

## JRC TECHNICAL REPORTS

# Identification of Informative Content Needs supporting Rapid Risk Assessment of Acute Public Health Events (ICN-RRA)

Mantero, J (Dr),  
Doherty, B

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**Contact information**

Name: Brian Doherty  
Email: [brian.doherty@ec.europa.eu](mailto:brian.doherty@ec.europa.eu)  
Tel.: +39 0332 785547

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**D**isaster  
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## **Foreword**

This document is intended to identify the kinds of data which are of particular use to an analyst tasked with creating a Rapid Risk Assessment (RRA) associated with a particular incident or outbreak of an infectious disease. In that sense its scope is limited, but it nevertheless addresses an important first step to improving the whole rapid risk assessment process.

This document does not address methodologies or operating procedures, nor does it provide guidance on these topics. The identification, evaluation and management of data sources for the identified data needs is also not addressed here. The document should provide a signpost for later work to collect, manage, store and make available this data in the most useful way possible.

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### **Authors**

*Jas' Mantero, external consultant*

*Brian Doherty, Directorate E - Space, Security and Migration- Disaster Risk Management Unit (E.1) -European Commission – Joint Research Centre*







## **Abstract**

Risk Assessment is considered a key part of the risk management cycle and can be defined as a mental process aiming to establish a level of risk for a population in relation to a specific event, with the purpose of identifying potential response or mitigation actions. The process is usually expressed in terms of probability of occurrence of an event and of consequences for the involved individuals, and is used in several scientific disciplines.

In public health, Risk Assessment implies an evaluation of a risk in terms of health for a human population exposed, or potentially exposed, to a threat. In case of outbreaks and other acute public health events, the process is commonly defined within the scientific community as a **“Rapid Risk Assessment of Acute Public Health Events” (RRA)** and aims to achieve a particularly prompt identification of action able to rapidly limit the spread of the event and the health consequences for the population.

RRA has become today an inherent component of regular activities of public health entities such as national and subnational health authorities, international health organizations, academies and non-governmental organisations (NGOs). Up until now, there has not been a clear methodological standardization of RRA and the process has mainly relied on individual technical expertise and on internal organizational procedures, which have not always been totally documented. Nevertheless, several current RRA products are based on collaborations between experts from different organizations and there have been recent efforts to share experiences and theoretical understanding of the process. In addition, technical guidance documents on the topic have been recently published by international health organisations, contributing to an increase in common understanding of the main methodological steps.

One of the key foundations of the RRA process is the systematic collection and documentation of reliable information about an event, the related cause, the population exposed and the specific context of occurrence. Experts involved in RRA activities commonly consider this to be a challenging step, as information is frequently limited at initial stages of acute events. Also, there are commonly sudden or unexpected changes, necessitating a continuous gathering of details and data from several sources.

# 1 Introduction

**Risk Assessment** is considered a key part of the risk management cycle and can be defined as a mental process aiming to establish a level of risk for a population in relation to a specific event, with the purpose of identifying potential response or mitigation actions. The process is usually expressed in terms of probability of occurrence of an event and of consequences for the involved individuals, and is used in several scientific disciplines.

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The **Disaster Risk Management Knowledge Centre (DRMKC)** ([DRMKC](#)) is an initiative of the European Commission launched in 2015 to enhance resilience to disasters at EU level. The activities of the DRMKC support the translation of complex scientific data and analyses into usable information and provide science-based advice for decision making purposes, as well as timely and reliable scientific-based analyses for emergency preparedness and coordinated response activities. The overall scope of the DRMKC is to bring together existing initiatives in which science and innovative practices contribute to the management of natural disaster risks. Among other objectives, the DRMKC is required to support EU member states in improving their capacities to reduce risk across multiple hazards and sectors, including global health threats. For this reason, in terms of acute public health events, the DRMKC is currently trying to identify the information useful to support the RRA related to biological hazards (epidemics). The ultimate aim is to create a web-based informative repository openly consultable by member state authorities and other health professionals both in the EU and further afield. This platform aims to include validated multidisciplinary information and an exhaustive list of additional credible informative online sources able to support RRA activities.

The **Joint Research Centre** ([JRC](#)) is the science and knowledge service of the European Commission with the responsibility of supporting EU policies with independent scientific evidence. It has been providing design and development support for many years to national and international health organisations on different steps of the epidemic intelligence process, including epidemic early detection and rapid risk assessment of acute public health events.

## **2 Objective and overall approach**

This document aims to provide a list of informative requirements that may be useful for producing RRA related to communicable disease events with the view to define which information should ideally be included in a web-based repository supporting health professionals in their RRA activity at any level. The list has taken into consideration what has been expressed by the main online technical guidelines commonly in use, as well as specific feedback provided by identified experts involved in RRA activities in different organisations.

The identified recommendations have been complemented and edited by the author who has created a final list. The document does not include an exhaustive list of all the potential reference sources that should be included in the planned web-based repository based on this list, as this aspect will be addressed in the next phase of the process envisaged by the DRMKC. Despite that, some examples of open online sources have been included for each of the informative requirements mentioned for illustration.

## 3 Background

### 3.1 Rapid Risk Assessment of acute Public Health Events (RRA)

Rapid Risk Assessment of an acute public health event (RRA) consists in an overall process of identification, analysis and evaluation of a risk for a defined human population in relation to an acute public health event. The process is performed by health organisations for health emergencies requiring immediate response and aims specifically to define possible actions to be promptly taken in order to control or mitigate the overall health risk for a population. The RRA process is implemented by health professionals in different public health organisations through methodological approaches with less than total standardisation and indeed with some inconsistency in terminology. This document focuses on the identification of informative requirements potentially needed for the finalisation of RRA related with communicable diseases, as epidemics and outbreaks, and does not take into account the different methodological models and terminology aspects in use in the different organisations.

### 3.2 RRA roles and responsibilities at EU level/worldwide

At EU level, the **European Centre for Disease Prevention & Control (ECDC)** is responsible, among other tasks, for producing independent assessment of “risk to human health related to acute public health events associated with communicable diseases and outbreaks of unknown origin presenting an EU relevance”(Decision No 1082/13/EC). This process is performed in collaboration with other institutions, external experts and representatives of health authorities of affected countries. Results of ECDC RRAs are made available initially to the European Commission and EU national health authorities through a secure restricted online platform (the Early Warning and Response System, [EWRS](#)); after that, if no confidential information is present, findings are publicly made available online. In addition to this activity, ECDC supports EU MS health authorities in developing their own risk assessment capacities at national level.

The other crucial public health international actor involved in RRA activities is the **World Health Organisation (WHO)**. In contrast to ECDC, WHO performs this activity in the context of a multi-hazard approach and the risk is evaluated for events requiring immediate response potentially caused by any agent, i.e. biological, chemical, radio nuclear hazards and natural disasters. The WHO process is driven by the revised International Health Regulations ([IHR, 2005](#)) that require countries to develop their own internal RRA core capacities at national and at subnational level. Results of WHO RRA activities are mainly used internally (at regional offices and Headquarters) however part of the information is shared online with the general public, as in case of large epidemics with relevant media attention.

Most of national health authorities inside and outside the EU have developed some level of RRA capability, mainly for national and subnational purposes, as requested by the IHR and other binding international health regulations. However there are countries that, for geographical, political or historical reasons, have developed RRA activities at international level, as for example in the case of the health authorities of France ([Santé Publique France](#)), Canada ([Public Health Agency of Canada](#)) and the United States ([Centers for Disease Control and Prevention](#), US CDC).

Several existing initiatives involving different national and international health organisations aim to strengthen health preparedness and response to health threats,

including promoting RRA activities, with a collaborative approach. Among these, the **Global Health Security Initiative (GHSI)** is an informal international global health partnership launched in 2001 by European Commission, Canada, France, Germany, Italy, Japan, Mexico, UK and US, with the WHO serving as observer: so far, epidemic intelligence has been among the most important areas of collaboration within the initiative, with the definition and implementation of important collaborative projects that include RRA aspects.

### **3.3 EC JRC support to RRA activities**

The European Commission Joint Research Centre ([EC JRC](#)) has a long experience in supporting health organisations on early detection and RRA activities and important collaborations have been built with the World Health Organisation (WHO) and the Global Health Security Initiative (GHSI) in recent years.

The system developed for WHO is the Hazard Detection and Risk Assessment System ([HDRAS](#)) and is used on a daily basis to enhance the capacity of the organization in early detection and monitoring of ongoing public health risks globally. Since this initiative, WHO and EC JRC have signed a Collaborative Research Agreement to promote further cooperation in scientific and technological research activities.

The system developed for the GHSI is the Early Alerting and Reporting system ([EAR](#)), a tool used on a rotating shift basis by members of ECDC and public health institutions of countries involved to identify threats and perform basic risk assessments activities in a collaborative way.

WHO and GHSI members have recognised the benefits to be attained by combining the systems above described at a technical level and ensuring a joint management and development plan. In addition, both communities want to extend the functionality available and expand the user base to potentially include external stakeholders. The ultimate aim of this new initiative supported by EC JRC has been the finalization of a highly efficient system supporting epidemic intelligence in terms of threat detection, event monitoring and also a deeper level of risk assessment process, all in an adaptable way to the needs at national and international level of each organisation. The new system is called Epidemic Intelligence from Open Sources" ([EIOS](#)) and represents an example of how intranational collaborations contribute to building trusted professional relationships among health experts, leading to further initiatives among which joint RRA activities are considered a priority.

### **3.4 Informative Content Needs supporting RRA (INC-RRA)**

When a significant acute public health event occurs, health organisations performing RRA activities need to be able to promptly and appropriately describe key characteristics related to:

1. the possible cause and the specific health condition implicated
2. the affected population
3. the overall context of occurrence of the event.

For the purpose of this document this multidisciplinary informative need is collectively referred as "**Informative Content Needs supporting RRA**" (**INC-RRA**). The rapid availability of reliable and up to date INC-RRA is considered by health professionals involved in RRA activities a relevant and timely objective.



## 4 Methodology

The definition of INC-RRA has been based on a two-step process. The starting point has been a critical analysis of technical reference documents in use among experts at EU level for the definition of their RRA procedures. The informative content needs so identified have been edited and complemented by the author and organised in a draft list of potential topics shared with selected health experts involved in the RRA process at different levels, with the purpose of gathering further technical feedback. Suggestions collected have been integrated and organised in a final list of INC-RRA that has been briefly described and complemented with examples of potential informative online sources.

### 4.1 Informative content needs described in RRA reference documents (step I)

The selection of technical documents has been based on feedback provided directly by health professionals involved in RRA activities through direct contact. The following documents have in addition been considered:

- (a) [ECDC Operational Guidance on Rapid Risk Assessment methodology](#) (finalised by UK HPA experts in 2011)
- (b) [WHO Rapid Risk Assessment of Acute Public Health Events](#) (finalised by WHO experts in 2012)

These documents describe the RRA process from a theoretical perspective and suggest methodological procedures to be implemented; in both cases there is no inclusion of systematic definitions of specific informative requirements to be considered for RRA purposes, however some recurrent topics are expressly mentioned and have been therefore considered for the definition of an initial list of INC-RRA.

### 4.2 Collection of feedback and final list of INC-RRA (step II)

Semi-structured questionnaires (SSQs) are interview formats that combine pre-defined open questions with the opportunity for responders to explore additional themes or add comments. SSQs are considered valid qualitative research tools and are commonly used to describe technical working process functions.

The initial list of INS-RRA defined through the analysis of technical documents (cf. par. 4.1, step I) has been edited by the author and organised in a SSQ format comprising of the following sections:

Section 1: requiring specific feedback on the list (based on personal experience and professional opinion)

Section 2: requiring information about known initiatives on online informative repositories for RRA purposes

The questionnaire has been shared with a selected number of health experts involved at different levels, and within different organisations, in technical aspects of RRA production. These "key informants" have been identified based on a recent documented experience on the topic, and, in particular, on their participation in relevant RRA-related consultations, such as the ECDC 2017 external experts' consultation on RRA (Stockholm - Jan 2017).

A total of 15 health professionals, and/or related teams, have been identified from seven EU MS public health authorities, two non-EU national health authorities, two international health organisations and two international non-governmental organisations (NGOs). The selected experts have received via e-mail an anonymous electronic version of the questionnaire and have been requested to provide technical feedback within a defined time period. Out of 15 teams or individual professionals involved, 13 of them have provided feedback that has been collected, analysed and documented, while ensuring the privacy of respondents. Based on the professional opinions gathered and the previous step performed, a final list of INC-RRA has been defined, and described in detail.

## 5 Results

### 5.1 Initial list of INC-RRA (I step)

In the *WHO Rapid Risk Assessment of Acute Public Health Events Manual* ([WHO-RRA](#)) the process is described as being structured on different components, each referring to a specific domain of information (cf. Fig.1).

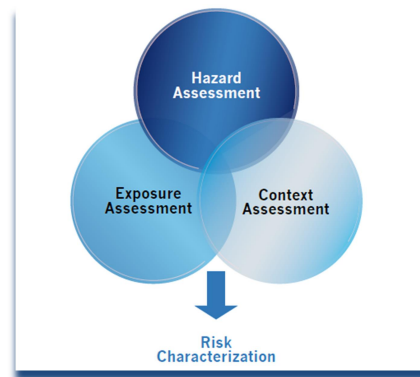


Figure 1: WHO Risk Assessment process visualization (*WHO Manual on Rapid Risk Assessment of Acute Public Health Events*)

The first component described is the “hazard assessment” which should be based on information related to the potential cause determining the event (i.e. the suspected biological agent) and the health effects on the population (i.e. the disease).

The second component is the “exposure assessment” and implies the collection of information useful to evaluate the level of exposure to the hazard of individuals potentially involved.

The last component is the “context assessment” and requires the collection of information enabling the evaluation of the context/environment in which the event has occurred (i.e. external factors). This last domain of information outlined is the most difficult to define as potentially it refers to a very broad range of informative fields, including the physical description and the economic profile of an area as well as aspects more closely related to health such as the quality of the health care system in place. In this regard, the authors make an interesting observation, noticing how RRA experts with medical training such as medical doctors and veterinarians tend to approach their evaluation from a strong medical perspective, underestimating how “external factors” may affect the overall definition of the level of risk, both in terms of likelihood of occurrence and consequences for the population. The WHO does not give a detailed and standardised theoretical description of possible informative requirements for RRA purposes. However, the manual includes an example of information needed for a specific event (i.e. “Japanese encephalitis cases in a non-defined location”). The “exercise” defines the informative needs and applies the approach based on a separate assessment for each of the components described (cf. Tab. 1).

<b>Assessment Component</b>	<b>Informative requirements: general</b>	<b>Informative requirements: Specific</b>
<b>HAZARD</b>	Viral factors	Virus characterization (genotype, neurovirulence; antigenicity, proliferation)
	Clinical factors	Disease presentation; progression; severity
<b>EXPOSURE</b>	Vector factors	Vector distribution; density; host preferences
	Host factors	Infection/disease epidemiology in dead-end hosts (humans, others)
	Host factors	Amplifying hosts distribution and susceptibility (animal)
	Host factors	Human population susceptibility (age, immunity, vaccination status)
<b>CONTEXT</b>	Socio-economic factors	Human population size
	Socio-economic factors	Agriculture and livestock management
	Socio-economic factors	Human behaviours
	Ecological factors	Climate
	Ecological factors	Mosquito breeding sites
	Ecological factors	Amplifying natural hosts (birds)
	Ecological factors	Other animal information (feral pigs)
	Programmatic factors	Health system (access; capacities in terms of ICU, diagnostic, surveillance, vaccination, vector control; financial and human resources)
	Programmatic factors	Political support to response; coordination among sectors

Table 1: WHO Risk Assessment Information requirements for Japanese Encephalitis (adapted from *WHO manual on Rapid Risk Assessment of Acute Public Health Events*)

In the **ECDC Operational Guidance on Rapid Risk Assessment methodology** ([ECDC- RRA](#)) the approach to the process seems to be particularly medical, with a strong focus on disease and potential aetiological agents in terms of informative requirements. The overall process is described in detail in five procedural stages, with collection of information specifically mentioned as an action of stage II (“to perform structured literature search/systematic collection of information about the potential agent”). The INC-RRA are generically referred as “information useful to answer the key questions previously defined” (cf. Tab.2).

<b>Assessment Component</b>	<b>Informative requirements (general)</b>	<b>Informative requirements (specific)</b>
<b>DISEASE INFORMATION and DETERMINANTS</b>	Occurrence	In time, place and among persons
	Occurrence	Route of introduction
	Occurrence	Seasonal/temporal trends
	Occurrence	Reservoir
	Occurrence	Previous outbreaks/incidents
	Susceptibility	are specific risk groups at increased risk of exposure/infection
	Infectiousness	Incubation period; period of communicability; length of asymptomatic infection; reproductive rate
	Clinical presentation out	Severity: morbidity, mortality and case fatality; complications/sequelae; groups at increased risk of severe disease/complications
	Laboratory	Tests available; test specifications and limitations
	Treatment and control measures	Treatment efficacy; prophylaxis; other control measures

Table 2: ECDC check list for basic disease information determinants for Rapid Risk Assessment (adapted from *ECDC guidance on rapid risk assessment methodology*)

Despite the absence of a specific reference to information requirements on external factors, ECDC guidance mentions the need to refer to two additional informative domains to “better define” the risk (cf. Tab. 3):

1. the concrete availability of effective treatment and control measures;

2. other “contextual factors”, defined as “all other external factors not directly related to the hazard that do not alter the risk in absolute terms but may alter the perception of the risk and should therefore be flagged up”.

Assessment Component	Informative requirements (general)	Informative requirements (specific)
<b>CONTROL MEASURES AVAILABILITY</b>	Control measures	Treatment available in place and/or deliverable
	Control measures	Prophylaxis available in place and/or deliverable
	Feasibility	Amplifying hosts distribution and susceptibility (animal)
	Acceptability	Human population susceptibility (age, immunity, vaccination status)
<b>CONTEXT</b>	Contextual factors	Public perception
	Contextual factors	Media interest
	Contextual factors	Political/economic issues
	Contextual factors	Special circumstances (e.g. mass gathering, tourism)

Table 3: ECDC check list for Control Measure Availability and Contextual Factors for Rapid Risk Assessment purposes (adapted from *ECDC guidance on rapid risk assessment methodology*)

## 5.2 Final list of INC-RRA (II step)

The purpose of this document is to provide a comprehensive list of informative needs that may be useful to assess a risk in terms of health for a population potentially exposed to an acute public health event of biological origin such as outbreaks and epidemics in general (INC-RRA). The list suggested is based on a simple classification of potential common informative topics without any judgment on their specific relevance, as this may vary in each RRA depending on factors such as the nature of the event, the location and the organisation performing the evaluation.

Considering that INC-RRA covers potentially a large spectrum of domains that may overlap, it has been chosen to classify them following a theoretical descriptive model frequently used in epidemiology to describe infectious disease causation called the “epidemiological triangle” (cf. Fig.2). This approach allows a practical and understandable listing of informative requirements for RRA purposes and takes into consideration an external “**agent**”, a susceptible “**host**” and an “**environment**” (or context). Following this approach, a **disease** is the result of the interaction between a pathogen (agent) and

an individual (susceptible host) in presence of a situation supporting the transmission of the agent from the source to the host (conductive environment/context).

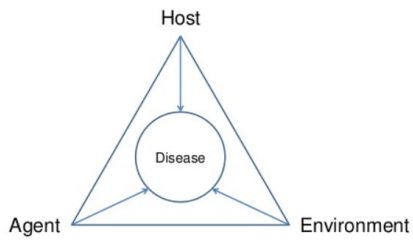


Figure 2: The epidemiological triangle

What follows (cf. Tab. 4) is the final list of INC-RRA identified and classified using an epidemiological triangle descriptive approach. A more detailed description of each component follows in the next paragraphs (cf. paragraphs 5.2.1 and 5.2.2).

<b>Assessment Component</b>	<b>INC-RRA (general)</b>
<b>AGENT and DISEASE</b>	Agent and disease background
	Disease epidemiological profile – Worldwide
	Disease epidemiological profile – Local
	Expertise (subject matter experts)
<b>HOST</b>	Population demographic profile
	Population health status
	Social and cultural aspects related to health and health condition
<b>CONTEXT</b>	Human health care system
	Animal health sector
	Medical entomology
	Geophysical profile
	Climate information
	Infrastructures
	Economy
	Social-Political Information and other cultural aspects

Table 4: Final list of INC-RRA identified



### **5.2.1 Agent/disease assessment**

For practical reasons, in our classification Agent and the related Disease are considered to be in the same domain of information and refer to the biological characteristics of the infectious microorganism potentially involved and to the basic description of the related health condition that may occur.

It appears from the technical documentation considered and from the feedback collected that this component is a key informative domain and needs to be analysed rapidly; health experts report that these details are in most of cases easily accessible from known and reliable online sources but there is a need for a quicker identification and visualization (e.g. maps, graphics) of the information needed for RRA purposes only. Public health experts tend to rely on official medical literature and disease/specific online fact sheets posted by international public health organisations. This information is frequently very detailed and comprehensive and ideally should be abridged, or easily filtered for specific informative needs related to the specific situation assessed. In addition, it should be clear whether or not the details refer to recent updates (i.e. through the inclusion of last revision dates) and what are the main scientific references used.

When necessary, for example in case of health conditions with a limited number of publications available or for diseases with recent or unpublished scientific findings, the information should be complemented by reliable scientific and research documentation outside the traditional publishing distribution channels. This production is generally referred to as "grey literature" and includes research material, reports from health authorities and other stakeholders active in the health sector, working papers, evaluations and more. Even though the quality of grey literature varies significantly, its use is becoming relevant for RRA purpose and must be considered with all the necessary precautions, starting from a selection of reliable sources. The specific informative domains related to the agent and the disease are described in detail below (cf. Tab. 5 and following paragraphs).

<b>Assessment Component</b>	<b>INC-RRA (general)</b>	<b>INC-RRA (specific)</b>
<b>AGENT and DISEASE</b>	<b>Background</b>	<u>Agent characterization</u> (nature, pathogenicity, virulence, transmission and diagnosis)  <u>Disease characterization</u> (presentation; severity; case management, prognosis; public health response and mitigation options)
	<b>Epidemiological profile – Worldwide</b>	Overall picture (endemic areas, recent significant outbreaks)
	<b>Epidemiological profile – Local</b>	Local picture (most recent data available, surveillance in place)
	<b>Expertise</b>	Mapping of specific expertise on agent and/or disease

Table 5: INC-RRA for agent and diseases assessment purposes

### **5.2.1.1 Disease background**

The information about Agent and Disease requires detailed and continuous monitoring of publications and documentation, with a special reference to available data (epidemiological profile) and new scientific articles covering crucial public health aspects (e.g. diagnosis, case management, control measures).

The first aspect to be covered is a basic description of the potential bioagent and includes specific details on its nature (bacterial, fungal, viral etc), pathogenicity (capacity of producing the disease), virulence (capacity of causing damage in a host), transmission (modalities within and between species, reservoirs, carriers and potential risk groups), circulating strains and available diagnostic possibilities.

The information needs then focus on the clinical presentation of the related disease, with an exhaustive description of clinical features (signs and symptoms described in literature) and severity. This second aspect is particularly relevant in terms of RRA and refers to literature and recent documentation about the impact of the disease on human population. Information about available treatments and prognostic factors need to be included together with details on documented options for public health response and mitigation actions (e.g. vaccination, vector control activities, isolation measures etc.). Finally, the chapter needs to include information about the available public health control measures, possibly with examples of recent applications.

There are several examples of online factsheets on infectious disease, that in most cases include details on the latest epidemiological update available (e.g. [WHO fact sheets on Infectious Diseases](#); [ECDC Infectious Disease and Public Health facts](#); [US CDC Diseases](#)

[and Conditions](#) ). The information taken from these sources should be the essential, including only basic details, but giving the opportunity to explore more deeply in the original sources (e.g. including links to further online documentation).

#### **5.2.1.2 Disease general epidemiological profile**

This component refers to specific data on the disease occurrence, mainly in terms of morbidity and mortality, in order to have an overall picture of the epidemiological situation.

The availability of epidemiological information varies significantly depending on diseases and locations due to several factors including local surveillance capacities and effective data access. Despite that, an effort should be made to gather all existing official information sources that may support the definition of endemicity and recent significant epidemiological changes in time in the area under observation (outbreaks).

The epidemiological information used for this purpose refers mainly to supranational databases including official data consultable online such as for the [WHO Global Health Atlas](#) and databases of public health organizations with specific geographic coverage (e.g. [ECDC annual epidemiological reports](#) for the EU). In addition, several national and subnational health authorities provide this kind of information for their specific area of responsibility.

Some recent initiatives have tried to gather and organize this information from different official sources in order to improve the overall accessibility, as in the case of the [Global Health Data Exchange](#) initiative, a project of the Institute for Health Metrics and Evaluation.

Due to the need for information to be as recent as possible, the reference to official epidemiological databases needs to be complemented by basic descriptions of recent significant outbreaks/epidemics not yet officially documented. For this purpose, a selection of reliable sources complementing official surveillance systems should be considered and include rapid publications online (e.g. [Eurosurveillance](#) Rapid Communications and e-alerts), situational reports from organizations (e.g. [ReliefWeb](#) platform) and online reports provided by specific technical networks specifically dedicated to the dissemination of information on recent acute public health events (e.g. Program for Monitoring Emerging Diseases, [ProMED](#)).

#### **5.2.1.3 Disease specific epidemiological profile**

This component is strongly related to that described in the previous section but refers to specific countries and areas of occurrence of an event, or neighboring regions. It would include, in addition to details about recent outbreaks such as morbidity and mortality data, information about circulating strains at local level.

When it comes to the assessment of a health condition at local level the need for close to real time information becomes particularly relevant and the role of complementary surveillance data, including details both unconfirmed and officially reported, becomes crucial to characterize the risk in time. This is why, in addition to the internet-based sources already mentioned, particular attention should be dedicated to the presence of in situ local surveillance systems (e.g. syndromic early warning platforms such as the [WHO](#)

[EWARN in Iran](#)) and documentation from other health actors active at local level (e.g. NGOs reports).

#### **5.2.1.4 Disease Expertise**

The inclusion of a directory of experts by disease (i.e. a list of subject matter experts) would be ideal within an informative online repository for RRA purposes as it would promote collaboration among organizations on some of the most technical aspects of the process. The expertise could refer to any technical aspect of the disease including prevention, case management, public health response and control activities. Laboratory diagnostic possibilities would be a particularly interesting topic and a list of reference laboratories by disease is highly recommended.

Having a list of disease specific experts for RRA purposes is difficult for several organizational and historical reasons, however the fact that in recent years there have been relevant examples of RRA collaborative initiatives suggests that building a virtual space allowing experts to express, on a voluntarily basis, their availability to contribute to RRA tasks, should be at least considered.

The organization of a list of subject matter experts available for RRA purposes would need the development of specific rules in terms of enrollment and participation at local and/or international level: for the purpose of this document, we are only expressing this need at a conceptual level.

#### **5.2.2 Host assessment**

The information useful for RRA purposes with reference to “host assessment” refers in our approach to informative requirements related to the human population that may be exposed to a pathogen. More specifically, it refers to a large variety of factors intrinsic to the host and able to influence exposure, susceptibility and response to the causative agent. For practical reasons, the INC-RRA related to this component have been classified in three main informative domains, as summarised in the table below (cf. Tab.6).

<b>Assessment Component</b>	<b>INC-RRA (general)</b>	<b>INC-RRA (specific)</b>
<b>HOST</b>	<b>Population Demographic profile</b>	Demographical characteristics; identification of vulnerable subgroups; population movements
	<b>Population Health Status</b>	General health baseline (selected indicators); latest relevant public health events occurred
	<b>Social and cultural aspects related to health condition</b>	Disease perception and stigma; social, anthropological and cultural aspects related to health, disease, illness, health care and service

Table 6: INC-RRA for host assessment purposes

### **5.2.2.1 Population demographic profile**

The basic demographic profile of a population is an important informative component to define a health risk for individuals potentially exposed to a disease. There are several types of data that may contribute (cf. Fig.3) although only a few are crucial for RRA purposes. The following is a list of potential useful demographic data sets and can refer to real or estimated values:

- Population size
- Population density
- Birth and death rates
- Age distribution (following defined age groups)
- Sex ratio
- Urban and rural composition
- Recent internal population movements (e.g. migrations for political, economic social reason)
- Other population movements, including tourism, air traffic, mass gatherings etc.

These data allow the calculation of useful public health indicators such as Crude Birth Rate (CBR), Women of Reproductive Age and Fertility Rate. They also allow the identification of subgroups within the population considered at risk for defined conditions, namely risk groups, such as, for example, the under five years old population (U5) and minority groups (e.g. for ethnic or religious reason).

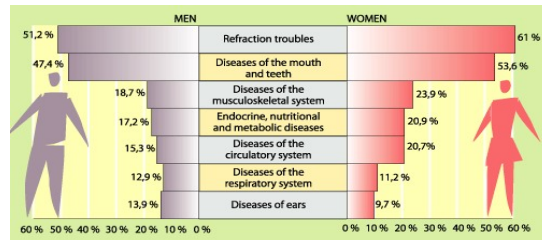


Figure 3: Example of demographic data (visualisation)

The quality of demographic information varies dramatically by location in terms of availability, reliability and timeliness. Several international organizations (such as the [United Nations Statistics Division](#) and [The World Bank](#)) regularly publish this data, collecting information through different mechanisms including estimations based on historical data, censuses datasets and other official publications of authorities at national level (e.g. national statistical offices). In some cases, this information will not reflect a dynamic change driven by, for example, localised socio-political events. In these cases, specific data concerning rapidly evolving indicators, such as regional population migration patterns, may be crucial. Where a risk assessment is being attempted on a complex emergency of this type, it could be necessary to refer to online reports made available by specialized international organizations such as FAO (cf. [FAO Atlas of Rural Migration in sub-Saharan Africa](#)) and IOM ([International Organization for Migration](#)).

Another important aspect to consider in terms of demography requirements for RRA purposes is the need for information at local level in areas with limited availability of data. In this case it may be necessary to rely on alternative sources such as surveys implemented by NGOs active locally.

### 5.2.2.2 Population health status

A population health status can be generically expressed as the description of the health outcomes of a defined group of individuals and includes, ideally, the distribution of such outcomes within the population observed. In terms of RRA, this information is relevant as it contributes in the definition of the level of vulnerability and susceptibility to an acute disease of individuals potentially exposed to a pathogen.

The identification of data describing the health profile of a population is difficult to predefine in terms of usefulness for RRA purposes as it may depend on the specific hazard assessed and require ad-hoc searches from several data sources. Despite that, a set of generic indicators defining the health baseline should be identified and be based on data describing key information, as:

- Morbidity (main causes of disease)
- Mortality (main causes of deaths including population rates, as U5 mortality)
- Live expectancy
- Nutritional status (using international case definitions)
- Reproductive health indicators (e.g. maternal mortality)
- Vaccine coverage for different Vaccine Preventable Diseases (VPDs)

Several initiatives aiming to describe country health profiles have been launched worldwide for different purposes and with different approaches taking into consideration the variability of health patterns and data available in different areas of the globe (cf. Fig. 4).

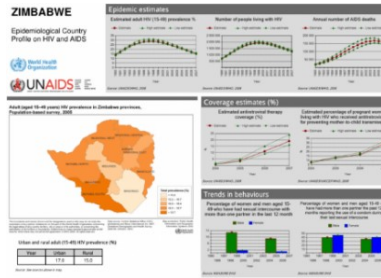


Figure 4: Example of population health status data (source UNAIDS)

The WHO, for example, describes countries in terms of health status in all WHO regions using a predefined set of statistical health related indicators that have been set up to monitor progress towards the Sustainable Development Goals (cf. [WHO Global Health Observatory Gateway](#)). At EURO level there is an initiative that considers a subset of core indicators agreed by WHO EURO Member States as being the most important to monitor progress towards the [WHO EURO Health 2020 targets](#), and based on both WHO and non-WHO data.

Another recent interesting attempt is the [State of Health in the EU project](#) launched by the European Commission in collaboration with the Organization for Economic Co-operation and Development ([OECD](#)) and the [European Observatory on Health Systems and Policies](#). This latter initiative aims to define concise individual country health profiles for each EU MS taking into consideration, in addition to population health status, defined health determinants and data describing health system organization, effectiveness, accessibility and resilience.

Initiatives aiming to collect data describing the health status of populations have also been launched by academic actors, as in the case of the University of Washington Institute for Health Metrics and Evaluation ([IHME](#)). This is an independent global health research centre that gathers and publishes online open health-related data (The Global Health Data Exchange, [IHME GHDx](#)) using over 100,000 different verified sources.

For the purposes of this document, it is suggested to consider a set of common indicators defining the basic country health profile using available quantitative and qualitative data. This information would need a level of flexibility in relation to specific contexts and would explicitly not be meant to be exhaustive. For this reason, links to additional online data sources for ad-hoc data analysis needs should be considered.

### **5.2.2.3 Social and cultural aspects related to health/disease**

The use of the available health services by a community within a country is strongly influenced by factors related to the health care service itself (e.g. costs, distances to health facilities and staff capacities, cf. paragraph 5.2.3.1). There are, however, other aspects related to the population and to individual profiles that could have an impact, such as education, cultural beliefs and past experience in relation to a disease. All these can be generically referred as health seeking behaviours and may be particularly relevant in specific circumstances (e.g. rural remote populations) when seeking to provide a better definition of the health risk related to an acute public health event.

Another interesting aspect in terms of the impact of socio-cultural factors on health is how health conditions are perceived in a population in general and individually, regardless of the scientific evidence. While “disease” is a term specifically used to provide an objective and scientific description of a physiological or mental disfunction, there are other terms used to define concepts that may vary significantly in a population in relation to a health condition. “Sickness” can be expressed as a social or cultural interpretation of a disease and refers to how this is perceived in general by a population and to the state of related social dysfunction: in defined contexts there may be a particularly negative reaction to a specific health condition, such as feelings of fear, rejection, stigma or even denial. The term “illness”, on the other hand, refers to a subjective experience of a disease and can be described as a personal perception in terms of symptomatology: the fact that significant differences in terms of disease perception exist should be considered as this may systematically influence, for example, what patients report to health professionals in terms of symptoms experienced and have consequences in terms of detection, diagnosis and prognosis.

The relevance of social-cultural and anthropological factors in terms of RRA is highly depended on the place of occurrence of an event. It may have a specific impact in the case of remote and isolated cultures that do not reflect common patterns described in most of countries. An example of a document analyzing such aspects in a specific country for a defined health condition is a chapter of a book describing AIDS perception in a population of Haiti. The documentation available on this topic may be limited as this is information based on qualitative ad-hoc studies and surveys not routinely collected. Despite this difficulty, there are several online sources that may be helpful and can be identified through regular medical libraries.

### 5.2.3 Context assessment

The fact that this component has a potential impact on population health is governed by the principle of “determinants of health” that expresses how health status is influenced by complex interactions between individual factors (e.g. genetic and behavioural) and external aspects not always under the direct control of individuals (cf. Fig. 5).



Figure 5: Determinants of health (visualisation)

For practical reasons it has been decided to use the term “context” (and not “environment”, as for most epidemiological descriptive purposes) to refer to all the “external factors” that may affect either the agent capacity to infect or the host opportunity of exposure. This approach excludes all aspects clearly related to the biological cause of the disease or to the host and includes, among others, health care system and physical-environmental factors (cf. Tab.7).



<b>Assessment Component</b>	<b>INC-RRA (general)</b>	<b>INC-RRA (specific)</b>
<b>CONTEXT</b>	<b>Human Health care system</b>	Health services availability and access; health care staff; health packages and specific health policies; drugs; vaccines
	<b>Animal health sector</b>	Animal health baseline information with a specific focus on zoonosis; animal health sector and link with human health
	<b>Medical entomology</b>	Competent vectors population ; entomological surveillance
	<b>Geophysical profile</b>	Basic information on geographical and geological related aspects
	<b>Climate information</b>	General information on relevant climatic related aspects as climate, description of seasonality, risk of droughts etc.
	<b>Infrastructures</b>	Basic details facilities and systems including road communication, water supply, sewers, electrical grids, telecommunications.
	<b>Economy</b>	Economical country profile, including processes and working activities
	<b>Social-Political-Cultural</b>	Political profile; stability and security aspects; other cultural information

Table 7: INC-RRA for environment assessment purposes

### **5.2.3.1 Human health care system**

A health care system can be defined as the system of resources, including human expertise and institutions, that is responsible within a community for the delivery of services aiming to improve, maintain or restore the health of individuals. It implies, in addition to individual medical care, different levels of health promotion and prevention activities within the community. Health care systems today differ widely in their function and organizational management by country as each nation has built over time its own, in accordance to specific needs expressed, to resources available and to social-cultural factors.

The health care system has a crucial role in the context of an acute public health event as it has a direct role in the health outcomes of the affected population. For RRA purposes, the most important point of interest regarding the health care service provided is the first level of contact that individuals, families and communities have with the service, in particular general practitioners, hospitals and other health facilities. There are several other aspects pertaining to the complexity of a health care system that may be

considered. Here is list of topics that may be relevant to analyze, ideally at national and subnational level:

- Health system model (including details on public and private sector and partnerships; cf. Fig. 6)
- Health facilities availability, capacity, maintenance and access (i.e. health facilities assessment)
- Health staff (presence and capacities)
- Curative measures in place including minimum health package and Primary Health Care activities
- Drugs program (policies, availability, use and accessibility)
- Vaccination program (availability, immunization strategies e.g. routine and reactive campaigns)
- Health Prevention and Health Promotion activities
- Public Health response capacities (auto assessment e.g. IHR, JEE; recent examples)
- Diagnostic capacities (laboratory capacity and capability, biosafety level)
- Vertical health programmes
- Specific national health policies (e.g. on abortion, quarantine etc.)
- Health data organization and flow, notification system
- Infectious disease surveillance capacities
- Event based surveillance capacities
- Response measures in place
- Assistance to specific target group (e.g. IDPs, victims of violence)
- Other health actors (e.g. charity, NGOs, academies, international agencies, traditional medicine)
- Welfare system and social safety net

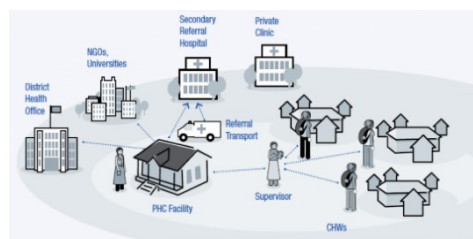


Figure 6: Health system model (visualisation)

The structural information about a health system, such as the model and the health facilities in place, is usually available online at national level from health authorities (e.g. [National Health Facility Registry - Philippines](#)) or from international health organizations (in this case usually organized within country profiles information, e.g. WHO country profiles). The information may be neither sufficiently fresh nor detailed to assess a situation at local level: complementary local details may be needed and be extracted

from ad-hoc health facilities assessments performed by other health actors as NGOs or international organizations.

At international level the Joint External Evaluation initiative (JEE) is a voluntary and collaborative process which aims to assess several indicators related to the health system of a country. It uses a multi-sectorial approach, in order to define the overall status of the system, the progress in achieving targets defined by the WHO revised International Health Regulations (IHR, 2005) and recommendations for priority actions to be taken across all the different technical areas evaluated. The initiative allows countries to prioritize actions needed to improve their health system and to identify opportunities to enhance their preparedness and response capacities. The results collected are intended to be updated systematically and reports are made available online (more information at: [JEE mission reports](#)). This initiative represents an important example of the provision of accessible information to assess the health system of countries. In addition, for some specific technical areas within the health system, there are ad-hoc evaluations documented online that can be consulted.

It should also be considered that there are other relevant initiatives aiming to collect accurate information through participative based approaches in real time about health facilities, such as contact details, validation of facility locations and more general health care related data. This information, despite not commonly being validated and relying mainly on community initiatives, may represent a relevant complementary source of information in situation where details about health facilities are limited or not up to date (e.g. [HealthSites](#)).

#### **5.2.3.2 Animal health sector**

Today, the fact that the human and animal health sectors are strongly interdependent and closely bound to the related living environment is a concept considered crucial to improved understanding of the public health risk for a defined population, especially in relation to infectious disease events. Medicine and Veterinary science are disciplines that have historically developed separately and built clearly distinct professional profiles, with limited interaction. This has been recently addressed as an important challenge in terms of public health and several initiatives are in place to bridge this divide.

For example, the “One Health” initiative has been developed in recent decades to create a more collaborative approach among experts in human, animal and environmental health in order to achieve better public health outcomes. The area of infectious diseases, among others, needs particular consideration within this initiative due to the fact that zoonosis (i.e. diseases transmitted from animals to humans) have a key role in epidemics; in addition, animal populations can play an important role in the spread of diseases being mainly of human interest, for example contributing in the for circulation or covering a role of reservoir for some pathogens.

Information collected on animal health for RRA purposes should cover primarily details on the generic animal health profile and focus on the epidemiology of zoonosis of particular risk for humans; it should include data on endemic diseases and historical summaries of recently occurred outbreaks. This information may be available from national authorities’ sources although the most relevant web-based repositories are official databases developed by international animal health organizations such as the World Animal Health Information System of the World Organization of Animal Health ([OIE WAHIS](#)). This source provides free access to data provided directly by OIE Members in real time, following defined submission regulations, and includes an early warning system for a selected list of conditions requiring immediate action. Other international organizations collect animal health data only historically as in the case of the Animal Disease Notification System ([ADNS](#)) of the EU.

In terms of non-notifiable animal diseases, scientific publications and grey literature should be considered. At local level it would be relevant to understand how the animal

health system is organized and which forms of interaction or collaboration (formal and informal) with the existing human health system are in place.

### **5.2.3.3 Medical entomology**

Medical entomology deals with the study of arthropods of medical importance, meaning insects and other invertebrates able to cause diseases in humans, either directly, or as vectors of pathogens. The importance of medical entomology in terms of acute public health events is related to the role of some vectors, such as mosquitoes, ticks and flies in the transmission of specific infectious diseases. These conditions, called vector-borne diseases (VBDs), cause every year more than 700,000 deaths and include, among others, diseases particularly important in terms of public health such as malaria, dengue and yellow fever.

Medical entomology studies the ecology and the biology of the vectors implied in VBDs in order to understand their role in the transmission and to learn more on vector breeding sites, biting and resting habits. This information is important for the implementation of effective vector control activities and is normally documented through publications that are translated in public health activities.

For the purpose of a RRA, the most important information to collect in terms of medical entomology is the local presence (population, density) of vector species able to transmit VBDs to humans. Entomological surveillance activities consist in the systematic monitoring of such data and can help to predict outbreaks, understand the risk of propagation of VBDs within a population, and to evaluate the impact of vector control measures implemented. Data about ongoing surveillance activities are openly accessible on the web in some cases from national health authorities' sources and from ad-hoc studies and publications. However, several initiatives at international level are trying to consolidate this information in maps and unique informative repositories (e.g. the [ECDC Surveillance Platform for Disease Vectors](#)).

### **5.2.3.4 Geophysical profile**

The geophysical description of a context of occurrence of an acute public health event may not seem particularly relevant in terms of RRA. However, in some situations, basic information about geographical, geological and other related aspects may be useful, particularly at local level. A description of the physical context could include details on several key aspects, among others:

- Territorial characteristics and land use (presence of forests, mountains, agricultural areas),
- Water sources (including natural safe water access)
- Quality of air and environmental issues (pollution, other environmental risks e.g. chemical exposure)
- Natural risks (e.g. risk of flooding, hurricanes)

All these details help in the definition of a specific physical context and some of them may be particularly relevant in specific situations. For example, it would be important to know about available water sources and related safe water access in case of a severe water-borne disease, such as cholera, in a rural context. It may also help to gather information more related to the population habits that may have an impact on the spread of a disease, for example housing characteristics.

This information is normally included in country profiles updated online by international organizations, as [World Bank country profiles](#) and CIA ([CIA World Fact Book](#)). Because ideally the most useful information for RRA purposes is related to the local context, it may be necessary to rely in some situations on additional sources of information such as reports and documentation from local authorities and other actors as NGOs. The

repository should include easy access to maps and other GIS material provided by organizations such as [OCHA Maps & Infographics](#) and including local detail of geographical information.

#### **5.2.3.5 Climate information**

Climate meteorological information refers to all data describing a geographical region in terms of weather-related aspects and includes data on climatic seasonal variability, temperature and precipitation profile, risk of drought and other weather-related emergencies such as storm and flooding.

Climate factors indirectly affect some of the most important determinants of health such as air, water, food, and shelter, thereby influencing the occurrence and spread of infectious diseases. Several climate related indicators are used for epidemic early warning purposes, such as seasonal forecasts of temperature and rainfall, but can also be used as part of the estimation of the likelihood of spread of an ongoing outbreak, necessitating real-time monitoring of data.

For the purpose of a RRA, climate information may be relevant for some aspects of the characterization of a health risk and in the definition of the most appropriate response options. It should be defined as much as possible locally (i.e. referred to the place of occurrence of the event) and be available in close to real time. Collaborations between climate and health experts are limited and therefore most of the data available online is based on historical climate documentation (i.e. data from previous years). In several countries, collection and provision of climate information is a responsibility of the national meteorological service ([World Meteorological Organisation, National Services](#)) but data provided vary significantly in terms of quality and level of detail.

#### **5.2.3.6 Infrastructure**

“Infrastructure” is a generic term used to describe the fundamental physical facilities and systems serving a defined area and providing commodities essential to allow societal living conditions, including a functioning economy. It is typically used to describe transportation structures as roads, bridges, tunnels and inland waterways but may refer to any other technical installation such as water supply, sewers, electrical grids and telecommunication services.

The condition of the infrastructure in a region can have a role for the community in terms of daily activities and in the quality of life; the related impact on health is determined, among other factors, by the influence on access to health care and on a potential role in the spread of certain diseases.

The information about infrastructures is normally available either online at national level or provided by international organizations that make use of several sources of data. The World Bank, for example, gathers this information in detailed country profiles ([WB infrastructure databank](#)) that consolidate the best available metadata. Information about infrastructure in most middle and high-income countries is available online at national and possibly at subnational level from a variety of sources. On the other hand, in low-income countries the information online is usually very limited, especially at local level. If direct observation is not possible, it may be necessary to refer to online documentation provided by organizations such as NGOs.

#### **5.2.3.7 Economy**

In general, the economical profile of a defined region can form part of the definition of a community profile. If a population is exposed to an acute public health event, the level of the economy may influence the characterization of the overall risk. The main information required would be an evaluation of the population in terms of (absolute/relative) poverty, living conditions (housing), state of employment and working conditions. At a general

level it is important to know about the financial resources of a community and its economic resilience.

For the purpose of an RRA, the contribution of economic details may not seem particularly relevant. However, it influences the capacity and of a community to react to an acute public health event and to prioritize external intervention.

Information describing the economy of countries is commonly available online, as it is classified at national level by several organizations following defined standard indicators (e.g. [EUROSTAT database](#)). It is more difficult to gather such information at subnational level and it may require, if no direct observation is possible, a reliance on documentation provided by non-official actors and NGOs.

#### **5.2.3.8 Socio-Political Information and other cultural aspects**

When assessing the risk associated with an acute public health event, the socio-political stability of the region is a key concern: if the internal stability and security of a country is compromised, so is its ability to respond in an effective and timely manner. For this reason a regular collection of information on security, government effectiveness and the legal system of a country may be helpful in the final definition of a RA

There are several online systems providing basic, frequently updated information on the socio-political situation. The information is frequently organized in country profiles that are regularly updated and rely on national media monitoring and official communications from national authorities (e.g. [BBC country profiles](#)). In addition, there are reliable websites collecting socio-political information attempting to provide real-time monitoring. These sites use a broad range of documentation that includes grey literature such as online reports collected from local authorities, UN and other international organizations, local and international NGOs and any other actors active at local level (cf. [ReliefWeb](#)).

## **6 Conclusions and next steps**

This document reflects the need expressed by EC JRC to define a comprehensive list of Informative Content Needs for Rapid Risk Assessment of Acute Public Health Events purposes (INC-RRAs). The intention of this initiative is to assess the feasibility of creating in the future a repository of information, openly consultable online to support experts involved in RRA activities at any level. Any implementation of this repository must minimize any duplication with other similar international projects and for this reason all opinions and suggestions from external health actors will be considered carefully during the coming months. Defining a list of INC-RRA is the first procedural step in the process and has been performed based on feedback provided by relevant public health experts involved in RRA activities and on a careful analysis of current relevant technical documentation. Nevertheless, the list does not aim to define any international standard to be followed and has been finalized only for the purpose described.

The most important aspect that has become clear through this initiative is that, in the context of a possible repository for RRA purposes, there should be better coordination to avoid duplication of work among experts involved in RRA activities and a more collaborative approach to the overall process. For this reason, a future web-based repository should include an exhaustive documentation of risk assessment reports produced by different organizations that are made openly available to the public. In addition, data and links to valuable online information should be provided, organized along the lines of the INC-RRA sections defined.

This document should be considered a technical starting point within the overall initiative. In particular, the fact that only events due to Infectious Diseases have been considered so far does not mean that a multi-hazard approach could not be defined later on, especially if there is a recognized added value for potential users. From the point of view of the JRC, the next step of the process (2018) will be the definition of a comprehensive first list of potential online information sources able to cover the INC-RRA here described. This list will rely mainly on online, openly available information but may be complemented by documentation and data not accessible online and provided by external actors.

For this reason, one of the most important aspects that will need to be considered in the coming months is the definition of potential roles and responsibilities of institutions such as public health organizations, and health authorities in general, in terms of maintenance of the information included in such a repository. With respect to this aspect, it should be considered that participation in any future system will be voluntary and health authorities would not be responsible for any informative contents, as the plan is to create a virtual space where open online information useful for RRA purposes is made available. Nevertheless, it is possible that once the plan of the repository is better defined, countries or other actors may feel the need to have a role in the validation or review of the included contents referring to their area of responsibility within their institutions.

Before any final decision about the repository functions, further work will be needed to better define the requirements and assess the possible commitment of stakeholders potentially involved in the initiative.





## References

### EU European Commission

- Disaster Risk Management Knowledge Centre website: <http://drmkc.jrc.ec.europa.eu/>
- European Commission Joint Research Center (EC JRC) website: <https://ec.europa.eu/jrc/en>
- State of Health in the EU, EC EU project: [https://ec.europa.eu/health/state/country\\_profiles\\_en](https://ec.europa.eu/health/state/country_profiles_en)

### EU legislation on surveillance, epidemic early warning and risk assessment

- Decision No 1082/2013/EU (22 Oct 2013) on Serious Cross-Border Threats to Health: [https://ec.europa.eu/health/sites/health/files/preparedness\\_response/docs/decision\\_serious\\_crossborder\\_threats\\_22102013\\_en.pdf](https://ec.europa.eu/health/sites/health/files/preparedness_response/docs/decision_serious_crossborder_threats_22102013_en.pdf)
- ECDC main webpage: <https://ecdc.europa.eu/en/home>
- ECDC Infectious Disease and Public Health facts: <https://ecdc.europa.eu/en/infectious-diseases-public-health>
- ECDC Operational guidance on rapid risk assessment methodology (ECDC technical document), 2011: [https://ecdc.europa.eu/sites/portal/files/media/en/publications/Publications/1108\\_TED\\_Risk\\_Assessment\\_Methodology\\_Guidance.pdf](https://ecdc.europa.eu/sites/portal/files/media/en/publications/Publications/1108_TED_Risk_Assessment_Methodology_Guidance.pdf)
- ECDC Rapid Risk Assessments: <https://ecdc.europa.eu/en/threats-and-outbreaks/reports-and-data/risk-assessments>
- ECDC Risk Assessment activities, summary: <https://ecdc.europa.eu/en/threats-and-outbreaks/reports-and-data/risk-assessments>
- ECDC Surveillance Platform for Disease Vectors: <https://ecdc.europa.eu/en/disease-vectors/surveillance-and-disease-data/mosquito-maps>
- EU Early Warning and Response System (EWRS): [https://ec.europa.eu/health/communicable\\_diseases/early\\_warning\\_en](https://ec.europa.eu/health/communicable_diseases/early_warning_en)

### WHO and International Health Regulations (IHR, 2005)

- WHO Early Warning and Response Network (EWARN) for Iraq: <http://irg-data.emro.who.int/ewarn/>
- WHO EURO Health 2020 indicators: <https://gateway.euro.who.int/en/datasets/health-2020-indicators/>
- WHO Global Health Atlas: <http://apps.who.int/globalatlas/>
- WHO Health Observatory Gateway, country profiles: <http://www.who.int/gho/countries/en/>
- WHO HDRAS: <https://extranet.who.int/hdras/OpenIdLogin/tabid/85/Default.aspx?returnurl=%2fhdras%2fMonitoring.aspx>
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## List of abbreviations and definitions

ADNS	Animal Disease Notification System (EU)
CIA	United States Central Intelligence Agency
DRM	Disaster Risk Management
DRMKC	Disaster Risk Management Knowledge Center (EC JRC)
EAR	Early Alert and Report project
EC JRC	European Union Joint Research Center
ECDC	European Center for Disease Prevention and Control
EU	European Union
EU MS	European Union Member State
EWRS	EU Early Warning and Response System
FAO	Food and Agriculture Organization (UN organization)
GHSAG	Global Health Security Action Group
GHSI	Global Health Security Initiative
IHR	WHO International Health Regulations
INS-RRR	Informative Needs Supporting Rapid Risk Assessment of acute public health events
JEE	WHO Joint External Evaluation
NGO	Non-Government Organization
OCHA	United Nations Office for the Coordination of Humanitarian Affairs (UN organization)
OECD	Organization for Economic Co-operation and Development
OIE	Organization for Animal Health (UN organization)
OIE WAHIS	World Animal Health Information System of the Organization for Animal Health
RAA	Rapid Risk Assessment of Acute Public Health Events
UN	United Nations
US CDC	United States Centers for Disease Control and Prevention
WB	World Bank
WHO	World Health Organization (UN organization)
WHO EURO	World Health Organization - EURO region

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