2017	Sri Lanka's food production hit by extreme drought followed by floods	Sri Lanka		http://reliefweb.int/report/sri-lanka/special-report-faowfp-crop-and-food-security-assessment-mission-sri-lanka-22-june	Natural hazards	SEDVA/02/20170623																			
DVA	22- ق. ا. -2017	Sri Lanka's food production hit by extreme drought followed by floods - UN	Sri Lanka		http://www.colombopage.com/archive_17A/Jun22_1498126141CH.php	Natural hazards	SEDVA/02/20170623	Duplicate																		
DVA	22- ق. ا. -2017	ONE JAPANESE ENCEPHALITIS CASE GETS STATE ON ITS TOES, Pune	India	Maharashtra	http://punemirror.indiatimes.com/pune/others/one-japanese-encephalitis-case-gets-state-on-its-toes/articleshow/59260060.cms	Infectious disease	SEDVA/03/20170623																			
DVA	20- ق. ا. -2017	Four scrub typhus cases found in Chitwan in two months	Nepal	Chitwan	http://www.myrepublica.com/news/22251/	Infectious disease	SEDVA/04/20170623																			
DVA	22- ق. ا. -2017	TN, Kerala account for 70% of dengue cases in country	India	Tamil Nadu, Kerala	http://timesofindia.indiatimes.com/city/chennai/tn-kerala-account-for-70-of-dengue-cases-in-country/articleshow/59262649.cms	Infectious disease	SEDVA/05/20170623																			
PIA	22- ق. ا. -2017	Brace for Dengue	Sri Lanka		http://www.dailymirror.lk/article/BRACE-FOR-DENGUE-131417.html	Infectious disease	SEDVA/01/20170406	Update																		
PIA	22- ق. ا. -2017	Dengue Dengue Everywhere	Sri Lanka		http://www.dailymirror.lk/article/Dengue-Dengue-Everywhere-131410.html	Infectious disease	SEDVA/01/20170406	Duplicate																		
PIA	22- ق. ا. -2017	Fever claims 10 lives	India	Kerala	http://www.thehindu.com/news/national/kerala/fever-claims-10-lives/article19121088.ece	Infectious disease	SEDVA/05/20170622	Update																		
DVA	22- ق. ا. -2017	25,000 marooned in Moulvibazar	Bangladesh	Sylhet	http://www.dhakatribune.com/bangladesh/nation/2017/06/22/25000-marooned-moulvibazar/	Natural hazards	SEDVA/07/20170619	Update																		

Benefit from RRA

- To create awareness of risk
- To assess who may be at risk of acute public health event
- To determine whether a control program is required for a particular outbreak
- To determine if existing control measures are adequate or if more should be done
- To prevent further illness, especially at the planning stage
- To prioritize outbreak and control measures
- To meet legal requirements where applicable

Principles

- **Early detection** is required for early action, to prevent events from becoming emergencies.
- **Risk assessment** improves decision making for effective public health response.
- The **event must be monitored** until it is over or no longer represents a significant risk to public health.
- **IHR** ; the legal framework for sharing information among Member States.

Planning for RRA

- **“ Scope of risk assessment”**
(e.g., be specific about assessing the types of outbreaks)
- **“ Resources needed”**
(e.g., train a team to carry out the assessment, the types of info)
- **“Type of risk analysis measures”**
(e.g., manual, specific form)
- **“Stakeholders involved”**
(e.g., MS, CO, RO, HQ)
- **“Relevant Laws, Regulations, Codes, or Standards as well as Organizational Policies and Procedures”**

Risk assessment Vs Outbreak Investigation

Risk assessment

- Guide the definition and prioritization of control measures and what to communicate to the public, especially for evaluating the impact of control measures and identifying whether the risks to health could recur.

Outbreak Investigation

- Understand and ultimately **control and prevent the spread** of diseases
- **Provide accurate and specific information** which will be used and interpreted along with additional information to answer specific risk question.
- Important when the disease in question is particularly **severe or has high rates of transmission.**
- To **study the natural history** of the disease in question—including the agent, mode of transmission, and incubation period
- A **newly recognized disease** - to study the clinical spectrum of the illness
- Characterize the **populations at greatest risk** and to identify specific risk factors.

Rapid Risk Assessment (between 24h - 48h)

Rapid risk assessment

- to give the likelihood of occurrence of the risk with the estimated consequences
- to propose management option to reduce the adverse human health effects of this incident
- undertaken (usually within 24 to 48 hours) to evaluate the risk to human health
- determine whether
 - a response is indicated;
 - the urgency and magnitude of response;
 - the design and selection of critical control measures, and
 - will inform about the wider implications and further management of the incident.

Advanced Preparation for RRA

- Develop evidence-based **protocols and guidance** for responding to incidents and outbreaks of common infectious threats (disease/agent risk profile)
- Establish clearly defined protocols for **identifying sources of key information** for RRA
- Gather **published literature, grey literature**, outputs of national and international public health experts.
- **Identify relevant focal points** at different administrative level (national, provincial and district level) .
- Identify (availability) and maintain (sustainability) **lists of named individual experts**. This may include links with relevant groups or individuals and should include details of qualifications, experience in the field, publications, sources of funding.
- Ensure **relevant staff members** are able to undertake a rapid literature search.

How to characterize the risk?

Need to decide on the level at which risk assessment is taking place (local, subnational, national)?

- The probability of contracting the disease **for a given exposure or for any exposure?**
- **The timing** during the course of the public health event and the timing of consequences?
- Is the exposure of interest is a **daily one, monthly one or yearly one?**
- **Numbers of infections, illnesses, hospitalizations or death ?**
- Any **subpopulation** of interest or **geographical areas** (risk groups)?
- Level of perceived **external interest** in the event? And what are the **needs of public health managers?**

Summary page, [EVENT NAME], [LOCATION]

Led by: CO RO HQ

Date and version of current assessment:

Date(s) of previous assessment(s):

Date of next assessment (if planned):

Overall risk (based on information available at time of assessment)

Very high		High		Moderate		Low	
National	<input type="checkbox"/>	National	<input type="checkbox"/>	National	<input type="checkbox"/>	National	<input type="checkbox"/>
Regional	<input type="checkbox"/>	Regional	<input type="checkbox"/>	Regional	<input type="checkbox"/>	Regional	<input type="checkbox"/>
Global	<input type="checkbox"/>	Global	<input type="checkbox"/>	Global	<input type="checkbox"/>	Global	<input type="checkbox"/>

Risk statement

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Risk question ⁺	Assessment		Likelihood [*]	Consequences ^{**}	Risk ^{***}	Confidence [#]	Comments
Risk for impact on human health?	National	<input type="checkbox"/>					
	Regional	<input type="checkbox"/>					
	Global	<input type="checkbox"/>					
Risk of event spreading?	National	<input type="checkbox"/>					
	Regional	<input type="checkbox"/>					
	Global	<input type="checkbox"/>					
Risk of insufficient control capacities with available resources?	National	<input type="checkbox"/>					
	Regional	<input type="checkbox"/>					
	Global	<input type="checkbox"/>					
Add further risk questions if needed							

Major actions recommended by the risk assessment team

	Action	Timeframe
<input type="checkbox"/>	Urgent public health response required, immediate activation of EMO/IMS mechanism (ERF)	Immediate ⁺
<input type="checkbox"/>	Recommend setting up grading call	Immediate ⁺
<input type="checkbox"/>	Support Member State to undertake preparedness measures	Immediate ⁺
<input type="checkbox"/>	Limited confidence in information available for rapid risk assessment; seek further information and repeat rapid risk assessment	Immediate ⁺
<input type="checkbox"/>	Continue to closely monitor	Continuous
<input type="checkbox"/>	No further risk assessment required for this event, return to routine activities	Not applicable

Communications

Target audience/ channel	Planned	Shared	First date	Last update
Senior management (eg ExD, RED, WR etc)	<input type="checkbox"/>	<input type="checkbox"/>		
Event Management System (EMS)	<input type="checkbox"/>	<input type="checkbox"/>		
Event Information Site (EIS)	<input type="checkbox"/>	<input type="checkbox"/>		
GOARN secure website	<input type="checkbox"/>	<input type="checkbox"/>		
Disease Outbreak News (DON)	<input type="checkbox"/>	<input type="checkbox"/>		
Public SitRep	<input type="checkbox"/>	<input type="checkbox"/>		
Media talking points	<input type="checkbox"/>	<input type="checkbox"/>		
Other – specify:	<input type="checkbox"/>	<input type="checkbox"/>		

Risk Assessment Steps

- RA Step 1: General Information
- RA Step 2: Hazard Assessment
- RA Step 3: Exposure Assessment
- RA Step 4: Context Assessment
- RA Step 5: Capacities and Vulnerabilities
- RA Step 6: Risk Questions
- RA Step 7: Overall Assessment
- RA Step 8: Risk Statement
- RA Step 9: Immediate actions, RA teams and references

Structure of risk assessment template

Page 1 – Summary page

Gives a very concise overview of the risk of an event, only including the most pertinent information:

- Dates and number of assessment
- Overall risk
- Risk statement with brief summary of justification
- Assessment of specific risk questions
- Major recommended actions by the risk assessment team
- Communications regarding risk assessment

Page 2 – Supporting information

Aims to provide the most relevant background of the event required to inform the risk assessment:

- Brief assessment of
 - Hazard
 - Exposure
 - Context
- Immediate actions
- Risk assessment team members
- Reference documents supporting risk assessment

Summary page, [EVENT NAME], [LOCATION]

Date and version of current assessment: _____ Led by: CO RO HQ
Date(s) of previous assessment(s): _____
Date of next assessment (if planned): _____

Overall risk (based on information available at time of assessment)

Very high		High		Moderate		Low	
National	<input type="checkbox"/>	National	<input type="checkbox"/>	National	<input type="checkbox"/>	National	<input type="checkbox"/>
Regional	<input type="checkbox"/>	Regional	<input type="checkbox"/>	Regional	<input type="checkbox"/>	Regional	<input type="checkbox"/>
Global	<input type="checkbox"/>	Global	<input type="checkbox"/>	Global	<input type="checkbox"/>	Global	<input type="checkbox"/>

Risk statement

Hazard, exposure and context assessment

The first step of the RRA is based on the hazard, exposure and context assessments of the WHO Rapid Risk Assessment Manual. The existing disease/agent risk profiles should be used as source of information. Additional information should be gathered from published and grey literature, and consultation of experts.

Risk

- Depends on the likelihood of transmission in the population (**probability**) and the severity of disease (**impact**).
- Influenced by the context or broad environment in which the threat occurs including political, public, media interest and perception of risk.

Probability x impact = risk ← context

Hazard assessment

Hazard Assessment	
Definition	Hazard assessment is the identification of the characteristics of a public health hazard and the associated adverse health effects. Hazards can include biological, chemical, radiological and nuclear events.
Process	<ul style="list-style-type: none">▪ Straightforward when laboratory confirmation of the causative agent is available, or when the event is easily characterized on clinical and epidemiological features.▪ In all other cases, hazard assessment starts with listing possible causes on the basis of: the initial description of the event; known burden of disease in the affected community; and type and distribution of existing hazards (e.g. the number and location of chemical plants and the chemicals they use).

Hazard Assessment

- **Hazard identification: Biology, chemical, radionuclear, physical (BCRN)**

- Agent confirmed and fully known
- Unknown infectious agent
- Known infectious agent but incomplete information

- **Hazard characterization: (Microbes)**

- Mode of transmission/Infectiousness / Transmissibility
(Epidemic dynamics or: R0, point sources, etc.)
- Pathogenicity/Severity of illness
- Difficulty related to diagnosis (test performance, asymptomatic/symptomatic or unspecific symptoms)
- Presence or high introduction threat

- **E.g. EID:**

- genetic markers of severity or H2H transmission, number and size of clusters
- clinical features and natural history of the disease in humans or animals
- timing of the event and the speed with which the event evolves

- **In short, links between agent detection, its presence, severity and transmissibility**

- **Disasters: type of disaster and type of impact according to frequency/magnitude**

Hazard Assessment (KFD)

Kyasanur forest disease (KFD) is a tick-borne viral haemorrhagic fever endemic (constant presence of disease) in Karnataka State, India. It is also referred as monkey fever by local people. The virus causing the disease: KFD virus (KFDV) is a member of the genus Flavivirus and family Flaviviridae. Viruses related to KFDV have been identified in China and Saudi Arabia.

KFDV was first identified in 1957, when an illness occurred in monkeys (the black faced langur and the red faced bonnet monkey) in Kyasanur Forest area of Shimoga district, Karnataka State. Initially the disease was limited to several districts of Karnataka. Later outbreaks were also reported from Northeast Goa in 2015. Evidences of KFD virus or related viruses were found in different parts of India (parts of the Saurashtra region in Gujarat State, forested regions west of Kolkata, West Bengal State, and the Andaman Islands) during serological studies.

The incubation period of KFD is about 2 to 7 days after tick bites or exposure. The onset of symptoms is sudden, with chills, frontal headache, severe myalgia followed by fever. The increase in temperature is continuous and lasts for 5-12 days or even longer. Most of the patients recover without any complications after one to two weeks of symptoms. There is no specific treatment for KFD. Management of disease is mainly supportive in the form of maintenance of the hydration and measures to prevent and control bleeding disorders and neurological complications. Case fatality rate is 2% to 10%.

Hazard Assessment (H7N9)

Avian influenza A(H7N9) virus is a subtype of influenza viruses that has been detected in birds in the past. This particular A(H7N9) virus had not previously been seen in either animals or humans until it was identified in March 2013 in China.

However, since then, infections in both humans and birds have been observed in China. Most human cases presented with severe disease.

The case fatality rate (CFR) among reported confirmed cases **since 2013 is** around 39%. Most of the cases of human infection with this avian influenza A(H7N9) virus have reported recent exposure to live poultry or potentially contaminated environments, especially markets where live birds are sold. The virus does not appear to transmit easily from person to person, and sustained human-to-human transmission has not been reported.

A(H7N9) infections in poultry appear to be enzootic in China and the virus is mainly linked to a specific poultry type predominantly raised and consumed in China. Avian influenza A(H7N9) virus is low pathogenic for poultry and is therefore only detected in animals through sampling. Although the virus is changing since the detection of initial human cases, there are no virological indicators of higher virulence or more adaptation to infection in humans.

Hazard Assessment (Yellow Fever)

YF is an acute viral disease transmitted by infected mosquitoes. Once contracted, the YF virus incubates in the body for 3 to 6 days. Many people do not experience symptoms, but when these do occur, the most common are fever, muscle pain with prominent backache, headache, loss of appetite, and nausea or vomiting. In most cases, symptoms disappear after 3 to 4 days. In approximately 15% of cases, there is a brief remission of hours to a day followed by jaundice and haemorrhagic signs. Half of the patients who enter the toxic phase die within 10 to 14 days, the rest recover without significant organ damage. Vaccination is the most important means of preventing the infection.

Vaccination against YF provides life-long protection There is no specific treatment for YF, only supportive care to treat dehydration, respiratory failure, and fever. Associated bacterial infections can be treated with antibiotics. Supportive care may improve outcomes for seriously ill patients, but it is rarely available in poorer areas. Brazil is a country at risk of YF transmission in endemic areas. Vaccination is recommended before travelling to Brazil for all travelers aged 9 months or over going to states with known YF transmission. Updates on yellow fever vaccination recommendations for international travelers related to the current situation in Brazil are available at: <http://www.who.int/csr/don/04-april-2017-yellow-fever-brazil/en/>.

Exposure assessment

Exposure assessment	
Definition	<p>Exposure assessment is the evaluation of the exposure of individuals and populations to likely hazards. The key output of the assessment is an estimate of the:</p> <ul style="list-style-type: none">▪ Number of people or group known or likely to have been exposed; and▪ Number of exposed people or groups who are likely to be susceptible (not immune).
Process	<p>Information required to evaluate exposure includes:</p> <ul style="list-style-type: none">▪ Mode of transmission (e.g. human-to-human: droplet spread, sexual transmission; animal-to-human; occupational risk);▪ Information related to the vector (e.g. distribution, density, infectivity) and/or animal hosts (density, prevalence, existing control programmes);▪ Incubation period (known or suspected);▪ Estimation of the potential for transmission (e.g. R_0 basic reproduction number);▪ Immune status of the exposed population; and▪ Dose of exposure (e.g. amount of ingested/absorbed/inhaled heavy metals, salmonella bacteria, radionuclides) and duration of exposure.

Exposure Assessment

- The evaluation of the exposure of individuals to likely hazards: **host factors (humans, vectors, animal reservoir), disasters**
 - Population susceptibility
 - Environmental suitability (climate, temperature, urbanization)
 - Frequency or/and magnitude of disaster hazard
- The key output is an estimate of**
 - Number of people exposed and susceptible if appropriate
 - High risk groups for exposure
 - Risk factors or determinants of infection or disease
 - Health status of population: nutrition, aging, HIV, TB..etc
- In short, population and risk factors data**

Exposure Assessment (KFD)

- The virus is transmitted to humans by bite of infected unfed nymphs*(immature stage of tick). Small mammals particularly rats and squirrels are main reservoir of the virus. Monkeys act as amplifying hosts for the virus and disseminate the infection, but most of them die from KFD infection. Cattle maintain tick population by providing them blood meal but play no part in virus maintenance. Man is incidental or dead end host, and plays no role in viral transmission. Hard Ticks of genus Haemaphysalis is the vector that transmits the disease.
- People with occupational or recreational exposure to rural or outdoor settings (e.g., hunters, herders, forest workers, farmers) are potentially at risk for infection by contact with infected ticks. In Karnataka more cases are reported during the dry season, from November to June. This could be correlated with the increased activity of nymphs during November to May in this area.

Exposure Assessment (H7N9)

- As of 30 January 2017, a total of 1,101 laboratory-confirmed human infections with avian influenza A(H7N9) virus have been reported through IHR report since early 2013. The disease follows a seasonal pattern with higher number of cases in the northern hemisphere winter months. All of the cases reported have been exposed in China.
- In the current wave, since November 2016, a total of 303 human infections with avian influenza A(H7N9) virus, including 65 deaths have been reported by China through IHR. Current numbers indicate a higher wave than previous years especially as the peak might not have been reached and weekly numbers are already exceeding the weekly numbers of previous waves. There is one new province reporting cases and additional cities and counties are affected. The most affected provinces are Jiangsu, Zhejiang and Guangdong, with Jiangsu accounting for almost half of the cases.
- Most of the cases with available information on exposure history have reported contact with poultry or visiting live bird markets. Among reported cases in this wave, there are three, two-person clusters of possible human-to-human transmission, which is in accordance with previous waves.

Exposure Assessment (H7N9) II

- An increase in sporadic human cases is expected during this wave as there is apparently a high level of environmental contamination with avian influenza A(H7N9) virus (Zhou H7N9 in China (WPSAR publication Jan 2017)).
- Apart from a sharp increase in the number of human cases this wave, there is no evidence of changes in the epidemiology of the human cases, no evidence of sustained human-to-human transmission, no important changes in the clinical presentation (remains rapidly progressing severe acute respiratory distress and multi organ failure) and no indication of increased CFR. A longer incubation period has been recognized during case reviews (up to 10-14 days) (Information provided during clinical network teleconference).
- Thirty-three viruses from human samples from the early phase of this wave have been fully sequenced and cluster with the viruses isolated in the beginning of 2016. The genetic markers of mammalian adaptation and antiviral resistance (the virus is known to be highly resistant to M2 inhibitors but susceptible to neuraminidase inhibitors) remain similar to previous waves.

Exposure Assessment (YF)

Overall, between 1 December 2016 and 9 May 2017, Brazil reported 1,392 cases (729 confirmed and 663 suspected), including 294 deaths (249 confirmed and 45 suspected). The overall CFR is 29% and 34% among confirmed cases. Cases have been reported from 15 states [Amapá (AP), Bahia (BA), Espírito Santo (ES), Goiás (GO), Maranhão (MA), Mato Grosso do Sul (MS), Minas Gerais (MG), Pará (PA), Paraná (PR), Rio Grande do Sul (RS), Rio de Janeiro (RJ), Rondônia (RO), Santa Catarina (SC), São Paulo (SP), and Tocantins (TO)] and the Federal District. In addition, for the same period, 3,660 epizootics (474 of which were confirmed for YF) were reported in 21 states (Alagoas, Amazonas, Bahia, Goiás, Espírito Santo, Mato Grosso, Mato Grosso do Sul, Minas Gerais, Pará, Paraíba, Paraná, Pernambuco, Rio Grande do Norte, Rio Grande do Sul, Rio de Janeiro, Rondônia, Roraima, Santa Catarina, São Paulo, Sergipe, and Tocantins) and the Federal District, including in areas bordering Argentina, Bolivia, Colombia, Guyana, Paraguay, Perú, Suriname, Uruguay, and Venezuela. A matter of concern is the recent confirmation of epizootics in the State of Rio de Janeiro, which triggered a preventive vaccination campaign in the whole state.

On 4 April, the WHO IHR Secretariat updated for the fourth time the yellow fever vaccination recommendations for international travellers and determined that the State of Rio de Janeiro (including the urban areas of Rio de Janeiro City and Niterói), and the State of São Paulo, with the exception of the urban areas of São Paulo City, should also be considered at risk for yellow fever transmission.

Exposure Assessment (YF) II

- As a global trend, human cases have been decreasing since March 2017; however, the risk of occurrence of new cases persists, given the internal movement of people, the spread of epizootics throughout natural ecosystems, and rainy season (till end of May/June) and pockets of unvaccinated populations in difficult-to-reach areas. In MG, no new cases have been confirmed in April. In ES, confirmed cases continue to be reported; however, no new municipalities have been affected since the beginning of April.
- Preliminary results of entomological surveys have indicated that *Aedes* spp. captured in different ecosystems of selected areas of MG (city of Belo Horizonte), ES (municipality of Domingo Martins), and RJ (municipality of Casimiro de Abreu) were negative for YF. It is important to note that *Haemagogus* spp. captured in an area of edge habitat in ES have tested positive for YF. To date, there is no evidence that *Aedes aegypti* is implicated in transmission; However, the risk of involvement of *Ae. aegypti* still remains considering that some municipalities where YF transmission occurs have also high transmission of chikungunya and dengue, which suggests high incidence of *Aedes*. 5 municipalities in MG, 2 in TO, and 1 in SP have reported the highest dengue incidence in Brazil during 2017. With regard to chikungunya, the municipalities of Conselheiro Pena, Governador Valadares, and Teófilo Otoni in Minas Gerais have been those with the highest chikungunya incidence rate at national level during 2017. Zika has been circulating at low levels in ES, MG, RJ, SP, and TO during 2017. These 4 arboviruses can be transmitted to humans by day-biting *Aedes* mosquitoes.

Context assessment

Context assessment	
Definition	<p>Context assessment is an evaluation of the environment in which the event is taking place. This may include the physical environment such as climate, vegetation, land use (e.g. farming, industry) and water systems and sources, as well as the health of the population (e.g. nutritional status, disease burden and previous outbreaks), infrastructure (e.g. transport links, health-care and public health infrastructure), cultural practices and beliefs.</p>
Process	<p>Context assessment should consider all factors that can affect the risk of the event. These factors may be social, ethical, technical, scientific, economic, environmental and political. They will include the surveillance system's capacity to detect cases, health-seeking behaviour of the individual groups, the prevalence of malnutrition, environmental conditions favouring the multiplication of vectors and the presence of animal hosts. For instance:</p> <ul style="list-style-type: none">▪ For measles, the risk of expansion of an outbreak after the detection of the event will depend upon factors including the immunization coverage of the population; the capacity to quickly organize a mass vaccination campaign if the coverage is too low; the local conditions of hygiene; the access to health care; the capacity to detect and isolate cases; and population behaviour.▪ For an event such as contamination of a river by a chemical agent, the risk of human intoxication will depend on factors such as local practices about water use; season (cold or hot, rainy or dry); river flow; capacity to broadcast messages of prevention; and acceptability of control measures.

Context Assessment

- An evaluation of the environment in which the event is taking place which may include (high resilience, lower impact):*
 - Socio-cultural: cultural practices, beliefs, acceptance, social resilience, public and professional perception
 - Technical capacity
 - Economy: infrastructure, resilience, financial capacity
 - Environment: climate, vegetation, land use (e.g. farming, industry) and water systems and sources
 - Policy: regulations and laws framework
- Defence systems (technical capacity)
 - Health system resilience: IPC, coordination, availability of supplies
 - Surveillance: EWARS & lab capacity
 - Response capacity & business continuity
 - Preparedness plan and implementation

Context Assessment (H7N9)

Sudden increases in the number of human infections with avian influenza A(H7N9) virus identified have been reported in previous years during this period of time (December-January). Poultry and human movement increases in the weeks around Chinese New Year (28 January 2017), which might lead to further spread. China has strong capacity to respond to the outbreak including regarding surveillance, risk assessment, and epidemiological and virological investigations in humans. However, the regular recurrence of this outbreak in humans for the 5th consecutive year suggests that the capabilities to control outbreaks in the poultry population is limited and its spread in the poultry sector will continue to present a risk for future human cases and pandemic potential. China Ministry of Health response includes publication of updated guidance for H7N9 clinical management and trainings convening 100 clinicians across the country. Referral hospitals are supplied with oseltamivir and peramivir for treatment and laboratory diagnosis is available within 24 hours. The preparedness level of not previously affected cities and counties is not known. Public health interventions have been implemented including measures to lower the risk of exposure (for example closure of live poultry markets, strengthening of regulations in live poultry markets, limitation of transport of poultry). However these are performed at the provincial or municipal level with no national coordination thus possibly contributing to a spread of the virus rather than to containment through ad hoc and unregulated sales and transportation of live poultry.

Context Assessment (H7N9) II

Control measures are complicated by the fact that avian influenza A(H7N9) virus is of low pathogenicity in poultry and there is a robust cultural practice to buy live chickens from live bird markets. Closure of markets might even move the problem to non-affected, less controlled and rural areas.

At present, A(H7N9) infections in poultry are mainly prevalent in a specific poultry type which is predominantly raised and consumed in China which might help explain why human cases have not been reported from other countries.

Countries with substantial human and animal traffic with affected areas are at highest risk for A(H7N9) outbreaks in animals and humans. Several countries neighbouring China have previous experience with avian influenza A(H5N1) and other avian influenza virus outbreaks and are able to detect and identify human and animal infections with avian influenza A(H7N9) virus and can respond appropriately.

Nevertheless There is a low confidence in the capacity of some of the neighbouring countries to detect single infrequent human cases, in adequate surveillance in the animal and human sector, and in the capacity to respond and manage larger A(H7N9) outbreaks. Countries with substantial human and animal traffic with affected areas are at highest risk.

Eight candidate vaccine strains were proposed in the VCM of Sept 2016 and there are several phase 2 clinical trials underway/planned.

Context Assessment (YF)

Laboratory-confirmed and suspected cases are being reported from 15 states and the Federal District. The latest confirmed cases reported in RJ State (Maricá) and reports of epizootics in relative proximity to Belo Horizonte, São Paulo, Rio de Janeiro, and Vitória (respectively, the capital cities of MG, SP, RJ, and ES) are concerning and highlight the persistence of the risk of urbanization of the outbreak. Suspected epizootics have been reported in rural areas of states at risk for YF bordering Argentina, Bolivia, Colombia, Guyana, Paraguay, Perú, Suriname, Uruguay, and Venezuela. Vaccination coverage is improving, with more than 62% of prioritized municipalities (n=984) having optimal coverage, exceeding 75%. Laboratory capacities have been strengthened with decentralized laboratory capacity in Espírito Santo and Bahia.

Examples of the type of information that could be collected during a context assessment

Source	Type of information	Output from the assessment
Surveillance system	<ul style="list-style-type: none"> • Number of functioning reporting sites in the affected area • How suspected cases are identified 	The likelihood that cases will be identified
Health-care infrastructure assessments or reports	<ul style="list-style-type: none"> • The number, location and quality of health-care facilities in the affected area • Health-seeking behaviour in the affected population 	The likelihood that cases will seek and receive medical care that results in good clinical outcomes
Nutrition surveys from NGO or government reports	<ul style="list-style-type: none"> • Level of malnutrition in the affected area or among specific risk groups 	The likelihood of severe disease
Information on animals and vectors	<ul style="list-style-type: none"> • Information on environmental conditions that might be favourable to population explosions of potential vectors of disease • Information on the number and distribution of potential animal hosts 	The likelihood of outbreaks in humans or animals

Example to assess Context/Exposure

- **Surveillance System**

- Sensitivity of surveillance (representativeness) # surveillance units
- Identification of suspect cases (lab capacity, awareness of clinicians)



The likelihood that cases will be identified

- **Resilience**

- Number and quality of health facilities
- Health seeking behavior
- Staff dedicated and well trained
- Well equipped or/and well paid staff with compensation schemes



The likelihood that cases will seek and receive medical care that results in good clinical outcomes

- **High risk groups**

- Nutrition status
- Immunocompromised groups
- Younger or older age groups



The likelihood of severe disease

Examples to assess Context/Exposure

- **Information on animals and Vectors**



The likelihood of outbreaks in humans or animals

- **Government policy for outbreak control/risk mitigation**

- Funding available for outbreak control
- SOP for outbreak control is available
- Treatment
- Efficient interventions
- Coordination, preparedness/readiness



The likelihood of early detection and response for outbreak control

RA Step 5

Capacities	Vulnerabilities

Capacities; these can decrease the likelihood and impact of the event

Vulnerabilities; these can increase the likelihood and impact of the event

(H7N9)

Capacities	Vulnerabilities
<p>China-has adequate capacities (case detection, treatment and lab facilities).</p> <p>Candidate vaccine virus has been selected and vaccine trials in phase II in China.</p> <p>Antivirals available.</p>	<p>Lack of timely virus sharing beyond China WHO CC.</p> <p>A(H7N9) virus is low pathogenic in poultry, therefore infected animals cannot easily be identified which renders control in animals more difficult. As animals are not visibly sick, there is less incentive for animal sector to control the disease.</p> <p>Market closure in bigger cities might push the problem to unaffected areas which are less prepared.</p> <p>Uncertainties about level of control of trade of possibly infected live poultry.</p>

Yellow Fever

Capacities	Vulnerabilities
<p>Epizootics and vector control:</p> <ul style="list-style-type: none"> • Vector control activities to eliminate <i>Ae. aegypti</i> adults and larvae in breeding sites are carried out in the affected municipalities. <p>Surveillance, Laboratory and Investigation:</p> <ul style="list-style-type: none"> • The State and Municipal Secretaries of Health are being supported by epidemiological teams from the MoH; • The MoH and the State Secretaries of Health are jointly producing technical notes, monitoring the event and coordinating services and health professionals; • The General Coordination of Communicable Diseases of the Brazil Ministry of Health is disseminating technical guidance to improve surveillance and differential diagnosis; • Since 1 March, PAHO Regional and CO with MoH are permanently deployed to MG, ES and RJ states to strengthen analysis, epizootic surveillance and AEGI surveillance. . • Diagnostic capacity is available in the states of BA, ES, MG, RJ, and SP and at the national level. 	<p>Epizootics and vector control:</p> <ul style="list-style-type: none"> • Activities aimed at controlling <i>Ae. aegypti</i> had a limited impact on the dynamics of the Zika transmission in the coastal areas of Brazil during 2015-16; similarly, actual entomological indices may not be adequately low to protect urban areas from an <i>Ae. aegypti</i> transmitted YF cycle. <p>Surveillance and Laboratory:</p> <ul style="list-style-type: none"> • Suboptimal epidemiological characterization of human suspected cases complicates the early detection of any changes suggestive of YF transmission in urban setting. • Delays in testing for obtaining laboratory results still persist in RJ and MG.

Yellow Fever II

Capacities	Vulnerabilities
<p>Vaccination:</p> <ul style="list-style-type: none"> • The Brazil MoH has distributed 25 M doses of YF vaccine to 5 states, with more than 27 M persons having been vaccinated. A house-to-house and fixed post immunization campaign is being conducted in the rural areas of affected municipalities. The state of RJ received 4.8 M doses, of which 1.9 M have been administered. • The cumulative vaccination coverage is as follows: ES 82.2%, MG 79.8%, BA 51.3%, SP 51.1%, and RJ 41.2%. An estimated 19.1 M persons remain unvaccinated in these states. • Bio-Manguinhos/Fiocruz will deliver 24 M doses until the end of the year. In the context of the YF outbreak, Bio-Manguinhos is not exporting the YF vaccine. • Brazil national authorities are preparing the implementation of fractional doses in selected municipalities in SP and BA in case of proved urban transmission. <p>Risk communication:</p> <ul style="list-style-type: none"> • The local press office is working together with the MoH; • A web portal has been launched by MoH and affected states to inform the public about the situation and provide guidance. <p>Coordination :</p> <ul style="list-style-type: none"> • State and municipal authorities are carrying out massive campaigns with the participation of the public and private sectors, Army and Navy, community leaders, and traditional and social media. • Situation Rooms have been established in the affected states and at the national level. 	<p>Vaccination:</p> <ul style="list-style-type: none"> • Even though vaccination campaigns are being carried out by State and Federal health authorities, pockets of unvaccinated populations in difficult-to-reach areas still persist. • A request for 20 M syringes (0.1 ml) was channelled to PAHO/WHO on 30 March 2017 for the administration of fractional doses. Without the additional syringes, the country will not be able to implement this strategy. • Results from the surveillance of AEFIs have been received but require further analysis. • Some UK travel clinics have reported shortages of the European vaccine. <p>Coordination :</p> <ul style="list-style-type: none"> • Brazil is a federal country: Brasilia is in charge for the vaccines supplies while States are in charge of the strategies regarding surveillance and vaccination campaigns leading to a slow process with no harmonization and poor coordination

RA Step 6

Risk question ⁺			Assessment		Risk ^{***}	Confidence #	Comments
			Likelihood*	Consequences**			
Risk for impact on human health?	National	<input type="checkbox"/>	Very unlikely	Minimal	Low	High	
	Regional	<input type="checkbox"/>	Very unlikely	Minimal	Low	High	
	Global	<input type="checkbox"/>	Very unlikely	Minimal	Low	High	
Risk of event spreading?	National	<input type="checkbox"/>	Very unlikely	Minimal	Low	High	
	Regional	<input type="checkbox"/>	Very unlikely	Minimal	Low	High	
	Global	<input type="checkbox"/>	Very unlikely	Minimal	Low	High	
Risk of insufficient control capacities with available resources?	National	<input type="checkbox"/>	Very unlikely	Minimal	Low	High	
	Regional	<input type="checkbox"/>	Very unlikely	Minimal	Low	High	
	Global	<input type="checkbox"/>	Very unlikely	Minimal	Low	High	
Add further risk questions if needed							

⁺Identified at the beginning of meeting, specific to the event

*Choose from Almost certain, Highly likely, Likely, Unlikely, Very unlikely **OR** Insufficient information available

Choose from Severe, Major, Moderate, Minor, Minimal **OR Insufficient information available

***Choose from Very high, High, Moderate and Low according to the risk matrix combining likelihood and consequences

#Choose High , Moderate or Low

Formulating Risk Questions

Risk questions

- to define the scope of the assessment
- ensure that all relevant information is collected
- need to come from the RRA team, in order to
- characterize risks to make decisions.

Formulating Risk Questions

- Objectives of RRA: prediction of likelihood
 - Risk of occurrence or spread?
 - Risk of severe consequences?
 - What is the likely effect on transmission if implementing intervention A (e.g. vaccination)?
 - What is the likely consequences if implementing intervention (social distancing, early introduction, high risk group focus etc)
- Scope:
 - Risk of introduction or spread?
 - National or subnational risk?
 - Health sector or food/security?
 - Risk to vulnerables?
 - What particular time frame are we interested in?

Formulating Risk Questions

- **What is the likelihood of the worst consequence?**
- **Where would be the areas of highest risk of spread?**
- **Can the hazards result in endemic transmission?**
- **Does the system has the capacity to detect early enough?**
- **What are the best options for control measures?**
- **Be specific in terms of scope – otherwise interpretations can vary:**
 - E.g. what is the risk of introduction of H5?
 - H5N1? Migratory birds? Poultry? Humans? In Nepal?

Systematic Collection of Data

Emerging diseases/agents:

For new or unusual conditions, the risk profile will summarize current stage of knowledge of the condition, including all contextual information

The most important functions of the risk profile is to reduce and better define the uncertainty relevant to the decision problem.

Ensure that detailed information on the incident has been gathered , preferably from those responsible for investigating the incident at local or national level. The incident information should be summarized by the RRA team following a standardized format.

For already known agent or disease:

Use already available agent/disease profile and up-date them with the latest information available at the time of occurrence of the incident, complete the disease profile with the risk profile.

Risk and Likelihood

- Risk = Measure the probability of occurrence and the magnitude of the biological and economic consequences of a harmful event or incident (threat) to individuals or populations, during a specified period.
- Risk perception: A stakeholder's view on a risk. Risk perception reflects the stakeholder's needs, issues, knowledge, beliefs and values
- Likelihood: the chance of an event or an incident happening, whether defined, measured or determined objectively or subjectively.
 - Probability: In statistics, a measure of the chance of an event or an incident happening

Health Consequences

- Impact = consequences; downstream effects that result from an action or condition that may be negative or positive.
- Vulnerability: A set of conditions determined by physical, social, economic and environmental factors that increases the susceptibility of a community to the impact of hazards.
 - **Note:** Vulnerability is a measure of how well prepared and equipped a community is to minimize the impact of or cope with hazards.
 - Vulnerability assessment: The process of identifying and evaluating vulnerabilities, describing all protective measures in place to reduce them and estimating the likelihood of consequences
- Opposite to vulnerability is resilience: Capacity of a system/community/society to adapt to disruptions resulting from hazards by persevering, recuperating or changing to reach and maintain functioning.

Categorizing the risk based on likelihood and consequences for the different risk questions

Likelihood		Consequences	
Level	Definition	Level	Definition
Almost certain	Is expected to occur in most circumstances (e.g. probability of 95% or more)	Severe	<ul style="list-style-type: none"> • Severe impact for a large population or at-risk group • Severe disruption to normal activities and services • A large number of additional control measures will be needed and most of these require significant resources to implement • Serious increase in costs for authorities and stakeholders
Highly likely	Will probably occur in most circumstances (e.g. a probability of between 70% and 94%)	Major	<ul style="list-style-type: none"> • Major impact for a small population or at-risk group • Major disruption to normal activities and services • A large number of additional control measures will be needed and some of these require significant resources to implement • Significant increase in costs for authorities and stakeholders
Likely	Will occur some of the time (e.g. a probability of between 30% and 69%)	Moderate	<ul style="list-style-type: none"> • Moderate impact as a large population or at-risk group is affected • Moderate disruption to normal activities and services • Some additional control measures will be needed and some of these require moderate resources to implement • Moderate increase in costs for authorities and stakeholders
Unlikely	Could occur some of the time (e.g. a probability of between 5% and 29%)	Minor	<ul style="list-style-type: none"> • Minor impact for a small population or at-risk group • Limited disruption to normal activities and services • A small number of additional control measures will be needed that require minimal resources • Some increase in costs for authorities and stakeholders.
Very unlikely	Could occur under exceptional circumstances (e.g. a probability of less than 5%)	Minimal	<ul style="list-style-type: none"> • Limited impact on the affected population • Little disruption to normal activities and services • Routine responses are adequate and there is no need to implement additional control measures • Few extra costs for authorities and stakeholders

Matrix on likelihood and consequences to determine risk

		Minimal	Minor	Moderate	Major	Severe
Likelihood	Almost certain	Green	Yellow	Orange	Red	Red
	Highly likely	Green	Yellow	Orange	Red	Red
	Likely	Green	Yellow	Orange	Orange	Red
	Unlikely	Green	Green	Yellow	Orange	Orange
	Very unlikely	Green	Green	Yellow	Orange	Orange

Matrix on likelihood and consequences to determine risk

	Level of overall risk	Actions
	Low risk	Managed according to standard response protocols, routine control programmes and regulation (e.g. monitoring through routine surveillance systems)
	Moderate risk	Roles and responsibility for the response must be specified. Specific monitoring or control measures required (e.g. enhanced surveillance, additional vaccination campaigns)
	High risk	Senior management attention needed: there may be a need to establish command and control structures; a range of additional control measures will be required some of which may have significant consequences
	Very high risk	Immediate response required even if the event is reported out of normal working hours. Immediate senior management attention needed (e.g. the command and control structure should be established within hours); the implementation of control measures with serious consequences is highly likely

Evaluating the quality of evidence (Confidence)

Confidence	Type of evidence
<p><u>Good</u> Further research unlikely to change confidence in information.</p>	<p>Etiological agents known to have caused similar outbreaks in the previous 2 years Peer-reviewed articles and evidence from previous outbreaks Multiple reliable sources Expert group risk assessments, or specialized expert knowledge, or consensus opinion of experts</p>
<p><u>Medium</u> Further research likely to have impact on confidence of information and may change assessment.</p>	<p>Non-peer-reviewed published studies/reports but consistent results published in grey literature Detailed clinical description of cases (observational studies / surveillance reports/outbreak reports Reliable local sources: detailed information from local leaders and health authorities Agreement between experts or opinion of two trusted experts</p>
<p><u>Poor</u> Further research very likely to have impact on confidence of information and likely to change assessment.</p>	<p>Individual case reports with non-specific clinical description of cases No historical data Grey literature Individual (non-expert) opinion Uncertainty/ conflicting views amongst experts</p>

Sample 1

KFD	Risk question ⁺		Assessment		Risk ^{***}	Confidence #	Comms
			Likelihood*	Consequences**			
Risk for impact on human health?	National	<input checked="" type="checkbox"/>	Likely	Moderate	Moderate	Moderate	Zoonosis. No evidence of sustained human-to-human transmission. Increased number of cases expected at national level.
	Regional	<input checked="" type="checkbox"/>	Unlikely	Moderate	Moderate	Moderate	
	Global	<input checked="" type="checkbox"/>	Very unlikely	Moderate	Moderate	Moderate	
Risk of event spreading?	National	<input checked="" type="checkbox"/>	Highly likely	Moderate	High	High	Zoonosis. No evidence of sustained human-to-human transmission.
	Regional	<input checked="" type="checkbox"/>	Unlikely	Moderate	Moderate	Moderate	
	Global	<input checked="" type="checkbox"/>	Very unlikely	Moderate	Moderate	Low	
Risk of insufficient control capacities with available resources?	National	<input checked="" type="checkbox"/>	Unlikely	Moderate	Moderate	High	Sufficient capacities in China, particularly in the provinces previously affected. Capacities in neighbouring countries varies widely
	Regional	<input checked="" type="checkbox"/>	Likely	Moderate	Moderate	Moderate	
	Global	<input checked="" type="checkbox"/>	Likely	Moderate	Moderate		
Risk of sustained human-to-human transmission			Very Unlikely	Major	Moderate	Moderate	No evidence of sustained human-to-human transmission. No evidence of significant changes in the virus characterized so far in comparison with previous waves.

⁺Identified at the beginning of meeting, specific to the event

*Choose from Almost certain, Highly likely, Likely, Unlikely, Very unlikely **OR** Insufficient information available

Choose from Severe, Major, Moderate, Minor, Minimal **OR Insufficient information available

***Choose from Very high, High, Moderate and Low according to the risk matrix combining likelihood and consequences

#Choose High or Moderate or Low

Sample 2

H7N9	Risk question ⁺		Assessment		Risk ^{***}	Confidence #	Comments
			Likelihood*	Consequences**			
Risk for impact on human health?	National	<input checked="" type="checkbox"/>	Likely	Moderate	Moderate	Moderate	Zoonosis. No evidence of sustained human-to-human transmission. Increased number of cases expected at national level.
	Regional	<input checked="" type="checkbox"/>	Unlikely	Moderate	Moderate	Moderate	
	Global	<input checked="" type="checkbox"/>	Very unlikely	Moderate	Moderate	Moderate	
Risk of event spreading?	National	<input checked="" type="checkbox"/>	Highly likely	Moderate	High	High	Zoonosis. No evidence of sustained human-to-human transmission.
	Regional	<input checked="" type="checkbox"/>	Unlikely	Moderate	Moderate	Moderate	
	Global	<input checked="" type="checkbox"/>	Very unlikely	Moderate	Moderate	Low	
Risk of insufficient control capacities with available resources?	National	<input checked="" type="checkbox"/>	Unlikely	Moderate	Moderate	High	Sufficient capacities in China, particularly in the provinces previously affected. Capacities in neighbouring countries varies widely
	Regional	<input checked="" type="checkbox"/>	Likely	Moderate	Moderate	Moderate	
	Global	<input checked="" type="checkbox"/>	Likely	Moderate	Moderate		
Risk of sustained human-to-human transmission			Very Unlikely	Major	Moderate	Moderate	No evidence of sustained human-to-human transmission. No evidence of significant changes in the virus characterized so far in comparison with previous waves.

⁺Identified at the beginning of meeting, specific to the event

*Choose from Almost certain, Highly likely, Likely, Unlikely, Very unlikely OR Insufficient information available

**Choose from Severe, Major, Moderate, Minor, Minimal OR Insufficient information available

***Choose from Very high, High, Moderate and Low according to the risk matrix combining likelihood and consequences

#Choose High or Moderate or Low

Sample 3

YF Risk question+		Assessment		Risk***	Confidence #	Comments
		Likelihood *	Consequences **			
Risk for impact on human health?	National	Almost certain	Severe	High	High	Transmission decreased since March 2017, though a high risk of urbanization persists in populated urban areas with suboptimal levels of vaccination coverage.
	Regional	Likely	Major	Moderate	High	
	Global	Likely	Moderate	Moderate	High	
Risk of event spreading?	National	Highly likely	Major	High	High	Human cases are reported in the Federal District and 15 states. Epizootics are in 21 states and Federal District and. The risk of spread to other countries remains, especially to those bordering Brazil with same ecosystem and suboptimal levels of vaccination coverage. If urban outbreaks occur, there is a high risk of exportation outside of Brazil.
	Regional	Likely	Moderate	Moderate	High	
	Global	Unlikely	Minor	Moderate	High	
Risk of insufficient control capacities with available resources?	National	Likely	Major	High	High	It is not clear whether neighbouring countries have the capacity to effectively manage an outbreak of YF. The requests for additional doses of vaccines to the ICG could affect the global YF vaccine supply and the capacity to respond to new outbreaks.
	Regional	Unlikely	Major	Moderate	High	
	Global	Unlikely	Moderate	Moderate	High	

RA Step 7 & 8

Date and version of current assessment: _____ Led by: CO RO HQ
Date(s) of previous assessment(s): _____
Date of next assessment (if planned): _____

Overall risk (based on information available at time of assessment)

Very high		High		Moderate		Low	
National	<input type="checkbox"/>	National	<input type="checkbox"/>	National	<input type="checkbox"/>	National	<input type="checkbox"/>
Regional	<input type="checkbox"/>	Regional	<input type="checkbox"/>	Regional	<input type="checkbox"/>	Regional	<input type="checkbox"/>
Global	<input type="checkbox"/>	Global	<input type="checkbox"/>	Global	<input type="checkbox"/>	Global	<input type="checkbox"/>

Risk statement

Summary page, [KFD], [LOCATION]

Date and version of current assessment: 08-03-2017 ver.1 Led by: CO RO HQ
Date(s) of previous assessment(s): -
Date of next assessment (if planned):

Overall risk (based on information available at time of assessment)

Very high		High		Moderate		Low	
National	<input type="checkbox"/>	National	<input type="checkbox"/>	National	<input type="checkbox"/>	National	<input checked="" type="checkbox"/>
Regional	<input type="checkbox"/>	Regional	<input type="checkbox"/>	Regional	<input type="checkbox"/>	Regional	<input checked="" type="checkbox"/>
Global	<input type="checkbox"/>	Global	<input type="checkbox"/>	Global	<input type="checkbox"/>	Global	<input checked="" type="checkbox"/>

Risk statement

Since KFD was identified in 1957, the disease had been so far reported from Karnataka, Kerala, Tamil Nadu, Goa, and Maharashtra State. Vaccine has been offering to population in the high risk districts.

Recently there was report of 45 cases including 2 deaths from Sindhudurg district in Maharashtra. Within the region, the likelihood of contracting the disease remains low among local farmers/forest workers. In area frequent visited by visitors, the likelihood of exposure is also low.

Influenza A(H7N9) Outbreak in China

Date and version of current assessment: 1 February 2017

Led by: CO RO HQ

Date(s) of previous assessment(s): -

Date of next assessment (if planned):

Overall risk (based on information available at time of assessment)

Very high		High		Moderate		Low	
National	<input type="checkbox"/>	National	<input type="checkbox"/>	National	<input checked="" type="checkbox"/>	National	<input type="checkbox"/>
Regional	<input type="checkbox"/>	Regional	<input type="checkbox"/>	Regional	<input checked="" type="checkbox"/>	Regional	<input type="checkbox"/>
Risk statement	<input type="checkbox"/>	Global	<input type="checkbox"/>	Global	<input type="checkbox"/>	Global	<input checked="" type="checkbox"/>

The overall risk is considered to be moderate at national and regional level based on the information currently available.

The number of cases reported this season (from November 2016 to January 2017) is higher than in previous seasons for the same period. Cases are reported for the first time from one new province compared to previous waves. More cities and counties are reported with human cases, but these are within previously affected provinces. There are no significant changes in the epidemiology of human cases or the virology to indicate sustained human-to-human transmission.

National level: Since the virus is widely spread in poultry throughout the country, more human cases are expected at the national level. China has sufficient capacity and experience to manage the current outbreak.

Regional level: Spread of infected animals might occur given that A(H7N9) is low pathogenic among birds. Capacity to detect / respond varies among neighboring countries. Although many countries have experience with A(H5N1) and other avian influenza virus outbreaks in humans and animals, H7N9 might be going undetected given low path in animals and some countries might be less prepared (case management, contact tracing, control in poultry) if human cases are detected.

Summary page, Yellow fever, Brazil

Date and version of current assessment: 2017-05-03, v4

Led by: CO RO HQ

Date(s) of previous assessment(s):

2017-01-17 v1, 2017-02-01 v2, 2017-03-19 v3

Date of next assessment (if planned):

Overall risk (based on information available at time of assessment)		High		Moderate		Low	
National	Very High	National	High	National	Moderate	National	Low
Regional	Very High	Regional	High	Regional	Moderate	Regional	Low
Global	Very High	Global	High	Global	Moderate	Global	Low

RISK STATEMENT

Since the beginning of the outbreak at the end of 2016, an expansion of the transmission area and increasing number of suspected and confirmed cases and epizootics have been reported, with a high risk of urbanization in municipalities close to large urban areas. Since March 2017, reported human cases have been decreasing; nonetheless, YF virus transmission persists in certain areas of Espírito Santo, São Paulo, and Rio de Janeiro. Following vaccination campaigns, the strengthening of human and animal surveillance, overall risk level was re-assessed and lowered from very high to high.

Major actions recommended by the risk assessment team

	Action	Timeframe
<input type="checkbox"/>	Urgent public health response required, immediate activation of EMO/IMS mechanism (ERF)	Immediate ⁺
<input type="checkbox"/>	Recommend setting up grading call	Immediate ⁺
<input type="checkbox"/>	Support Member State to undertake preparedness measures	Immediate ⁺
<input type="checkbox"/>	Limited confidence in information available for rapid risk assessment; seek further information and repeat rapid risk assessment	Immediate ⁺
<input type="checkbox"/>	Continue to closely monitor	Continuous
<input type="checkbox"/>	No further risk assessment required for this event, return to routine activities	Not applicable

⁺If ticked, please list immediate actions and identify persons responsible and due dates for each action

Communication

Target audience/ channel	Planned	Shared	First date	Last update
Senior management (eg ExD, RED, WR etc)	<input type="checkbox"/>	<input type="checkbox"/>		
Event Management System (EMS)	<input type="checkbox"/>	<input type="checkbox"/>		
Event Information Site (EIS)	<input type="checkbox"/>	<input type="checkbox"/>		
GOARN secure website	<input type="checkbox"/>	<input type="checkbox"/>		
Disease Outbreak News (DON)	<input type="checkbox"/>	<input type="checkbox"/>		
Public SitRep	<input type="checkbox"/>	<input type="checkbox"/>		
Media talking points	<input type="checkbox"/>	<input type="checkbox"/>		
Other – specify:	<input type="checkbox"/>	<input type="checkbox"/>		

Sample 1

Major recommended actions by the risk assessment team (KFD)

	Action	Timeframe
<input type="checkbox"/>	Urgent public health response required, immediate activation of EMO/IMS mechanism (ERF)	Immediate ⁺
<input type="checkbox"/>	Recommend setting up grading call	Immediate ⁺
<input type="checkbox"/>	Support Member State to undertake preparedness measures	Immediate ⁺
<input type="checkbox"/>	Limited confidence in information available for rapid risk assessment; seek further information and repeat rapid risk assessment	Immediate ⁺
<input checked="" type="checkbox"/>	Continue to closely monitor	Continuous
<input type="checkbox"/>	No further risk assessment required for this event, return to routine activities	Not applicable

⁺If ticked, please list immediate actions and identify persons responsible and due dates for each action

Communications

Target audience/ channel	Planned	Shared	First date	Last update
Senior management (eg ExD, RED, WR etc)	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
Event Management System (EMS)	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
Event Information Site (EIS)	<input type="checkbox"/>	<input type="checkbox"/>		
GOARN secure website	<input type="checkbox"/>	<input type="checkbox"/>		
Disease Outbreak News (DON)	<input type="checkbox"/>	<input type="checkbox"/>		
Public SitRep	<input type="checkbox"/>	<input type="checkbox"/>		
Media talking points	<input type="checkbox"/>	<input type="checkbox"/>		
Other – specify:	<input type="checkbox"/>	<input type="checkbox"/>		

Sample 2

Major recommended actions by the risk assessment team (H7N9)

	Action	Timeframe
<input type="checkbox"/>	Urgent public health response required, immediate activation of EMO/IMS mechanism (ERF)	Immediate ⁺
<input type="checkbox"/>	Set up grading call	Immediate ⁺
<input type="checkbox"/>	Support Member State to undertake preparedness measures	Immediate ⁺
<input checked="" type="checkbox"/>	Seek further information and repeat rapid risk assessment. Available information is limited (for example analysis of most recent samples, virus circulating in neighbouring countries) therefore confidence in the result of the risk assessment is limited (moderate;)	Immediate ⁺
<input checked="" type="checkbox"/>	Continue to closely monitor	Continuous
<input type="checkbox"/>	No further risk assessment required for this event, return to routine activities	Not applicable

⁺If ticked, please list immediate actions and identify persons responsible and due dates for each action

Communications

Target audience/ channel	Planned	Shared	First date	Last update
Senior management (eg ExD, RED, WR etc)	<input type="checkbox"/>	<input checked="" type="checkbox"/>		Weekly Report
Event Management System (EMS)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	2013-04-01	2017-01-24
Event Information Site (EIS)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	2013-04-01	2017-01-24
GOARN secure website	<input type="checkbox"/>	<input type="checkbox"/>		
Disease Outbreak News (DON)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	2013-04-01	2017-01-17
Public SitRep	<input type="checkbox"/>	<input type="checkbox"/>		
Media talking points	<input checked="" type="checkbox"/>	<input type="checkbox"/>		
Other – specify:				
	Tripartite communications	<input type="checkbox"/>	<input checked="" type="checkbox"/>	2017-01-18
	WPSAR publication	<input type="checkbox"/>	<input checked="" type="checkbox"/>	2017-01-18

Sample 3

Major actions recommended by the risk assessment team (Yellow Fever)

Action	Timeframe
Urgent public health response required, immediate activation of IMS mechanism (ERF) to provide support to Brazil	Ongoing
Recommend setting up grading call	Done
Support Member State to undertake preparedness measures	Immediate+
Limited confidence in information available for rapid risk assessment; seek further information and repeat rapid risk assessment	
Continue to closely monitor	Continuous
No further risk assessment required for this event, return to routine activities	Not applicable

+If ticked, please list immediate actions and identify persons responsible and due dates for each action

Communications

Target audience/ channel	Planned	Shared	First date	Last update
Senior management (eg ExD, RD, RED, WR etc)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	9 January	10 March
Event Management System (EMS)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	6 January	25 April
Event Information Site (EIS)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	13 January	3 April
GOARN secure website	<input type="checkbox"/>	<input checked="" type="checkbox"/>	9 February	
Disease Outbreak News (DON)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	13 January	4 April
SitRep	<input type="checkbox"/>	<input checked="" type="checkbox"/>	13 January	9 May
Media talking points	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	2 February	5 May
Other – specify: PAHO epidemiological alert/update	<input type="checkbox"/>	<input checked="" type="checkbox"/>	9 January	2 May

References

- Rapid Risk assessment of Acute Public Health Events –WHO
- Guidance on using the “Rapid risk assessment, acute events of potential public health concern” template
- Emergency Response Framework 2nd Edition WHO

Why should we do risk assessment? (1)

- **Evidence for decision-making: FOR DECISION-MAKERS**
 - Risk-based decisions
 - objective, unbiased treatment of the available evidence in well-organized and easy to understand documentation
 - Evidence links to conclusions
 - Defensible decisions before affected publics and stakeholders
- **Implementation of appropriate and timely control measures**
 - identify evidence-based control measures; rank the suitability and feasibility of control measures
 - ensure that control measures are proportional to the risk posed to public health
 - rapid risk assessment during emergencies offers authorities
 - an opportunity to adapt control measures as new information becomes available

Why should we do risk assessment? (2)

- **More effective operational communication**
 - Using a common risk terminology to improve the operational communication between different levels of an organization and with other sectors and institutions
- **More effective risk communication**
 - Public or crisis risk communication = providing facts and enable population to make informed prevention and mitigation measures.
 - Effective risk communication relies on the timely and transparent sharing of all relevant information, and the building of trust and empathy
- **Improved preparedness**
 - Risk assessment of introduction/importation
 - Or seasonal and recurrent outbreaks (e.g. magnitude of annual cholera or dengue outbreaks in Sri Lanka)

Thank you very much