EU SHIPSAN ACT Joint Action

The impact on maritime transport of health threats due to biological, chemical and radiological agents, including communicable diseases

State of the Art

Work Package 4: State of the Art Report

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Content

1.4 Emerging and vector borne diseases

1.5 Other infectious diseases

2. Other communicable disease reports

2.1 Respiratory diseases

2.2 Food and water borne diseases

2.3 Vaccine preventable diseases

2.4 Emerging and vector borne diseases

2.5 Sexual transmitted diseases

2.6 Other infectious diseases

3. Case reports

3.1 Respiratory diseases

3.2 Food and water borne diseases

3.3 Vaccine preventable diseases

3.4 Emerging and vector borne diseases

Part B: Literature review and surveys for chemical or radiological incidents in all types of ships and at ports

B.1 Literature review

1. Literature review on radiological events

2. Literature review on chemical events

B.2 Survey

1. Identification of authorities responsible for responding to radiological events on any type of ships and at ports among the European Union (EU) countries.

2. Current practices regarding radiological events on any type of ships and at ports among the European Union (EU) countries

3. Identification of authorities responsible for responding to chemical events on any type of ships and at ports among the European Union (EU) countries.

4. Current practices regarding chemical events on any type of ships and at ports among the European Union (EU) countries

Part C: Practices regarding fishing vessels

Part D: Training needs related to core capacities at ports

Discussion

Part A: Literature review on communicable diseases in all types of ships, including inland waterways, and ports

Part B: Literature review and surveys for chemical or radiological incidents in all types of ships and at ports

B.1 Literature review

B.2 Survey

Part C: Practices regarding fishing vessels

Part D: Training needs related to core capacities at ports

Annexes

Executive summary

Introduction

The European Sea Ports Organisation reports that "90 % of Europe's cargo trade in goods passes through the more than 1200 seaports existing in the 23 maritime Member States of the EU and that more than 400 million passengers pass through Europe's ports every year." Maritime transport can impact population health. Diseases can be transmitted easily in ships (cargo/passenger) through contaminated food, surfaces or water, and can also be responsible for international spread of diseases by vectors and transportation of sick people. In addition, deliberate or accidental events related to chemical, biological and radiological (CBR) agents would have catastrophic health and financial consequences.

The International Health Regulations (IHR), adopted by the World Health Assembly in 2005, covers "illness or medical condition, irrespective of origin or source, that presents or could present significant harm to humans", including biological, chemical, radiological and nuclear events. IHR (2005) also updates certificates applicable to international travel and transport, and requirements for international ports, airports and ground crossings. At European level, Decision No 2119/98/EC on serious cross-border threats to health came into force in 2013; apart from communicable diseases, the legal framework has been extended to cover a number of other sources of danger to health, in particular threats arising from biological or chemical agents, or from environmental events.

The objectives of this report are to describe evidence for events and consequences due to CBRN agents in all types of ships including sea and inland water vessels; the characteristics of the authorities responsible for responding to radiological and chemical events on any type of ship or at ports; describe practices and the legal framework related to radiological and chemical events on ships or at ports; describe hygiene standards and inspection practices related to fishing vessels; and identify training needs related to core capacities under IHR 2005 at points of entry (ports) among European Union countries.

Methodology

A literature review to describe scientific evidence on communicable diseases affecting people on any type of ships or at ports, from 1990 to 2013 was carried out. Moreover a literature review on radiological and chemical events of public health relevance, associated with ships or at ports worldwide, from 1940 to 2013 was performed. Databases reviewed were: Medline / Pubmed, Scopus, Web of Science core collection and Spanish Society of Maritime Medicine –SSMM- and WebPages of World Health Organization, The International Radio Medical Advice Centre, International Atomic Energy Agency, European Maritime Safety Agency, Marine Accident Investigation Branch, Spanish Nuclear Safety Council and the Major Accident Reporting System. Comunicable disease articles were clasified in three major groups: outbreaks reports; prevalence, incidence and mortality studies; and single cases reports.

A survey was carried out, based on standard questionnaires administered to relevant authorities among all European Union Member States, Iceland and Norway for:

- Identification and description of responsible authorities and practices regarding radiological and chemical events on ships or at ports.
- Reporting requirements and inspection practices in fishing vessels.
- Training needs related to core capacities at the ports.

Data entry and analysis of the questionnaires was performed using Epi Info.

Results and conclusions

Literature review on communicable diseases. From 1990 to 2013, 196 infectious diseases outbreaks relating to ships or ports with more than 24,000 cases and 19 deaths were published. More than half of the outbreaks (59%, n=116) were due to food and waterborne diseases, causing 82% (n=19741) of cases and 12 deaths (11 deaths being due to Legionella, case fatality ratio of 7%); almost a third of them were caused by norovirus. Respiratory diseases, mainly Influenza, caused 18% of outbreaks and 2 deaths. Moreover 108 studies of infectious disease prevalence, incidence, mortality, etc. relating to ships or ports were published. Notable differences compared to the outbreak report literature were that no deaths were reported within 74 cases of legionellosis, there were no Influenza studies

published and there were 13 sexually transmitted diseases studies published accounting for almost 4000 cases, the majority HIV. Finally, 45 case studies were found during the search; 34 of them (76%) were legionellosis cases, including 8 deaths (case fatality ratio 24%).

When comparing type of vessel, the majority of published outbreaks took place onboard cruise ships including 72% of norovirus outbreaks and 86% of legionellosis outbreaks. On the other hand, tuberculosis and Ciguatera fish poisoning outbreaks were reported only onboard cargo ships or fishing vessels. Vaccine preventable disease outbreaks were reported mainly onboard cruise ships (88%) with crew members being the most affected.

Control measures were mentioned mainly for respiratory diseases outbreaks. In 90% of published Influenza outbreaks different interventions were implemented including isolation of cases and quarantine of contacts, vaccination and antiviral drug administration.

Communicable diseases were more frequently reported in cruise ships than in cargo or fishing vessels. Overall, food and waterborne diseases are the most reported; followed by respiratory diseases. Legionellosis accounted for the highest case fataility ratio. Tuberculosis was reported only on seafarers from cargo or fishing vessels, and vaccine preventable diseases was mainly reported on crew members from cruise ships.

Literature review on radiological and chemical events. Thirteen radiological events were published that affected 500 persons and caused 47 deaths, 24 of which were attributed to exposure to elevated levels of radiation. Seventy percent of the events happened between 1960 and 1980 onboard nuclear ships; more than half of them took place in the North Atlantic Sea (mainly in Russian ports and coastline). Two events happened in cargo ship, one in the Mediterranean sea in 2012 that did not affect anyone.

During the study period 94 chemical events were published, of which 69 events affected people and in the remaining events only a public health risk was present. These 69 chemical events generated almost 12,000 cases and more than 2,000 deaths. Two events in the forties accounted for 81% of cases and 80% of deceased, after the year 2000 only two deaths have been reported in the published studies. Inorganic substances (32%) followed by hydrocarbons (16%) caused 48% of the events. The events occurred mainly (51% n=35) in cargo ships but 14 events happened in fishing vessels and five events exclusively at ports.

In the last five years there were no reports on radiological events affecting people related to ships or ports and only two chemical events have been published affecting people.

Survey on radiological and chemical events. Thirty countries including all EU Member States, Norway and Iceland were requested to complete the questionnaires regarding identification of authorities and practices for management of radiological and chemical events. Response rate was higher for radiological events compared to chemical events: 67% of countries responded to the questionnaire for 'identification of authorities responsible for responding to radiological events' while 47% submitted the questionnaire for 'identification of authorities responsible for responding to chemical events'. In addition, 60% completed the questionnaire regarding 'the current practices related to radiological events' while only 37% responded to the questionnaire regarding 'the current practices related to chemical events'. Some countries did not complete the questionnaire on chemical events because they were not able to identify the responsible authorities. The number of countries that only have one authority responsible for radiological events was higher than for chemical events. Moreover the proportion of countries where national authorities were responsible for management of radiological events was higher than for chemical events. Additionally there were more countries where the national authorities were responsible for radiological or chemical events than countries where the responsible authorities were regional or local, mainly for creating legislation and for impact or risk assessment.

Authorities responsible for training related to public health management of radiological and chemical events were less frequently identified by the responding countries than authorities responsible for the other aspects. Although most of the countries have specific personnel to manage radiological or chemical events, only a small number of countries indicated that the personnel undertake specific training for public health management of these events.

Between 80% and 100% of the responding countries specified that their authorities are responsible for management of both accidental and deliberate radiological and chemical events.

However, the number of countries whose authorities are responsible for management of all types of radiological or chemical events (related to food, water, environment, and non-food consumer products) were significantly lower. Overall, radiological and chemical events

related to the environment are more commonly managed by most of the countries compared to the rest of the events.

In terms of type of authority, health authorities are not frequently responsible for the management and response of radiological and chemical events. Other authorities such as Ministry of Interior, Ministry of Infrastructures and Transport, Ministry of Environment, Ministry of Defence, etc. are more commonly responsible.

Most of the countries specified that legislations or guidelines for public health management of radiological and chemical events are national legislations without specific provisions for ships, or at ports, and apply to all type of ships. In the same way, although contingency plans for public health management of radiological and chemical events were available in most of the countries, only 29% and 63% of these contingency plans were specific for ships or at port for radiological and chemical events respectively.

Detection systems are more frequently available for radiological events (89% of the countries) than for chemical events (73% of the countries).

Laboratories for analysing radionuclides in case of a radiological event were available in the majority of the responding countries, and laboratories of toxicology for chemical events were available in all responding countries.

Only one country reported to have managed a radiological event in the last five years. Two countries indicated to have managed a chemical event.

Competent authorities for public health management of radiological events were easier to identify than for chemical events. Competent authorities are mainly national authorities, usually not health authorities. In general, legislation and contingency plans are not specific for ships or ports and there is lack of training.

Survey on fishing vessels reporting requirements, hygiene standards and inspection practices. Almost half of the responding countries (44%) have no specific legislation for conducting inspections on fishing vessels. Moreover 63% of the reporting countries do not perform regular inspections on fishing vessels. However, when an inspection on a fishing vessel is performed, all areas and aspects of the fishing vessels are included in the inspection. The majority of the responding countries (7 out of 10) indicated that there is no

information available regarding the policy for issuance of Ship Sanitation Certificates in fishing vessels travelling in international waters. This could be a problem as the ships goes to different ports and they have different criteria applied in each port.

Fishing vessels are requested in the majority the responding countries (7 out of 12) to communicate any health-related event to the competent authority. Five of these countries use the Maritime Declaration of Health.

Countries have different national policies at designated and authorized ports regarding issuing of the SSC, and different inspection practices. Contingency plans at designated points of entry are not available for all the countries.

The majority of the countries have specific personnel to inspect ships and ports from a sanitary point of view and for IHR implementation. However, inspectors are not commonly involved in outbreak management.

Training needs related to core capacities at points of entry. Overall, personnel working at ports require specific training in all topics in line with the IHR requirements at points of entry. They especially indicate an intensive training need related to public health risks from microbiological, chemical and radiological agents; proceedings to report to the competent authorities for the point of entry and communication with other authorities; and quarantine of suspected travellers.

Countries would prefer face to face training for inspectors and managers compared to E learning training activities. Presentations and case studies in classroom and practical training onboard ship were considered most useful by the countries.

Seven out of 16 (44%) responding countries reported to have organised simulation exercises at ports related to events that may constitute a PHEIC .

There are specific personnel for IHR activities but practices are not homogenous to all the countries, more training is needed and higher interrelation between inspections and outbreak investigations.

Introduction

The European Sea Ports Organisation reports that "90 % of Europe's cargo trade in goods passes through the more than 1200 seaports existing in the 23 maritime Member States of the EU and that more than 400 million passengers pass through Europe's ports every year."[1] According to Eurostat, the total weight of goods handled in European Union (EU) ports is estimated at 3.7 billion tonnes in 2011, a rise of 1.7 % compared with 2010.[2]

Maritime transport can impact population health in the EU. Ships (cargo/passenger) have provided the setting for person to person or animal to human disease transmission. Diseases can be transmitted easily in ships to passengers and crew through contaminated food, surfaces or water, and can also be responsible for international spread of diseases by vector and sick people transportation.

The International Health Regulations (IHR) were adopted for the first time by the World Health Assembly in 1969. These Regulations, which initially covered six "quarantinable diseases", were amended in 1973 and 1981. The IHR (2005)[3] were adopted on 23 May 2005 and entered into force on 15 June 2007. The purpose and scope of these Regulations are to prevent, protect against, control and provide a public health response to the international spread of disease in ways that are commensurate with and restricted to public health risks, and which avoid unnecessary interference with international traffic and trade. The IHR (2005) contain a range of innovations, including a scope not limited to any specific disease or manner of transmission, but covering "illness or medical condition, irrespective of origin or source, that presents or could present significant harm to humans", including biological, chemical, radiological and nuclear events. The provisions in the IHR (2005) also update and revise many of the technical and other regulatory functions, including certificates applicable to international travel and transport, and requirements for international ports, airports and ground crossings.

Annex 1-B of the IHR 2005 specifies the core capacity requirements for designated airports, ports and ground crossings at all times and also for responding to events that may constitute a public health emergency of international concern (PHEIC).

[1] http://www.espo.be/
[2] http://epp.eurostat.ec.europa.eu
[3] World Health Organization. 2008. International health regulations (2005) -- 2nd ed. WHO Library Cataloguing-in-Publication Data. ISBN 978 92 4 158041 0.

At European level, Decision No 2119/98/EC on serious cross-border threats to health came into force in 2013. This Decision lays down rules on epidemiological surveillance, monitoring, early warning of, and combating serious cross-border threats to health, including preparedness and response planning related to those activities, in order to coordinate and complement national policies.

Apart from communicable diseases, the legal framework has been extended to cover a number of other sources of danger to health, in particular related to other biological or chemical agents or environmental events. Relevant information from the various rapid alert and information systems at Union level and under the Euratom Treaty should be gathered and communicated to the Member States through the Early Warning and Response System (EWRS).The Decision highlights the importance of cooperation with third countries and international organisations in the field of public health, in particular the exchange of information with the WHO on the measures taken pursuant to this Decision.

The Decision seeks to ensure that measures taken at national level are proportionate and limited to public health risks related to serious cross- border threats to health, and do not conflict with obligations and rights laid down in the Treaty on the functioning of the EU (TFEU) such as those related to the restriction on travel and trade.

Several networks, under the WHO, are available for addressing health threats: ChemiNet for chemical events, the Radiation Emergency Medical Preparedness and Assistance Network (REMPAN) and the Food Safety Authorities Network (INFOSAN) managed jointly by the Food and Agriculture organization and the WHO.

At European level there is a rapid alert system for chemicals (RAS-CHEM); for food and feed (RASFF); and for health threats due to deliberate release of chemical, biological or radio-nuclear agents (RAS-BICHAT).

It is as well to mention the Megaports Initiative, from the National Nuclear Safety Administration (NNSA) in United States [http://nnsa.energy.gov] that works with foreign customs, port authorities, port operators, and/or other relevant entities in partner countries to systematically enhance detection capabilities for special nuclear and other radioactive materials in containerised cargo transiting the global maritime shipping network. In support of this mission, the Megaports Initiative helps partner countries with the installation of

radiation detection equipment and alarm communication systems in major international seaports.

The goal of the Megaports Initiative is to scan as much container traffic as possible with minimal impact to port operations. The Megaports Initiative seeks to equip 100 seaports with radiation detection systems by 2015, scanning approximately 50 percent of global maritime containerized cargo. Since the start of the Megaports Initiative in 2003, 10 EU countries have been equipped by NNSA.

In order to address communicable diseases on ships, the European Commission (EC) funded two previous SHIPSAN projects from 2006 to 2011. Within these projects the 'European Manual for hygiene standards and communicable diseases surveillance on passenger ships' was created. In addition, the project developed training material and courses together with inspections; and a communication system called SHIPSAN COMMUNICATION NETWORK to allow rapid information exchange among MS ports and ships. An added value to EU MS and to industry was documented and the aim of the SHIPSAN ACT was to make all these SHIPSAN projects outputs sustainable, expanding its scope to all chemical, biological, radiological and nuclear threats (CBRN) and to all type of ships.

This state of the art report will update the literature review conducted by SHIPSAN project (addressing solely passenger ships and infectious diseases) and will cover infectious diseases on all types of ships and at ports. The report will also include chemical and radiological incidents on all types of ships and at ports.

Objectives

The objective of the state of the art report is to describe:

- Evidence for events and consequences due to CBR agents in all types of ships including sea and inland waterways.
- The characteristics of the authorities responsible for responding to radiological and chemical events on any type of ship or at ports among the European Union countries.
- Practices and the legal framework related to radiological and chemical events on ships or at ports among European Union countries.
- Training needs related to core capacities under IHR 2005 at points of entry (ports) among the European Union countries.

- Hygiene standards and inspection practices related to fishing vessels among European Union countries.

Methodology

Definitions:

- **Authority:** Any independent service or department within a government ministry. If the authorities are regional or local, it was asked to provide details on one major regional or local authority, and the national authority to which all regional or local authorities correspond. It was not necessary to provide details on all regional authorities.
- **Chemical event:** Manifestation of disease or an occurrence that creates a potential for disease caused by a chemical agent, which can produce an acute adverse biological effect.
    - Biotoxins or other toxic biological agents are excluded.
    - Environmental contamination that does not pose a public health risk is excluded.
    - Accidental and deliberate chemical events are included.
- **Radiological event:** Manifestation of disease or an occurrence that creates a potential for disease caused by a radiological agent, which can produce an acute adverse biological effect.
    - Environmental contamination that does not pose a public health risk is excluded.
    - Accidental and deliberate radiological events are included.
    - Stochastic effects of the radiological agents are excluded.
- **Fishing vessel:** Any vessel used commercially for catching fish, whales, seals, walrus or other living resources of the sea.
- **Port:** Seaport or a port on an inland body of water where ships on an international voyage arrive or depart.

- **Point of entry:** Passage for international entry or exit of travellers, baggage, cargo, containers, conveyances, goods and postal parcels as well as agencies and areas providing services to them on entry or exit.
- **Authorized port:** Port authorized by the State Party to offer:
    - The issuance of Ship Sanitation Control Certificates (SSCC)
    - The issuance of Ship Sanitation Control Exemption Certificates (SSECC) only,
    - Extension of the Ship Sanitation Control Exemption Certificates for a period of one month
- **Designated port**: Port that shall develop the capacities provided in Annex 1 of the IHR-2005

Work Package 4: State of the Art Report was assigned to the Spanish National Institute of Public Health (Instituto de Salud Carlos III) and is divided in four parts:

Part A: Literature review on communicable diseases in all types of ships, including inland waterways, and ports.

Part B: Literature review and surveys for chemical or radiological incidents in all types of ships and at ports.

Part C: Survey for practices regarding fishing vessels.

Part D: Survey for training needs related to core capacities at ports.

Part A: Literature review on communicable diseases in all types of ships, including inland waterways, and ports.

Part A will respond partly to the first objective: to describe the evidence for events and consequences due to CBRN agents in all types of ships including sea and inland waterways. Part A will focus on communicable diseases.

Search strategy for identifying studies in bibliographic databases

Any article published in scientific journals (indexed or not) was included in the review without distinguishing by type of intervention or results.

- Databases for reviewing

Scientific databases (Medline / Pubmed, Scopus, Web of Science core collection and Spanish Society of Maritime Medicine –SSMM-) and WebPages of World Health Organization (WHO) and Radio Medical Advice Centre (RMAC) were used for the literature review.

It was not possible to include the EMBASE database as it was not accessible from our institution.

- Search terms:

Terms related to setting, population of interest and type of event were used in the search; the MESH terms (Medical Subject Heading) used are shown in Table 1.

Table 1
MESH terms used in the infectious diseases searching

Terms		
Setting	Population of interest	Type of event
Ship	Tourist	Case
Ferry	Passenger	Cluster
Cruise	Crew	Outbreak
Liner	Crewmember	Infection
Boat	Seafarer	Infectious
Yacht	Seaman	Communicable
Ferryboat	Seamen	Disease
Cruise ship	Shipman	Illness
Navy ship	Mariner	Sickness
Naval ship	Sailor	
Barge	Cruiser	
Fishing vessel	Voyager	
Cargo	Patient	
Tanker	Ill	
Inland	Sick	
	Symptomatic	
	Case	
	Human	
	Person	
	People	

- Inclusion criteria and search strategy:

All articles published in journals (indexed or not) from 1990 until 2013 were included, describing cases, cluster or outbreaks of infectious diseases, which have been linked with ships or ports.

For identifying the articles "Boolean logic" to link the MESH term was used, as follows:

Table 2
Syntaxes used for infectious events

TITLE-ABS-KEY(**case** OR **cluster** OR **outbreak** OR **infection** OR **"infectious"** OR **"communicable disease"** OR **illness** OR **sickness**) AND TITLE-ABS-KEY(**tourist** OR **passenger** OR **crew** OR **crewmember** OR **seafarer** OR **seaman** OR **seamen** OR **shipman** OR **mariner** OR **sailor** OR **cruiser** OR **voyager** OR **patient** OR **ill** OR **sick** OR **symptomatic** OR **case** OR **human** OR **person** OR **people**) AND TITLE-ABS-KEY(• **ship** OR **ferry** OR **cruise** OR **linear** OR **boat** OR **yacht** OR **ferryboat** OR **"cruise ship"** OR **"navy ship"** OR **"naval ship"** OR **barge** OR **"fishing vessel"** OR **cargo** OR **tanker** OR **inland**)) AND PUBYEAR > **1989**

- Identification, localization and review of articles:

The articles were identified using the MESH terms in titles, key words and/or abstracts.

The abstracts of every article were reviewed in order to select those that would do part of the final review . When the full articles were not available on-line, they were requested to the Spanish Library of Health Science and then stored in the designated Reference Manager Database. All searches were done with English terms without exclusion criteria by language of articles on initial exploration; however for articles written in a language different that English, French or Spanish, only the information from the abstract was used.

- Complementary search:

All references included in the selected articles were reviewed and added when they fulfilled the inclusion criteria.

- Articles identified and reviewed:

The search was done between August and September 2013, and the review was carried out between October and December 2013. In a first step 5,660 articles were identified and reviewed by two independent persons who selected the final articles to be analysed. Finally 186 articles with 349 infectious diseases events were selected. Finally 186 articles with 349 infectious diseases events were selected for inclusion. They included 196 infectious diseases outbreak reports, 108 prevalence and other studies, and 45 case studies. In some cases the same event was published by different authors (duplicate events were counted only once) or one article reports several outbreaks (Table 3). According to the scarce information from many articles it was not possible to classified cases as confirm, probable, possible, symptomatic, asymptomatic, etc; because of that, every case mentioned in the articles was taken into account regardless of their status.

Table 3
Sources of information, articles identified and selected

Event	Source	Articles identified	1st review	Final Articles
Infectious diseases	Pubmed / Medline	2978	282	186 articles with 349 events
	Scopus	1007	112	
	Web of Science core collection	1650	3	
	SSMM*	12	11	
	Others	13	9	
Total		5660	417	

*Spanish Society of Maritime Medicine

Part B: Literature review and surveys for chemical or radiological incidents in all types of ships and at ports

Part B will respond to the first and second objectives: to describe the evidence for events and consequences due to CBRN agents in all types of ships including sea and inland waterways and to describe the characteristics of the authorities responsible for responding to radiological and chemical events on any type of ship or at ports among the European Union countries.

B.1: Literature review

Search strategy for identifying studies in bibliographic databases

Any types of study, published or unpublished, were included. They were not selected by type of intervention, or results.

- Databases for reviewing

Four scientific databases were reviewed: Medline / Pubmed, Scopus, Web of Science core collection and Spanish Society of Maritime Medicine –SSMM. Information from the World Health Organization, Radio medical advice centre, International Atomic Energy Agency, European Maritime Safety Agency, Marine Accident Investigation Branch, Spanish Nuclear Safety Council were included in the search.

Moreover the Major Accident Reporting System (MARS) was analysed. The MARS contains reports of chemical accidents and near misses provided to the Major Accident and Hazards Bureau of the European Commission's Joint Research Centre from EU, the Organisation for Economic Co-operation and Development (OECD) and United Nations Economic Commission for Europe (UNECE) countries. Reporting an event into eMARS is compulsory for EU Member States when a Seveso establishment is involved and the event meets the criteria of a "major accident" as defined by Annex VI of the Seveso III Directive (2012/18/EU). For non-EU OECD and UNECE countries reporting accidents to the eMARS database is voluntary.

- Search terms:

The specific MESH terms for carrying out the search were related to settings, type of incident and agent and they are shown in table 4.

Table 4

MESH terms used for chemical and radiological events searching

Terms		
Setting	**Type of incident**	**Agent**
Ship	Incident	Chemical
Ferry	Event	Radiological
Cruise	Contamination	Nuclear
Liner	Release	Radiation
Boat	Accident	
Yacht	Accidental	
Cargo	Spillage	
Ferryboat	Disease	
Tanker	Sickness	
Fishing vessel	Illness	
Naval ship		
Container ship		
Bulk carrier		
Maritime transport		
Port		
Onboard		
Aboard		

- Inclusion / exclusion criteria:

We included articles published from 1970 to 2013, but the events published occurred from 1960 for radiological events and from 1940 for chemical events. Selected articles referred to any type of ship, to chemical or radiological events that took place onboard ships or at ports, and to events of public health concern. We excluded all articles reporting chemical or radiological events that caused exclusively environmental pollution.

- Search strategy

The syntaxes used for recognizing the chemical and radiological articles were described in table 5.

Table 5

Syntaxes used for chemical and radiological events

Chemical syntaxes	Radiological syntaxes
(TITLE-ABS-KEY(**ship** OR **ferry** OR **cruise** OR **liner** OR **boat** OR **yacht** OR **cargo** OR **ferryboat** OR **tanker** OR **"Fishing vessel"** OR **"Naval ship"** OR **"Container ship"** OR **"Bulk carrier"** OR **"Maritime transport"** OR **port** OR **onboard** OR **aboard**) AND TITLE-ABS-KEY(**incident** OR **event** OR **contamination** OR **release** OR **accident** OR **accidental** OR **spillage** OR **disease** OR **sickness** OR **illness**) AND TITLE-ABS-KEY(**chemical**)) AND PUBYEAR > **1969**	(TITLE-ABS-KEY(**ship** OR **ferry** OR **cruise** OR **liner** OR **boat** OR **yacht** OR **cargo** OR **ferryboat** OR **tanker** OR **"Fishing vessel"** OR **"Naval ship"** OR **"Container ship"** OR **"Bulk carrier"** OR **"Maritime transport"** OR **port** OR **onboard** OR **aboard**) AND TITLE-ABS-KEY(**incident** OR **event** OR **contamination** OR **release** OR **accident** OR **accidental** OR **spillage** OR **disease** OR **sickness** OR **illness**) AND TITLE-ABS-KEY(**radiological** OR **nuclear** OR **radiation**)) AND PUBYEAR > **1969**

- Identification, localization and review of articles:

The articles were identified using the MESH terms in titles, key words and/or abstracts.

The abstracts of every article were reviewed in order to select those that would do part of the final review . When the full articles were not available on-line, they were requested to the Spanish Library of Health Science and then stored in the designated Reference Manager Database. All searches were done with English terms without exclusion criteria by language of articles on initial exploration; however for articles written in a language different that Enghlish, French or Spanish, only the information from the abstract was used.

- Complementary search:

All references mentioned in the selected articles were reviewed and those that met the inclusion criteria were included. Moreover, a complementary search was done in unindexed journals, abstracts of congress and doctoral theses.

- Articles identified and reviewed:

The search yielded 4079 articles related to chemical events and 4795 articles related to radiological events. The search was done between June and July 2013, and the rewiew was

carried out between August and December 2013. Articles were excluded because: they were duplicates; the full article was not available (or was in a language different from English, French or Spanish), and the information from the abstract was not enough; or they did not meet the inclusion criteria. The articles were reviewed by two independent persons who selected the final articles to be analysed. Finally, 22 chemical publications with 94 incident/accidents and six radiological papers with 13 events were selected. The same event could be published by different authors (duplicate events are counted only once) or one article could report several events (Table 6). According to the scarce information from many articles it was not possible to classified cases as confirm, probable, possible, symptomatic, asymptomatic, etc; because of that, every case mentioned in the articles was taken into account regardless of their status.

Table 6

Sources of information, articles identified and selected, and reviewing procedure

Event	Source	Articles identified	1st review	Final articles
Chemical	Pubmed / Medline	281	86	22 (94 events)
	Scopus	2672	147	
	Web of Science core collection	1097	4	
	SSMM*	4	4	
	Others	25	25	
Total		4079	266	
Radiological	Pubmed	624	45	6 (13 events)
	Scopus	2693	6	
	Web of Science core collection	1474	1	
	SSMM*	1	1	
	Others	3	28	
Total		4795	81	

*Spanish Society of Maritime Medicine

B.2: Surveys for chemical or radiological events in all types of ships and at ports

A survey was carried out, based on four questionnaires administered to all European Union Member States, Iceland and Norway in order to:

a. Identify and describe the characteristics of competent authorities for management of chemical and radiological events in each MS. Questionnaires can be found atAnnex 1 and Annex 2.
b. Describe the current situation in EU regarding practices, legal frame related to chemical and radiological incidents on ships and at ports, events that authorities confronted in the past and the contingency plan that they use. Questionnaires can be found at Annex 3 and Annex 4.

For the preparation of the questionnaires, a working group was established. The group included partners responsible for biological threats during SHIPSAN projects; experts from the different work packages and from the advisory board of SHIPSAN ACT; and other experts from other EU networks addressing CBR threats.

Part C: Practices regarding fishing vessels

A survey based on one questionnaire administered to relevant authorities among EU Member States to describe current practices regarding fishing vessels (reporting requirements, inspection practices, and standards) was conducted. Questionnaire can be found at Annex 5.

A specific working group for the preparation of the questionnaire was implemented.

Part D: Training needs related to core capacities at ports

A survey based on one questionnaire administered to relevant authorities among EU Member States to identify training needs related to core capacities (IHR 2005 requirements) at the points of entry (ports) was conducted. Questionnaire can be found at Annex 6.

A specific working group for the preparation of the questionnaire was set up.

Results

Part A: Literature review on communicable diseases in all types of ships, including inland waterways, and ports.

1. Communicable disease outbreak reports

During the study period 196 outbreaks of communicable diseases were published. They accounted for at least 24,034 cases and 19 deaths. Most of the outbreaks (n=116, 59%) were caused by food and water borne diseases, followed by respiratory diseases (n=36) and vaccine preventable diseases (n=33) (table 7).

Table 7. Infectious diseases outbreaks, cases and deaths

Infectious diseases outbreaks	Number Outbreaks (%)	Number Cases	Average outbreak size (Number Cases/Number Outbreaks)	Number Deaths
Respiratory diseases	**36 (18)**	**3587**	100	**2**
Influenza	23 (12)	3103	135	2
Tuberculosis	6 (3)	53	9	0
Other respiratory diseases	7 (4)	431	62	0
Food and water borne diseases	**116 (59)**	**19669**	170	**12**
Norovirus	34 (17)	8980	264	0
Enterotoxigenic E Coli	12 (6)	3826	319	0
Salmonellosis	9 (5)	515	57	0
Ciguatera fish poisoning	11 (6)	96	9	0
Shigellosis	3 (2)	1164	388	1
Legionellosis	14 (7)	148	11	11
Other bacterial diseases	5 (3)	188	38	0
Other parasitic diseases	4 (2)	719	180	0
Other viral diseases	3 (2)	93	31	0
Other diseases caused by multiple microorganism	2 (1)	265	133	0
Other diseases without confirmed agent	19 (10)	3675	193	0
Vaccine-preventable diseases	**33 (17)**	**503**	15	**1**
Varicella	26 (13)	253	10	0
Rubella	3 (2)	67	22	0
Measles	1 (1)	155	155	0
Mumps	1 (1)	9	9	0
Meningococcal Meningitis	1 (1)	4	4	1
Measles, Rubella and Varicella	1 (1)	15	15	0
Emerging and vector borne diseases	**3 (2)**	**60**	20	**0**
Malaria	1 (1)	2	2	0
SARS	1 (1)	14	14	0
Human Plague	1 (1)	44	44	0
Other infectious diseases	**8 (4)**	**143**	**18**	**4**
Scabies	1 (1)	102	102	0
Tonsillitis	1 (1)	No data		No data
Staphylococcosis	1 (1)	8	8	0
Viral Myocarditis	1 (1)	4	4	4
Lepidopterism	3 (2)	21	7	0
Dermatological infectious	1 (1)	8	8	0
Total	**196**	**23962**	122	**19**

1.1. Respiratory diseases

- Influenza outbreaks

From 1990 to 2013, 23 confirmed Influenza outbreaks on ships or at ports were published in the scientific literature. Eighteen outbreaks were caused by Influenza A; two by Influenza B and one by both (A and B); in two events the type of Influenza was not mentioned. Within the Influenza A outbreaks, six were caused by H3N2 virus (26%); five by H1N1 (22%); one by both H1N1 and H3N2 (4%); and six did not have subtype information (Figure 1). More than 3,100 cases and two deaths have been reported, median of 92 cases per outbreak (range 7-466). Cases include passengers, crew members, navy personnel and workers. The median attack rate was 6.5% (range 0.1% - 56%). Fourteen outbreaks (61%), with 1966 cases, occurred onboard cruise ships; six onboard navy ships (26%), with 1049 cases; and one in each of a tall ship (7 cases), a dredging barge (28 cases) and an oil rig (53 cases) (Figure 2). Four outbreaks occurred at ports and on ships simultaneously. Ten outbreaks occurred during the 90s, being 1997 and 1999 the years with most of the outbreaks; the remaining 13 outbreaks occurred between 2000 and 2011, mostly in 2009 (Figure 3). Eleven outbreaks took place in North America (USA and Canada), five in Australia, two in the Mediterranean Sea, one in the Baltic Sea, one in Scotland and one in South Pacific (Figure 4). Information on location was not available for two outbreaks. Prevention and control measures were described in 21 out of 23 (91%) outbreaks, which included treatment of patients and close contacts according to WHO influenza guidelines; isolation of cases and establishment of a respiratory surveillance program for early detection of cases and vaccination of crew members. The most recent influenza outbreaks published during the study period occurred in 2011 in two cruise ships travelling in USA; cases were isolated in their cabins and treated with oseltamivir, close contacts received oseltamivir as prophylaxis[1-24]. Annex 7 shows detailed information on the influenza outbreaks identified.

Figure 1. Influenza outbreaks by types and subtypes. N=23

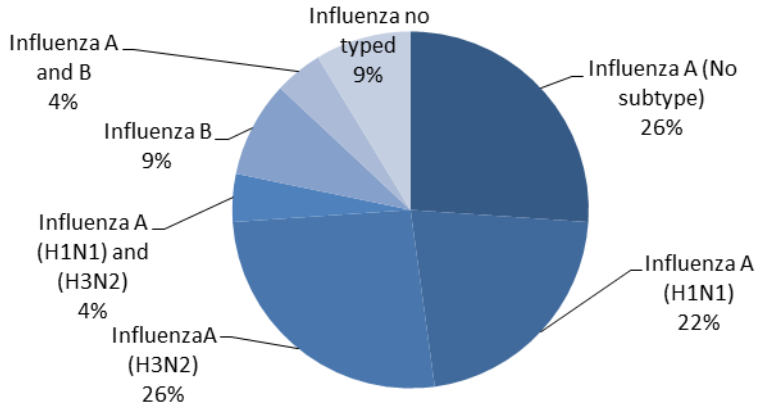


Figure 2. Influenza outbreaks by types of vessel. N=23

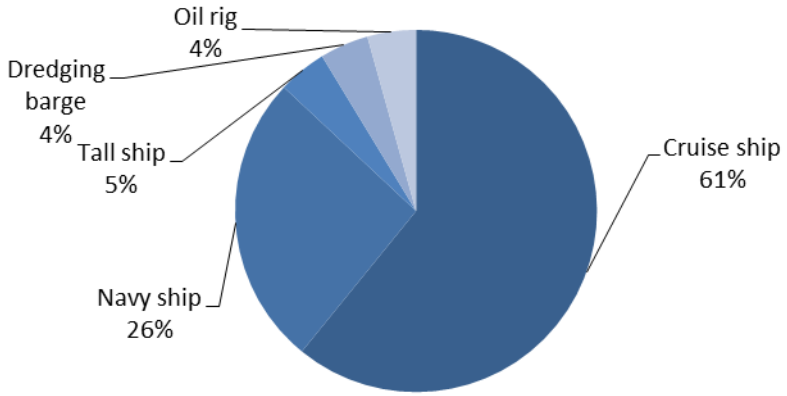


Figure 3. Influenza outbreaks by year of occurrence.

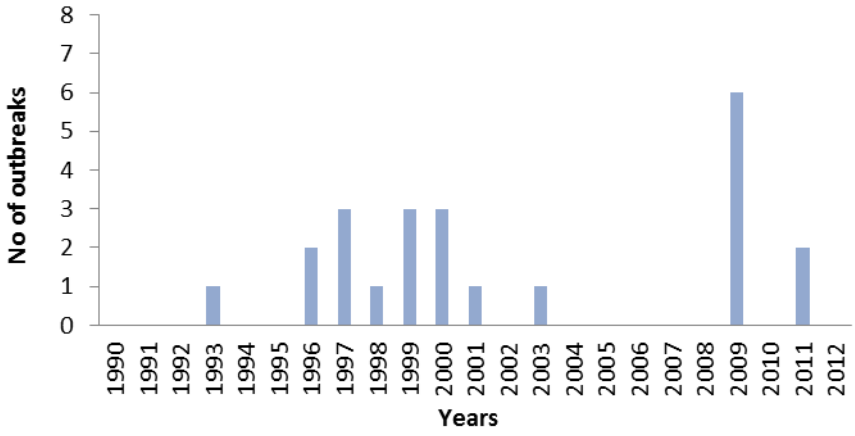
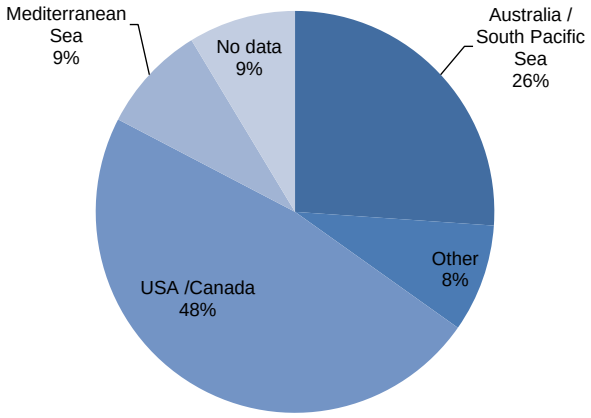


Figure 4. Geographic distribution of Influenza outbreaks. N=23



- Tuberculosis outbreaks

During the study period six outbreaks of tuberculosis with more than 100 confirmed cases have been reported in the literature. Median of cases was 9 (range 2-64). All cases were ships workers and navy personnel; no fatal cases were reported. *Mycobacterium tuberculosis* was isolated in every outbreak. Three outbreaks occurred on board fishing vessels, one on a merchant vessel, one on a navy ship and one on a quarter boat; this last outbreak was the only one that happened simultaneously at port and on-board a ship. Four outbreaks occurred during the 90s and two between 2000 and 2002. The outbreaks took place in different countries: Denmark, Spain, USA (Mississippi river), Japan and Argentina. Prevention and control measures were described in five outbreaks (83%): chemotherapy and secondary prophylaxis, under direct supervision; and contact tracing. Results of the outbreak study in Japan, led to the introduction of medical check-ups every year and the pre-employment medical check-ups in non-Japanese workers[25-30]. Annex 8 shows detailed information on the tuberculosis outbreaks identified.

- Others Respiratory disease outbreaks

Seven respiratory diseases outbreaks accounting for 431 cases were identified, no fatal cases were reported. *Mycoplasma pneumonia* and Coronavirus were identified in one outbreak in an US Navy ship in 2007; Isolation of cases was implemented for the control of the outbreak. No agent was identified in the other outbreaks. Five outbreaks occurred on board cruise ships in the South Pacific. The other two outbreaks occurred in US navy ships, without information on the place of ocurrence[14,31-32]. Annex 9 shows detailed information on the others respiratory disease outbreaks identified.

1.2. Food and Water borne diseases

- Norovirus outbreaks

From 1986 to 2013, 34 Norovirus outbreaks on ships or at ports have been published in the scientific literature. Three outbreaks were caused by Norovirus together with other microorganisms: Norovirus and Enterotoxigenic *Escherichia coli*; Norovirus, Sapovirus and Rotavirus; and Norovirus together with Astrovirus. These outbreaks have affected approximately 9,000 people, 62% passengers or crew members and 38% Navy personnel. The median attack rate was 7.9% (range 0.4% to 48%). The transmission mode was identified in 18 outbreaks (53%); half of them were from person to person, three outbreaks were foodborne, two waterborne, one environmental and in other outbreak common exposure (pizza restaurant) was reported. In two outbreaks more than one transmission mode was reported.

Twenty seven of these outbreaks occurred on cruise ships one on a ferry ship and 6 on Navy ships (Figure 5). These 34 outbreaks affected 42 ships: 30 cruise ships, one ferry and 11 navy ships. One outbreak affected five Navy ships, another outbreak affected 4 cruise ships in the western Mediterranean on consecutive weeks of 1995, and another outbreak affected two Navy ships. One outbreak occurred simultaneously at port and on a ship (US Navy ship visiting the port of Lima, Peru, 2008). Seventy percent of outbreaks have occurred since 2000, being 2002 and 2006 the years with the highest number of outbreaks (Figure 6). Norovirus have caused outbreaks in different regions of the world: 13 outbreaks in American waters (41%); 10 outbreaks in Europe (31%); four in Asia (13%); three in Oceania (9%); and

two outbreaks in ships travelling through more than one continent (6%). Information on location was not available for two events (Figure 7). Prevention and control measures reported were: reinforcement of disinfection and sanitation practices; excluding ill food handlers from the work place; closure of eating and other common areas; recommendations on hand washing; encouraging ill passengers to visit medical clinic and quarantine of ill until symptom-free for 72 hours; recommendations to the ship's commander and/or tour operators on how to control the current and prevent future outbreaks[14,33-58]. Annex 10 shows detailed information on the norovirus outbreaks identified.

Figure 5. Norovirus outbreaks by type of vessel. N=42

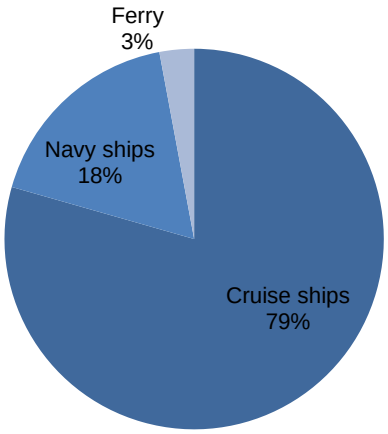


Figure 6. Norovirus outbreaks by date of occurrence. N=34

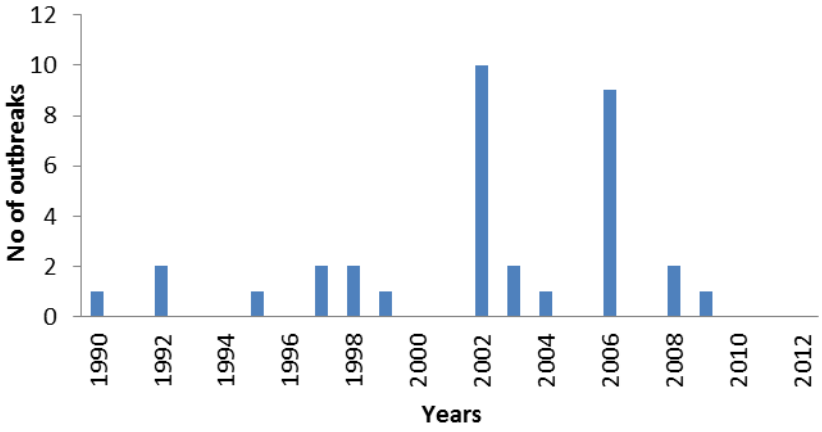
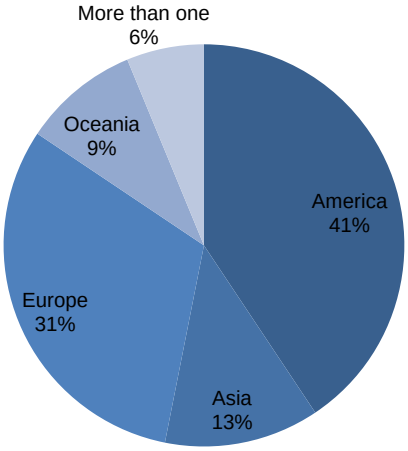


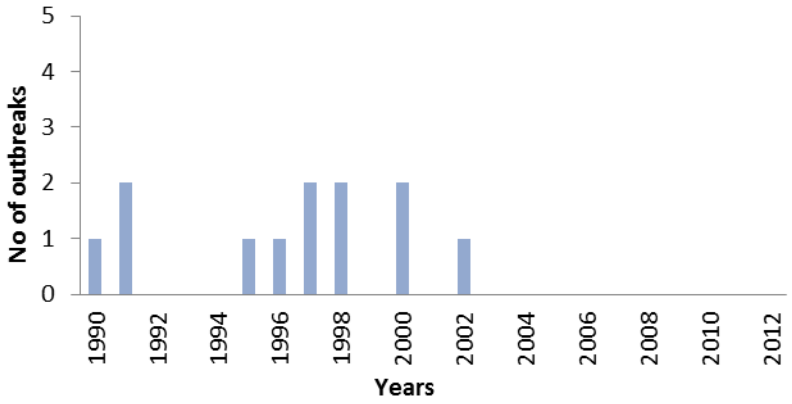
Figure 7. Norovirus outbreaks by place of occurrence. N=32



- Enterotoxigenic *Escherichia coli* (ETEC) outbreaks.

Since 1990, 12 confirmed ETEC outbreaks, including 3,826 cases, were reported. The serotypes identified were: O169:H41, O6:H16, O27:H7, O148:H28, O153:H45, O34:H10, O--:H7, O--:H32, O8:H9, O78:H12, O167:H5; O27:NM, O25:NM, O64:NM, O169:NM, O79:Hund. The source of infection was mentioned in all outbreaks, except one, being food in six out of 11 outbreaks (55%) and water in 45% (5/11) of the outbreaks. All outbreaks occurred on board cruise ships. Most of the outbreaks (9/12) occurred during the 90s, with 6 outbreas (67%) of episodes between 1995 and 1999 (Figure 8). All published outbreaks occurred in America[45-46,59-61]. Annex 11 shows detailed information on the enterotoxigenic *E. coli* outbreaks identified.

Figure 8. Enterotoxigenic Escherichia Coli outbreaks by date of occurrence. N=12



- Salmonellosis outbreaks

Nine salmonellosis outbreaks were published during the period of study; most of them occurred between 1999 and 2003 (Figure 9). These outbreaks caused more than 500 cases, no fatal cases were reported. Two of the outbreaks were caused by *Salmonella* Typhi. Seven outbreaks were mentioned to be food-borne and another one food or waterborne. Eight events occurred on-board cruise ships (one during a river cruise). Two outbreaks occurred simultaneously at port and on ships. Three outbreaks took place on cruises in United Kingdom, one on a ferry from Sweden to Poland, one on a cruise in the Mediterranean Sea and two on cruise ships arriving to Sydney (Figure 10). In two outbreak, the place of occurrence was not specified[14,31,45-46,62-63]. Annex 12 shows detailed information on the salmonellosis outbreaks identified.

Figure 9. Salmonellosis outbreaks by date of occurrence and cases. N=9

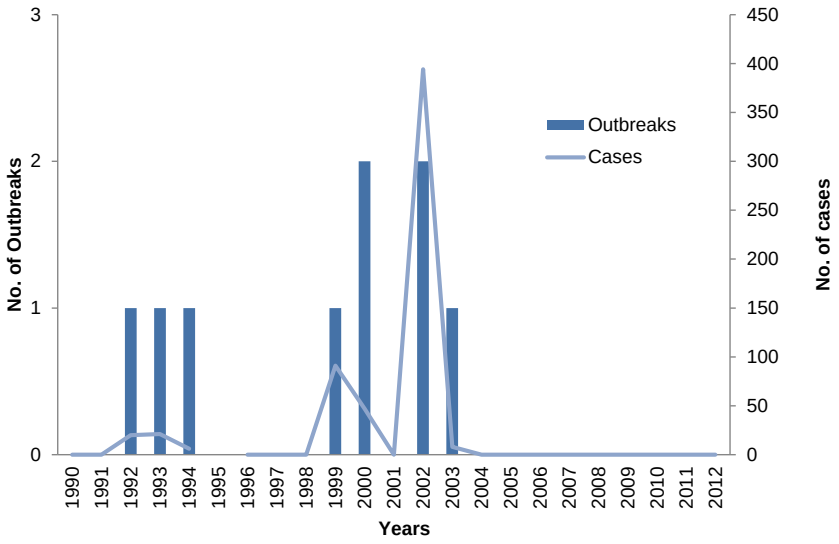
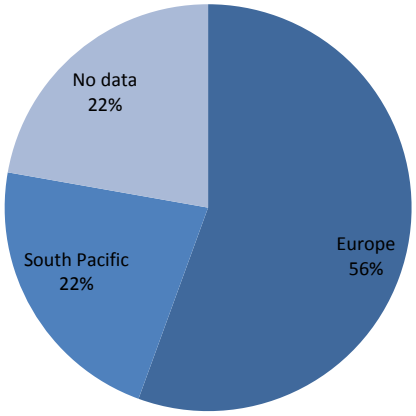


Figure 10. Salmonellosis outbreaks by place of occurrence. N=9



- Ciguatera fish poisoning outbreaks

During the study period 11 outbreaks of Ciguatera fish poisoning were published. Ninety six cases were affected, there were no fatal cases. One outbreak occurred on board a yacht during a cruise of a group of scuba divers in 1991. Eight outbreaks happened in the 90s, half

of them in 1998 (Figure 11). Three outbreaks occurred in Europe (United Kingdom, Croatia and Germany), two in USA, two in the Caribbean Sea and one in Australia[64-71] (Figure 12). Annex 13 shows detailed information on the ciguatera outbreaks identified.

Figure 11. Ciguatera fish poisoning outbreaks by date of occurrence and cases. N=9

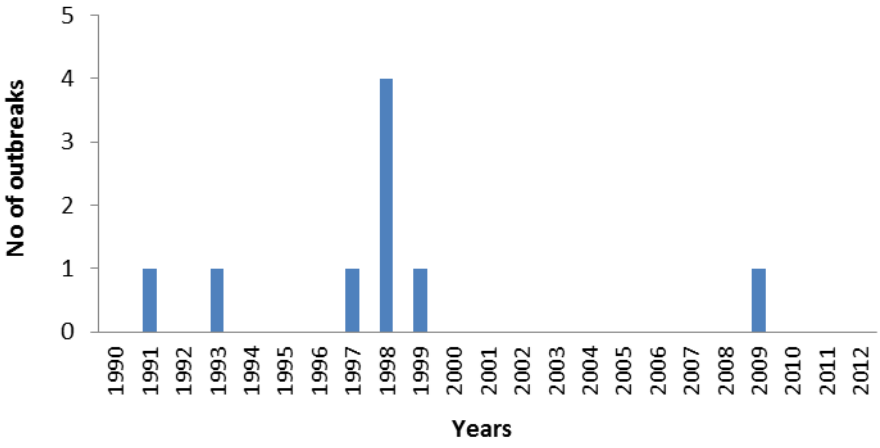
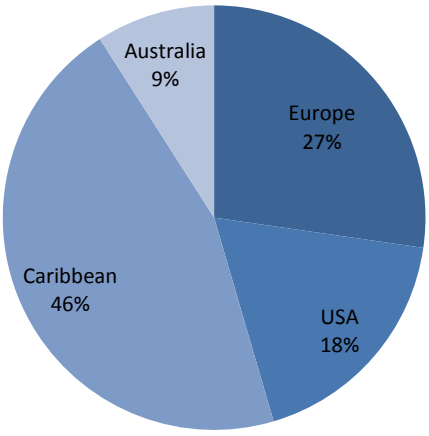


Figure 12. Ciguatera fish poisoning outbreaks by place of occurrence. N=11



- Shigellosis outbreaks

Three outbreaks of shigellosis were detected during the study period affecting passenger and crew on board cruise ships. One outbreak occurred on a cruise ship travelling from USA to Mexico in 1994, it was due to *S. flexneri* that caused 1,180 cases and one death. The transmission mode was not identified. Another outbreak occurred on a cruise ship travelling through the eastern Mediterranean sea in 1996. The agent identified was *S. dysenteriae* type 1, that caused 330 cases. The outbreak was linked to food consumed on-board. The third outbreak occurred on a cruise ship travelling around the world in 2003. The agent identified was *Shigella spp*, without further typing, it caused 154 cases. The probable source was food consumed on shore[14,72-73]. Annex 14 shows detailed information on the shigellosis outbreaks identified.

- Legionellosis outbreaks

Since 1990, 14 outbreaks of Legionnaires' disease on ships or at ports have been published worldwide. *Legionella pneumophila* serogroup 1 was responsible for six outbreaks (43%); *L. pneumophila* serogroup 3, serogroup 5, and serogroup 1 and 3 were each responsible for three more outbreaks (7%). In the other five outbreaks it was not possible to identify neither the species nor the serogroup (Figure 13). Two thirds of events occurred during the 90's, these outbreaks generated 148 cases (68 confirmed) including 11 deaths (Figure 14). Median of cases was 4.5 (range 2-50). Twelve of these 14 outbreaks (86%) occurred on cruise ships, affecting 119 passengers and crew members, including two outbreaks of 50 and 40 cases. One outbreak occurred on a cargo ship docked at a port (7%) and the other on a sail training ship (7%) (Figure 15).

The source of infection was identified in 80% of outbreaks, water supply/distribution systems, whirlpool, spa, baths, pools and air handling units were mentioned. Legionellosis outbreaks took place in rivers and sea waters of Europe (48%); Caribbean Sea (27%); Pacific Ocean (10%); North America (5%) and in trans-Atlantic travels (5%). Information on location was not available in one outbreak (5%) (Figure 16). Control and prevention measures were reported in 60% of the outbreaks, mainly involving the treatment of water supply and closure of specific areas for disinfection[18,63,74-87]. Annex 15 shows detailed information on the legionelosis outbreaks identified.

Figure 13. Legionnaires' diseases outbreaks by species and serogroups. N=14

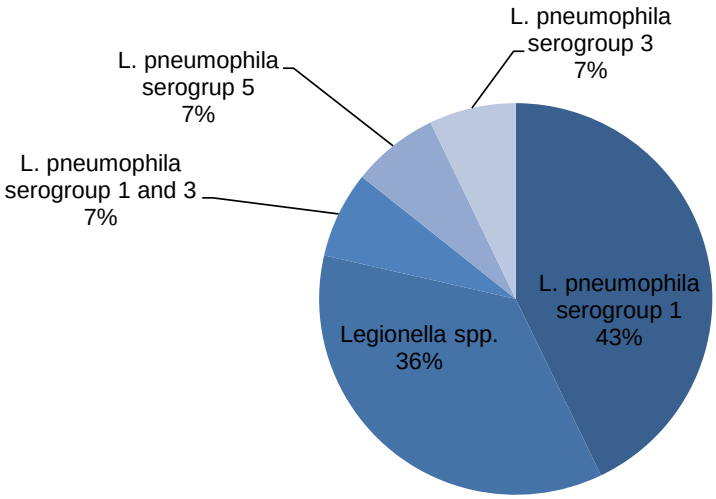


Figure 14. Number of Legionnaires' diseases outbreaks and cases by year of occurrence.

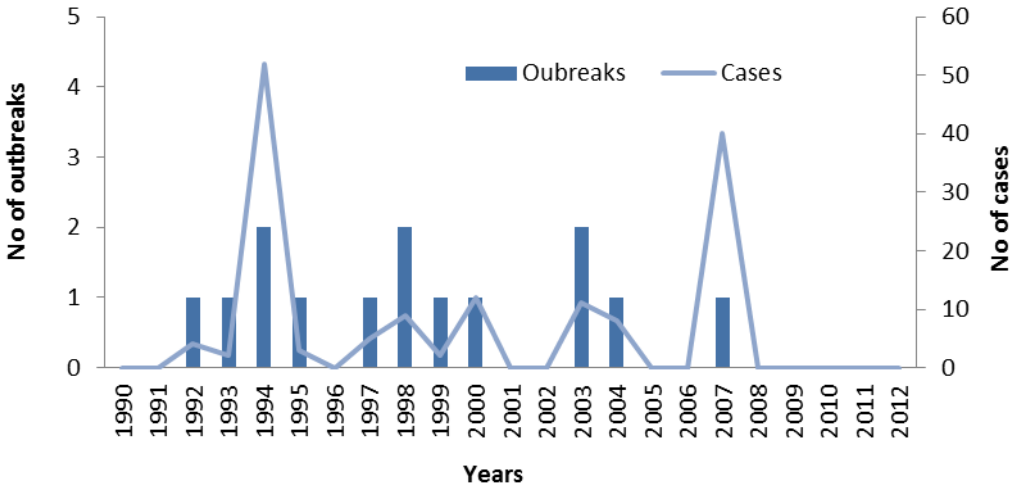


Figure 15. Legionnaires' diseases outbreaks by type of vessel.

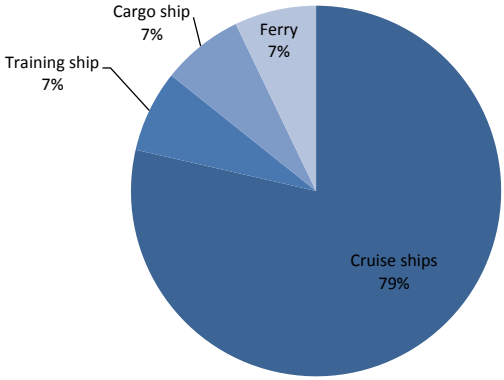
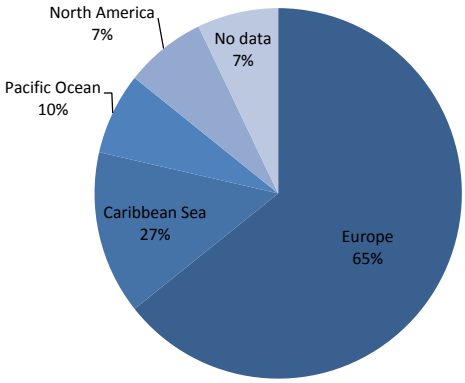


Figure 16. Legionnaires' diseases outbreaks by place of occurrence.



- Food and water-borne diseases outbreaks caused by other bacteria

Five outbreaks caused by other bacteria were published, three occurred on cruise ships and one on a river boat. One outbreak (6 cases) was due to *Vibrio cholera* O139 on a cruise ship travelling through Southeast Asia in 1994, it was linked to the consumption of food on shore in Thailand. Another outbreak was due to *Clostridium botulinum* on a cruise ship in Turkey in 2008, it caused 8 cases linked to the consumption of unprocessed black olives onboard. Another outbreak was due to *Yersinia enterocolitica*; the outbreak occurred on an oil tanker travelling from Croatia to Italy in 2002 and caused 22 cases. Another outbreak (62 cases) was due to *Vibrio parahaemolyticus* on a cruise ship in the US in 2004, it was linked to the

consumption of raw oysters. Another outbreak was due to *Clostridium perfringes* on a river boat in the UK in 1997, it was linked to the consumption of fish and caused 90 cases[63,88-92]. Annex 16 shows detailed information on the other food and water borne disease outbreaks caused by bacteria identified.

- Food and water-borne disease outbreaks caused by parasites

Four outbreaks caused by parasites, with 719 cases, were published in the study period: cyclosporiasis (2), cryptosporidiosis (1) and giardiasis (1). The two cyclosporiasis outbreaks, caused 241 and 220 cases, mainly among passengers, they took place on board two cruise ships travelling through Florida (US) in 1997 and Australia in 2010 respectively. Raspberries imported from Guatemala were identified as the source for one outbreak and fresh products from South-east Asia were identified as the source for the other outbreak. The outbreak in the US occurred within a large outbreak of cyclosporiasis that affected North America during 1997.

The cryptosporidiosis outbreak, with 58 coast guard persons affected, occurred on board a US Coast Guard in Wisconsin (US) in March 1993; it was due to the consumption of contaminated water, from Milwaukee city, stored in the vessel tanks.

The giardiasis outbreak occurred on an US Navy ship travelling through Indonesia in April 1998. There were 200 cases linked to the consumption of water from an unknown source[18,45-46,93]. Annex 17 shows detailed information on the other food and water borne disease outbreaks caused by parasites identified.

- Food and water borne disease outbreaks caused by other viruses

Three foodborne diseases outbreaks caused by viruses, other than norovirus, were identified in the review: two due to Hepatitis A virus and one due to Hepatitis E virus genotype 3.

The outbreaks of Hepatitis A took place on board river cruise ships along the Nile River during the second half of 2008; more than 60 passengers were affected, most of which were European citizens.

The Hepatitis E outbreak affected 33 cruise passengers returning from a 3-months world cruise; consumption of shellfish while on board was identified as the source of infection; this event also occurred in 2008[94-96]. Annex 18 shows detailed information on other food and water borne disease outbreaks caused by viruses identified.

- Other food and water-borne disease outbreaks caused by multiple organisms

There were two outbreaks caused by multiple pathogens, affecting 265 persons. The identified microorganisms were: *Shigella sonnei*, *Giardia spp.* and *Cryptosporidium spp.* in one outbreak (41 cases), and Enterotoxigenic *E. coli* O25: NM, *Salmonella* Newport and *S.* Java, and *Giardia spp.* in the other (224 cases). The involved vehicles were ice and shellfish respectively. Both events took place in USA, during 2000 and 2008 respectively[63-97]. Annex 19 shows detailed information on other food and water borne disease outbreaks caused by multiple organisms identified.

- Food and water-borne disease outbreaks without identified agent

Nineteen gastrointestinal illness outbreaks where a causal agent was not identified caused 3,675 cases among cruise ship passengers and crew (496), and navy personnel (3,179). The possible transmission mode was identified in four outbreaks: foodborne in three outbreaks and person to person in one. The vessels involved were: 14 US Naval ships (74%), three sea cruise ship (16%) and two river cruise ships (10%) (Figure 17). Four outbreaks (24%) occurred between 1992 and 1999, thirteen outbreaks (76%) occurred between 2000 and 2002. The navy ships were deployed in the eastern Mediterranean sea, Haiti, Coast of Virginia (US) and Middle East (Persian Gulf and nearby seas) and the cruise ships were travelling around Australian east coast, Galapagos Islands (Ecuador), Florida (US) and the United Kingdom[14,45-46,63,98-103] (Figure 18). Annex 20 shows detailed information on other food and water borne disease outbreaks without identified agent.

Figure 17. Food and water-borne diseases outbreaks without identified agent by type of vessel. N=19

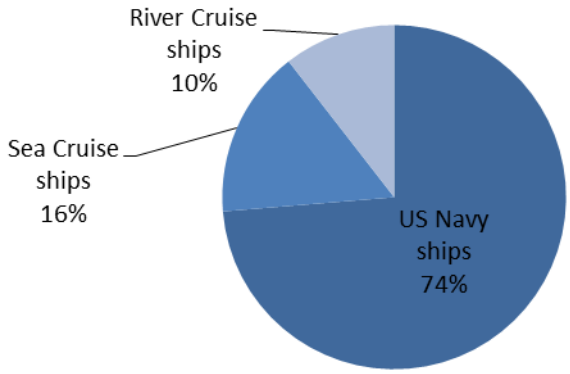
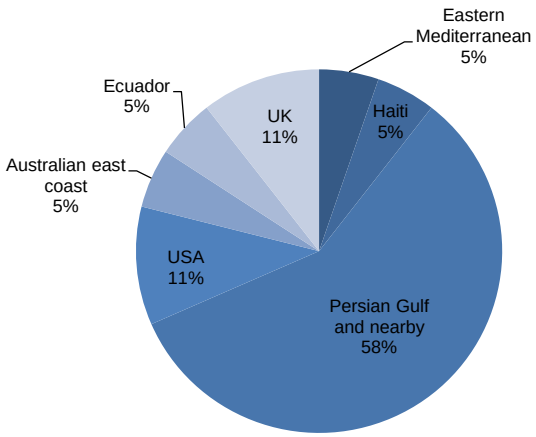


Figure 18. Food and water-borne diseases outbreaks without identified agent by place of occurrence. N=19



The transmission mode for some outbreaks was not identified or was mentioned together food or water-borne. Apart from legionelosis outbreaks, in 11 outbreaks water borne

transmission mode was mentioned. Water borne outbreaks occurred mainly on cruise ships. The main agent involved on water borne outbreaks was Legionella (14 outbreaks) followed by Enterotoxigenic E. coli, that was mentioned in 5 outbreaks, in four of them ice was mentioned as the vehicle. The median of cases reported from water borne outbreaks (excluding Legionella) was 388 (range 41-652).

1.3. Vaccine-preventable diseases

Since 1990, 33 vaccine preventable disease outbreaks occurred on ships or at ports worldwide: 26 due to varicella; three to rubella, one to measles, one to mumps, one to meningococcal disease, and one caused by Measles, Rubella and Varicella simultaneously. These outbreaks generated 405 cases: Varicella (48%), Measles (29%) and Rubella (13%) (Figure 19). One fatal case was reported, due to *Neisseria meningitidis*. More than 50% of cases were cruise ship's crew, most of them were from developing countries . Ninety one percent of outbreaks occurred on board cruise ships. The measles outbreak happened on a ferry and at the port at the same time. About two-thirds of outbreaks took place in the Caribbean Sea and the maritime waters of US followed by the Mediterranean Sea and the Pacific Ocean, this information was not available in 26% of outbreaks (Figure 20). Eighty five percent of the outbreaks occurred between 2006 and 2012, most of them (n=18, 55%) in 2009 (Figure 21). Prevention and control measures implemented were: isolation of cases; evacuation; vaccination[104-112]. Annex 21 shows detailed information on vaccine preventable disease outbreaks identified.

Figure 19. Vaccine-preventable disease outbreaks. N=33

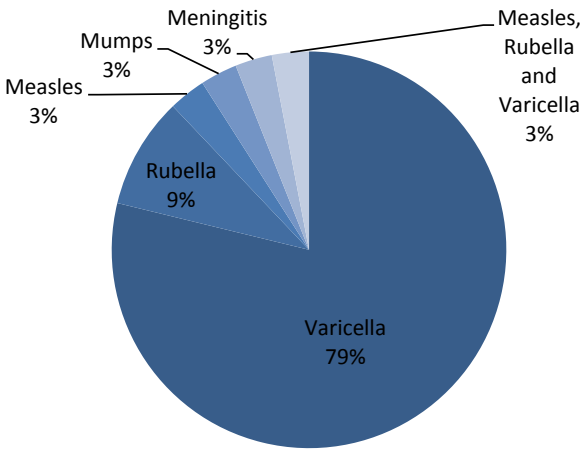


Figure 20. Vaccine-preventable disease outbreaks by type of ship. N=33

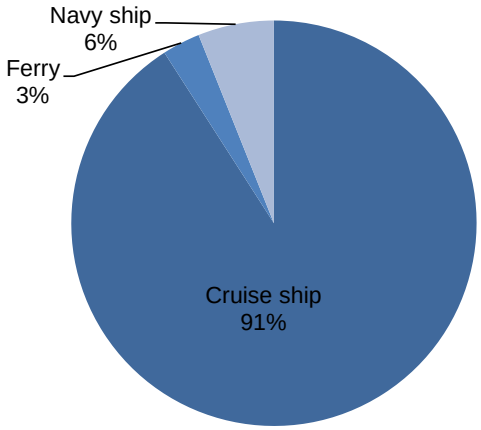
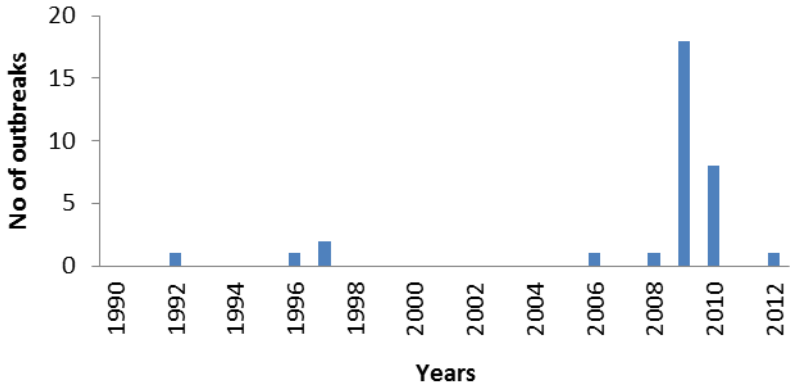


Figure 21. Vaccine-preventable disease outbreaks by date of occurrence. N=33



1.4. Emerging and vector borne diseases outbreaks

Three confirmed outbreaks were reported: one malaria outbreak (due to *Plasmodium falciparum*); one of Severe Acute Respiratory Syndrome -SARS- and one of plague. The source of infection was identified in all events; all occurred in ports, the SARS outbreak additionally affected a cruise ship. The malaria outbreak (2 cases) occurred in the Marseille port (France) in 1994; the SARS outbreak (14 cases) occurred in Singapore and Malaysia in 2003; and human plague in Madagascar (44 cases) occurred between 1991 and 1999[113-115]. Annex 22 shows detailed information on emerging and vector borne disease outbreaks identified.

1.5. Other infectious diseases outbreaks

Eight infectious diseases outbreaks not classified in the above categories were found during the review and were caused by: lepidopterism (3 outbreaks), tonsillitis, methicillin-resistant Staphylococcus, viral myocarditis, dermatological infectious disease and scabies. These events affected 165 persons. The viral myocarditis outbreak caused four deaths. The viral myocarditis and the scabies outbreaks were related to the illegal transport of immigrants from China to USA on board cargo ships. The other outbreaks affected navy ships, tall ship, and cargo ships. The outbreaks took place in ships travelling through South America, Pacific

Ocean, Atlantic Ocean and ports of Africa. Two outbreaks happened in 1995 and the others between 2001 and 2006[31,116-120]. Annex 23 shows detailed information on other infectious disease outbreaks identified.

2. Other communicable diseases publications

Other publications were found during the search; these include prevalence, incidence and mortality studies; annuals reports for specific diseases; reviews; epidemiological surveillance results, etc. Although there is a specific chapter for outbreaks, this section of the review includes general information about outbreaks or clusters not having enough information to be included in the outbreak chapter. Table 8 shows a summary of the infectious diseases studies published.

Table 8. Description of infectious disease studies

Infectious diseases studies	No. Studies	No. Cases	No. Deaths
Respiratory diseases	**4**	**334**	**0**
Tuberculosis	3	334	0
Others respiratory diseases	1	No data	No data
Food and water borne diseases	**44**	**19280**	**6**
Gastrointestinal illness	26	19129	6
Schistosomiasis	1	17	0
Legionellosis	16	71	0
Helicobacteriosis	1	63	0
Vaccine-preventable diseases	**6**	**7719**	**0**
Varicella	4	7168	0
Measles	1	254	0
Mumps	1	297	0
Emerging and vector borne	**5**	**651**	**2**
Malaria	4	584	2
Rickettsiosis	1	67	0
Sexual transmitted diseases	**13**	**3718**	**0**
HIV	6	1553	0
Syphilis and others	4	1143	0
Gonorrhoea	1	599	0
Multiple microorganisms	1	178	0
No data	1	245	0
Others infectious diseases	**35**	**23208**	**34**
Total	**107**	**54910**	**42**

2.1. Respiratory diseases

Four studies related to respiratory diseases have been published. Three prevalence studies of tuberculosis were found; these studies identified more than 300 tuberculosis cases and 47 latent tuberculosis infections, 258 cases (86%) were identified in a study performed between

1980 and 1995, the other studies were carried out in 2003 and between 2000-2005. Two events happened on board US navy ships and the other in a fishing vessel. They took place in different regions of the world.

One last study was related to respiratory streptococcal infection in crew members on board six Russian commercial ships. No data was available on number of cases or time of occurrence[121-124]. Annex 24 shows detailed information on the respiratory diseases studies identified.

2.2. Food and water-borne diseases

In this section 44 studies were identified: 26 prevalence studies of gastrointestinal illnesses, 16 studies of legionellosis and two studies on schistosomiasis and helicobacteriosis.

The gastrointestinal illnesses studies included more than 20,000 cases from which the following microorganism, among others, were identified: Enterotoxigenic *Escherichia coli*; *Giardia lamblia*; Salmonella; Rotavirus; Shigella; *Campylobacter jejuni* and *Entamoeba histolytic*; Norovirus. One study on surveillance of deaths onboard merchant ship registered six fatal cases of gastrointestinal illness. Seventy three percent of the studies were performed after year 2000 in different parts of the world.

The 'Travel-associated Legionnaires´ disease in Europe' reports registered 16 studies related to Legionella between 2000 and 2010, including 13 clusters and more than 70 cases on board cruise or ferry ships. Information on place of occurrence was not available.

The schistosomiasis and helicobacteriosis studies included more than 80 cases with no deaths. Cases from the schistosomiasis study occurred in fluvial cruise ships and helicobacteriosis in German submarines[123,125-145]. Annex 25 shows detailed information on food and water-borne disease studies identified.

2.3. Vaccine preventable diseases

Four studies on vaccine preventable diseases were found. Three studies related to varicella: one study was carried out from 2000 to 2009 on cruise ships in the USA, it accounted for 278 cases; another study on varicella among seafarers in India in 2008, mentioning vaccination of

seafarers as part of their pre-employment medical examination; and the other study from two cruise ships and one cargo ship in the port of Hamburg from November 2007 to April 2008, including 5 cases. The fourth study was one large study in the US Navy that reports more than 7,000 cases of varicella, measles and mumps from 1980 to 1995[110,123,146-147]. Annex 26 shows detailed information on the vaccine preventable disease studies identified.

2.4. Emerging and vector borne diseases

Four malaria studies, and one on rickettsiosis and other arthropod-borne diseases, were included. The malaria studies were carried out in seafarers with more than 500 cases reported, who acquired the disease mainly in Africa. The 67 cases of rickettsiosis were diagnosed in US Navy personnel[123,148-151]. Annex 27 shows detailed information on the emerging and vector borne disease studies identified.

2.5. Sexual transmitted infections

Six Human Immunodeficiency Virus (HIV) prevalence studies were carried out among seafarers in Thailand, Poland, Brazil, Spain and Australia. More than 1,500 confirmed cases were detected during the 90s. Some studies evaluated the risk factors and found intravenous drug addiction and certain types of sexual behaviours to be associated.

One sexually transmitted infection (STI) prevalence study evaluated the disease history, self-treatment, and behaviours among fishermen in Thailand during 1998. It confirmed 245 cases (without specific diagnosis). Another study (between 1989 and 1991), on STI risk factors among deployed U.S. military personnel identified syphilis and gonorrhoea, among other diseases; before the military deployment 37 cases were identified and 166 new cases during the deployment.

Gonorrhoea, syphilis, and other STI were identified in another investigation, among 1740 US Navy personnel deployed in different regions of the world, between 1980 and 1985[123,152-160]. Annex 28 shows detailed information on the sexual transmitted disease studies identified.

2.6. Other infectious diseases

Fifteen prevalence studies, describing 35 events, were published: Illnesses and injuries on board sea/river cruise ships and others vessels; surveillance of deaths in merchant ships and deaths in international travellers arriving in the US; the risk of communicable diseases aboard cargo ships; hepatitis virus among US Navy military personnel; hepatitis virus among Denmark merchant seamen; and Methicillin-resistant *Staphylococcus aureus* infections.

These studies were carried out in different parts of the world, most of them between 2001 and 2012[123,129,161-173]. Annex 29 shows detailed information on the other infectious disease studies identified.

3. Single case reports

Case reports are related to single cases of communicable diseases acquired during travel onboard vessel or at ports.

Table 9 Description of infectious diseases single case reports

Infectious diseases case reports	No. Cases	No. Deaths
Respiratory diseases	**3**	**0**
Tuberculosis	3	0
Food and water borne diseases	**37**	**9**
Legionellosis	34	8
Parasitic infection	1	0
Cyclosporosis	1	0
Gastroenteritis due to *E. coli*	1	1
Vaccine-preventable diseases	**2**	**0**
Diphtheria	1	0
Meningococcal meningitis	1	0
Emerging and vector borne diseases	**3**	**2**
Israeli Spotted Fever (ISF)	1	1
Malaria	2	1
Total	45	10

3.1. Respiratory diseases

Three cases of tuberculosis were described: one US aircraft carrier marine; one submarine crew member and one illegal immigrant onboard a boat; the cases happened in voyages through the west coast of US (2005); Japan (before 1997) and west coast of Canada (1999), respectively[174-177]. Annex 30 shows detailed information on the respiratory disease single case reports identified.

3.2. Food and water-borne diseases

There were 37 single case reports. Thirty four single case reports of Legionellosis, including 8 deaths have been published mainly in cruise or ferry ships from 1990 to 2001. Three more cases were published: one due to *Taenia saginata* in an officer from an ocean liner with travel history to South America; one case of cyclosporosis in a man visiting the Greek islands in a sailing boat; and, a fatal case of gastroenteritis due to *Escherichia coli* in Papua New Guinea[63,78,178-181]. Annex 31 shows detailed information on the food and water borne disease single case reports identified.

3.3. Vaccine-preventable diseases

There were two cases, one of diphtheria in an unimmunised 72 year old person, travelling on board a cruise ship in the Baltic Sea, and one of meningococcal meningitis in a 24 year old sailor on board an aircraft carrier at sea during 2003[182-183]. Annex 32 shows detailed information on the vaccine preventable disease single case reports, identified.

3.4. Emerging and vector borne diseases

There were two individual cases of malaria on board commercial ships travelling through the Venezuela coast and Gulf of Guinea; one of the cases, the captain of the ship, died. *Plasmodium falciparum* was diagnosed in both events. There was one case of Israeli Spotted Fever in a tourist on board a cruise ship travelling around the Mediterranean Sea, probably infected in Libya[181,184-185]. Annex 33 shows detailed information on the emerging and vector borne disease single case reports identified.

Part B: Literature review and surveys for chemical or radiological events in all types of ships or at ports

B.1. Literature review

1. Literature review on radiological events

From 1960 to 2013, 13 radiological events related to all type of ships, or at ports, were identified. Elven events occurred on-board nuclear ships (85%) and two on cargo ships (15%) (Figure 22). Five of these events affected ports as well. At least 449 exposed people were mentioned and 38 deaths.

One of the events on cargo ship occurred in 1997 when the ship broke in two off the Azores because of a violent storm. This accident caused the spillage of several containers, one container transporting three biological irradiators equipped with their radioactive sources (Cs 137) that implode in the seabed at 3000 metres. The other event on cargo ship occurred on 2012, when scrap-iron was transported from Morocco to Spain by ship and afterthat by a truck. Radiation was detected when the truck enter a steell mill in Spain. A device for control industrial processes with a radioactive source (Cs 137) was detected and isolate. The truck driver and the workers of the steel mill were not exposed to the radiation.

Ninety two per cent of radiological incidents published occurred between 1960 and 1989 (Figure 23). Seven of them took place at the Russian coastline and nearby; two in the Atlantic Ocean, one in the Mediterranean Sea and one in the USA. Information on location was not available for two incidents (Figure 24). Specific implemented measures were reported in eight incidents: evacuation of personnel; treatment of exposed cases; identification, detection and characterization of the radiation source; repair of the source; decontamination and closure of the affected areas and continuous monitoring during several years[186-191]. Annex 34 shows detailed information on the radiological events identified.

Figure 22. Radiological events by type of vessel. N=13

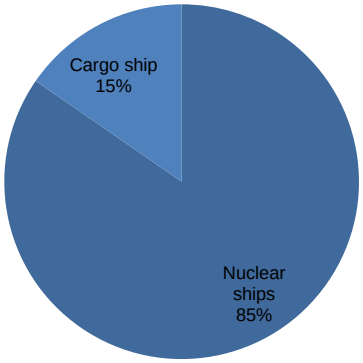


Figure 23. Radiological events by year of occurrence. N=13

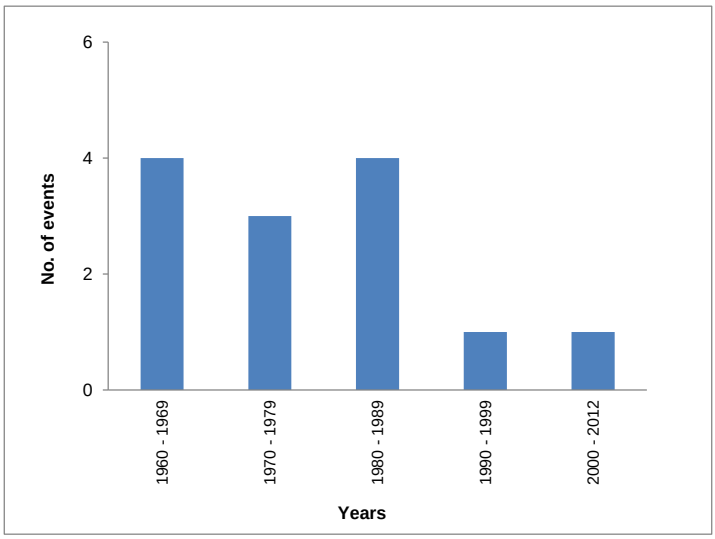
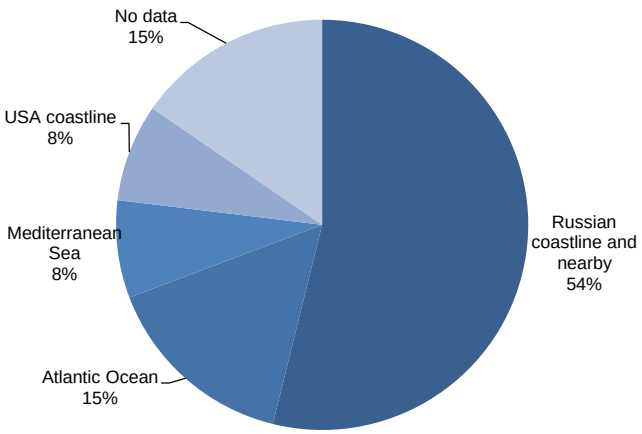


Figure 24. Radiological events by place of occurrence. N=13



2. Literature review on Chemical events

From 1944, 94 chemical accidents or incidents on vessels or at ports were published. Sixty two (66%) of these events took place on cargo ships, 11 (12%) on fishing vessels and four events on: a ferry, a nuclear submarine, a barge and a recreational boat. Information on the type of boat was available for 16 events (Figure 25). Twenty six events occurred simultaneously in vessels and at ports and 5 exclusively at ports. Half of the chemical events published (50% n=49) occured in the 70´s and from the year 2000, during the 90´s occurred 22% (n=19) of events (figure 26). Six events did not include a date of occurrence. These events caused at least 12,000 cases with more than 2,000 deaths. Two of them (Indian port in 1944 and Texas port in 1947) were responsible for 81% of cases and 80% of the deaths. Chemical substances involved in the events were: hydrocarbons, inorganic substances, nitrosamines, ethers, alcohols, pesticides, warfare chemicals and mixture of substances; in 7% of the events information about the chemicals involved was not available.

Thirty events (32%) occurred in Europe, namely 7 in France, 5 in Netherlands and in Spain , 4 in Great Britain, 3 in Italy, 2 in Germany and in Sweden and 1 in Greece and Ireland. Eighteen events (19%) took place in USA. Fourteen events (15%) occurred in 8 Asiatic countries: 3 events occurred in India and 3 in Malasya. Sixteen events ocurred in 9 diferent places, 5 of these events took place in the Atlantic Ocean. Information on place of occurrence was not available in 17% (n=16) of the events (Figure 28). In two events the local

population were evacuated (Mumbai port in India, 2010 and Finisterre port in Spain, 1987)[188,189,192-215]. Annex 35 shows detailed information on the chemical events published.

Figure 25. Chemical events by type of vessel. N=94

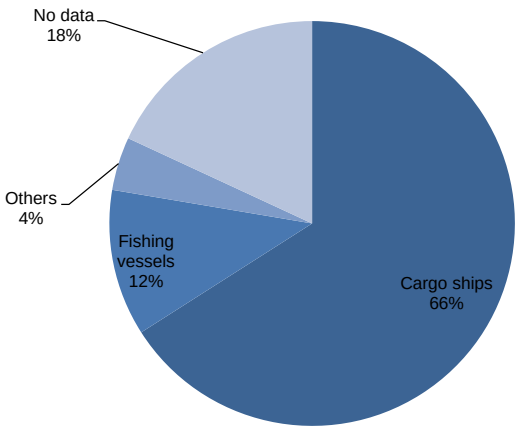


Figure 26. Chemical events, with number of cases associated, by date of occurrence. N=88

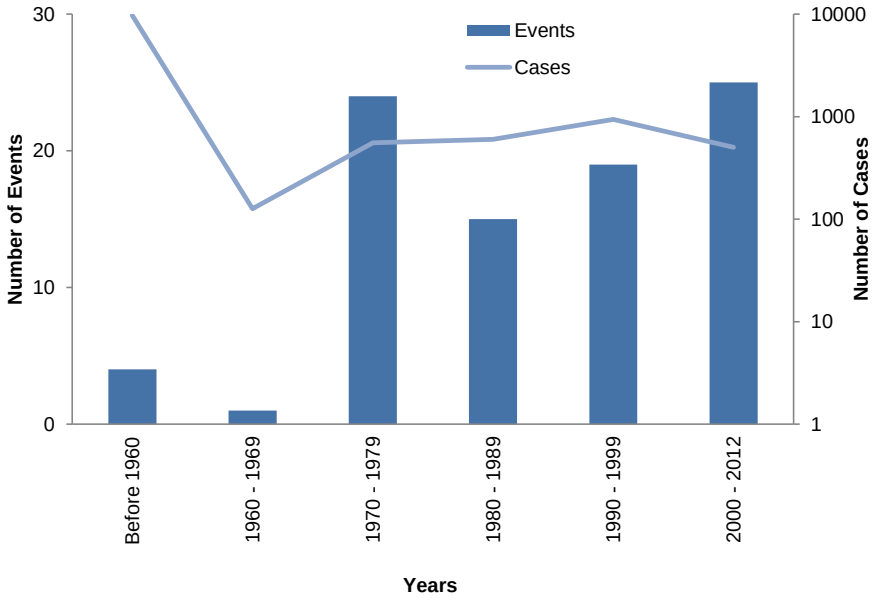
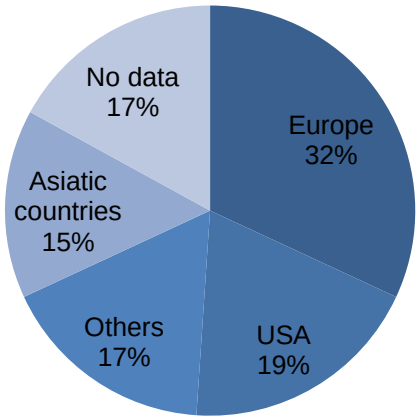


Figure 27. Chemical events by place of occurrence. N=94



From 1980, eight chemical events on ships or at ports, accounting for 122 cases and 9 deaths, have been reported to the eMARS. The events occurred from 1985 to 1998 in different ships and four of them affected the port as well. All except one were due to

hydrocarbons, mainly during loading and unloading[216]. Annex 35b shows detailed information on the chemical events reported to the eMARS.

B.2. Surveys for chemical or radiological events on all types of ships or at ports

1. Identification of authorities responsible for responding to radiological events on any type of ship or at ports among the European Union (EU) countries

Twenty countries (67%) completed the questionnaire for the identification of authorities responsible for responding to radiological events on any type of ship or at ports. These countries were Austria, Bulgaria, Croatia, Cyprus, Estonia, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Lithuania, Malta, Norway, Romania, Slovakia, Slovenia, Spain and UK.

These countries identified the authorities responsible for creating legislation, planning, detection and recording, impact assessment, response, communication and training related to public health management of radiological events on ships or at ports (Table 10-16).

Creating legislation

Twenty countries identified the authorities responsible for creating legislation, regulations or mandatory guidelines related to public health management of radiological events on ships or at ports. Table 10 shows the countries, type and name of these responsible authorities.

Table 10. Country, type and name of the authority responsible for creating legislation or mandatory guidelines related to public health management of radiological events on ships or at ports

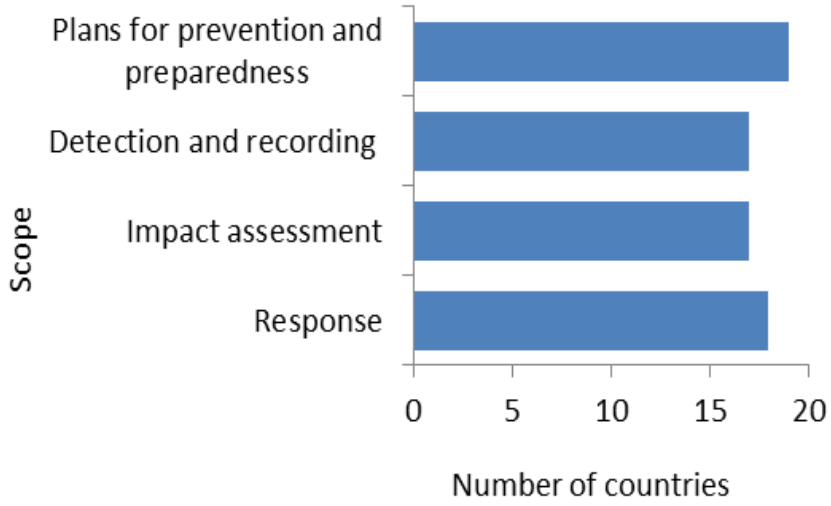
Country	Type of Authority	Name of Authority
Austria	National	Federal Ministry of Agriculture, Forestry, Environment and Water Management
Bulgaria	National	Ministry of Health
Croatia	National	The State Office for Radiological and Nuclear Safety
Republic of Cyprus	National	Ministry of Labour and Social Insurance
Estonia	National	Ministry of Environment / Ministry of Agriculture / Ministry of Social Affairs
Finland	National	Ministry of Interior
France	National	Ministry of Health / Ministry of Interior
Germany	National	Federal Office for Radiation Protection
Greece	National	Ministry of Health / Ministry of Shipping, Maritime Affairs and the Aegean / General Secretariat for Civil Protection Supportive Team Management of Chemical, Biological, Radiological and Nuclear Threats and Incidents / Greek Atomic Energy Commission (GAEC)
Iceland	National	Icelandic Radiation Safety Authority
Italy	National	Ministry of Health / Ministry of Interior / Ministry of Infrastructure and Transport / Civil Protection Department
Ireland	National	Radiological Protection Institute of Ireland
Republic of Lithuania	National	Ministry of Interior
Malta	National	Radiation Protection Board
Norway	National	Ministry of Health and Care Services
Romania	National	Ministry of Health / Ministry of Transportation / National Commission for Nuclear Activities Control / Ministry of Interior
Slovak Republic	National	Ministry of Health
Slovenia	National	Administration for Civil Protection and Disaster Relief / Nuclear Safety Administration / Radiation Protection Administration
Spain	National and Regional or Local	Ministry of Interior / Ministry of Health / Ministry of Infrastructure and Transports / Regional Spanish Port System
United Kingdom	National	Department of Health England, Welsh Government, Scottish Government, Department of Health, Social Services and Public Safety (Northern Ireland) / Public Health England / Public Health Wales / Health Protection Scotland / Public Health Agency Northern Ireland

The responsible authorities for legislation are national authorities in all countries except in Spain where the responsible authorities are both national and regional/local.

Eighteen countries specified the scope of their legislations. Seventeen countries reported that their authorities are responsible for creating legislation on plans for prevention and

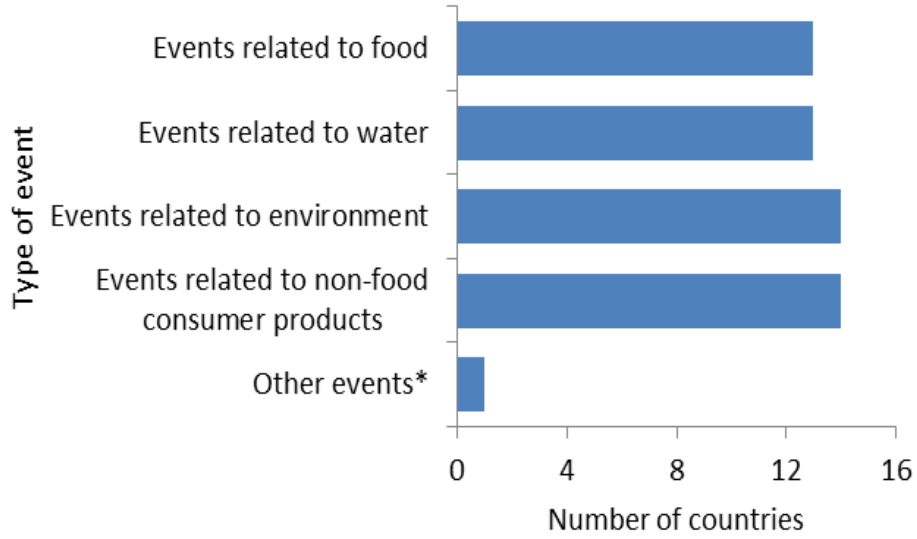
preparedness, detection and recording, impact assessment and response. One country only creates legislation on plans for prevention and preparedness (Figure 28). Eighteen out of 19 countries reported that their authorities are responsible for creating legislation on both accidental and deliberate radiological events on ships or at ports. One country creates legislation only on accidental events.

Figure 28. Number of countries by scope of legislation on radiological events on ships or at ports



Thirteen countries create legislation on all types of radiological events including events related to food, water, the environment and non-food consumer products (Figure 29).

Figure 29. Number of countries whose authorities are responsible for creating legislation on radiological events on ships or at ports by type of event



* Tracing the source of the radiological event

Planning

Twenty countries identified authorities responsible for planning related to public health management of radiological events on ships or at ports. Table 11 shows the countries, type and name of these responsible authorities.

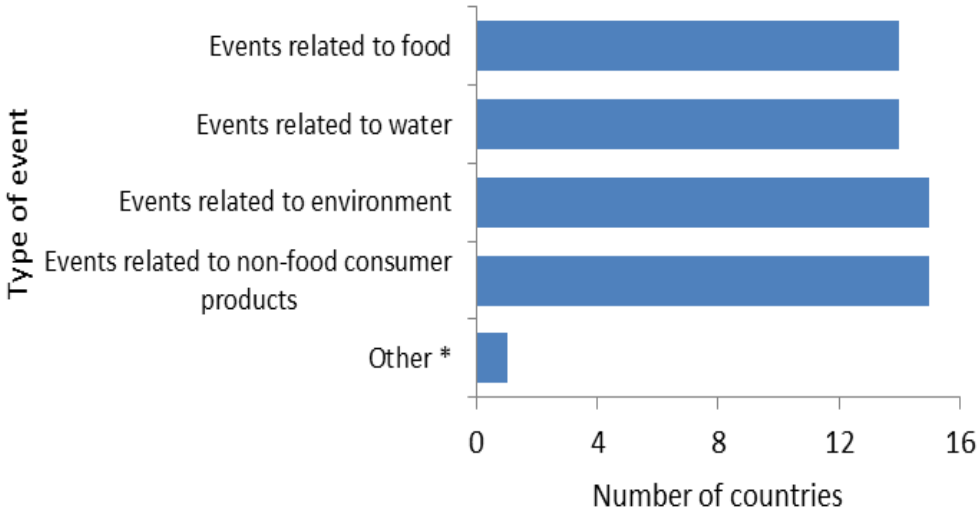
Table 11. Country, type and name of the authority responsible for planning related to public health management of radiological events on ships or at ports

Country	Type of Authority	Name of Authority
Austria	National	Federal Ministry of Agriculture, Forestry, Environment and Water Management
Bulgaria	National and Regional or Local	Regional administration
Croatia	National	National Institute of Public Health (Ministry of Health)
Republic of Cyprus	National	Radiation Inspection and Control Service (Ministry of Labour and Social Insurance)
Estonia	National	Environmental Board
Finland	Regional or Local	Rescue Departments
France	Regional or Local	Health Agency / Prefet
Germany	Regional or Local	Hamburg Department of Interior
Greece	National	General Secretariat for Civil Protection Supportive Team Management of Chemical, Biological, Radiological and Nuclear Threats and Incidents / Greek Atomic Energy Commission (GAEC)
Iceland	National	Icelandic Radiation Safety Authority
Italy	National	Ministry of Health / Ministry of Interior / Ministry of Infrastructure and Transport / Civil Protection Department
Ireland	National	Radiological Protection Institute of Ireland / Health Service Ireland (HSE)
Republic of Lithuania	National	Ministry of Health
Malta	National	Radiation Protection Board
Norway	National and Regional or Local	The Norwegian Radiation Protection Authority / County Government
Romania	National and Regional or Local	Constanta District Public Health Authority / Romanian Naval Authority (Ministry of Transportation) / National Environment Guard (Ministry of Environment) / General Inspectorate for Emergency Situations (Ministry of Interior) / Border Office (Ministry of Interior) / National Commission for Nuclear Activities Control / Customs (Ministry of Finance) / National Veterinary Authority and Food Safety
Slovak Republic	National	Ministry of Transport, Construction and Regional Development
Slovenia	National	Administration for Civil Protection and Disaster Relief
Spain	National and Regional or Local	Ministry of Interior / Ministry of Health / Ministry of Infrastructure and Transports / Regional Spanish Port System
United Kingdom	National	Department of Health England, Welsh Government, Scottish Government, Department of Health, Social Services and Public Safety (Northern Ireland) / Public Health England / Public Health Wales / Health Protection Scotland / Public Health Agency Northern Ireland

Thirteen out of 20 countries (65%) reported that the responsible authorities for planning related to public health management of radiological events on ships or at ports were national authorities, in three countries were regional or local, and in four countries the responsible authorities were both national and regional/local.

Nineteen countries reported that their authorities were responsible for planning related to public health management of accidental and deliberate radiological events on ships or at ports. Fourteen countries specified that their authorities are responsible for planning on all types of radiological events including events related to food, water, the environment and non-food consumer products (Figure 30).

Figure 30. Number of countries whose authorities are responsible for planning on radiological events on ships or at ports by type of event



*Radiological events related to transit accidents

Detection and recording

Nineteen countries identified authorities responsible for detection and recording of radiological events on ships or at ports. Table 12 shows the countries, type and name of these responsible authorities.

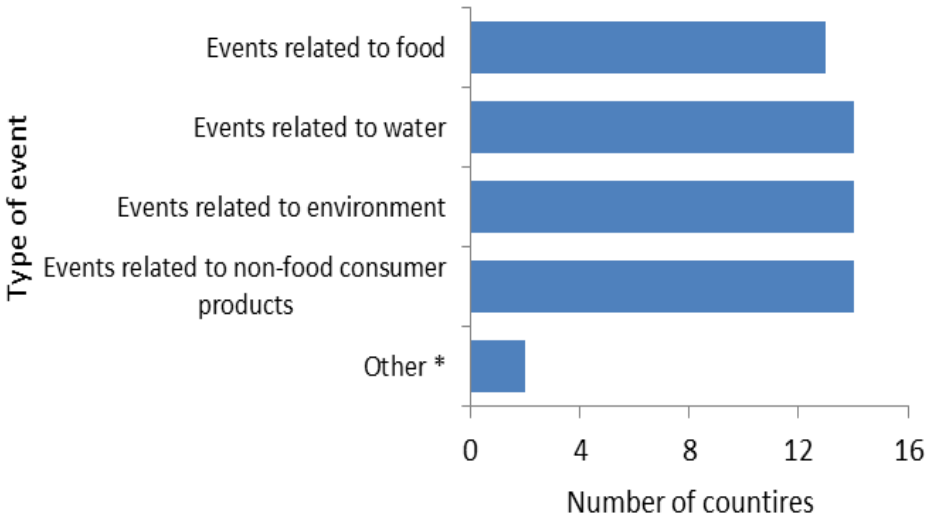
Table 12. Country, type and name of the authority responsible for detection and recording of radiological events on ships or at ports

Country	Type of Authority	Name of Authority
Austria	National	Federal Ministry of Agriculture, Forestry, Environment and Water Management
Bulgaria	National and Regional or Local	Border Police – Varna Port/ Burgas Port
Croatia	-	-
Republic of Cyprus	National	Radiation Inspection and Control Service (Ministry of Labour and Social Insurance)
Estonia	National	Estonian Maritime Administration
Finland	National	Finnish Customs
France	Regional or Local	Fireman and IRSN
Germany	National	Central Command for Maritime Emergencies
Greece	National	General Secretariat for Civil Protection Supportive Team Management of Chemical, Biological, Radiological and Nuclear Threats and Incidents / Greek Atomic Energy Commission (GAEC) / Office of Acute Risk Assessment and Management of Acute Public Health Events – Hellenic Center for Disease Control and Prevention
Iceland	National	Icelandic Radiation Safety Authority
Italy	National and Regional or Local	Ministry of Interior / Regional Agency for Environment Protection (ARPA) / SperimentalZooprophylacticInstitut (IZZ)
Ireland	National	Customs (Office of the Revenue Commissioners) / Radiological Protection Institute of Ireland
Republic of Lithuania	National	State Border Guard Service (Ministry of Interior)
Malta	National	Radiation Protection Board / Customs Department
Norway	National	The Norwegian Radiation Protection Authority
Romania	National and Regional or Local	Constanta District Public Health Authority / Romanian Naval Authority (Ministry of Transportation) / National Environment Guard (Ministry of Environment) / General Inspectorate for Emergency Situations (Ministry of Interior) / National Commission for Nuclear Activities Control
Slovak Republic	National	Ministry of Transport, Construction and Regional Development
Slovenia	National	Slovenian Nuclear Safety Administration
Spain	National and Regional or Local	Nuclear Safety Council / Civil Protection / Customs / Regional Civil Protection
United Kingdom	National	Port Health Authorities / Local Authorities / Public Health England / Public Health Wales / Health Protection Scotland / Public Health Agency Northern Ireland / Maritime and Coastguard Agency

Fourteen out of 19 countries (74%) reported that the responsible authorities for detection and recording were national authorities, in one country were regional or local, and in four countries the responsible authorities were both national and regional/local.

Seventeen out of 18 countries (94%) reported that their authorities are responsible for detection and recording of accidental and deliberated radiological events on ships or at ports. One country reported that their authorities are responsible for detection and recording only for accidental events. Thirteen countries indicated that their authorities are responsible for detection and recording of all types of events including events related to food, water, environment and non-food consumer products (Figure 31).

Figure 31. Number of countries whose authorities are responsible for detection and recording of radiological events on ships or at ports by type of event



*Radiological events on vessels, and on all cargo

Impact assessment

Nineteen countries identified authorities responsible for public health impact assessment of radiological events on ships or at ports. Table 13 shows the countries, type and name of these responsible authorities.

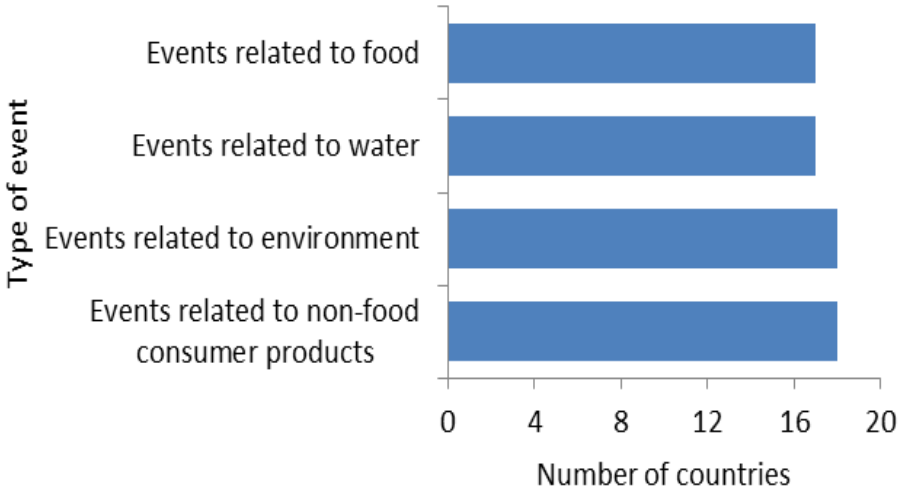
Table 13. Country, type and name of the authority responsible for public health impact assessment of radiological events on ships or at ports

Country	Type of Authority	Name of Authority
Austria	National	Federal Ministry of Agriculture, Forestry, Environment and Water Management
Bulgaria	National	Nuclear Regulatory Agency
Croatia	-	-
Republic of Cyprus	National	Radiation Inspection and Control Service (Ministry of Labour and Social Insurance)
Estonia	National	Environmental Board
Finland	National	Radiation and Nuclear Safety Authority
France	National	National Public Health Institute / IRSN
Germany	National	Federal Office for Radiation Protection
Greece	National	General Secretariat for Civil Protection Supportive Team Management of Chemical, Biological, Radiological and Nuclear Threats and Incidents
Iceland	National	Icelandic Radiation Safety Authority
Italy	National	Ministry of Interior / Ministry of Environment and Protection of Land and Sea / Ministry of Health
Ireland	National	Radiological Protection Institute of Ireland / Health Service Ireland (HSE)
Republic of Lithuania	National	Ministry of Health
Malta	National	Radiation Protection Board
Norway	National	The Norwegian Radiation Protection Authority
Romania	National	National Institute of Public Health / National Commission for Nuclear Activities Control
Slovak Republic	National	Ministry of Transport, Construction and Regional Development
Slovenia	National	Administration for Civil Protection and Disaster Relief
Spain	National	Nuclear Safety Council
United Kingdom	National	Port Health Authorities / Local Authorities / Public Health England / Public Health Wales / Health Protection Scotland / Public Health Agency Northern Ireland

All nineteen responding countries reported that their responsible authorities for public health impact assessment were national authorities.

Eighteen countries (95%) reported that their authorities are responsible for public health impact assessment of accidental and deliberate radiological events on ships or at ports. One country reported that their authorities are responsible only for impact assessment of accidental events. A total of seventeen countries specified that their authorities are responsible for public health impact assessment of all types of radiological events including events related to food, water, the environment and non-food consumer products (Figure 32).

Figure 32. Number of countries whose authorities are responsible for public health impact assessment of radiological events on ships or at ports by type of event



Response

Twenty countries identified authorities responsible for public health response to radiological events on ships or at ports. Table 14 shows the countries, type and name of these responsible authorities.

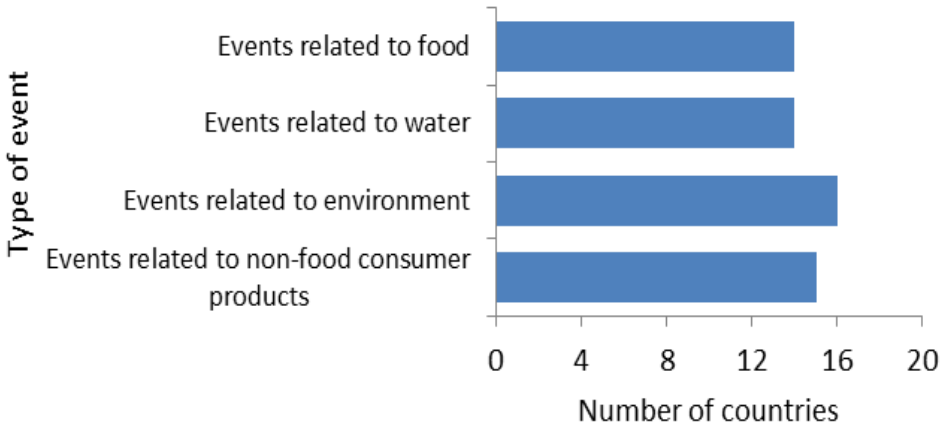
Table 14. Country, type and name of the authority responsible for public health response to radiological events on ships or at ports

Country	Type of Authority	Name of Authority
Austria	National	Federal Ministry of Agriculture, Forestry, Environment and Water Management
Bulgaria	National and Regional or Local	RHI
Croatia	National	National Public Health Institute (Ministry of Health) / State Office for Radiological and Nuclear Safety
Republic of Cyprus	National	Radiation Inspection and Control Service (Ministry of Labour and Social Insurance)
Estonia	National	Rescue Board
Finland	Regional or Local	Regional Rescue Services
France	Regional or Local	Health Agency / Prefet
Germany	National	Central Command for Maritime Emergencies
Greece	National	General Secretariat for Civil Protection Supportive Team Management of Chemical, Biological, Radiological and Nuclear Threats and Incidents / Greek Atomic Energy Commission (GAEC)
Iceland	National	Icelandic Radiation Safety Authority
Italy	National	Ministry of Interior / Ministry of Environment and Protection of Land and Sea / Ministry of Health
Ireland	National	Radiological Protection Institute of Ireland / Health Service Ireland (HSE)
Republic of Lithuania	Regional or Local	Municipalities
Malta	National	Radiation Protection Board / Superintendent for Public Health
Norway	National and Regional or Local	The Norwegian Radiation Protection Authority / Crisis Committee for Nuclear Preparedness / County Government
Romania	National and Regional or Local	Constanta District Public Health Authority / Romanian Naval Authority (Ministry of Transportation) / National Environment Guard (Ministry of Environment) / General Inspectorate for Emergency Situations (Ministry of Interior) / National Commission for Nuclear Activities Control / National Veterinary Authority and Food Safety
Slovak Republic	National	Ministry of Transport, Construction and Regional Development
Slovenia	National	Administration for Civil Protection and Disaster Relief
Spain	National and Regional or Local	Ministry of Health / Regional Public Health Authorities
United Kingdom	National	Port Health Authorities / Local Authorities / Public Health England / Public Health Wales / Health Protection Scotland / Public Health Agency Northern Ireland / National Health Service (NHS)

Thirteen out of 20 countries (65%) reported that the responsible authorities for responding were national authorities, in three countries were regional or local, and in four countries the responsible authorities were both national and regional/local.

Seventeen out of 18 countries (94%) specified that their authorities are responsible for public health response to accidental and deliberate radiological events on ships or at ports. One country reported that their authorities are responsible only for public health response to accidental events. Fourteen countries specified that their authorities are responsible for public health response to all types of radiological events including events related to food, water, the environment and non-food consumer products (Figure 33).

Figure 33. Number of countries whose authorities are responsible for public health response to radiological events on ships or at ports by type of event



Communication

Twenty countries identified authorities responsible for communication of radiological events on ships or at ports. Table 15 shows the countries, type and name of these responsible authorities.

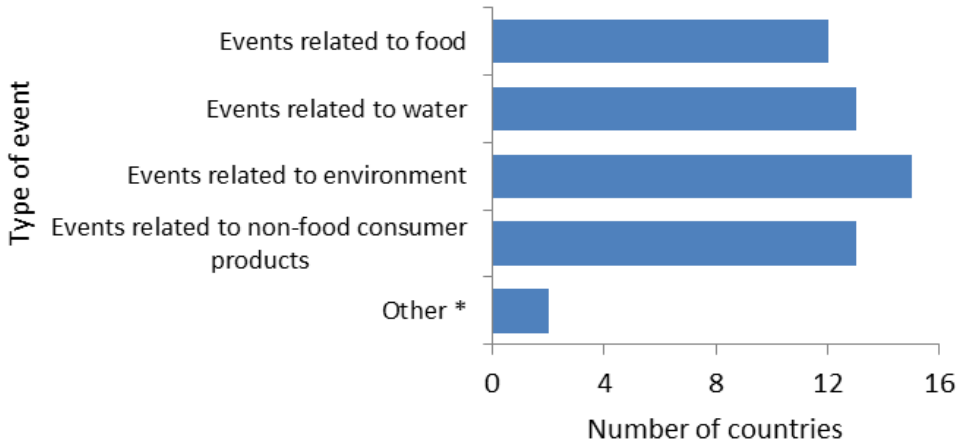
Table 15. Country, type and name of the authority responsible for communication of radiological events on ships or at ports

Country	Type of Authority	Name of Authority
Austria	National	Federal Ministry of Agriculture, Forestry, Environment and Water Management
Bulgaria	National and Regional or Local	Border Police Station – Varna Port / Burgas Port
Croatia	National	Ministry of Maritime Affairs, Transport and Infrastructure
Republic of Cyprus	National	Radiation Inspection and Control Service (Ministry of Labour and Social Insurance)
Estonia	National	Rescue Board
Finland	Regional or Local	Regional Rescue Services
France	Regional or Local	Prefet
Germany	National	Federal Office for Radiation Protection
Greece	National	General Secretariat for Civil Protection Supportive Team Management of Chemical, Biological, Radiological and Nuclear Threats and Incidents / Office of Acute Risk Assessment and Management of Acute Public Health Events – Hellenic Center for Disease Control and Prevention/ Greek Atomic Energy Commission (GAEC)
Iceland	National	Icelandic Radiation Safety Authority
Italy	National	Ministry of Interior / Civil Protection Department
Ireland	National	Radiological Protection Institute of Ireland / Department of Transport, Tourism and Sport / Irish Coast Guard / Port Authority
Republic of Lithuania	National	Fire and Rescue Department / Ministry of Interior
Malta	National	Radiation Protection Board / Civil Protection Department
Norway	National and Regional or Local	The Norwegian Radiation Protection Authority / County Government
Romania	National and Regional or Local	Romanian Naval Authority (Ministry of Transportation) / National Environment Guard (Ministry of Environment)) / Constanta District Public Health Authoritiy / National Commission for Nuclear Activities Control / NFP for IHR and EWRS
Slovak Republic	National	Ministry of Transport, Construction and Regional Development
Slovenia	National	Administration for Civil Protection and Disaster Relief
Spain	National and Regional or Local	Nuclear Safety Council / Ministry of Health / Regional Public Health Authorities
United Kingdom	National	Port Health Authorities / Local Authorities / Public Health England / Public Health Wales / Health Protection Scotland / Public Health Agency Northern Ireland

Fourteen out of 20 countries (70%) reported that the responsible authorities for communication were national authorities, in two countries were regional or local, and in four countries the responsible authorities were both national and regional/local.

Seventeen out of 19 countries (90%) specified that their authorities are responsible for communication of accidental and deliberated radiological events on ships or at ports. Two countries reported that their authorities are responsible only for the communication of deliberate radiological events. Twelve countries reported that their authorities are responsible for the communication of all types of radiological events including events related to food, water, the environment and non-food consumer products (Figure 34).

Figure 34. Number of countries whose authorities are responsible for communication of radiological events on ships or at ports by type of event

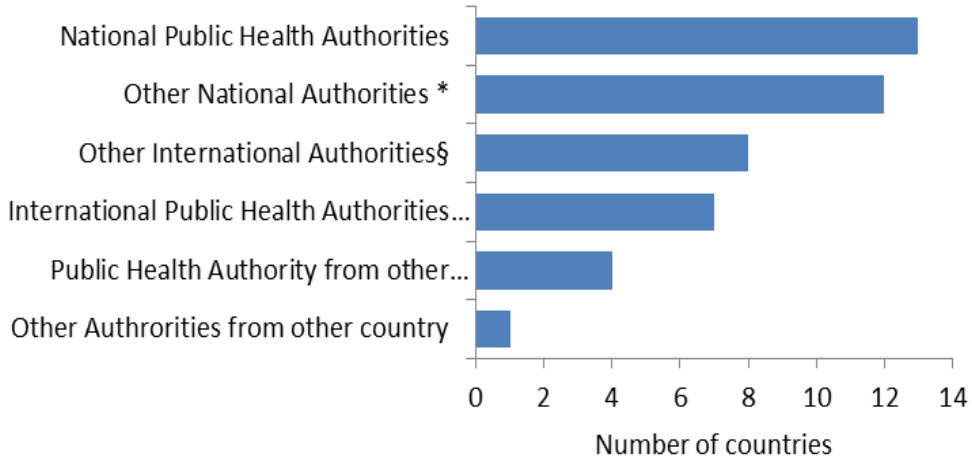


*Radiological events in vessels, and in all cargo

Thirteen countries reported that their authorities communicate with national public health authorities on radiological events on ships or at ports. Twelve countries also communicate with other national authorities such as nuclear and radiological safety authorities or ministries. Eight countries communicate with international authorities including International Atomic Energy Agency (IAEA) and the European Commission. Seven countries specified that their authorities communicate with international public health authorities including World Health Organization (WHO) and European Centre for Disease Prevention

and Control (ECDC). Only five countries reported that their authorities communicate with public health and other authorities from other countries (Figure 35).

Figure 35. Number of countries by type of communication with other authorities on radiological events on ships or at ports



* Nuclear and Radiological Safety Authorities, Ministries

§ IAEA, European Commission

¥ WHO, ECDC

Training

Fifteen countries identified authorities responsible for training related to public health management of radiological events on ships or at ports. Table 16 shows the countries, type and name of these responsible authorities.

Table 16. Country, type and name of the authority responsible for training related to public health management of radiological events on ships or at ports

Country	Type of Authority	Name of Authority
Austria	National	Federal Ministry of Agriculture, Forestry, Environment and Water Management
Bulgaria	National and Regional or Local	Naval Academy
Croatia	-	-
Republic of Cyprus	National	Radiation Inspection and Control Service (Ministry of Labour and Social Insurance)
Estonia	-	-
Finland	National and Regional or Local	Finnish Customs / Regional Rescue Services
France	-	-
Germany	National	Federal Office for Radiation Protection
Greece	National	Greek Atomic Energy Commission (GAEC)
Iceland	National	Icelandic Radiation Safety Authority
Italy	National	-
Ireland	National	Radiological Protection Institute of Ireland / Department of Transport, Tourism and Sport / Irish Coast Guard / Port Authority
Republic of Lithuania	National	Ministry of Health
Malta	-	-
Norway	National and Regional or Local	The Norwegian Radiation Protection Authority / County Government
Romania	National	National Commission for Nuclear Activities Control
Slovak Republic	-	-
Slovenia	National	Administration for Civil Protection and Disaster Relief
Spain	National and Regional or Local	Nuclear Safety Council / Civil Protection / ENRESA / Regional Civil Protection
United Kingdom	National and Regional or Local	Port Health Authorities / Local Authorities / Public Health England / Public Health Wales / Health Protection Scotland / Public Health Agency Northern Ireland

Ten out of 15 countries (67%) reported that the responsible authorities for training were national authorities. The rest of the countries authorities were both national and regional/local.

Fourteen countries specified that their authorities are responsible for training related to public health management of accidental and deliberate radiological events on ships or at ports. Eleven countries specified that their authorities are responsible for training related to public health management of all types of radiological events including events related to food, water, the environment and non-food consumer products (Figure 36).

Figure 36. Number of countries whose authorities are responsible for training related to public health management of radiological events on ships or at ports by type of event

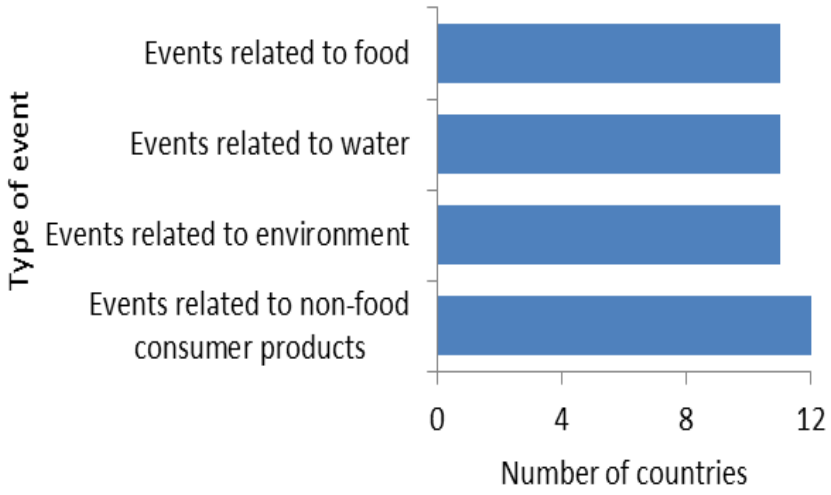
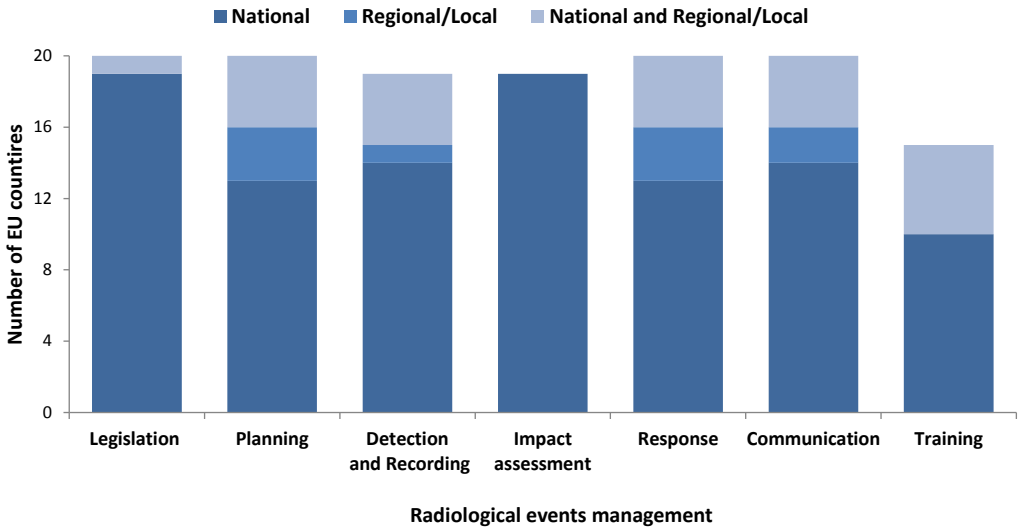


Figure 37 shows the type of authorities responsible for the different aspects covering the management of radiological events on ships or at ports.

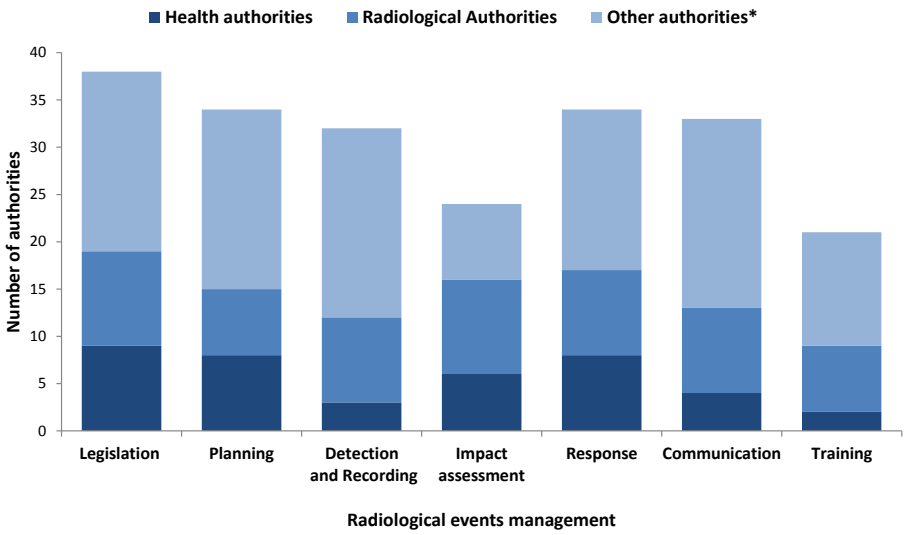
Figure 37. Number of countries by type of authority responsible by topic for the management of radiological events on ships or at ports



Most of the countries reported that national authorities are the responsible authorities for creating legislation, planning, detection and recording, impact assessment, response, communication and training related to public health management of radiological events on ships or at ports. Few countries identified regional or local authorities as the responsible authorities for planning, response and communication, and a small number of countries identified both national and regional/local authorities as the responsible authorities for every aspect of the management of radiological events except for impact assessment (only national authorities were identified). Only 15 countries identified authorities responsible for training.

Different types of authorities or institutions are involved in the management of radiological events, these include: health authorities, radiological authorities and other authorities such as Ministry of Home Affairs, Ministry of Transport, Emergencies, etc in the countries. Health authorities (Ministries, regional departments and Public Health Institutes) are more frequently responsible for creating legislation, planning, response and impact assessment compared to detection and recording of radiological events and training (Figure 38).

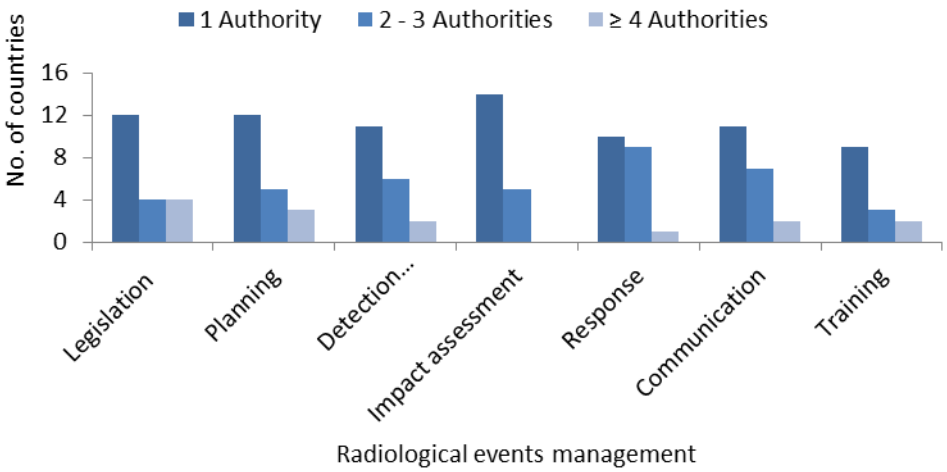
Figure 38. Number of authorities by type involved in the management of radiological events on ships or at ports



*Other authorities: Ministry of Home Affairs; Ministry of Infrastructures and Transport; Ministry of Labour and Social Insurance;;Ministry of Agriculture, Forestry, Environment and Water Management, Emergencies, etc.

Most of the countries reported that only one authority is responsible for creating legislation, planning, detection and recording, impact assessment, response, communication and training related to public health management of radiological events on ships or at ports. Regarding activities related to response and communication of radiological events more than one authority was commonly involved (Figure 39).

Figure 39. Number of countries by number of authorities involved in the management of radiological events on ships or at ports



2. Current practices regarding radiological events on any type of ships and at ports among the European Union (EU) countries

Eighteen countries (60%) responded the questionnaire for describing current practices, legal framework related to radiological events on ships or at ports, the events that authorities confronted in the past and the contingency plan that they use. These countries are Austria, Bulgaria, Cyprus, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Lithuania, Malta, Norway, Romania, Slovakia, Slovenia, Spain and UK.

These countries specified the type of legislation and year when entered into force related to public health management of radiological events on ships or at ports (Table 17).

Table 17. Country, type of legislation or regulation or guidelines applied to ships or at ports for public health management of radiological events

Country	Type of Legislation, regulation or guideline	Entered into Force
Austria	National legislation without specific provisions / Other	2007
Bulgaria	National legislation with specific provisions	2011
Cyprus	Other	2002
Finland	National legislation without specific provisions	1991
France	National legislation without specific provisions	2011
Germany	National legislation with specific provisions	2013
Greece	National legislation with specific provisions	2001
Iceland	National legislation with specific provisions / National legislation without specific provisions / Other	1972, 1986, 2002
Ireland	National legislation without specific provisions	1991
Italy	National legislation with specific provisions	2006
Lithuania	Specific legislation for ships or at ports / National legislation with specific provisions	1999
Malta	-	-
Norway	National legislation with specific provisions	2000
Romania	National legislation without specific provisions	2004, 2010
Slovakia	National legislation without specific provisions	2007
Slovenia	National legislation without specific provisions	2000, 2004
Spain	Specific for ships or at ports / National legislation without specific provisions / Other	1996, 1999, 2003, 2010
United Kingdom	Specific legislation for ships or at ports / National legislation with specific provisions / National legislation without specific	1936, 1974, 1984, 1989, 1990, 2004,

Most of the countries' legislations, regulations or guidelines applied to ships or at ports for public health management of radiological events are national legislations without specific

provisions for ships or at ports, followed by national legislations including specific provisions for ships or at ports. Only three countries have specific legislation for ships or at ports.

Seven countries reported that their guidelines applied to ships or at ports for public health management of radiological events are mandatory and one country reported that its guidelines are scientific.

Fifteen countries (83%) reported that their legislations, regulations or guidelines are applied to all types of ships for public health management of radiological events. Three countries did not answer to this question.

Fourteen countries (78%) reported that their legislations/guidelines apply to accidental and deliberate radiological events. One country's legislation applies only to deliberate events. Thirteen countries (72%) reported that their legislations/guidelines apply to all types of radiological events including events related to food, water, the environment and non-food consumer products.

Detection systems

Sixteen countries (89%) reported that there is a detection system for radiological events in place for ships or at ports. Fourteen countries specified that their detection systems apply both to accidental and deliberate radiological events. Ten countries reported that their detection systems apply to all types of radiological events including events related to food, water, the environment and non-food consumer products. Nine out of 16 countries with a detection system reported that the information obtained from the detection system is recorded and analyzed. The detection system was specific for ships or ports and covers all types of ships in eight countries.

Megaport initiative

Ten countries including 23 ports participate in the Megaport Initiative. The participating country, number and name of the operational and future ports are specified in table 18. Italy, UK and Spain present the higher number of Megaports among the countries with 57% of the total Megaports in Europe.

Table 18. Participating country in the MEGAPORT initiative, number of operational and future ports

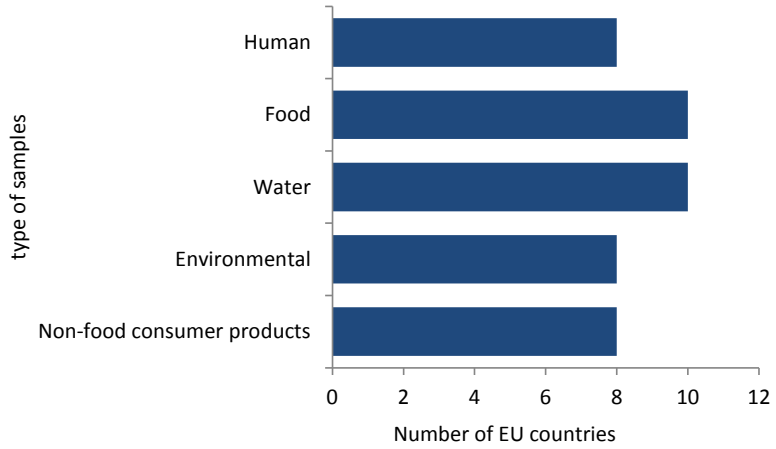
Country	Number of ports	Ports*
Belgium	2	Zeebrugge, Antwerp
France	2	Le Havre, Marseille
Germany	2	Bremen, Hamburg
Greece	1	Piraeus
Italy	5	Genoa, Gioia Tauro, La Spezia, Livorno, Naples
Netherlands	1	Rotterdam
Portugal	1	Lisbon
Spain	3	Algeciras, Barcelona, Valencia
Sweden	1	Gotenborg
UK	5	Southampton, Felixstowe, Liverpool, Thamesport, Tilbury

*Source: http://nnsa.energy.gov

Laboratory capacity

Fifteen countries (83%) reported that there is a laboratory available to analyze radionuclides in case of a radiological event on ships or at ports. Fourteen countries specified the type of laboratory (national, regional or local). Laboratories were national in seven countries, regional in three countries and local in three additional countries. One country had national, regional and local laboratories available. Figure 40 shows the type of samples that can be analyzed in these laboratories.

Figure 40. Number of countries with laboratory available for analyzing radionuclides by type of samples that can be analyzed



Eight out of the 15 countries with a laboratory available specified to have laboratory capacity for analyzing all types of samples (human, food, water, environmental and non-food consumer samples). Two additional countries indicated that they can only analyze food and water samples.

Contingency plans

Fourteen countries (78%) indicated that there is a contingency plan available for public health management of radiological events for ships or at ports. Four of them reported that their contingency plans are specific for ships or at ports. Contingency plans in eleven countries cover all type of ships.

Thirteen countries (93%) reported that their contingency plans apply to accidental and deliberate radiological events. One contingency plan from one country applies only to accidental events. Thirteen countries specified that their contingency plans apply to all types of radiological events including events related to food, to water, to the environment and to non-food consumer products.

Radiological events management

One country reported that have managed three radiological events on ships or at ports in the last five years, involving two, three and one cases. Ra226 was the radioactive source identified in all these three events occurred on ships. Control measures including isolation of contaminated items and materials were implemented. No deaths were reported.

Human resources for radiological events management

Seventeen countries indicated that their authorities have specific personnel to manage radiological events for all types of events and premises. Only four countries reported that the personnel responsible for public health management of radiological events undertake specific training on these events on ships or at ports.

3. Identification of authorities responsible for responding to chemical events on any type of ships and at ports among the European Union (EU) countries

Fourteen countries (47%) responded the questionnaire for identification of authorities responsible for responding to chemical events on any type of ships and at ports. These countries were Bulgaria, Croatia, Estonia, France, Germany, Greece, Iceland, Italy, Lithuania, Norway, Romania, Slovenia, Spain and UK.

These countries identified the authorities responsible for creating legislation, planning, detection and recording, impact assessment, response, communication and training related to public health management of chemical events on ships or at ports (Table 19-25). Other countries including Austria, Cyprus and Slovak Republic informed that they were not able to identified the authorities responsible for responding to chemical events on ships or at ports.

Legislation

Fourteen countries identified the authorities responsible for creating legislation, regulations or mandatory guidelines related to public health management of chemical events on ships or at ports. Table 19 shows the countries, type and name of these responsible authorities.

Table 19. Country, type and name of the authority responsible for creating legislation or mandatory guidelines related to public health management of chemical events on ships or at ports

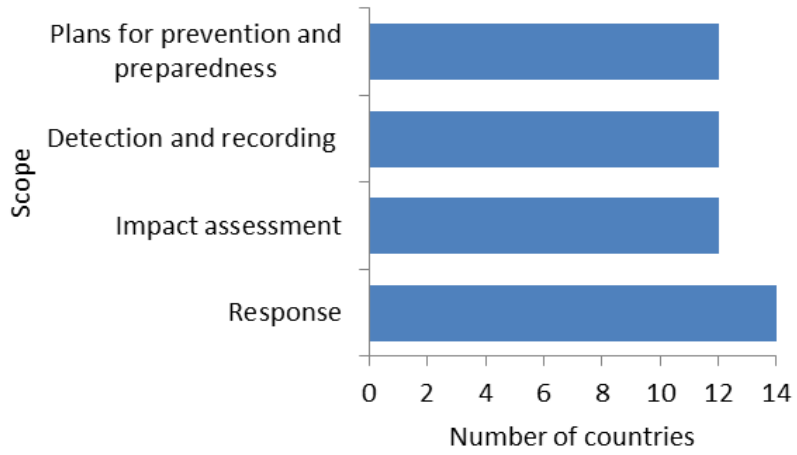
Country	Type of Authority	Name of Authority
Bulgaria	National	Ministry of Health
Croatia	National	Ministry of Maritime Affairs, Transport and Infrastructure
Estonia	National	Ministry of Interior / Ministry of Social Affairs / Ministry of Economic Affairs and Communications / Ministry of Environment
France	National	Ministry of Health / Ministry of Interior
Germany	National	Ministry for the Environment, Nature Conservation and Nuclear Safety / Office of Civil Protection and Disaster Assistance
Greece	National	Ministry of Shipping, Maritime Affairs and the Aegean / Ministry of Health / General Secretariat for Civil Protection Supportive Team Management of Chemical, Biological, Radiological and Nuclear Threats and Incidents
Iceland	National and Regional or Local	Ministry of Health / Ministry of Interior / Ministry of Environment / Regional Fire Departments
Italy	National	Ministry of Interior / Ministry of Infrastructure and Transport / Ministry of Health / Civil Protection
Republic of Lithuania	National	Ministry of Health / Ministry of Defense / Ministry of Interior / State Food and Veterinary Service / Ministry of Transport and Communications
Norway	National	Ministry of Trade, Industry and Fisheries / Norwegian Maritime Authority
Romania	National	Ministry of Health / Ministry of Environment / Ministry of Interior
Slovenia	National	Maritime Administration
Spain	National and Regional or Local	Ministry of Interior / Ministry of Health / Ministry of Infrastructures and Transports / Regional Governments / Spanish Port System
United Kingdom	National	Department of Health England, Welsh Government, Scottish Government, Department of Health, Social Services and Public Safety (Northern Ireland) / Public Health England / Public Health Wales / Health Protection Scotland / Public Health Agency Northern Ireland

Twelve countries (86%) identified national authorities responsible for creating legislation. Two countries indicated that responsible authorities for creating legislation on chemical events were both national and regional/local.

Twelve countries reported that their authorities are responsible for creating legislation on plans for prevention and preparedness, detection and recording, impact assessment and

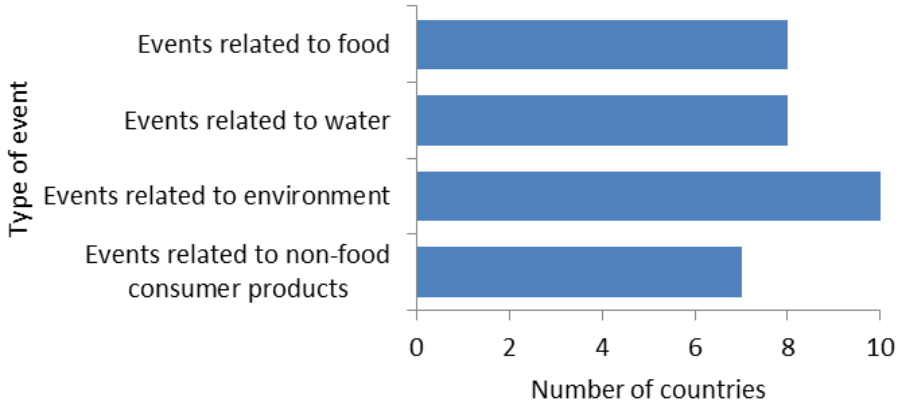
response. Two countries create legislation only on response activities (Figure 41). Thirteen countries specified that their authorities are responsible for creating legislation on both accidental and deliberate chemical events on ships or at ports.

Figure 41. Number of countries by scope of legislation on chemical events on ships or at ports



Seven countries create legislation on all types of chemical events including events related to food, water, the environment and non-food consumer products. Two countries specified that they create legislation on events related to food, water and environment, and one country creates legislation only on events related to environment (Figure 42).

Figure 42. Number of countries whose authorities are responsible for creating legislation on chemical events on ships or at ports by type of event



Planning

Twelve countries identified the authorities responsible for planning related to public health management of chemical events on ships or at ports. Table 20 shows the countries, type and name of these responsible authorities.

Table 20. Country, type and name of the authority responsible for planning related to public health management of chemical events on ships or at ports

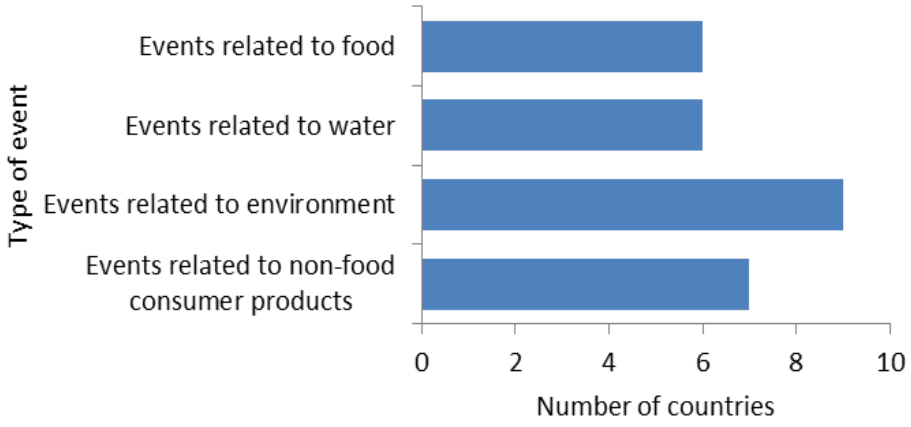
Country	Type of Authority	Name of Authority
Bulgaria	National and Regional or Local	Regional Administration
Croatia	-	-
Estonia	National	Maritime Administration / Rescue Board / Environment Board
France	Regional or Local	Health Agency / Prefet
Germany	Regional or Local	Hamburg Department of Interior
Greece	National	Hellenic Bureau for Marine Casualties Investigation / General Secretariat for Civil Protection Supportive Team Management of Chemical, Biological, Radiological and Nuclear Threats and Incidents
Iceland	-	-
Italy	National	Ministry of Interior / Ministry of Infrastructure and Transport / Ministry of Health / Civil Protection
Republic of Lithuania	Regional or Local	Klaipeda County Fire and Rescue Board / Klaipeda State Seaport Authority / Maritime Safety Administration / Regional Environment Protection Department / Klaipeda State Food and Veterinary Service
Norway	National	Ministry of Trade, Industry and Fisheries / Norwegian Maritime Authority
Romania	National and Regional or Local	Romanian Naval Authority / National Environment Guard / General Inspectorate for Emergency Situations / Constanta Public Health Authority
Slovenia	National	Maritime Administration
Spain	National	Ministry of Health
United Kingdom	National	Department of Health England, Welsh Government, Scottish Government, Department of Health, Social Services and Public Safety (Northern Ireland) / Public Health England / Public Health Wales / Health Protection Scotland / Public Health Agency Northern Ireland

Seven out of 12 countries (58%) reported that the responsible authorities for planning were national authorities. Three countries identified regional or local authorities and two countries indicated that the responsible authorities were both national and regional/local.

All twelve responding countries reported that their authorities are responsible for planning related to public health management of accidental and deliberate chemical events on ships or at ports. Six countries reported that their authorities are responsible for planning on all

types of chemical events including events related to food, water, the environment and non-food consumer products. Three countries reported that their authorities are responsible only for planning events related to environment (Figure 43).

Figure 43. Number of countries whose authorities are responsible for planning on chemical events on ships or at ports by type of event



Detection and recording

Twelve countries identified the authorities responsible for detection and recording of chemical events on ships or at ports. Table 21 shows the countries, type and name of these responsible authorities.

Table 21. Country, type and name of the authority responsible for detection and recording of chemical events on ships or at ports

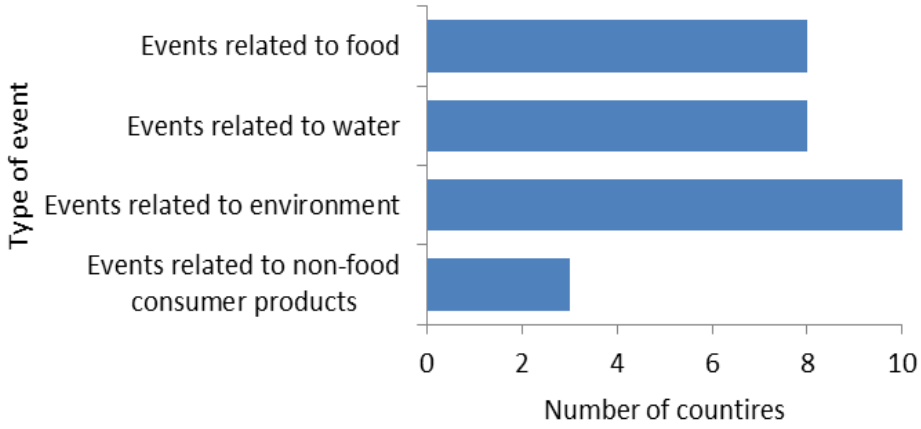
Country	Type of Authority	Name of Authority
Bulgaria	National	Ministry of Health
Croatia	-	-
Estonia	National	Maritime Administration / Rescue Board
France	Regional or Local	Fireman / INERIS
Germany	National	Central Command for Maritime Emergencies
Greece	National and Regional or Local	Hellenic Bureau for Maritime Casualties Investigation / Coast Guard / Piraeus Central Port Authority
Iceland	-	-
Italy	National and Regional or Local	Ministry of Interior / Regional Agency for Environment Protection / Institute Zooprophylactic Sperimental
Republic of Lithuania	Regional or Local	Klaipeda County Fire and Rescue Board / Klaipeda State Seaport Authority / Maritime Safety Administration / Regional Environment Protection Department / Klaipeda State Food and Veterinary Service / Klaipeda Public Health Center
Norway	National	Norwegian Maritime Authority
Romania	National and Regional or Local	Constanta Public Health Authority / Romanian Naval Authority / National Environment Guard / General Inspectorate for Emergency Situations
Slovenia	National	Maritime Administration
Spain	National and Regional or Local	Ministry of Interior / Civil Protection
United Kingdom	National	Department of Health England, Welsh Government, Scottish Government, Department of Health, Social Services and Public Safety (Northern Ireland) / Public Health England / Public Health Wales / Health Protection Scotland / Public Health Agency Northern Ireland

Six out of 12 countries (50%) reported that the responsible authorities for detection and recording of chemical events were national authorities, two countries indicated regional or local authorities, and four countries specified that the responsible authorities were both national and regional/local.

All twelve responding countries reported that their authorities are responsible for detection and recording of both accidental and deliberated chemical events on ships or at ports. Only

three countries reported that their authorities are responsible for detection and recording all types of events including events related to food, water, the environment and non-food consumer products. Eight countries reported that their authorities are responsible for detection and recording of chemical events related to food, water and environment (Figure 44).

Figure 44. Number of countries whose authorities are responsible for detection and recording of chemical events on ships or at ports by type of event



Risk assesment

Fourteen countries identified the authorities responsible for public health risk assessment of chemical events on ships or at ports. Table 22 shows the countries, type and name of these responsible authorities.

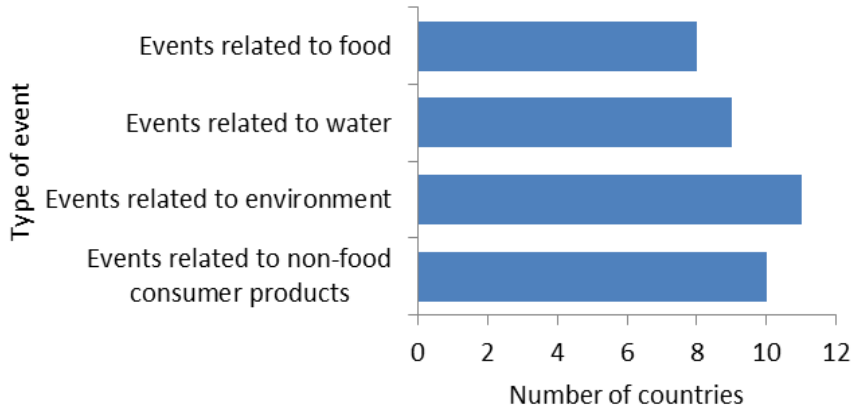
Table 22. Country, type and name of the authority responsible for public health impact assessment of chemical events on ships or at ports

Country	Type of Authority	Name of Authority
Bulgaria	National	Ministry of Health
Croatia	National	Institute for Toxicology and Antidoping
Estonia	National	Maritime Administration / Rescue Board/Environment Board
France	Regional or Local	Poison Control Centre / National Public Health Institute
Germany	National	Federal Office of civil Protection and Disaster Assistance
Greece	National	General Secretariat for Civil Protection Supportive Team Management of Chemical, Biological, Radiological and Nuclear Threats and Incidents / Office of Acute Risk Assessment and Management of Acute Public Health Events (Hellenic Centre for Disease Prevention and Control)
Iceland	National	Special Collaborative Committee
Italy	National	Ministry of Interior / Ministry of Environment and Protection Land and Sea / Ministry of Health
Republic of Lithuania	Regional or Local	Klaipeda County Fire and Rescue Board / Klaipeda State Seaport Authority / Regional Environment Protection Department / Klaipeda State Food and Veterinary Service / Klaipeda Public Health Center
Norway	National	Norwegian Maritime Authority
Romania	National	National Public Health Institute / Romanian Naval Authority / National Environment Guard / General Inspectorate for Emergency Situations / National Veterinary Authority and Food Safety
Slovenia	National	Civil Protection and Disaster
Spain	National and Regional or Local	Ministry of Interior / Ministry of Health / Civil Protection
United Kingdom	National	Department of Health England, Welsh Government, Scottish Government, Department of Health, Social Services and Public Safety (Northern Ireland) / Public Health England / Public Health Wales / Health Protection Scotland / Public Health Agency Northern Ireland / Port Authorities

Eleven out of 14 countries (79%) reported that the responsible authorities for public health impact assessment of chemical events were national authorities. Two countries indicated regional or local authorities, and one country specified that the responsible authorities were both national and regional/local.

Thirteen countries specified that their authorities are responsible for public health impact assessment of accidental and deliberate chemical events on ships or at ports. One country reported that their authorities are responsible only for impact assessment of accidental events. Eight countries reported that their authorities are responsible for public health impact assessment of all types of chemical events including events related to food, water, the environment and non-food consumer products. Two more countries reported that their authorities are responsible for public health impact assessment of chemical events related to the environment and non-food consumer products (Figure 45).

Figure 45. Number of countries whose authorities are responsible for public health impact assessment of chemical events on ships or at ports by type of event



Response

Thirteen countries identified the authorities responsible for public health response to chemical events on ships or at ports. Table 23 shows the countries, type and name of these responsible authorities.

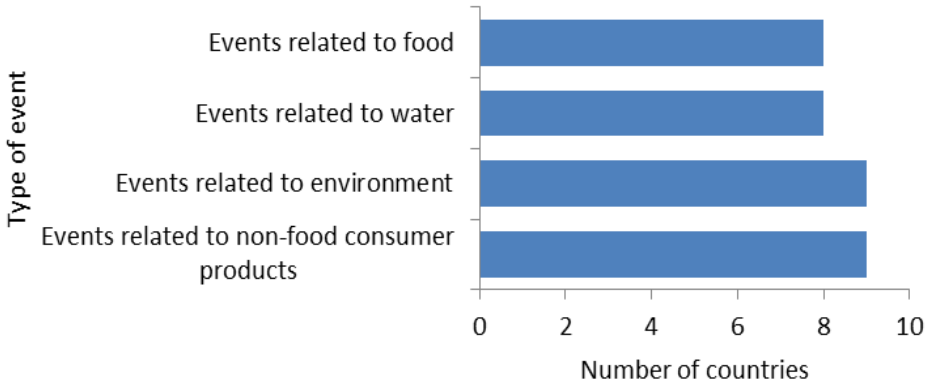
Table 23. Country, type and name of the authority responsible for public health response to chemical events on ships or at ports

Country	Type of Authority	Name of Authority
Bulgaria	National and Regional or Local	RHI
Croatia	National	Ministry of Health / National Public Health Institute / Ministry of Environment and Nature Protection
Estonia	National	Maritime Administration / Rescue Board/Environment Board
France	Regional or Local	Health Agency / Prefet
Germany	National	Central Command for Maritime Emergencies
Greece	National	General Secretariat for Civil Protection Supportive Team Management of Chemical, Biological, Radiological and Nuclear Threats and Incidents / Office of Acute Risk Assessment and Management of Acute Public Health Events (Hellenic Centre for Disease Prevention and Control)
Iceland	-	-
Italy	National	Ministry of Interior / Ministry of Environment and Protection Land and Sea / Ministry of Health
Republic of Lithuania	Regional or Local	Klaipeda County Fire and Rescue Board / Maritime Safety Administration / Klaipeda State Seaport Authority / Regional Environment Protection Department / Klaipeda State Food and Veterinary Service / Klaipeda Public Health Center
Norway	National	Ministry of Trade, Industry and Fisheries / Norwegian Maritime Authority
Romania	National and Regional or Local	Constanta Public Health / Romanian Naval Authority / National Environment Guard / General Inspectorate for Emergency Situations / National Veterinary Authority and Food Safety
Slovenia	National	Maritime Administration
Spain	National and Regional or Local	Ministry of Health / Regional Public Health Authorities
United Kingdom	National	Department of Health England, Welsh Government, Scottish Government, Department of Health, Social Services and Public Safety (Northern Ireland) / Public Health England / Public Health Wales / Health Protection Scotland / Public Health Agency Northern Ireland / Port Authorities

Eight out of 13 countries (62%) reported that the responsible authorities for responding to chemical events were national authorities. Two countries indicated regional or local authorities, and three countries specified that the responsible authorities were both national and regional/local.

All thirteen countries reported that their authorities are responsible for public health response to accidental and deliberate chemical events on ships or at ports. Eight countries reported that their authorities are responsible for public health response to all types of chemical events including events related to food, water, the environment and non-food consumer products, and two countries reported that their authorities are responsible for response only to events related to environment and non-food consumer products (Figure 46).

Figure 46. Number of countries whose authorities are responsible for public health response to chemical events on ships or at ports by type of event



Communication

Thirteen countries identified the authorities responsible for communication of chemical events on ships or at ports. Table 24 shows the countries, type and name of these responsible authorities.

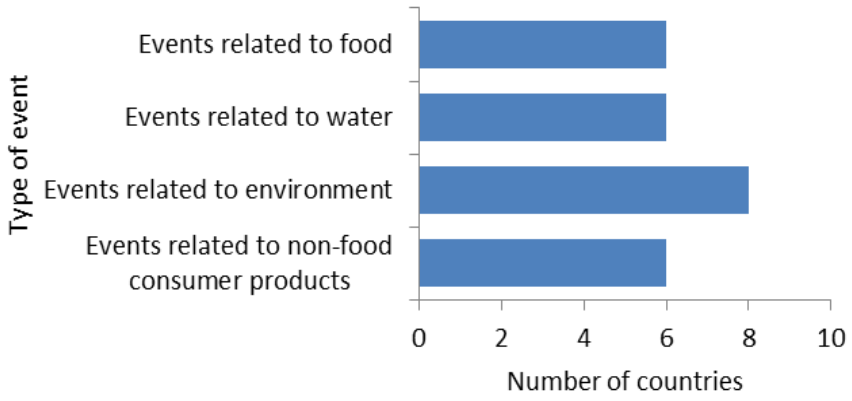
Table 24. Country, type and name of the authority responsible for communication of chemical events on ships or at ports

Country	Type of Authority	Name of Authority
Bulgaria	National and Regional or Local	RHI
Croatia	National	Ministry of Maritime Affairs, Transport and Infrastructure
Estonia	National	Maritime Administration / Rescue Board/Environment Board
France	Regional or Local	Health Agency / Prefet
Germany	National	Central Command for Maritime Emergencies
Greece	National	Office of Acute Risk Assessment and Management of Acute Public Health Events (Hellenic Centre for Disease Prevention and Control)
Iceland	-	-
Italy	National	Ministry of Interior / Civil Protection
Republic of Lithuania	Regional or Local	Klaipeda County Fire and Rescue Board / Maritime Safety Administration / Navy / Klaipeda State Seaport Authority / Regional Environment Protection Department / Klaipeda State Food and Veterinary Service / Klaipeda Public Health Center
Norway	National	Ministry of Trade, Industry and Fisheries / Norwegian Maritime Authority
Romania	National and Regional or Local	Constanta Public Health / Romanian Naval Authority / National Environment Guard / Ministry of Health
Slovenia	National	Maritime Administration
Spain	National and Regional or Local	Ministry of Health / Regional Public Health Authorities / Maritime Administration
United Kingdom	National	Department of Health England, Welsh Government, Scottish Government, Department of Health, Social Services and Public Safety (Northern Ireland) / Public Health England / Public Health Wales / Health Protection Scotland / Public Health Agency Northern Ireland / Port Authorities

Eight out of 13 countries (62%) reported that the responsible authorities for communication were national authorities. Two countries indicated regional or local authorities, and three countries specified that the responsible authorities were both national and regional/local.

Twelve countries (92%) indicated that their authorities are responsible for communication of accidental and deliberated chemical events on ships or at ports. One country reported that their authorities are responsible only for communication of deliberate chemical events. Six countries specified that their authorities are responsible for communication of all types of chemical events including events related to food, water, the environment and non-food consumer products, and two countries only for events related to the environment (Figure 47).

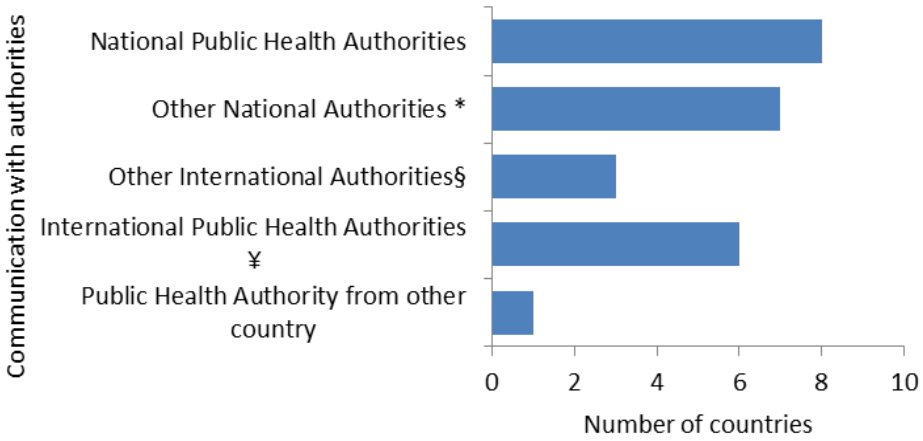
Figure 47. Number of countries whose authorities are responsible for communication of chemical events on ships or at ports by type of event



Eight countries reported that their authorities communicate with national public health authorities on chemical events on ships or at ports. Seven countries also communicate with other national authorities such as Ministry of Interior, Defense, Civil Protection, etc. Three countries communicate with international authorities such as the European Commission. Six countries reported that their authorities communicate with international public health authorities including World Health Organization (WHO) and European Centre for Disease

Prevention and Control (ECDC). Only one country reported that their authorities communicate with public health authorities from other countries (Figure 48).

Figure 48. Number of countries by type of communication with other authorities on chemical events on ships or at ports



* Fire and Police Departments, Ministries

§ European Commission

¥ WHO, ECDC

Training

Eleven countries identified the authorities responsible for training related to public health management of chemical events on ships or at ports. Table 25 shows the countries, type and name of these responsible authorities.

Table 25. Country, type and name of the authority responsible for training related to public health management of chemical events on ships or at ports

Country	Type of Authority	Name of Authority
Bulgaria	National	General Directorate Fire Safety and Civil Protection
Croatia	-	-
Estonia	National	Maritime Administration / Rescue Board/Environment Board / Police and Border Board
France	-	-
Germany	National	Central Command for Maritime Emergencies
Greece	National	Office of Acute Risk Assessment and Management of Acute Public Health Events (Hellenic Centre for Disease Prevention and Control)
Iceland	-	-
Italy	National	-
Republic of Lithuania	National and Regional or Local	Health Emergency Situations Centre (Ministry of Health) / Civil Protection Training Centre
Norway	National	Ministry of Trade, Industry and Fisheries / Maritime Schools
Romania	National and Regional or Local	Ministry of Health / Ministry of Transports / Ministry of Environment
Slovenia	National	Maritime Administration
Spain	National and Regional or Local	Civil Protection
United Kingdom	National	Department of Health England, Welsh Government, Scottish Government, Department of Health, Social Services and Public Safety (Northern Ireland) / Public Health England / Public Health Wales / Health Protection Scotland / Public Health Agency Northern Ireland / Port Authorities

Eight out of 11 countries (73%) reported that the responsible authorities for training were national authorities and the rest of the countries specified that authorities were both national and regional/local.

Nine out of 10 countries (90%) reported that their authorities are responsible for training related to public health management of accidental and deliberate chemical events on ships or at ports. One country reported that their authorities are responsible for training related only to deliberate chemical events.

Six countries reported that their authorities are responsible for training related to public health management of all types of chemical events including events related to food, water, the environment and non-food consumer products. Two countries reported that their authorities are responsible for training only of events related to the environment (Figure 49).

Figure 49. Number of countries whose authorities are responsible for training related to public health management of chemical events on ships or at ports by type of event

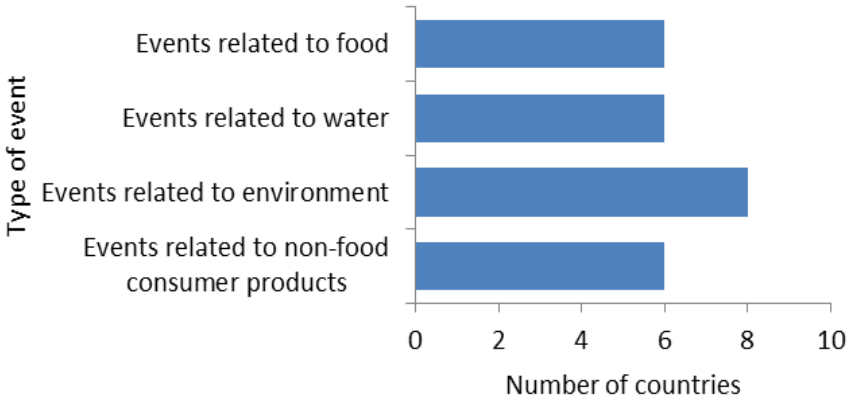
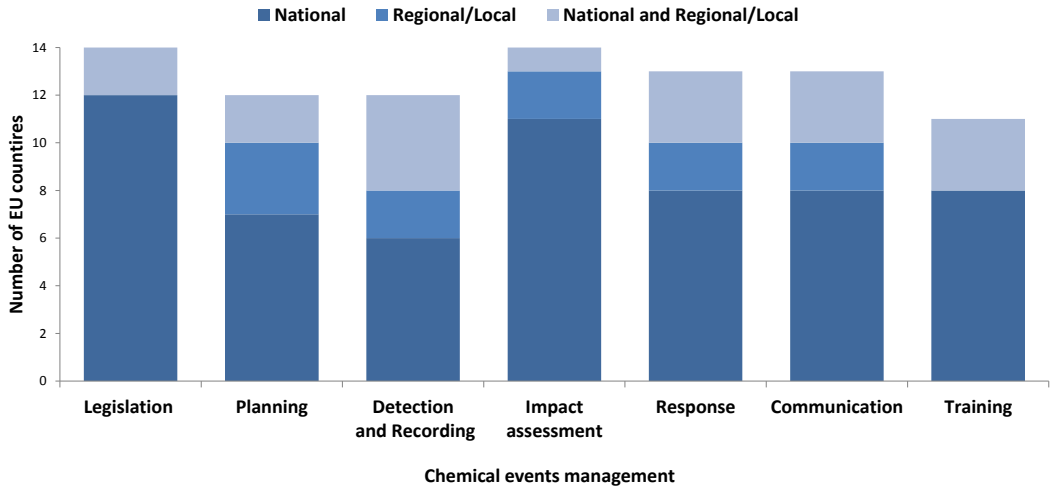


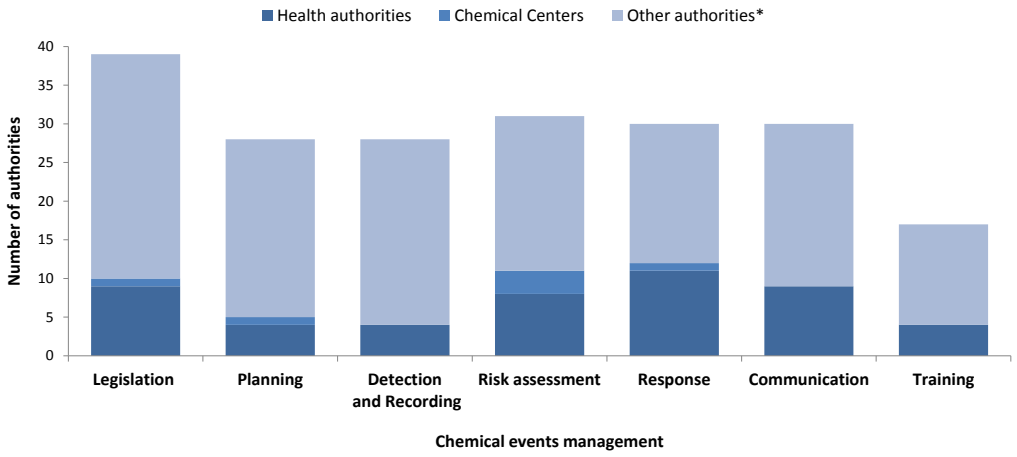
Figure 50 shows the type of authorities responsible for the different aspects covering the management of chemical events on ships or at ports. Most of the countries reported that national authorities are the responsible authorities for creating legislation, planning, detection and recording, impact assessment, response, communication and training related to public health management of chemical events on ships or at ports. Regional/local authorities were the responsible authorities in some countries for planning, detection, impact assessment, response and communication. Few countries identified both national and regional/local authorities as the responsible authorities for every aspect of the management of chemical events. Only 11 countries identified authorities responsible for training.

Figure 50. Number of countries by type of authority responsible for the management of chemical events on ships or at ports



Different authorities are involved in the management of chemical events: health authorities, chemical centres and other authorities (Ministry of Home Affairs, Ministry of Transport, Emergencies, etc) in the diferent countries. Overall, there are more health authorities such as Ministries, regional departments and Public Health Institutes responsible for responding than for planning, detection or training. Only few countries identified specific chemical centrers/institutions responsible for responding to chemical events on ships and at ports (Figure 51).

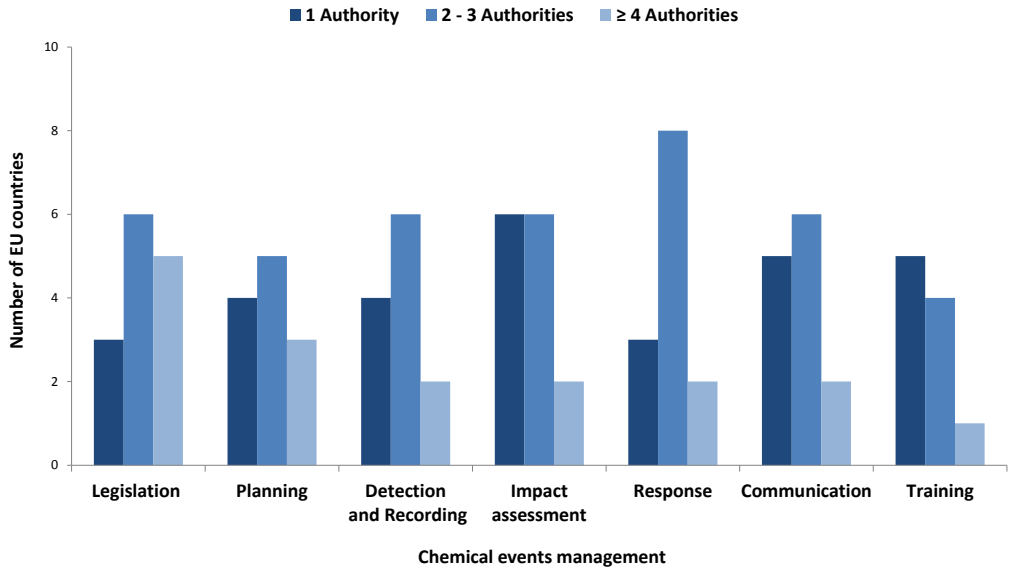
Figure 51. Number of authorities by type involved in the management of chemical events on ships or at ports



*Other authorities: Ministry of Interior, Ministry of Infrastructures and Transport, Maritime and Port authorities, Ministry of Environment, Ministry of Trade, Industry and Fisheries, Ministry of Defense, emergencies etc.

Concerning the number of authorities or institutions involved in the management of chemical events, most of the countries reported that between two and three authorities are commonly responsible for all type of activities related to public health management of chemical events on ships or at ports, especially response to chemical events. Five countries identified four or more authorities responsible for creating legislation. Training activities for public health management of chemical events on ships or at ports are normally managed by one authority (Figure 52).

Figure 52. Number of countries by number of authorities involved in the management of chemical events on ships or at ports



4. Current practices regarding chemical events on any type of ships and at ports among the European Union (EU) countries

Eleven countries (37%) responded the questionnaire for describing current practices, legal frame related to chemical events on ships or at ports, the events that authorities confronted in the past and the contingency plan that they use. These countries are Bulgaria, France, Germany, Greece, Iceland, Italy, Lithuania, Romania, Slovenia, Spain and UK. Other countries including Austria, Cyprus, Estonia and Slovak Republic informed that they were not able to identify the current practices for responding to chemical events on ships or at ports.

These countries specified the type of legislation and year when entered into force related to public health management of chemical events on ships or at ports (Table 26).

Table 26. Country, number and type of legislation or regulation or guidelines applied to ships or at ports for public health management of chemical events

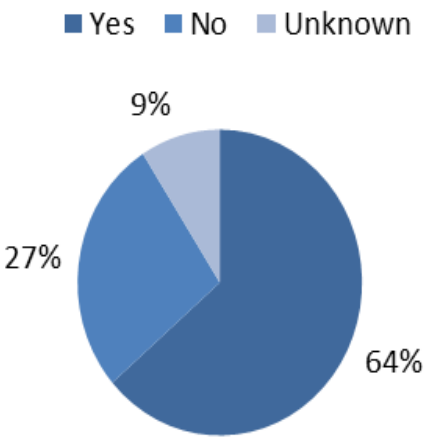
Country	Type of Legislation, regulation or guideline	Entered into Force
Bulgaria	National legislation without provisions for ships or at ports	2006
France	National legislation with provisions for ships or at ports/ National legislation without provisions for ships or at ports	2011, 2013
Germany	National legislation with provisions for ships or at ports/ National legislation without provisions for ships or at ports	2013
Greece	National legislation without provisions for ships or at ports	2003
Iceland	National legislation without provisions for ships or at ports	1998
Italy	National legislation with provisions for ships or at ports	2006
Lithuania	National legislation with provisions for ships or at ports/ National legislation without provisions for ships or at ports	2009
Romania	National legislation with provisions for ships or at ports/ National legislation without provisions for ships or at ports	1997, 2004, 2006, 2007, 2008, 2010, 2012
Slovenia	National legislation without provisions for ships or at ports	2005
Spain	Specific legislation for ships or at ports / National legislation without provisions for ships or at ports / Other	1996, 1999, 2003, 2011, 2012
United Kingdom	Specific legislation for ships or at ports / National legislation with specific provisions for ships or at ports / National legislation without specific provisions for ships or at ports	1936, 1974, 1984, 1989, 1990, 2004, 2008, 2010, 2012

Most of the countries' legislations, regulations or guidelines applied to ships or at ports for public health management of chemical events are national legislations without specific provisions for ships or at ports, followed by national legislations with specific provisions for ships or at ports. Only one country's legislation is specific for ships and at ports. Five countries (46%) specified that their guidelines applied to ships or at ports for public health management of chemical events are mandatory.

Seven out of 11 countries (64%) specified that their legislations, regulations or guidelines are applied to all types of ships for public health management of chemical events. Three

countries (27%) reported that legislations are not applied to all types of ships. One country did not answer to this question (Figure 53).

Figure 53. Percentage of countries whose legislation or regulation or guidelines are applied to all types of ships for public health management of chemical events (n=11)



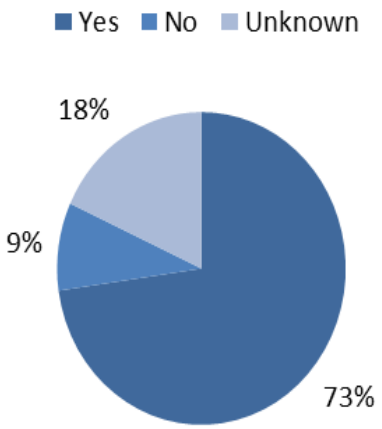
Ten out of 11 countries (91%) indicated that their legislations/guidelines apply to both accidental and deliberate chemical events. One country's legislation applies only to accidental chemical events.

Seven countries reported that their legislations/guidelines apply to all types of chemical events including events related to food, water, the environment and non-food consumer products. Two countries reported that their legislations apply only to chemical events related to water and environment.

Detection systems

Eight countries (73%) reported that there is a detection system for chemical events in place for ships or at ports (Figure 54).

Figure 54. Percentage of countries with a detection system for chemical events for ships or at ports (n=11)



All these eight countries specified that the detection system applies to both accidental and deliberate chemical events. Six out of eight (75%) countries reported that their detection systems apply to all types of chemical events including events related to food, water, the environment and non-food consumer products. Seven countries (88%) reported that the detection system covers all type of ships, and six countries (75%) indicated that the information obtained from the detection system is recorded and analyzed. Only two countries reported that the detection system is specific for ships or at ports.

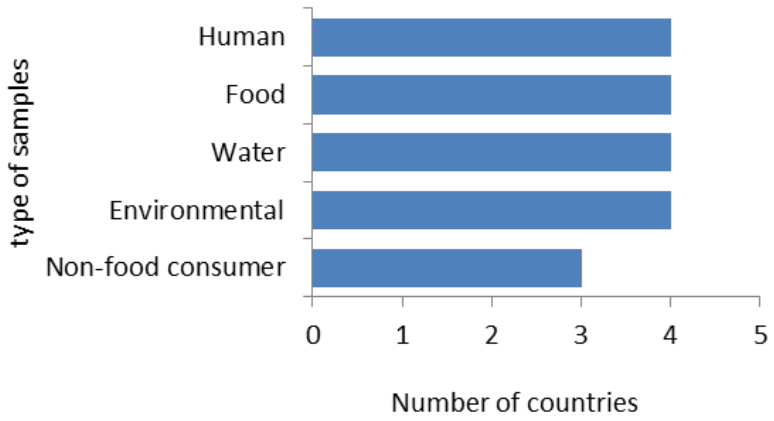
Laboratory capacity

All eleven countries reported that there is a laboratory of toxicology available to analyze samples in case of a chemical event on ships or at ports, however only seven countries specified the type of laboratory (national, regional or local). All these seven counties have a

national laboratory available. In five countries, local and/or regional laboratories were also available.

Figure 55 shows the type of samples that can be analyzed in these laboratories. Three countries reported to have laboratory capacity for analyzing all types of samples(human, food, water, environmental and non-food consumer samples). Four countries have laboratory capacity for analyzing all types of samples except for non-food consumer samples.

Figure 55. Number of countries with laboratory available for analyzing chemicals by type of samples that can be analyzed



<u>Contingency plans</u>

Eight countries (73%) indicated that there is a contingency plan available for public health management of chemical events for ships or at ports. Five of them reported that their contingency plans are specific for ships or at ports. Contingency plans in seven countries cover all type of ships.

Seven of these eight countries with a contingency plan available (88%) specified that their contingency plans apply to both accidental and deliberate chemical events. One country's

contingency plan applies only to deliberate chemical events. Five countries with a contingency plan available reported that it applies to all types of chemical events including events related to food, to water, to the environment and to non-food consumer products. In addition, two countries' contingency plan applies only to chemical events related to environment and non-food consumer products.

Chemical events management

Two countries reported that have managed chemical events from ships or at ports in the last five years. One country specified a total of nine events managed in this period. No information about the number of cases, agent, transmission mechanism and control measures of these events was provided.

The other country managed one chemical event in the last five years. Six human cases were identified. The agent was oil present in the sea from ship oil leak. The oil was recovered from the sea.

Human resources for chemical events management

Eight countries (73%) reported that their authorities have specific personnel to manage chemical events for all types of events and premises. One country reported that the port has specific personnel only to manage chemical events that are classified as small or medium size.

Nine countries (82%) reported that the personnel responsible for public health management of chemical events undertake specific training on these events on ships or at ports. Three countries specified that the percentage of personnel receiving training is above 90%. In addition, one country indicated that half of the personnel received training. The frequency of the training is yearly and the main aspects included in the training are chemical behavior, chemical agent recovery, liquidation of the pollution, actions to undertake and possible scenarios.

Part C: Reporting requirements, hygiene standards and inspection practices related to fishing vessels among the EU countries

Seven countries did not answer to this questionnaire because fishing vessels are not present in these countries. Sixteen countries out of 23 countries with fishing vessels (70%) responded to the questionnaire regarding the reporting requirement, hygiene standards and inspection practices related to fishing vessels. These countries are Croatia, Cyprus, Estonia, France, Germany, Greece, Iceland, Italy, Latvia, Lithuania, Malta, Netherlands, Norway, Slovakia, Spain and United Kingdom.

Questionnaire for identification of reporting requirements, hygiene standards and inspection practices related to fishing vessels among the countries was divided into seven parts, from A to G:

A. Specific legislation available to perform inspections in fishing vessels

Nine out of 16 countries (56%) reported to have specific legislation to perform a sanitary / hygiene inspection of fishing vessels different from fishery products official control. Seven countries have not specific legislations for inspection of fishing vessels.

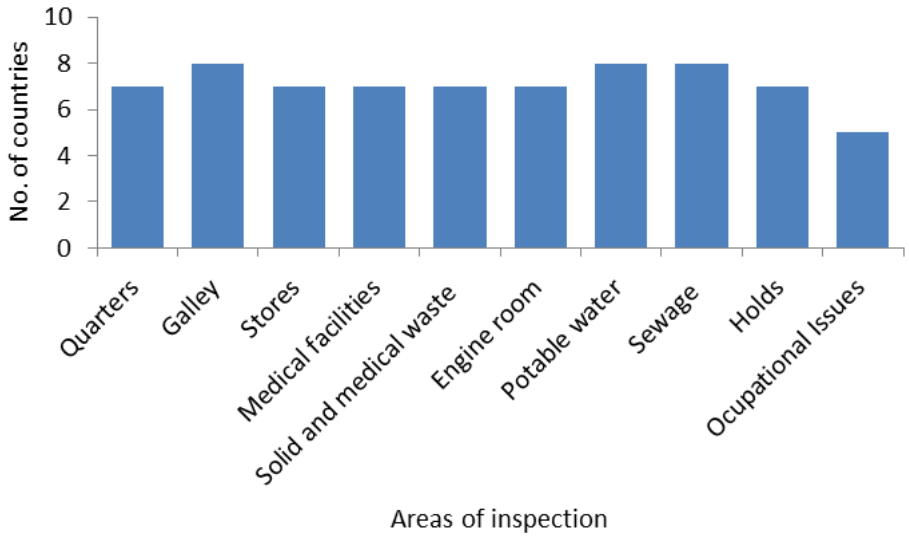
Only two countries specified the qualifications required for inspectors. These qualifications are degree in environmental health and veterinary medicine.

B. Inspections of all type of fishing vessels

Six countries (38%) reported that their authorities inspect regularly all type of fishing vessels regardless of the size and the distance to the coast they are authorized to sail. Nine countries reported that there is no regular inspection on fishing vessels. The respondent of one county indicated that they did not know any practices regarding inspection of fishing vessels.

Although only six countries indicated to perform regular inspections, eight countries specified aspects and areas included during inspections of fishing vessels. Overall, countries specified that all areas and aspects of the fishing vessels are included during the inspection, especially the galley, potable water and sewage. Occupational issues such as equipment and hygiene requirements were less frequently inspected (Figure 56).

Figure 56. Aspects included during the inspections of fishing vessels



C. Policy regarding issuance of Ship Sanitation Certificates (SSC) in fishing vessels travelling in international waters

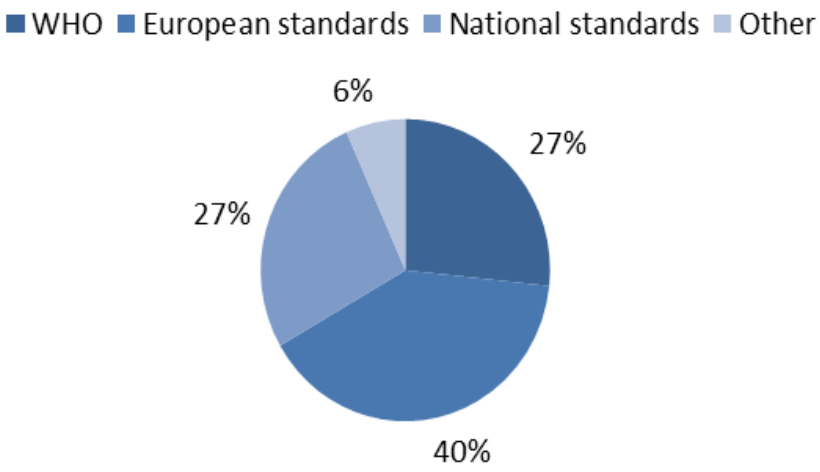
Ten countries answered to this question. Seven countries reported that there is no information available regarding the policy for issuance of Ship Sanitation Certificates in fishing vessels travelling in international waters. The respondents from the other three countries indicated that their authorities issued 1, 13 and 17 Ship Sanitation Certificates in fishing vessels respectively.

D. Standards used for inspection of fishing vessels

Fifteen countries reported to use standards for the inspection of fishing vessels. Six countries (40%) reported to use European Standards for inspection of fishing vessels such as Regulation (EC) No 852/2004 of the European Parliament and of the Council of 29 April 2004 on the hygiene of foodstuffs, Regulation (EC) No 853/2004 of the European Parliament and

of the Council of 29 April 2004 laying down specific hygiene rules for food of the animal origin, Directive 93/103/EC concerning the minimum safety and health requirements for work on board fishing vessels, and Directive 92/29/EEC on the minimum safety and health requirements for improved medical treatment on board vessels. Four countries (27%) specified to use WHO guidelines and four countries (27%) use national standards. One country reported that other standards/guidelines are used for inspection of fishing vessels. None of the countries reported to use the standards of the ILO – Work in Fishing Convention, 2007. The results are presented in Figure 57.

Figure 57. Standards or guidelines used by the countries for inspection of fishing vessels (n=15)



E. Fishing vessels requested to report health related events

Twelve countries answered to this question. Seven out of 12 countries (58%) reported that fishing vessels are requested to report health related events to competent authorities. Five of them (71%) specified that they use the Maritime Declaration of Health, and the other two do not use it. Four out of 12 countries (33%) reported that fishing vessels are not requested to report health related events to competent authorities and one country reported to not know any details.

Information regarding the number of health events related to fishing vessels, reported between 2007 and 2012, was completed by three countries: Norway reported 612 health related events, Spain five and Iceland one.

F. Requirements to have at least one person properly trained on health safety and sanitary issues on board fishing vessels

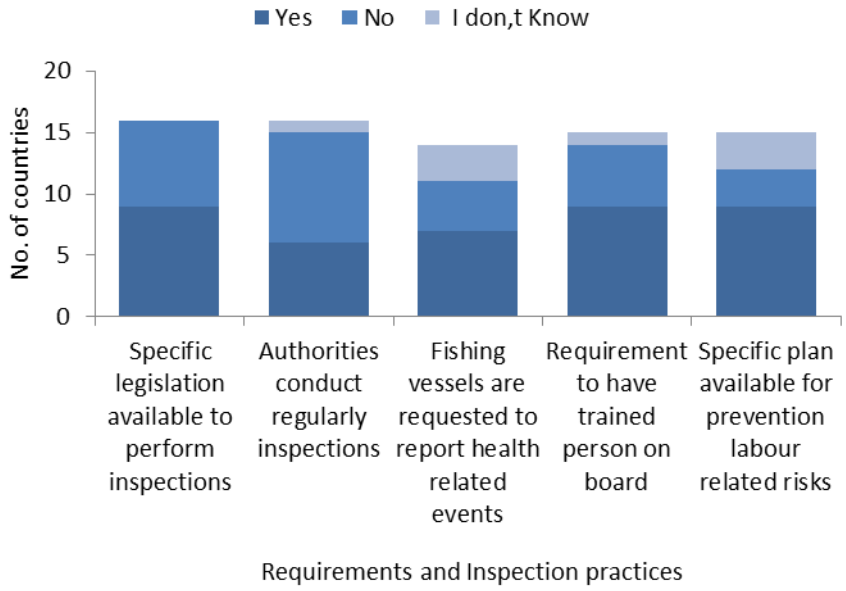
Fifteen countries answered to this question. Nine countries (60%) reported to have requirements to have at least one person on the vessel properly trained in health safety and sanitary issues on board fishing vessels. One country mentioned that these requirements depend on the number of passengers and the size of the boat. Five countries indicated that there are no requirements to have trained personnel, in this specific issue, on board.

G. Specific plans for the prevention of labour related risks

Nine out of fifteen countries reported that fishing vessels in their countries have specific plans for the prevention of labour related risks. Three countries reported to not have specific plans, and the other three countries mentioned did not know it.

Figure 58 shows the reporting requirements, hygiene standards and inspection practices related to fishing vessels among countries. Nine countries (56%) indicated to have a specific legislation available in the country to perform inspections and six countries (38%) reported that their authorities conduct regular inspections. Seven out of 14 (50%) countries indicated that fishing vessels are requested to report health-related events to the competent authority. Nine out of 15 countries (60%) reported to have requirements to have at least one person properly trained on health safety and sanitary issues on board fishing vessels, and to have specific plans available for the prevention of labour related risks.

Figure 58. Number of countries by requirements and inspection practices related to fishing vessels



Part D: Training needs related to core capacities at the points of entry (ports) among the EU countries

Twenty one countries (70%) responded to the questionnaire regarding the identification of training needs related to core capacities at the points of entry (ports) among the countries. These countries were Bulgaria, Croatia, Cyprus, Estonia, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Latvia, Lithuania, Malta, Netherlands, Norway, Romania**,** Slovak Republic, Slovenia, United Kingdom and Spain.

National policies and practices at designated or authorized ports

Seventeen out of 21 countries (81%) identified and specified the type of competent authority for issuing Ship Sanitation Certificates (SSC). Nine countries (53%) reported that their competent authorities for issuing SSC are regional or local authorities. Eight countries (47%) reported that the national authorities are responsible for issuing SSC.

Fourteen countries informed that their authorities ask for fees for issuing SSC. Rates depend on the sailing time, size of the vessel and number of passengers. Fees range from 1 euro to 1,181 euro.

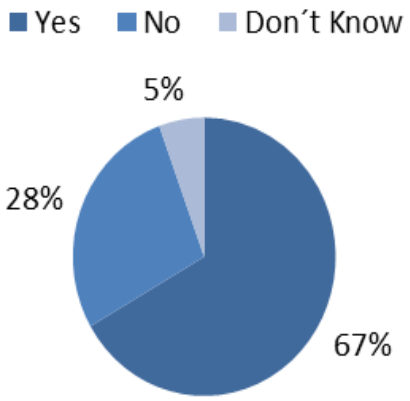
Nine countries (43%) indicated that they have prepared national guidelines for issuing SSC. Six of them developed their guidelines based on the WHO Handbook for inspection of ships and issuing SSC.

Nine countries (43%) reported to have a country-wide or a regional database for recording the ships inspection results for issuing the SSC. Ten countries reported absence of this database.

In relation with designated ports, fourteen out of 17 countries (82%) responded that they have already designated ports under IHR-2005 requirements. Eleven countries specified the number of designated ports, ranging from 1 to 82 ports.

With regard to contingency plans, eighteen countries answered to this question. Twelve countries (67%) reported to have those plans for public health emergency at designated ports in line with the IHR-2005 requirements. Five countries (28%) reported that there are no contingency plans available at designated ports (Figure 59).

Figure 59. Proportion of countries with contingency plans for public health emergencies at designated ports, required under IHR-2005 (n=18)



Human resources at authorized or designated ports

Twenty countries, all the responding countries except one, have specific personnel to inspect ships and ports from a sanitary point of view. Main qualifications required for those personnel in the different countries are university degree in biomedicine, experience as environmental health officers, health inspectors, sanitary officers or epidemiologists.

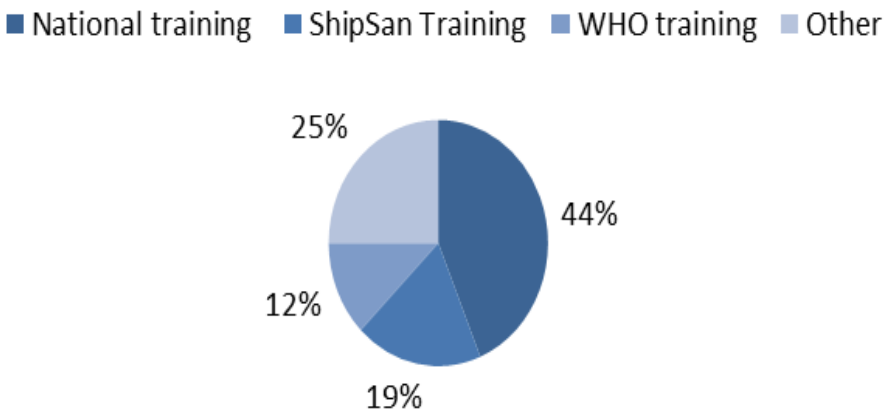
Fourteen out of 19 countries (74%) indicated that inspections and outbreak management is conducted by different personnel. Only five countries reported that the same personnel perform ship and port inspections as well as outbreak management on board ships.

Sixteen countries specified the number of personnel working at ports in relation to the IHR implementation. The median of personnel working per country was 11 persons, ranging from 2 to 160.

Training needs on core capacities at authorized and designated ports

Sixteen countries mentioned that the ship inspectors in charge for issuing SSC received specific training. Eight of these countries specified that all ship inspectors are trained for issuing SSC. Seven countries (44%) indicated that ship inspectors received a national training course to issue SSC, three countries (19%) reported that inspectors received a specific ShipSan training course, and two countries WHO training course. Four countries indicated that inspector received other training courses (Figure 60).

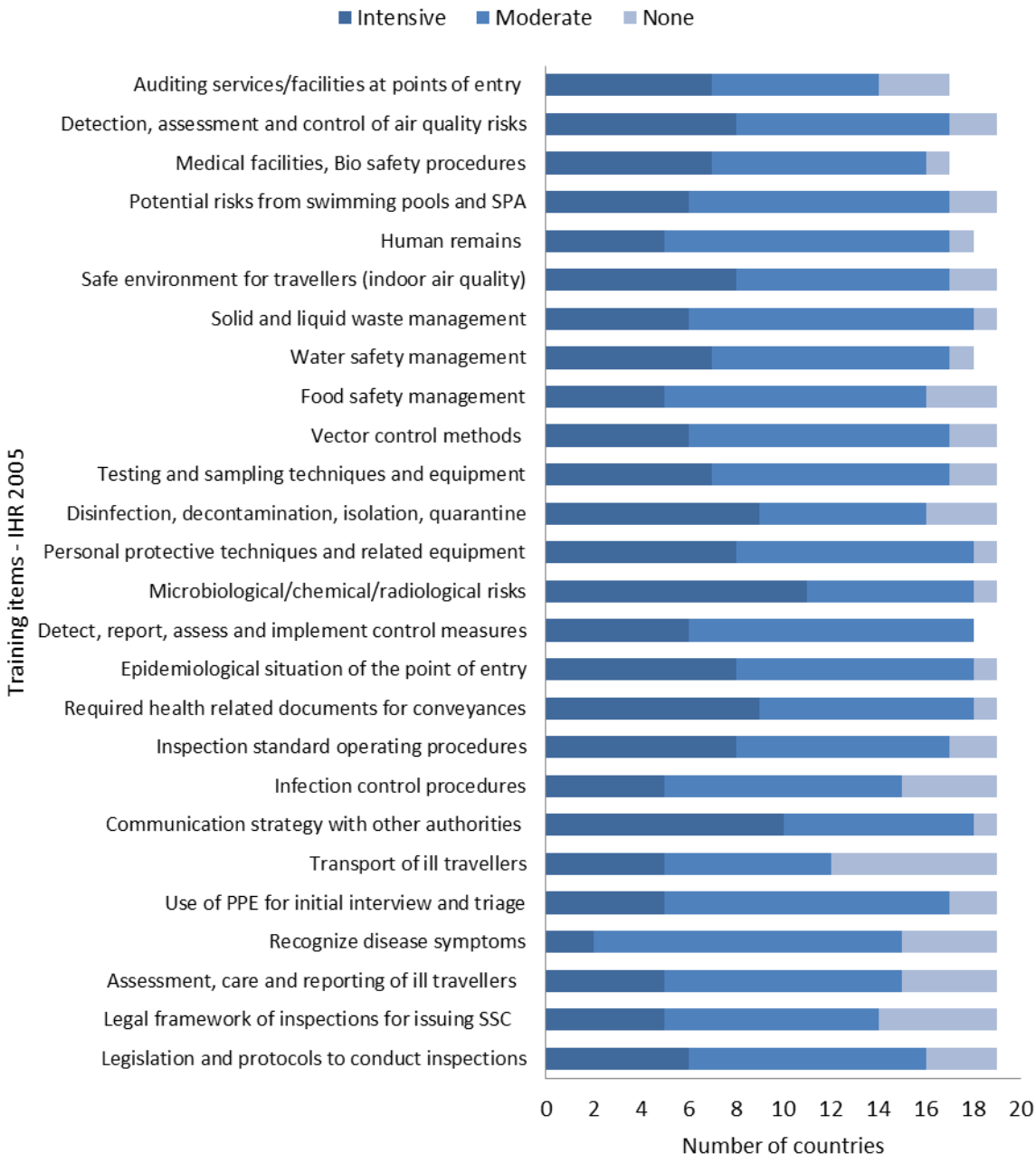
Figure 60. Proportion of countries by type of training received by the ship inspectors to issue SSC (n=16)



Regarding the needs for training at all times of the personnel working at the ports in the different countries, eleven countries specified an intensive need for training in public health risks from microbiological, chemical and radiological agents. Ten countries expressed an intensive need for training on communication strategy with other competent authorities and nine countries for training in public health measures such as disinfection, decontamination, isolation, quarantine, contact tracing, entry and exit control. Training needs on required health related documents for conveyances, understanding of inspection standard operating procedures, epidemiological situation of the point of entry, personal

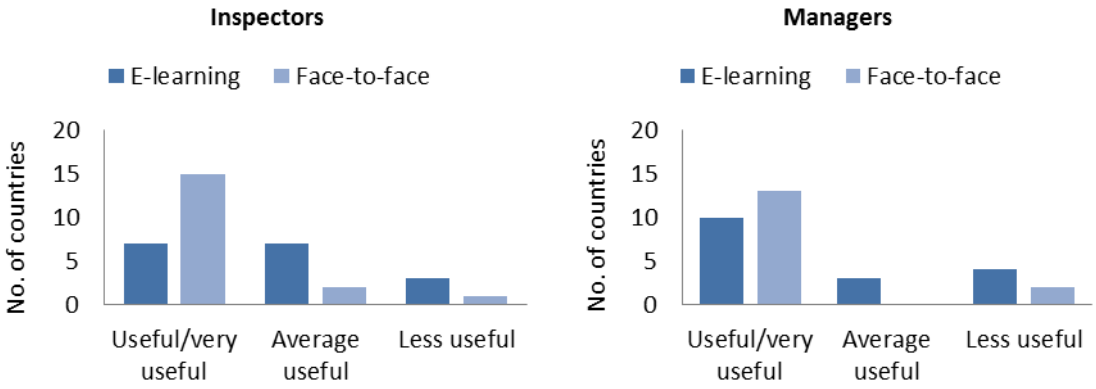
protective techniques and related equipment, understanding of correct practices of air health quality management, capacity for detection, assessment and control measures for potential risks from air quality, and safe environment for travellers (indoor air quality) were also frequently indicated by the countries. All countries indicated intensive or moderate training needs for knowledge and skills for detecting, reporting, assessing and provide first control measures to public health events (none indicated no training needs). Training in transport of ill travellers according to technical requirements and legal framework of inspections for issuing SSC were considered less needed by the countries (Figure 61).

Figure 61. Needs for training (at all times) by level of importance related to IHR-2005 core capacities requirements at points of entry



Most of the countries reported that they find useful or very useful that inspectors and managers personnel receive face to face training. Regarding the e-learning fewer countries found it useful or very useful: 10 countries found it useful or very useful for managers compared to seven countries for inspectors (Figure 62).

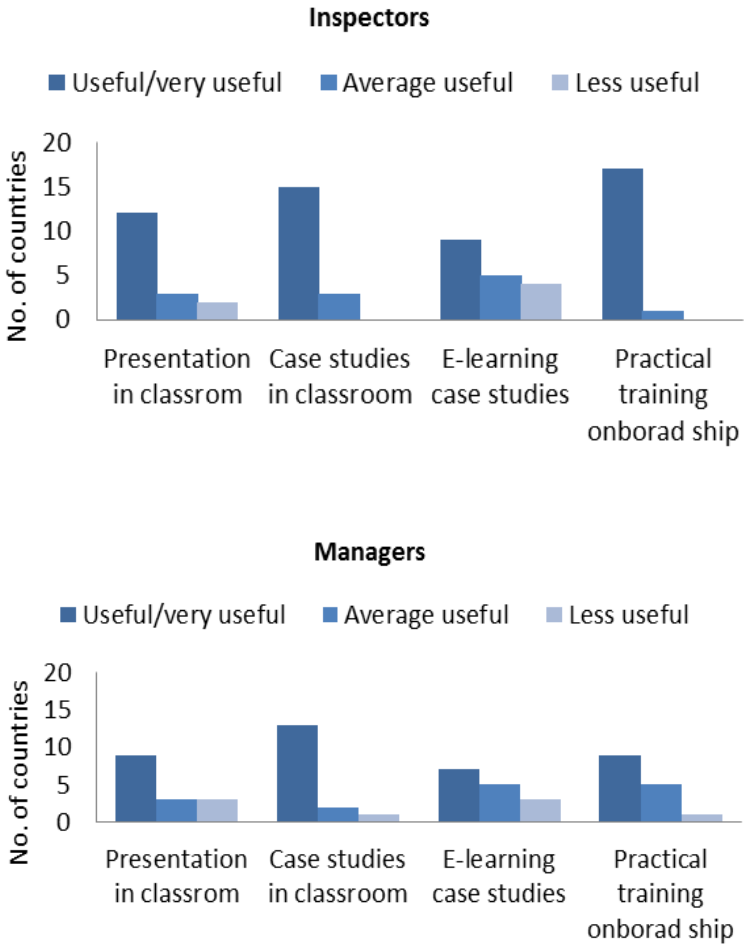
Figure 62. Number of countries by kind of training and usefulness by staff position



Overall, countries considered useful or very useful that both inspectors and managers receive all learning activities including presentations and case studies in classroom, e-learning case studies and practical training onboard ship. Practical training onboard ship for inspectors and case studies in classroom for managers were considered trainings useful or very useful by most of the countries (Figure 63).

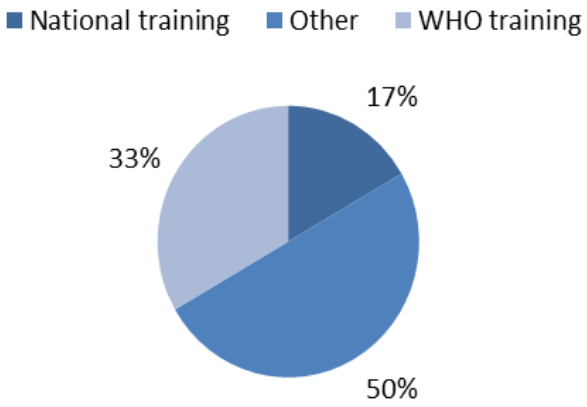
Eighteen countries (86%) indicated to have access to the e-platforms (computers, internet access, etc) and twelve countries reported that 100% of the personnel are familiar with or able to use them. Five countries reported that they organize training together with Port State Control personnel, and ten countries indicated that they do not organize training with Port State Control personnel.

Figure 63. Number of countries by kind of learning activities and preferences by staff position



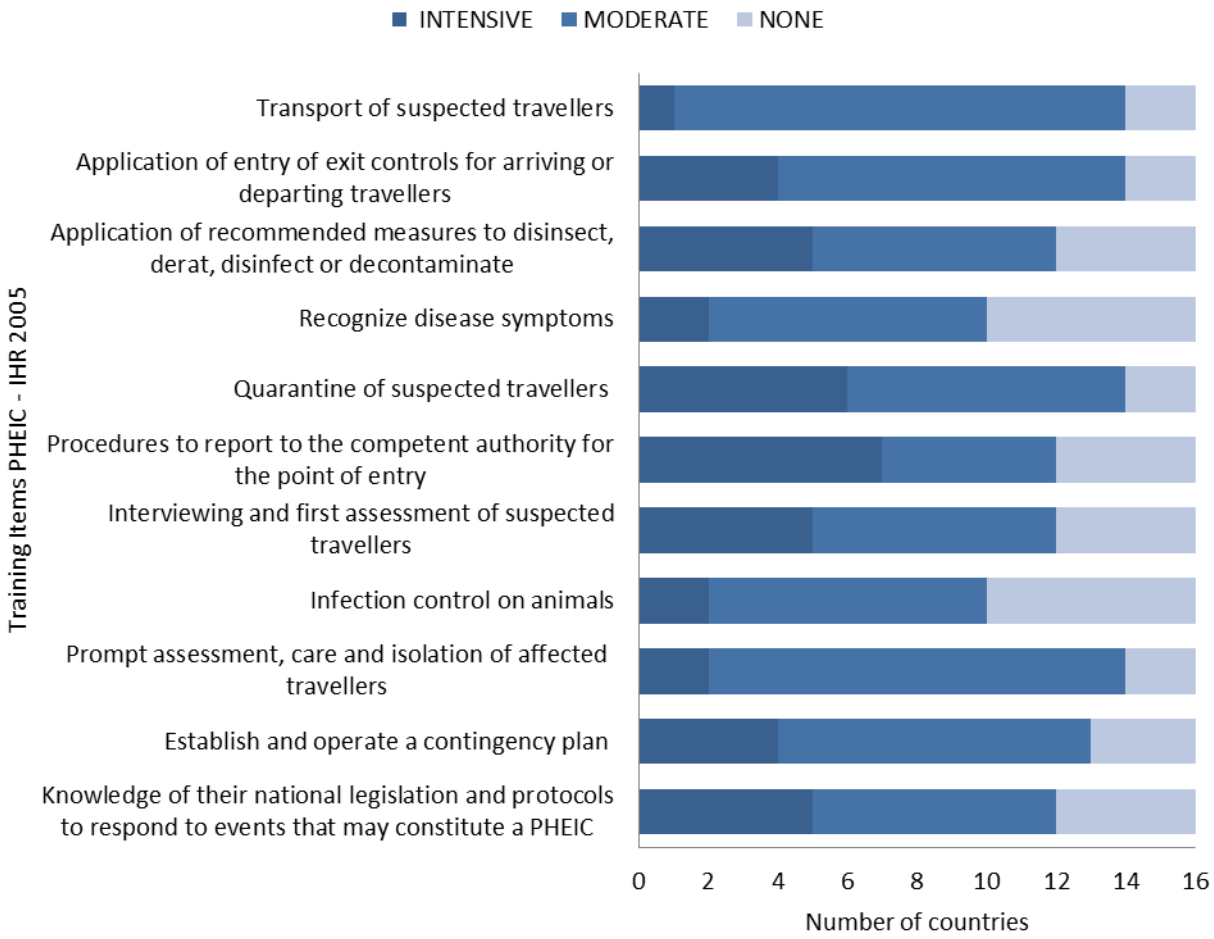
Regarding the needs for training for responding to events that may constitute public health emergency of international concern (PHEIC), eight countries specified the proportion of personnel received training for responding to PHEIC. Five of them indicated a proportion above 50% of the personnel. The type of training received for responding to PHEIC was specified in twelve countries. Four countries (33%) indicated the WHO training course, and two countries (17%) national training courses. Six countries (50%) reported other training courses such as regional and public health trainings (Figure 64).

Figure 64. Proportion of countries by type of training received by the inspectors (n=12)



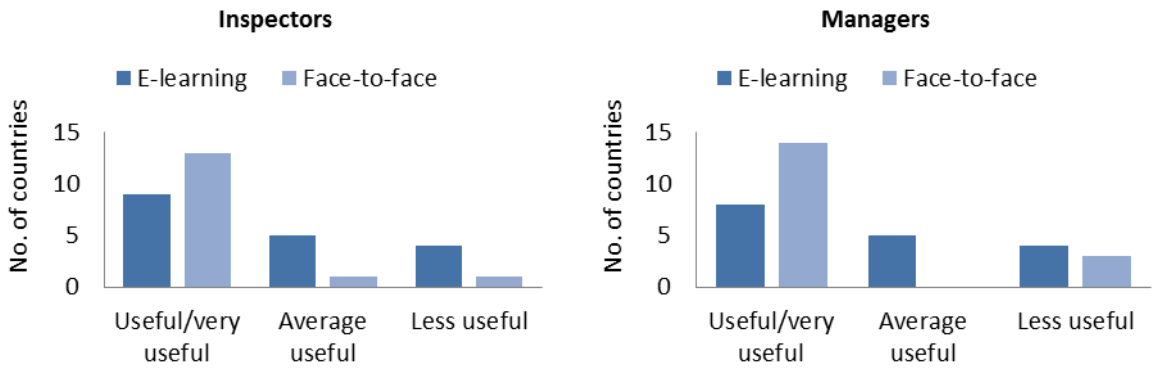
Sixteen countries completed the question regarding the training needs for responding to PHEIC. Seven countries mentioned that they have intensive training needs for responding to PHEIC in procedures to report to the competent authority for the point of entry. Six countries mentioned intensive needs for training in quarantine of suspected travellers, and five countries in knowledge of their national legislation and protocols to respond to PHEIC; interviewing and first assessment of suspected travellers; and training in application of recommended measures to disinsect, derat, disinfect or decontaminate. Six countries reported that they do not have any need for training for responding to PHEIC in recognize disease symptoms and in infection control on animals (Figure 65).

Figure 65. Needs for training by level of importance for responding to events that may constitute Public Health Emergency of International Concern (PHEIC)



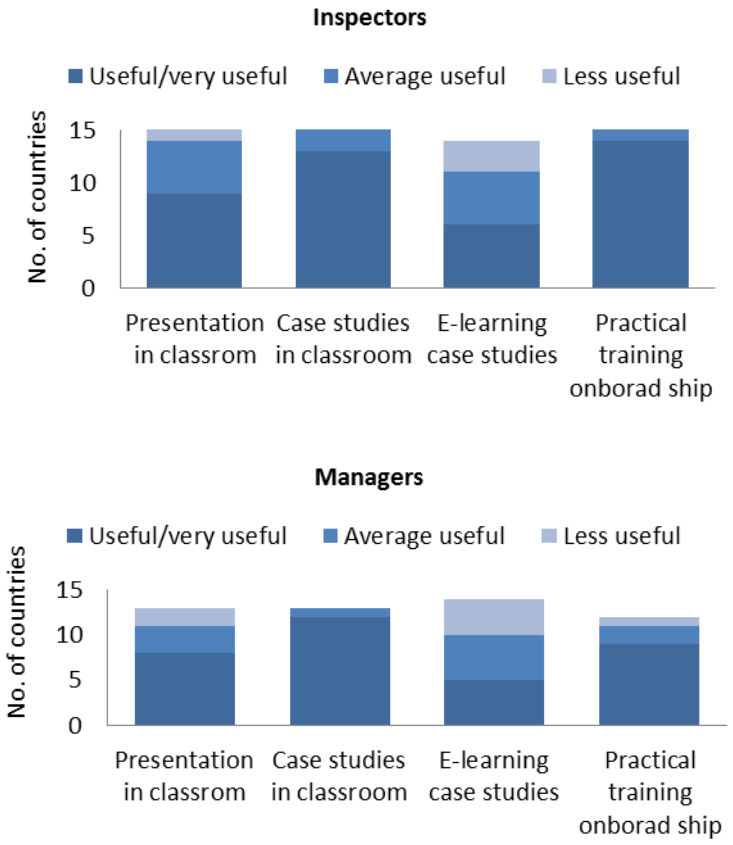
Most of the countries reported that they find useful or very useful that inspectors and managers personnel receive face to face training for implementing contingency plans at ports. E-learning training for inspectors and managers was also considered useful or very useful by nine and eight countries respectively (Figure 66).

Figure 66. Number of countries by kind of training and usefulness for personnel implementing contingency plans at ports by staff position



Overall countries considered useful or very useful that both inspectors and managers receive learning activities including presentations and case studies in classroom and practical training onboard ship. Practical training onboard ship and case studies in classroom were considered very useful or useful by most of the countries. Contrarily, E-learning case studies were considered less useful or average for implementing contingency plans at ports by most of the countries (Figure 67).

Figure 67. Number of countries by kind of learning activities and preference for personnel implementing contingency plans at ports by staff position



Seven out of 16 countries (44%) reported to have organized simulation exercises at points of entry related to events that may constitute a PHEIC. Fifteen out of 17 countries indicated having a school for training of seafarers. Ten of these countries specified that the training programme for seafarers includes health issues.

Discussion

Part A: Literature review on communicable diseases in all types of ships, including inland waterways, and ports.

Communicable diseases

During the study period 196 infectious diseases outbreaks relating to ships or ports with more than 24,000 cases and 19 deaths were published. More than half of the outbreaks (59% n=116) were due to food and waterborne diseases, causing 82% of cases and 12 deaths, 11 deaths due to Legionella (case fatality rate of 7%); almost 20% of them were caused by norovirus. It was difficult to analyse the outbreaks according to the transmission mode as for some outbreaks it was not identified or it was mentioned together food and water borne. Apart from legionelosis outbreaks, from the 116 outbreaks due to food and waterborne diseases only in 11 outbreaks water borne transmission mode was mentioned. Water borne outbreaks are less frequently reported than food borne outbreaks due to some extent to the difficulties for the detection of the pathogen in the water. Median number of cases per outbreak reported was 388. Water borne outbreaks may account for a high number of cases as usually water is widely consumed.

Respiratory diseases (mainly Influenza) caused 26% of outbreaks and 13 deaths. Moreover 108 studies of infectious disease prevalence, incidence, mortality, etc relating to ships or ports were published. Notable differences compared to the outbreaks report literature that no deaths were reported within the 74 cases of legionellosis, there were no Influenza studies published and there were 13 sexually transmitted diseases studies accounting for almost 4000 cases, mainly HIV. Finally 45 single case report studies were found during the search; 34 of them (76%) were legionellosis cases, including 8 deaths (case fatality ratio 24%). Differences in the case fatality ratio of legionelosis (among the outbreaks, prevalence studies and single case reports) could be due to the different sources of information. The travel-associated legionnaires' disease in Europe reports contains the early notification of

cases from countries and sometimes information on case's outcome is not available at that time. On the other hand single cases are more likely to be published if they are fatal cases.

The majority of outbreaks took place on board cruise ships, 79% of norovirus outbreaks and 86% of legionellosis outbreaks. The high proportion of legionellosis outbreaks may be due to some extent to the elderly people that go on a cruise ship, as they are more susceptible to the disease; and to the presence of risk sources on cruise ships, such as jacuzzies or similar facilities. On the other hand, tuberculosis and Ciguatera fish poisoning outbreaks were reported only onboard cargo ship or fishing vessels. The incubation period for tuberculosis is very long and therefore is difficult to link cases with cruise ships. Vaccine preventable diseases outbreaks occurred mainly onboard cruise ships with crew members being the most affected, to some extent likely to be because the crew members come from countries with a low vaccination coverage.

The highest number of Influenza outbreaks reported was in 2009, the year of the first appearance of the A/H1N1 2009 pandemic strain, maybe due to an increase in surveillance and reporting and to the large impact in the media. The highest number of norovirus outbreaks were reported in 2002 and 2006, likely due to an increase in norovirus activity in the community which coincide with the emergence of new variant strains[4].

Control measures were mentioned mainly for respiratory diseases outbreaks. In 90% of published Influenza outbreaks, different interventions were implemented including isolation of cases and quarantine of contacts, vaccination and antiviral drugs administration. The same measures were not applied for all the outbreaks.

Communicable diseases were more frequently reported in cruise ships than in cargo or fishing vessels. Overall, food and waterborne diseases are the most frequently reported. Legionellosis accounted for the highest case fatality ratio. Tuberculosis was reported only on seafarers from cargo or fishing vessels, and vaccine preventable diseases were reported mainly on crew members from cruise ships.

[4] Verhoef L, Depoortere E, Boxman I, Duizer E, van Duynhoven Y, et al. Emergence of new norovirus variants on spring cruise ships and prediction of winter epidemics.Emerg Infect Dis. 2008; 14(2): 238-43.

Part B: Literature review and surveys for chemical or radiological incidents in all types of ships and at ports

B.1: Literature review

Radiological events

The thirteen radiological events published affected 500 persons and caused 47 deaths, 24 of which were attributed to the exposure to elevated levels of radiation. The high number of deaths could be explained partly because the most serious events are more likely to be recognized and published. Seventy percent of them happened between 1960 and 1980 onboard nuclear ships; more than half of them took place in the North Atlantic Sea (mainly in Russian ports and coastline). Two events happened in cargo ship, one in the Mediterranean sea in 2012 that did not affect any person.

In recent years there have not been reports on radiological events affecting people related to ships or ports.

Chemical events

During the study period 94 chemical events were published. These chemical events generated at least 12,000 cases and more than 2,000 deaths. Two events in the forties accounted for 81% of cases and 80% of deceased, after the year 2000 only two deaths have been reported in the published studies. From 2010 only two chemical events, one on a cargo ship and one at a port, have been published. Regulations for the industry and for the transport of chemical substances have been updated after serious accidents. The events occurred mainly in cargo ships but 11 events happened in fishing vessels and four events at ports.

B.2: Surveys for chemical or radiological events in all types of ships and at ports

Responsible authorities and practices for management of radiological and chemical events.

Response rate was higher for radiological events compared to chemical events: 67% countries responded to the questionnaire for identification of authorities responsible for responding to radiological events while 47% submitted the questionnaire for identification of authorities responsible for responding to chemical events. In addition, 60% completed the questionnaire regarding the current practices related to radiological events while only 37% responded to the questionnaire regarding the current practices related to chemical events. Some countries did not complete the questionnaire on chemical events because they were not able to identify the responsible authorities. Low response rate for identification of authorities and practices regarding chemical events suggests that many different authorities are responsible for managing chemical events within the same country without always having clearly defined roles and responsibilities. In line with that, according to the results of the questionnaires, the number of countries that only have one authority responsible for radiological events was higher than for chemical events, which would mean that responsabilities for radiological events are more clearly defined. Moreover the proportion of countries where national authorities were responsible for management of radiological events was higher than for chemical events. Additionally there were more countries where the national authorities were responsible for radiological or chemical events than countries where the responsible authorities were regional or local, mainly for creating legislation and for impact or risk assessment. This may be because radiological or chemical events could imply some security aspects, mainly radiological events. Additionally for radiological events the expertise needed is very specific and the events could be highly relevant.

Authorities responsible for training related to public health management of radiological and chemical events were less frequently identified by the responding countries than authorities responsible for the other aspects. Although most of the countries have specific personnel to manage radiological or chemical events, only a small number of countries indicated that the personnel undertake specific training for public health management of these events. This lack of training may be due to training activities are not well established and regularly

conducted among the countries, or public health aspects are not incorporated into the training.

Between 80% and 100% of the responding countries specified that their authorities are responsible for management of both accidental and deliberate radiological and chemical events. That suggests that countries cover any kind of event regardless the origin or cause, or that the authorities responsible for deliberate events have not been identified.

However, the number of countries whose authorities are responsible for management of all types of radiological or chemical events (related to food, water, environment, and non-food consumer products) were significantly lower. Overall, radiological and chemical events related to the environment are more commonly managed by most of the countries compared to the rest of the events.

In terms of type of authority, health authorities are not frequently responsible for the management and response of radiological and chemical events. Other authorities such as Ministry of Interior, Ministry of Infrastructures and Transport, Ministry of Environment, Ministry of Defence, etc. are more commonly responsible. This could reflect that public health authorities are focused on biological issues but not well trained in chemical and radiological aspects. The involvement of the health sector (including public health professionals) in the management of radiological and chemical events is crucial, in that sense, in September 2012 the Strategy for Strengthening the Engagement of the Health Sector in the implementation of the Strategic Approach to International Chemicals Management (SAICM) was adopted at the International Conference on Chemicals Management.

Most of the countries specified that legislations or guidelines for public health management of radiological and chemical events are national legislations without specific provisions for ships or at ports and apply to all type of ships. In the same way, although contingency plans for public health management of radiological and chemical events were available in most of the countries, only 29% and 63% of these contingency plans were specific for ships or at port for radiological and chemical events respectively. This could lead to a less efficient management of the events if they occur on ships or at ports.

Detection systems are more frequently available for radiological events (89% of the countries) than for chemical events (73% of the countries).

Laboratories for analysing radionuclides in case of a radiological event were available in the majority of the responding countries, and laboratories of toxicology for chemical events were available in all responding countries.

Only one country reported to have managed a radiological event in the last five years. Two countries indicated to have managed a chemical event. This low number of reported events could reflect that radiological and chemical events are not a public health problem for ships and at ports nowadays, but could also be a weakness in the detection systems, deficiencies in the communication exchange with the rest of authorities, or that for some countries this information is confidential and not open to the public.

Competent authorities for public health management of radiological events were easier to identify than for chemical events. Competent authorities are mainly national authorities, usually not health authorities. In general, legislation and contingency plans are not specific for ships or ports and there is lack of training.

Part C: Reporting requirements, hygiene standards and inspection practices related to fishing vessels among the EU countries

Almost half of the responding countries have no specific legislation for conducting inspections on fishing vessels. Moreover, most of the countries do not perform regular inspections on fishing vessels. However, when an inspection on a fishing vessel is performed, all areas and aspects of the fishing vessels are included in the inspection. The majority of the countries indicated that there is no information available regarding the policy for issuance of Ship Sanitation Certificates in fishing vessels travelling in international waters. This could be a problem as the ships goes to different ports and they have different criteria applied in each port.

Fishing vessels are requested in almost 60% of the countries to communicate any health-related event to the competent authority. Most of these countries use the Maritime Declaration of Health for that purpose.

Part D: Training needs related to core capacities at points of entry (ports) among the EU countries

Countries have different national policies at designated and authorized ports regarding issuing of the SSC, and different inspection practices. Contingency plans at designated points of entry are not available for all the countries.

The majority of the countries have specific personnel to inspect ships and ports from a sanitary point of view and for IHR implementation. However, inspectors are not commonly involved in the outbreak management.

Overall, personnel working at ports require specific training in all topics in line with the IHR requirements at points of entry. They especially indicate an intensive training need related to public health risks from microbiological, chemical and radiological agents; proceedings to report to the competent authorities for the point of entry and communication with other authorities; and quarantine of suspected travellers.

Countries prefer face to face training for inspectors and managers compared to E learning training activities. Presentations and case studies in classroom and practical training onboard ship were considered more useful by the countries.

Simulation exercises at ports related to events that may constitute a PHEIC are not routinely performed by all countries.

There are specific personnel for IHR activities but practices are not homogenous to all the countries. More training is needed. Moreover, to ensure collaboration between authorities responsible for inspections and authorities responsible for outbreak investigations would be essential.

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Annexes

Annex 1. Questionnaire for identification of authorities responsible for responding to chemical events on any type of ship and at ports

The impact on maritime transport of health threats due to biological, chemical and radiological agents, including communicable diseases

Work package description: 4: State of the art
Lead Partner: ES Institute of Public Health Carlos III

Questionnaire for identification of authorities responsible for responding to chemical events on any type of ship and at ports among the European Union (EU) countries

Purpose

The purpose of the questionnaire is to identify the competent authorities for public health management of chemical events in the EU Member States.

General guideline

- The word “Authority” indicates any independent service or department within a government ministry. If the authorities are regional or local, please provide details on one major regional or local authority, and the national authority to which all regional or local authorities correspond. You do not need to provide details on all regional authorities.
- **Chemical event:** means a manifestation of disease or an occurrence that creates a potential for disease caused by a chemical agent, which can produce an acute adverse biological effect.
    - Biotoxins or other toxic biological agents are excluded.
    - Environmental contamination that does not affect people is excluded.

- Accidental and deliberate chemical events are included.

The SHIPSAN ACT Collaborator of the Country

1.1 Country name:

Name of the SHIPSAN ACT Collaborator:

Contact person:

Email:

Telephone number:

1.2 Fax number:

Part 0. Contact details of the person who collected information and answers on this data element (information collector)

0.1 Name of the information collector:

0.2 Email address of the information collector:

0.3 Telephone number of the information collector:

Part 1. Which authority (or authorities) creates legislation or mandatory guidelines related to public health management of chemical events on ships or at ports in a local and national level in your country?

(If the authorities are regional or local, please provide details on one major regional or local authority and the national authority to which all regional or local authorities correspond. You do not need to provide details on all regional authorities.)

1.1 □ National central authority □ Regional or Local authority

- Name of the authority: _____
- Telephone of the authority: _____
- Address of the authority: _____
- E-mail of the authority: _____
- Contact person: _____

1.2 This authority is responsible for creating legislation on:

□ Plans for prevention and preparedness on chemical events

□ Detection and recording of chemical events

□ Risk assessment of chemical events

□ Response to chemical events

1.3 This authority is responsible for creating legislation on:

□ Accidental chemical events

□ Deliberate chemical events

1.4 This authority is responsible for creating legislation on:

□ Chemical events related to food

□ Chemical events related to water

□ Chemical events related to the environment

□ Chemical events related to non-food consumer products

□ Other chemical events. Specify_____

1.5 If Regional or local department, please specify to which national authority the regional or local departments correspond: Name of the authority:

_____

Part 2. Which authority (or authorities) is/are responsible for planning related to public health management of chemical events on ships or at ports, in a local and national level in your country?

(If the authorities are regional or local, please provide details on one major regional or local authority and the national authority to which all regional or local authorities correspond. You do not need to provide details on all regional authorities.)

2.1 □ National central authority □ Regional or Local authority

- Name of the authority: _____
- Telephone of the authority: _____
- Address of the authority: _____
- E-mail of the authority: _____
- Contact person: _____

2.2 This authority is responsible for planning on:

□ Accidental chemical events

□ Deliberate chemical events

2.3 This authority is responsible for planning on:

□ Chemical events related to food

□ Chemical events related to water

□ Chemical events related to the environment

□ Chemical events related to non-food consumer products

□ Other chemical events. Specify_____

2.4 If Regional or local department, please specify to which national authority the regional or local departments correspond: Name of the authority:

_____

Part 3. Which authority (or authorities) is/are responsible for detection and recording of chemical events on ships or at ports, in a local and national level in your country?

(If the authorities are regional or local, please provide details on one major regional or local authority and the national authority to which all regional or local authorities correspond. You do not need to provide details on all regional authorities.)

3.1 □ National central authority □ Regional or Local authority

- Name of the authority: _____
- Telephone of the authority: _____
- Address of the authority: _____
- E-mail of the authority: _____
- Contact person: _____

3.2 This authority is responsible for detection and recording on:

□ Accidental chemical events

□ Deliberate chemical events

3.3 This authority is responsible for detection and recording on:

□ Chemical events related to food

□ Chemical events related to water

□ Chemical events related to the environment

□ Chemical events related to non-food consumer products

□ Other chemical events. Specify_____

3.4 If Regional or local department, please specify to which national authority the regional or local departments correspond: Name of the authority:

_____

Part 4. Which authority (or authorities) is/are responsible for public health risk assessment of chemical events on ships or at ports, in a local and national level in your country?

(If the authorities are regional or local, please provide details on one major regional or local authority and the national authority to which all regional or local authorities correspond. You do not need to provide details on all regional authorities.)

4.1 □ National central authority □ Regional or Local authority

- Name of the authority: _____

- Telephone of the authority: _____
- Address of the authority: _____
- E-mail of the authority: _____
- Contact person: _____

4.2 This authority is responsible for risk assessment on:

□ Accidental chemical events

□ Deliberate chemical events

4.3 This authority is responsible for risk assessment on:

□ Chemical events related to food

□ Chemical events related to water

□ Chemical events related to the environment

□ Chemical events related to non-food consumer products

□ Other chemical events. Specify_____

4.4 If Regional or local department, please specify to which national authority the regional or local departments correspond: Name of the authority:

_____

Part 5. Which authority (or authorities) is/are responsible for public health response to chemical events on ships or at ports, in a local and national level in your country?

(If the authorities are regional or local, please provide details on one major regional or local authority and the national authority to which all regional or local authorities correspond. You do not need to provide details on all regional authorities.)

5.1 □ National central authority □ Regional or Local authority

- Name of the authority: _____
- Telephone of the authority: _____
- Address of the authority: _____
- E-mail of the authority: _____
- Contact person: _____

5.2 This authority is responsible for response on:

□ Accidental chemical events

□ Deliberate chemical events

5.3 This authority is responsible for response on:

□ Chemical events related to food

□ Chemical events related to water

□ Chemical events related to the environment

□ Chemical events related to non-food consumer products

□ Other chemical events. Specify_____

5.4 If Regional or local department, please specify to which national authority the regional or local departments correspond: Name of the authority:

_____

Part 6. Which authority (or authorities) is/are responsible for communication of chemical events on ships or at ports, in a local and national level in your country?

(If the authorities are regional or local, please provide details on one major regional or local authority and the national authority to which all regional or local authorities correspond. You do not need to provide details on all regional authorities.)

6.1 □ National central authority □ Regional or Local authority

- Name of the authority: _____
- Telephone of the authority: _____
- Address of the authority: _____
- E-mail of the authority: _____
- Contact person: _____

6.2 This authority is responsible for communication on:

□ Accidental chemical events

□ Deliberate chemical events

6.3 This authority is responsible for communication on:

□ Chemical events related to food

□ Chemical events related to water

□ Chemical events related to the environment

□ Chemical events related to non-food consumer products

□ Other chemical events. Specify_____

6.4 This authority is responsible for communication to:

□ National public health authorities. Specify_____

□ Other national authorities. Specify_____

□ International public health authorities. Specify_____

□ Other international authorities. Specify_____

□ Public health authorities from other country. Specify_____

□ Other authorities from other country. Specify_____

Part 7. Which authority (or authorities) is/are responsible for training related to public health management of chemical events on ships or at ports, in a local and national level in your country?

(If the authorities are regional or local, please provide details on one major regional or local authority and the national authority to which all regional or local authorities correspond. You do not need to provide details on all regional authorities.)

7.1 □ National central authority □ Regional or Local authority

- Name of the authority: _____
- Telephone of the authority: _____
- Address of the authority: _____
- E-mail of the authority: _____
- Contact person: _____

7.2 This authority is responsible for training on:

□ Accidental chemical events

□ Deliberate chemical events

7.3 This authority is responsible for training on:

□ Chemical events related to food

□ Chemical events related to water

□ Chemical events related to the environment

□ Chemical events related to non-food consumer products

□ Other chemical events. Specify_____

7.4 If Regional or local department, please specify to which national authority the regional or local departments correspond: Name of the authority:

_____

Part 8. Questions on authorities <u>exclusively</u> dealing with ships or ports

8.1 Do any of the authorities you have mentioned in Part 1 create legislation or mandatory guidelines related to public health management of chemical events exclusively on ships or at ports?

- Name of the authority: _____
- Telephone of the authority: _____
- Address of the authority: _____
- E-mail of the authority: _____
- Contact person: _____

8.2 Are any of the authorities you have mentioned in Part 3 responsible for detection and recording of chemical events exclusively on ships or at ports in your country?

- Name of the authority: _____
- □ National central authority □ Regional authority
- Telephone of the authority: _____
- Address of the authority: _____
- E-mail of the authority: _____
- Contact person: _____

8.3 Are any of the authorities you have mentioned in Part 4 responsible or public health risk assessment of chemical events exclusively on ships or at ports in your country?

- Name of the authority: _____
- □ National central authority □ Regional authority
- Telephone of the authority: _____
- Address of the authority: _____
- E-mail of the authority: _____
- Contact person: _____

8.4 Are any of the authorities you have mentioned in Part 5 responsible for public health response to chemical events exclusively on ships or at ports in your country?

- Name of the authority: _____
- □ National central authority □ Regional authority
- Telephone of the authority: _____
- Address of the authority: _____
- E-mail of the authority: _____
- Contact person: _____

8.5 Are any of the authorities you have mentioned in Part 6 responsible for communication of chemical events exclusively on ships or at ports in your country?

- Name of the authority: _____
- □ National central authority □ Regional authority
- Telephone of the authority: _____
- Address of the authority: _____
- E-mail of the authority: _____
- Contact person: _____

8.6 Are any of the authorities you have mentioned in Part 7 responsible for training related to public health management of chemical events exclusively on ships or at ports in your country?

- Name of the authority: _____
- □ National central authority □ Regional authority
- Telephone of the authority: _____
- Address of the authority: _____
- E-mail of the authority: _____

- Contact person: _____

Comments:

Thank you for your assistance in completing the questionnaire and contributing to the SHIPSAN ACT Joint Action

The authorities that have been identified in this questionnaire will be contacted to specify their responsibilities.

If you have any questions, please contact us at the address below:

Carmen Varela, National Centre for Epidemiology, Institute of Public Health Carlos III,

5, Monforte de Lemos Avenue, Madrid 28019, Spain.

Phone: +34 91 822 26 04, Fax: +34 91 387 78 15, Email: mvarelam@isciii.es

Annex 2. Questionnaire for identification of authorities responsible for responding to radiological events on any type of ship and at ports

The impact on maritime transport of health threats due to biological, chemical and radiological agents, including communicable diseases

Work package description: 4: State of the art
Lead Partner: ES Institute of Public Health Carlos III

Questionnaire for identification of authorities responsible for responding to radiological events on any type of ship and at ports among the European Union (EU) countries

Purpose

The purpose of the questionnaire is to identify the competent authorities for public health management of radiological events in the EU Member States.

General guideline

- The word "Authority" indicates any independent service or department within a government ministry. If the authorities are regional or local, please provide details on one major regional or local authority, and the national authority to which all regional or local authorities correspond. You do not need to provide details on all regional authorities.
- **Radiological event:** means a manifestation of disease or an occurrence that creates a potential for disease caused by a radiological agent, which can produce an acute adverse biological effect.
    - Environmental contamination that does not affect people is excluded.
    - Accidental and deliberate radiological events are included.
    - Stochastic effects of the radiological agents are excluded.

The SHIPSAN ACT Collaborative partner of the Country

1.3 Country name:

Name of the SHIPSAN ACT Collaborative Partner:

Contact person:

Email:

Telephone number:

1.4 Fax number:

Part 0. Contact details of the person who collected information and answers on this data element (information collector)

0.1 Name of the information collector:

0.2 Email address of the information collector:

0.3 Telephone number of the information collector:

Part 1. Which authority (or authorities) creates legislation or mandatory guidelines related to public health management of radiological events on ships or at ports in a local and national level in your country?

(If the authorities are regional or local, please provide details on one major regional or local authority and the national authority to which all regional or local authorities correspond. You do not need to provide details on all regional authorities.)

1.1 □ National central authority □ Regional or Local authority

- Name of the authority: _____
- Telephone of the authority: _____
- Address of the authority: _____
- E-mail of the authority: _____
- Contact person: _____

1.2 This authority is responsible for creating legislation on:

□ Plans for prevention and preparedness on radiological events

□ Detection and recording of radiological events

□ Impact assessment of radiological events

□ Response to radiological events

1.3 This authority is responsible for creating legislation on:

□ Accidental radiological events

□ Deliberate radiological events

1.4 This authority is responsible for creating legislation on:

□ Radiological events related to food

□ Radiological events related to water

□ Radiological events related to the environment

□ Radiological events related to non-food consumer products

□ Other radiological events. Specify_____

1.5 If Regional or local department, please specify to which national authority the regional or local departments correspond: Name of the authority:

_____

Part 2. Which authority (or authorities) is/are responsible for planning related to public health management of radiological events on ships or at ports, in a local and national level in your country?

(If the authorities are regional or local, please provide details on one major regional or local authority and the national authority to which all regional or local authorities correspond. You do not need to provide details on all regional authorities.)

2.1 □ National central authority □ Regional or Local authority

- Name of the authority: _____
- Telephone of the authority: _____
- Address of the authority: _____
- E-mail of the authority: _____
- Contact person: _____

2.2 This authority is responsible for planning on:

□ Accidental radiological events

□ Deliberate radiological events

2.3 This authority is responsible for planning on:

□ Radiological events related to food

□ Radiological events related to water

□ Radiological events related to the environment

□ Radiological events related to non-food consumer products

□ Other radiological events. Specify_____

2.4 If Regional or local department, please specify to which national authority the regional or local departments correspond: Name of the authority:

_____

Part 3. Which authority (or authorities) is/are responsible for detection and recording of radiological events on ships or at ports, in a local and national level in your country?

(If the authorities are regional or local, please provide details on one major regional or local authority and the national authority to which all regional or local authorities correspond. You do not need to provide details on all regional authorities.)

3.1 □ National central authority □ Regional or Local authority

- Name of the authority: _____
- Telephone of the authority: _____
- Address of the authority: _____
- E-mail of the authority: _____
- Contact person: _____

3.2 This authority is responsible for detection and recording on:

□ Accidental radiological events

□ Deliberate radiological events

3.3 This authority is responsible for detection and recording on:

□ Radiological events related to food

□ Radiological events related to water

□ Radiological events related to the environment

□ Radiological events related to non-food consumer products

□ Other radiological events. Specify_____

3.4 If Regional or local department, please specify to which national authority the regional or local departments correspond: Name of the authority:

_____

Part 4. Which authority (or authorities) is/are responsible for public health impact assessment of radiological events on ships or at ports, in a local and national level in your country?

(If the authorities are regional or local, please provide details on one major regional or local authority and the national authority to which all regional or local authorities correspond. You do not need to provide details on all regional authorities.)

4.1 □ National central authority □ Regional or Local authority

- Name of the authority: _____
- Telephone of the authority: _____
- Address of the authority: _____
- E-mail of the authority: _____
- Contact person: _____

4.2 This authority is responsible for risk assessment on:

□ Accidental radiological events

□ Deliberate radiological events

4.3 This authority is responsible for risk assessment on:

□ Radiological events related to food

□ Radiological events related to water

□ Radiological events related to the environment

□ Radiological events related to non-food consumer products

□ Other radiological events. Specify_____

4.4 If Regional or local department, please specify to which national authority the regional or local departments correspond: Name of the authority:

_____

Part 5. Which authority (or authorities) is/are responsible for public health response to radiological events on ships or at ports, in a local and national level in your country?

(If the authorities are regional or local, please provide details on one major regional or local authority and the national authority to which all regional or local authorities correspond. You do not need to provide details on all regional authorities.)

5.1 □ National central authority □ Regional or Local authority

- Name of the authority: _____
- Telephone of the authority: _____
- Address of the authority: _____
- E-mail of the authority: _____
- Contact person: _____

5.2 This authority is responsible for response on:

□ Accidental radiological events

□ Deliberate radiological events

5.3 This authority is responsible for response on:

□ Radiological events related to food

□ Radiological events related to water

□ Radiological events related to the environment

□ Radiological events related to non-food consumer products

□ Other radiological events. Specify_____

5.4 If Regional or local department, please specify to which national authority the regional or local departments correspond: Name of the authority:

_____

Part 6. Which authority (or authorities) is/are responsible for communication of radiological events on ships or at ports, in a local and national level in your country?

(If the authorities are regional or local, please provide details on one major regional or local authority and the national authority to which all regional or local authorities correspond. You do not need to provide details on all regional authorities.)

6.1 □ National central authority □ Regional or Local authority

- Name of the authority: _____
- Telephone of the authority: _____
- Address of the authority: _____
- E-mail of the authority: _____
- Contact person: _____

6.2 This authority is responsible for communication on:

□ Accidental radiological events

□ Deliberate radiological events

6.3 This authority is responsible for communication on:

□ Radiological events related to food

□ Radiological events related to water

□ Radiological events related to the environment

□ Radiological events related to non-food consumer products

□ Other radiological events. Specify_____

6.4 This authority is responsible for communication to:

□ National public health authorities. Specify_____

□ Other national authorities. Specify_____

□ International public health authorities. Specify_____

□ Other international authorities. Specify_____

□ Public health authorities from other country. Specify_____

□ Other authorities from other country. Specify_____

Part 7. Which authority (or authorities) is/are responsible for training related to public health management of radiological events on ships or at ports, in a local and national level in your country?

(If the authorities are regional or local, please provide details on one major regional or local authority and the national authority to which all regional or local authorities correspond. You do not need to provide details on all regional authorities.)

7.1 □ National central authority □ Regional or Local authority

- Name of the authority: _____
- Telephone of the authority: _____
- Address of the authority: _____
- E-mail of the authority: _____
- Contact person: _____

7.2 This authority is responsible for training on:

□ Accidental radiological events

□ Deliberate radiological events

7.3 This authority is responsible for training on:

□ Radiological events related to food

□ Radiological events related to water

□ Radiological events related to the environment

□ Radiological events related to non-food consumer products

□ Other radiological events. Specify_____

7.4 If Regional or local department, please specify to which national authority the regional or local departments correspond: Name of the authority:

_____

Part 8. Questions on authorities <u>exclusively</u> dealing with ships or ports

8.1 Do any of the authorities you have mentioned in Part 1 create legislation or mandatory guidelines related to public health management of radiological events exclusively on ships or at ports?

- Name of the authority: _____
- Telephone of the authority: _____
- Address of the authority: _____
- E-mail of the authority: _____
- Contact person: _____

8.2 Are any of the authorities you have mentioned in Part 3 responsible for detection and recording of radiological events exclusively on ships or at ports in your country?

- Name of the authority: _____
- □ National central authority □ Regional authority
- Telephone of the authority: _____
- Address of the authority: _____
- E-mail of the authority: _____

- Contact person: _____

8.3 Are any of the authorities you have mentioned in Part 4 responsible or public health impact assessment of radiological events exclusively on ships or at ports in your country?

- Name of the authority: _____
- □ National central authority □ Regional authority
- Telephone of the authority: _____
- Address of the authority: _____
- E-mail of the authority: _____
- Contact person: _____

8.4 Are any of the authorities you have mentioned in Part 5 responsible for public health response to radiological events exclusively on ships or at ports in your country?

- Name of the authority: _____
- □ National central authority □ Regional authority
- Telephone of the authority: _____
- Address of the authority: _____
- E-mail of the authority: _____
- Contact person: _____

8.5 Are any of the authorities you have mentioned in Part 6 responsible for communication of radiological events exclusively on ships or at ports in your country?

- Name of the authority: _____
- □ National central authority □ Regional authority
- Telephone of the authority: _____
- Address of the authority: _____
- E-mail of the authority: _____
- Contact person: _____

8.6 Are any of the authorities you have mentioned in Part 7 responsible for training related to public health management of radiological events exclusively on ships or at ports in your country?

- Name of the authority: _____
- □ National central authority □ Regional authority
- Telephone of the authority: _____
- Address of the authority: _____
- E-mail of the authority: _____
- Contact person: _____

Comments:

Thank you for your assistance in completing the questionnaire and contributing to the SHIPSAN ACT Joint Action

The authorities that have been identified in this questionnaire will be contacted to specify their responsibilities.

If you have any questions, please contact us at the address below:

Carmen Varela, National Centre for Epidemiology, Institute of Public Health Carlos III,

5, Monforte de Lemos Avenue, Madrid 28019, Spain.

Phone: +34 91 822 26 04, Fax: +34 91 387 78 15, Email: mvarelam@isciii.es

Annex 3. Questionnaire for current practices regarding chemical events on any type of ship and at ports

The impact on maritime transport of health threats due to biological, chemical and radiological agents, including communicable diseases

Work package description: 4: State of the art
Lead Partner: ES Institute of Public Health Carlos III

Questionnaire for current practices regarding chemical events on any type of ship and at ports among the EU countries

Purpose

The purpose of the questionnaire is to collect information on the current situation in EU regarding practices, the legal frame related to chemical events on ships or at ports, the events that authorities confronted in the past and the contingency plan that they use.

General guideline

- The word "Authority" indicates any independent service or department within a government ministry. If the authorities are regional or local, please provide details on one major regional or local authority, and the national authority to which all regional or local authorities correspond. You do not need to provide details on all regional authorities.
- **Chemical event:** means a manifestation of disease or an occurrence that creates a potential for disease caused by a chemical agent, which can produce an acute adverse biological effect.
    - Biotoxins or other toxic biological agents are excluded.
    - Environmental contamination that does not affect people is excluded.
    - Accidental and deliberate chemical events are included.

Responding authority

□ National central authority □ Regional or Local authority

- Name of the authority: _____
- Telephone of the authority: _____
- Address of the authority: _____

- E-mail of the authority: _____
- Contact person: _____

1. What national legislation or regulation or guidelines are currently applied to ships or at ports for public health management of chemical events?

- Title / Main Concept: _____
- Entry into force: _____

1.1. Type of legislation
□ Specific Legislation or regulations or guidelines for ships or at ports

□ National Legislation or regulations or guidelines including specific provisions for ships or at ports.

□ National Legislation or regulations or guidelines without provisions for ships or at ports

□ Other (Please specify): _____

If guidelines please specify: □ Mandatory □ Scientific

1.2. Does this legislation/guideline apply to all types of ships:
□ Yes □ No

1.3. This legislation/guideline applies to the following:

☐ Accidental chemical events

☐ Deliberate chemical events

1.4. This legislation/guideline applies to the following types of events:
□ Chemical events related to food

☐ Chemical events related to water

☐ Chemical events related to the environment

☐ Chemical events related to non-food consumer products

☐ Other chemical events. Specify_____

2. Is there any detection system for chemical events for ships or at ports in place?
□ Yes □ No

2.1 Is it specific for ships or at ports?
□ Yes □ No

2.2 Does it cover all type of ships?
□ Yes □ No

2.3 It applies to the following:
□ Accidental chemical events

□ Deliberate chemical events

2.4 It applies to the following types of events:
□ Chemical events related to food

□ Chemical events related to water

□ Chemical events related to the environment

□ Chemical events related to non-food consumer products

□ Other chemical events. Specify_____

2.5 Is the information obtained from the detection system recorded?
□ Yes □ No

2.6 Is the information obtained from the detection system analyzed?
□ Yes □ No

2.7 Describe briefly the system
_____

3. Is there any toxicology laboratory available to analyze chemical events on ships or at ports?
□ Yes □ No

3.1 What kind of laboratory?
□ Local

□ Regional

□ National

3.2 Is it specific for ships or at ports?
□ Yes □ No

3.3 Does it cover all type of ships?
□ Yes □ No

3.4 What kind of samples can analyzed?:
□ Human samples

□ Food samples

□ Water samples

□ Environmental samples

□ Non-food consumer products samples

(The user is prompted to copy the above fields as many times as necessary.)

4. Is there any contingency plan for public health management of chemical events for ships or at ports?
□ Yes □ No

4.1 Is it specific for ships or at ports?
□ Yes □ No

4.2 Does it cover all type of ships?
□ Yes □ No

4.3 This contingency plan applies to the following:
□ Accidental chemical events

□ Deliberate chemical events

4.4 This contingency plan applies to the following types of events:
□ Chemical events related to food

□ Chemical events related to water

□ Chemical events related to the environment

□ Chemical events related to non-food consumer products

□ Other chemical events. Specify_____

4.5 Describe briefly the plan
_____

5. Have you managed any chemical event from ships or at ports in the last five years?
□ Yes □ No

Number of chemical events managed: _____

Please specify the last five events:

	Number of cases	Number of deaths	Agent	Transmission mechanism	Vehicle	Contributing factors	Control measures
Event 1							
Event 2							
Event 3							
Event 4							
Event 5							

6. Please provide a flow chart including the competent authorities which are involved in chemical event management on ships or at ports.

7. **Please provide a chart describing the flow of event information throughout the system (from suspected event to feedback of information) from local to international level**

8. **Does your authority have specific personnel to manage chemical events?**
□ Yes, for all types of events and premises

□ Yes, specific for ships or ports

□ No

□ Other, please specify _____

9. **Did the personnel responsible for public health management of chemical events undertake specific training on these events on ships or at ports?**
□ Yes □ No

If yes, please specify: Percentage of personnel receiving training Frequency of the training

Aspects included in the training_____

Comments:

Thank you for your assistance in completing the questionnaire and contributing to the SHIPSAN ACT Joint Action

If you have any questions, please contact us at the address below:

Carmen Varela, National Centre for Epidemiology, Institute of Public Health Carlos III,

5, Monforte de Lemos Avenue, Madrid 28019, Spain.

Phone: +34 91 822 26 04, Fax: +34 91 387 78 15, Email: mvarelam@isciii.es

Annex 4. Questionnaire for current practices regarding radiological events on any type of ship and at ports

The impact on maritime transport of health threats due to biological, chemical and radiological agents, including communicable diseases

Work package description: 4: State of the art
Lead Partner: ES Institute of Public Health Carlos III

Questionnaire for current practices regarding radiological events on any type of ship and at ports among the EU countries

Purpose

The purpose of the questionnaire is to collect information on the current situation in EU regarding practices, the legal frame related to radiological events on ships or at ports, the events that authorities confronted in the past and the contingency plan that they use.

General guideline

- The word "Authority" indicates any independent service or department within a government ministry. If the authorities are regional or local, please provide details on one major regional or local authority, and the national authority to which all regional or local authorities correspond. You do not need to provide details on all regional authorities.
- **Radiological event:** means a manifestation of disease or an occurrence that creates a potential for disease caused by a radiological agent, which can produce an acute adverse biological effect.
    - Environmental contamination that does not affect people is excluded.
    - Accidental and deliberate radiological events are included.
    - only acute effects of the radiological agents are included (carcinogenic effects are excluded).

Responding authority

□ National central authority □ Regional or Local authority

- Name of the authority: _____
- Telephone of the authority: _____
- Address of the authority: _____
- E-mail of the authority: _____
- Contact person: _____

1. What national legislation or regulation or guidelines are currently applied to ships or at ports for public health management of radiological events?

- Title / Main Concept: _____
- Entry into force: _____

1.5. Type of legislation
□ Specific Legislation or regulations or guidelines for ships or at ports

□ National Legislation or regulations or guidelines including specific provisions for ships or at ports.

□ National Legislation or regulations or guidelines without provisions for ships or at ports

□ Other (Please specify): _____

If guidelines please specify: □ Mandatory □ Scientific

1.6. Does this legislation/guideline apply to all types of ships:
□ Yes □ No

In case of no, please specify_____

1.7. This legislation/guideline applies to the following:

☐ Accidental radiological events

☐ Deliberate radiological events

1.8. This legislation/guideline applies to the following types of events:
□ Radiological events related to food

☐ Radiological events related to water

☐ Radiological events related to the environment

☐ Radiological events related to non-food consumer products

☐ Other radiological events. Specify_____

2. Is there any detection system for radiological events for ships or at ports in place?
□ Yes □ No

2.1 Is it specific for ships or at ports?
□ Yes □ No

2.2 Does it cover all type of ships?
□ Yes □ No

2.3 It applies to the following:
□ Accidental radiological events

□ Deliberate radiological events

2.4 It applies to the following types of events:
□ Radiological events related to food

□ Radiological events related to water

□ Radiological events related to the environment

□ Radiological events related to non-food consumer products

□ Other radiological events. Specify_____

2.5 Is the information obtained from the detection system recorded?
□ Yes □ No

2.6 Is the information obtained from the detection system analyzed?
□ Yes □ No

2.7 Describe briefly the system
_____

3. Does your country participate in the MEGAPORT initiative?
□ Yes □ No

4. How many ports in your country are members of the MEGAPORT initiative? _____

5. Is there any laboratory available to analyze radionuclides in case of a radiological event on ships or at ports?

5.1 What kind of laboratory?
□ Local

□ Regional

□ National

5.2 Does it cover all type of ships?
□ Yes □ No

5.3 What kind of samples can be analysed?
□ Human samples

□ Food samples

□ Water samples

□ Environmental samples

□ Non-food consumer samples

6. Is there any contingency plan for public health management of radiological events for ships or at ports?
□ Yes □ No

6.1 Is it specific for ships or at ports?
□ Yes □ No

6.2 Does it cover all type of ships?
□ Yes □ No

6.3 This contingency plan applies to the following:
□ Accidental radiological events

□ Deliberate radiological events

6.4 This contingency plan applies to the following types of events:
□ Radiological events related to food

□ Radiological events related to water

□ Radiological events related to the environment

□ Radiological events related to non-food consumer products

□ Other radiological events. Specify_____

6.5 Describe briefly the plan
_____

7. Have you managed any radiological event from ships or at ports in the last five years?
□ Yes □ No

Number of radiological events managed: _____

Please specify the last five events:

	Number of cases	Number of deaths	Agent	Transmission mechanism	Vehicle	Contributing factors	Control measures
Event 1							
Event 2							
Event 3							
Event 4							
Event 5							

8. **Please provide a flow chart including the competent authorities which are involved in radiological event management on ships or at ports.**

9. **Please provide a chart describing the flow of event information throughout the system (from suspected event to feedback of information) from local to international level**

10. **Does your authority have specific personnel to manage radiological events?**
□ Yes, for all types of events and premises

□ Yes, specific for ships or ports

□ No

□ Other, please specify _____

11. **Did the personnel responsible for public health management of radiological events undertake specific training on these events on ships or at ports?**
□ Yes □ No

If yes, please specify: Percentage of personnel receiving training Frequency of the training

Aspects included in the training_____

Comments:

Thank you for your assistance in completing the questionnaire and contributing to the SHIPSAN ACT Joint Action

If you have any questions, please contact us at the address below:

Carmen Varela, National Centre for Epidemiology, Institute of Public Health Carlos III,

5, Monforte de Lemos Avenue, Madrid 28019, Spain.

Phone: +34 91 822 26 04, Fax: +34 91 387 78 15, Email: mvarelam@isciii.es

Annex 5. Questionnaire for collecting information on reporting requirements, hygiene standards and inspection practices related to fishing vessels

The impact on maritime transport of health threats due to biological, chemical and radiological agents, including communicable diseases

Work package description: 4: State of the art
Lead Partner: ES Institute of Public Health Carlos III

Questionnaire for collecting information on reporting requirements, hygiene standards and inspection practices related to fishing vessels among the EU countries

Objective

To collect information related to hygiene standards and inspection practices related to fishing vessels.

Definitions

Fishing vessel means any vessel used commercially for catching fish, whales, seals, walrus or other living resources of the sea.

The SHIPSAN ACT Collaborator of the Country

1.5	**Country name:**
1.6	**Name of the SHIPSAN ACT Collaborator Partner:**
1.7	**Contact person:**
1.8	**Email:**
1.9	**Telephone number:**
1.10	**Fax number:**

RESPONDING AUTHORITY/IES

	□ National central authority □ Regional or Local Authority
a. Name of the authority: b. Telephone of the authority: c. Address of the authority: d. E-mail of the authority: e. Contact person:	

A. Does your country have specific legislation to perform a sanitary / hygiene inspection of fishing vessels different from fishery products official control?

□ YES

□ NO

If so, what are the qualifications required for those personnel in your country (degree, experience etc,)? Please, specify

_____

_____

_____

B. Does your country inspect regularly all type of fishing vessels regardless of the size and the distance of the coast they are authorized to sail?
□ YES

□ NO

□ I DON'T KNOW

If yes, what aspects are included during the inspection?

□ Quarters

□ Galley, pantry and service area

□ Stores

□ Medical facilities

□ Solid and medical waste

□ Engine room

□ Potable water

□ Sewage

□ Holds

□ Occupational issues. Please specify_____

C. What is the policy in your country regarding issuance of Ship Sanitation Certificates (SSC) in fishing vessels travelling in international waters?
□ there is no information available for SSC in fishing vessels (lack of data)

□ Authority issue about …….. SSC' in fishing vessels in the country (please add the number)

□ Other

If other, please specify

_____

_____

D. What are the standards used for inspection of fishing vessels in your country?
□ WHO Handbook for inspection of ships

□ ILO – Work in Fishing Convention, 2007 (No. 188)

□ European standards (please specify:……)

□ National standards (please, specify and provide us with it)……

□ Other, please specify: ……

E. Are fishing vessels requested to report health related events to competent authorities in your country?
□ YES

□ NO

□ I DON'T KNOW

If yes, please specify:

- How many events have been reported between 2007 and 2012?……..
- What kind of events? Please, describe briefly (include a list from ILO – Work in Fishing Convention, 2007 (No. 188))

……
……...

……
……...

- Did they use Maritime Declaration of Health?
  □ YES

  □ NO

F. Is there any requirement in your country to have at least one person on the vessel properly trained on health safety and sanitary issues on board fishing vessels?
□ YES

□ NO

□ I do not know

If yes, please specify……..

G. Do fishing vessels in your country have specific plans for the prevention labour related risks?
□ YES

□ NO

□ I do not know

Thank you for your assistance in completing the questionnaire and contributing to the SHIPSAN ACT Joint Action

If you have any questions, please contact us at the address below:

Carmen Varela, National Centre for Epidemiology, Institute of Public Health Carlos III,

5, Monforte de Lemos Avenue, Madrid 28019, Spain.

Phone: +34 91 822 26 04, Fax: +34 91 387 78 15, Email: mvarelam@isciii.es

Annex 6. Questionnaire for identification of training needs related to core capacities at the points of entry (ports)

The impact on maritime transport of health threats due to biological, chemical and radiological agents, including communicable diseases

Work package: 4 Description: State of the art
Lead Partner: ES Institute of Public Health Carlos III

Questionnaire for identification of training needs related to core capacities at the points of entry (ports) among the EU countries

Objective

- To collect information for identification of training needs related to core capacities among personnel working in designated and/or authorized ports.

Definitions

- "Port" means a seaport or a port on an inland body of water where ships on an international voyage arrive or depart.
- "Point of entry" means a passage for international entry or exit of travellers, baggage, cargo, containers, conveyances, goods and postal parcels as well as agencies and areas providing services to them on entry or exit.
- "Authorized port" means the port authorized by the State Party to offer:
    - The issuance of Ship Sanitation Control Certificates (SSCC)
    - The issuance of Ship Sanitation Control Exemption Certificates (SSECC) only,
    - Extension of the Ship Sanitation Control Exemption Certificates for a period of one month
- "Designated port" means the port that shall develop the capacities provided in Annex 1 of the IHR-2005

The SHIPSAN ACT Collaborator of the Country

1.11	**Country name:**
1.12	**Name of the SHIPSAN ACT Collaborator:**
1.13	**Contact person:**
1.14	**Email:**
1.15	**Telephone number:**
1.16	**Fax number:**

RESPONDING AUTHORITY
□ National central authority □ Regional or Local Authority
f. Name of the authority: g. Telephone of the authority: h. Address of the authority: i. E-mail of the authority: j. Contact person:

PART A: NATIONAL POLICIES AND PRACTICES AT DESIGNATED / AUTHORIZED PORTS

TO BE COMPLETED ONLY BY NATIONAL AUTHORITIES:

A.1. What type of competent authority has your country authorized to issue Ship Sanitation Certificates?

□ Governmental Authority

□ Regional or local Authority

□ Private company/agency

□ Other, please specify: ……

A.2. Does your country ask for fees for issuing Ship Sanitation Certificates?

□ YES

□ NO

If YES, could you please send your list of fees attached to this questionnaire?.....

A.3. Has your country designated ports under IHR-2005?

□ YES

□ NO

If yes, what is the total number of designated ports in your country? …….

Please specify the names: …….....

……
……

TO BE COMPLETED BY NATIONAL AUTHORITIES, DESIGNATED AND AUTHORIZED PORTS:

A.4. Has your country / port prepared contingency plans for public health emergencies at designated ports, required under IHR-2005?[5]
□ YES

□ NO

□ I DON'T KNOW

If yes, in how many designated ports of the total?.....

A.5. Has your country / port prepared national guidelines for issuing Ship Sanitation Certificates?
□ YES

□ NO

□ I DON'T KNOW

If yes, are these guidelines based on the WHO Handbook for inspection of ships and issuing Ship Sanitation Certificates?

□ YES

□ NO

□ I DON'T KNOW

Comments:

……..……
……..……

A.6. Is there a country-wide or a regional database for recording the ships' inspection results for issuing the SSCC/SSCEC?
□ YES

□ NO

□ I DON'T KNOW

If YES, could you please write down the web-link or provide us the contact details of the developer of this database:
……..……
……..……

PART B: HUMAN RESOURCES AT AUTHORIZED / DESIGNATED PORTS

TO BE COMPLETED BY NATIONAL AUTHORITIES, DESIGNATED AND AUTHORIZED PORTS:

[5] *This question must be only sent to designated ports.*

B.1. Does your country / port have specific personnel to inspect ships and ports from a sanitary point of view?
□ YES

□ NO

□ I DON'T KNOW

B.2. What are the qualifications required for those personnel in your country / port (degree, experience etc,)? Please, specify

……
……
……
……

B.3. Do the same personnel in your country / port perform ship and port inspections as well as outbreak management on board ships?
□ YES

□ NO

□ I DON'T KNOW

If not, please explain briefly your procedure

……
……
……

TO BE COMPLETED ONLY BY DESIGNATED AND AUTHORIZED PORTS:

B.4. What is the total number of personnel working in your port in relation to the IHR implementation (approximately)? ……..

PART C: TRAINING NEEDS ON CORE CAPACITIES AT AUTHORIZED AND DESIGNATED PORTS

TO BE COMPLETED BY AUTHORIZED AND DESIGNATED PORTS

C.1. What proportion of ship inspectors has received training to issue SSC? …….

C.2. What type of training have they received?
□ National training course

□ WHO training course

□ Other (specify)…….

C.3. Would personnel working at your port **need to be trained** in the following items related to IHR-2005 core capacities requirements at points of entry?

NEEDS FOR TRAINING - AT ALL TIMES

		INTENSIVE	MODERATE	NONE
1.	Knowledge of their national legislation and protocols to conduct inspections to identify public health risks and control measures to be applied	□	□	□
2.	Legal framework of inspections for issuing SSC	□	□	□
3.	Prompt assessment, care and reporting of ill travellers	□	□	□
4.	Recognize disease symptoms	□	□	□
5.	Use of personal protective equipment (PPE) for initial interview and triage	□	□	□
6.	Adequately transport of ill travellers according to technical requirements	□	□	□
7.	Communication strategy with other competent authorities	□	□	□
8.	Infection control techniques for the safe removal of ill travellers, application of PPE and use of information regarding contacting and accessing medical facilities	□	□	□
9.	Understanding of inspection standard operating procedures	□	□	□
10.	Required health related documents for conveyances	□	□	□
11.	Epidemiological situation of the point of entry	□	□	□
12.	Knowledge and skills for detecting, reporting, assessing and provide first control measures to public health events	□	□	□
13.	Public health risks from microbiological, chemical and radiological agents	□	□	□

14.	Personal protective techniques and related equipment	□	□	□
15.	Public health measures such as disinfection, decontamination, isolation, quarantine, contact tracing, entry and exit control	□	□	□
16.	Testing and sampling techniques and equipment	□	□	□
17.	Control methods of vectors and relevant vector-borne diseases.	□	□	□
18.	Food safety management	□	□	□
19.	Water safety management	□	□	□
20.	Solid and liquid waste management	□	□	□
21.	Safe environment for travellers (indoor air quality)	□	□	□
22.	Human remains	□	□	□
23.	Potential risks from swimming pools and SPA	□	□	□
24.	Medical facilities. Bio safety procedures, equipment, medical chest etc.	□	□	□
25.	Understanding of correct practices of air health quality management. Capacity for detection, assessment and control measures for potential risks from air quality	□	□	□
26.	Overseeing and auditing services and facilities of the points of entry	□	□	□

C.4. If inspections are performed by private companies or agencies, are their personnel properly trained on IHR implementation?

□ YES

□ NO

□ I DON'T KNOW

C.5. What kind of training do you find more useful according to staff position (please tick the appropriate level of training, scale rating 1 (low) to 5 (high))?

Type of	E-learning	Face-to-face

training **Personnel** **Position**	1	2	3	4	5	1	2	3	4	5
Inspectors										
Managers (senior level)										

C.6. What kind of learning activities do you prefer (please tick the appropriate level of training, scale rating 1 (low) to 5 (high))?

Training activities **Personnel position**	Presentations in the classroom					Case studies in the classroom					E-learning case studies					Practical training onboard ship				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Inspectors																				
Managers (senior level)																				

C.7. Do the personnel in your port have access to e-platforms (computers, internet access etc.)?
□ YES

□ NO

C.8. Is the personnel familiar with/able to use e-learning platforms? Please specify the percentage of personnel is familiar to use e-learning platforms:
□ 0%

□ 25%

□ 50%

□ 75%

□ 100%

C.9. Does your country organize training together with Port State Control personnel?
□ YES

□ NO

□ I DON'T KNOW

TO BE ONLY SENT TO DESIGNATED PORTS

C.10. What proportion of the personnel in your port has received training for responding to public health emergencies?……

C.11. What type of training have they received?

□ National training course

□ WHO training course

□ Other (specify)……

C.12. Would personnel working at your port **need to be trained** in the following items related to IHR-2005 core capacities requirements at points of entry?

NEEDS FOR TRAINING - FOR RESPONDING TO EVENTS THAT MAY CONSITUTE PUBLIC HEALTH EMERGENCY OF INTERNATIONAL CONCERN (PHEIC)

		INTENSIVE	MODERATE	NONE
1.	Knowledge of their national legislation and protocols to respond to events that may constitute a PHEIC	□	□	□
2.	Establish and operate a contingency plan	□	□	□
3.	Prompt assessment, care and isolation of affected travellers	□	□	□
4.	Infection control on animals	□	□	□
5.	Interviewing and first assessment of suspected travellers	□	□	□
6.	Procedures to report to the competent authority for the point of entry	□	□	□
7.	Quarantine of suspected travellers	□	□	□
8.	Recognize disease symptoms	□	□	□
9.	Application of recommended measures to disinsect, derat, disinfect or decontaminate	□	□	□
10.	Application of entry of exit controls for arriving or departing travellers	□	□	□
11.	Transport of suspected travellers	□	□	□

C.13. What kind of training do you find more useful for personnel implementing contingency plans at your port (implementation level)?

Type of training / **Personnel position**	E-learning					Face-to-face				
	1	2	3	4	5	1	2	3	4	5
Inspectors										
Managers (senior level)										

C.14. What kind of learning activities do you prefer for personnel implementing contingency plans at your port (implementation level)?

Training activities / **Personnel position**	Presentations in the classroom					Case studies in the classroom					E-learning case studies					Practical training onboard ship				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Inspectors																				
Managers (senior level)																				

C.15. Has your country organized simulation exercises at points of entry related to events that may constitute a PHEIC?

□ YES

□ NO

If yes, could you please specify what type of simulation exercise?

_____

_____

C.16. Is there in your country any school for training of seafarers?

□ YES

□ NO

If yes, does the school include health issues into its training programme?

□ YES

□ NO

C.17. What are the qualifications required for seafarers (Officers and ratings) in your country (degree, experience etc,)? Please, specify

……
……
……

Thank you for your assistance in completing the questionnaire and contributing to the SHIPSAN ACT Joint Action

If you have any questions, please contact us at the address below:

Carmen Varela, National Centre for Epidemiology, Institute of Public Health Carlos III,

5, Monforte de Lemos Avenue, Madrid 28019, Spain.

Infectious diseases outbreaks

Annex 7. Influenza outbreaks on ships and at ports in the world, 1990 – 2013

Title of papers	Author (s)	Date of occurrence	Agent	Cases/Deaths	Place of occurrence	Port	Ship	Type of ship	Investigation details
Large summertime influenza A outbreak among tourists in Alaska and the Yukon Territory	Uyeki TM	May - August / 1998	Influenza A	466	Alaska and Yukon territory (USA)	Yes	Yes	Cruise ship	Epidemiological, microbiological and environmental investigation was developed.
Outbreak of Influenza A Infection Among Travellers -- Alaska and the Yukon Territory, May-June 1999	MMWR	May - June / 1999	Influenza A	132	Alaska and Yukon territory (USA)	No	Yes	Cruise ship	Epidemiological, microbiological and environmental investigation was developed. In anticipation of possible persistent influenza activity, some cruise lines initiated policies to vaccinate crew members during the fall of 1998 to decrease the risk for influenza transmission by crew members to travellers. In addition, health departments in Alaska, the Yukon Territory, and British Columbia and collaborating cruise lines have implemented summertime respiratory illness surveillance.
First outbreak of influenza in the United Kingdom this season hits Orkney	CDR weekly	September / 1999	Influenza A	7	Stromness, Orkneys seaport (UK)	Yes	Yes	Tall ships	Swabs were sent for virus isolation and characterisation.
Influenza on a cruise ship in the Mediterranean	CDR weekly	May - June / 1999	Influenza A/Sidney/5/97(H3N2)-like.	60	Mediterranean sea	No	Yes	Cruise ship	Nose and throat swabs, blood and urine specimens from those most recently affected were obtained. Vaccination of all crew members was planned to include in guidance for the CDC on control of outbreaks of influenza on cruise ships.
Outbreak of 2009 pandemic influenza A (H1N1) on a Peruvian Navy ship - June-July 2009	MMWR	June - July / 2009	Influenza A (H1N1)	78	Port of San Francisco (USA)	Yes	Yes	Navy ship	An investigation was conducted to describe the outbreak; patients were treated according to WHO influenza treatment guidelines; six patients received antiviral medication because of pre-existing co morbidities. The shipboard respiratory surveillance program was implemented before the departure from Peru.
Influenza B virus outbreak on a cruise ship-Northern Europe, 2000 / Influenza and travelling	Anon / Ansart S	June - July / 2000	Influenza B	70	UK to Germany by Russia (Baltic sea)	No	Yes	"MS Rotterdam" Cruise ship	The crew with high fever were started with Rimantadine therapy. Ship's medical staff implemented a respiratory disease protocol that included surveillance for cases of respiratory disease.
Influenza and travelling	Ansart S	2001	Influenza A/Sydney/05/97(H3N2)	218	Australia to USA	No	Yes	Cruise ship	No data
A large outbreak of influenza A and B on a cruise ship causing widespread morbidity / Bound for Sydney town: health surveillance on international cruise vessels visiting the Port of Sydney	Brotherton JM / Ferson MJ	September / 2000	Influenza A and B	310/2	Sidney to Noumea (Australia)	No	Yes	Cruise ship	Environmental, microbiological and epidemiological investigation was performed.
Novel influenza A (H1N1) outbreak on board a US navy vessel	Dill CE	May / 2009	Influenza A (H1N1)	135	New York city (USA)	Yes	Yes	"US Iwo Jima" and "US Roosevelt" Navy ship	Ship wide infection control measures including strict isolation and active case finding were instituted immediately with affected crew members and medical staff receiving oseltamivir. Off-board sick leave was made when it was possible.
Outbreak of influenza in highly vaccinated crew of U.S. Navy ship	Earhart KC	February / 1996	Influenza A (H3N2) / Wuhan / 359 / 95-like	232	Southern California (USA)	No	Yes	"US Arkansas" nuclear-powered, guided missile cruiser	High rate of incapacitating illness forced the ship to dock in San Diego. The patients underwent a complete medical examination and additional laboratory testing. Amantadine was flown to the ship and offered to unvaccinated persons and those in the first day of illness.
Presumptive summer influenza A: an outbreak on a trans-Tasman cruise / Bound for Sydney town: health surveillance on international	Ferson MJ / Ferson MJ	February / 2000	Influenza A (H3N2)	108	Sidney - New Zealand - Sidney (Australia)	No	Yes	Cruise ship	Collection and transportation of throat swabs for viral culture was made.

Title of papers	Author (s)	Date of occurrence	Agent	Cases/Deaths	Place of occurrence	Port	Ship	Type of ship	Investigation details
cruise vessels visiting the Port of Sydney		August / 2003	Influenza A	92	South Pacific	No	Yes	Cruise ship	No data
Two Aircraft Carriers' Perspectives: A Comparative of Control Measures in Shipboard H1N1 Outbreaks	Harwood JL	2009	Influenza A (H1N1)	395	No data	No	Yes	"US George Washington" and the "US Ronald Reagan" Navy aircraft carriers.	Some patients received oseltamivir and were quarantined; face masks were used throughout. Different application of protocols was observed in the two ships.
An outbreak of influenza B among workers on an oil rig	Johnston F	December / 1996	Influenza B	53	Darwin harbour (Australia)	Yes	No	Oil rig	The CDC personnel was invited to study the outbreak, epidemiological, environmental and microbiological investigation was done.
Seroepidemiologic investigation of an outbreak of pandemic influenza A H1N1 2009 aboard a US Navy Vessel-San Diego, 2009	Khaokham CB	July - September / 2009	Influenza A (H1N1)	126	No data	No	Yes	"San Diego" US Navy ship	A retrospective Seroepidemiologic investigation was conducted to characterize the outbreak.
Respiratory disease on cruise ships	Kornylo K	September / 2011	Influenza Virus	59	USA west to east coast by Panama canal	No	Yes	Cruise ship	The cases were isolated in their cabins for approximately 48 hours and treated with oseltamivir. Close contacts of travellers with ILI symptoms were tested for influenza and isolated for 24 hours; they received a prophylactic treatment of oseltamivir. Housekeeping was instructed to perform continuous sanitation using chlorine and biocide was sprayed in all air conditioning shafts.
		October / 2011	Influenza Virus	60	USA west to east coast by Panama canal	No	Yes	Cruise ship	All affected passengers and crew members were separated and isolated in their cabins and asked to wear a face mask until 24 hours after symptoms resolved. Oseltamivir treatment was provided to all affected individuals, and oseltamivir prophylaxis was provided to close contacts. Enhanced sanitation with accelerated hydrogen peroxide was implemented, and all newly embarking passengers and crew members were required to complete a health assessment.
Influenza A outbreak on a cruise ship / Cruise ships: high-risk passengers and the global spread of new influenza viruses	Miller J / Miller J	August - September / 1997	Influenza A	113	New York (USA) to Montreal (Canada)	No	Yes	Cruise ship	Public-health officials from Health Canada and CDC boarded the ship in Canada to investigate the outbreak and advise ship officials on control measures. Active surveillance for ILI was instituted among the crew; those with ILI were confined to their cabins and started on Rimantadine. All non-ill crew members were started on Rimantadine prophylaxis for 14 days.
		September / 1997	Influenza A/Sydney/05/97-like(H3N2)	66	Montreal (Canada) to New York (USA)	No	Yes	Cruise ship	Public-health officials from Health Canada and CDC boarded the ship in Canada to investigate the outbreak and advise ship officials on control measures. Active surveillance for ILI was instituted among the crew; those with ILI were confined to their cabins and started on Rimantadine. All non-ill crew members were started on Rimantadine prophylaxis for 14 days.
		September / 1997	Influenza A/Sydney/05/97-like(H3N2)	30	New York (USA) to Montreal (Canada)	No	Yes	Cruise ship	Public-health officials from Health Canada and CDC boarded the ship in Canada to investigate the outbreak and advise ship officials on control measures. Active surveillance for ILI was instituted among the crew; those with ILI were confined to their cabins and started on Rimantadine. All non-ill crew members were started on Rimantadine prophylaxis for 14 days.

Title of papers	Author (s)	Date of occurrence	Agent	Cases/Deaths	Place of occurrence	Port	Ship	Type of ship	Investigation details
State of the art: public health and passenger ships	Mouchtouri VA / Anon	August - September / 1993	Influenza A	28	South-eastern Louisiana river (USA)	No	Yes	Dredging barge	Epidemiological, environmental and microbiology investigation. Louisiana Health Department recommended isolation of ill persons. Amantadine was administered for treatment to all ill persons and for prophylaxis to non ill persons remaining on the barge. Since the start of Amantadine, only one additional person has become ill on the barge.
Retrospective investigation of an influenza A/H1N1pdm outbreak in an Italian military ship cruising in the Mediterranean Sea, May-September 2009	Tarabbo M	May - September / 2009	Influenza A (H1N1)	83	Mediterranean sea: Taranto (Italy), Beirut (Lebanon), Lymassol (Cyprus) and Mersin (Turkey)	No	Yes	Military ship	Epidemiological, microbiological and environmental investigation. Specific medical attention and treatment with Oseltamivir. Isolation in some cases.
Outbreaks of pandemic (H1N1) 2009 and seasonal influenza A (H3N2) on cruise ship / Pandemic planning in the shipping industry--lessons learnt from the 2009 Influenza Pandemic / State of the art: public health and passenger ships	Ward KA / Bunyan K / Mouchtouri VA / Rusell	April - May / 2009	Influenza A (H1N1) 2009 virus and influenza A (H3N2) virus.	182	Australian and Pacific islands	No	Yes	Cruise ship	Epidemiological, microbiological and environmental investigation; all passengers who were experiencing influenza-like illness) isolate themselves from healthy persons and that all symptomatic passengers quarantine themselves for 7 days after disembarkation (or 7 days after onset of symptoms if they developed). Oseltamivir treatmen was recommended for passengers or crew members with ILI.

Annex 8. Tuberculosis outbreaks on ships and at ports in the world, 1990 – 2013

Title of papers	Author (s)	Date of occurrence	Agent	Cases/deaths	Place of occurrence	Port	Ship	Type of ship	Investigation details
Routes of M. tuberculosis transmission among merchant seafarers	Hansen HL	January / 1992 - October / 1993	*Mycobacterium tuberculosis*	64	Denmark	No	Yes	Danish merchant ships	No data
Transmisión de la tuberculosis en un buque de pesca de altura	Anibarro García L	December / 1998	*Mycobacterium tuberculosis*	2	Falkland Island (near to Argentine)	No	Yes	Fishing vessels	Epidemiological and laboratory investigation: PPD test, Chest X Ray, blood analysis and culture of samples were made in all contacts.
Tuberculosis outbreak investigation of a U.S. Navy amphibious ship crew and the Marine expeditionary unit aboard, 1998	LaMar JE	May / 1998	*Mycobacterium tuberculosis*	21	No data	No	Yes	US Navy amphibious ship	Epidemiological, laboratory and environmental investigation were developed.
Four cases of pulmonary tuberculosis among deep-sea fishermen	Ono H	2000 - 2002	*Mycobacterium tuberculosis*	4	Japan	No	Yes	Fishing vessels	The Japanese fishing boat crew members have received medical check-up every year. Indonesians have also received the pre-employment medical check-up.
A shipboard outbreak of tuberculosis in Mississippi and Louisiana, 1993 to 1994	Penman AD	1994	*Mycobacterium tuberculosis*	9	Mississippi river (USA)	Yes	Yes	Quarter boats	All patients were treated with standard four-drug TB chemotherapy under direct supervision. After negative evaluation for TB disease, all individuals with positive tuberculin skin tests were given secondary prophylaxis with Isoniazid under direct supervision.
Tuberculosis in the sea. A social and health problem	Cifuentes Mimoso T	2001	*Mycobacterium tuberculosis*	No data	Spain	No	Yes	Fishing vessels	Epidemiological, microbiological and environmental investigation. Study of index case and close contacts; chemoprophylaxis, case tracking, and control of secondary effects.

Annex 9. Other respiratory diseases outbreaks occurred on ships and at ports in the world, 1990 – 2013

Title of papers	Author (s)	Date of occurrence	Agent	Cases/deaths	Place of occurrence	Port	Ship	Type of ship	Investigation details
Bound for Sydney town: health surveillance on international cruise vessels visiting the Port of Sydney	Ferson MJ	March / 2001	Not identified	93	South Pacific	No	Yes	Cruise ship	No data
		November / 2001	Not identified	64	South Pacific	No	Yes	Cruise ship	No data
		December / 2001	Not identified	85	South Pacific	No	Yes	Cruise ship	No data
		February / 2002	Not identified	91	South Pacific	No	Yes	Cruise ship	No data
		August / 2002	Not identified	64	South Pacific	No	Yes	Cruise ship	No data
Maritime health emergencies	McKay MP	May / 2001 - May / 2005	Not identified	8	No data	No	Yes	US commercial ships	No data
Outbreak of acute respiratory disease caused by Mycoplasma pneumonia on board a deployed U.S. navy ship	Sliman JA	February 1 - May 23 / 2007	*Mycoplasma pneumonia* and Coronavirus	26	No data	No	Yes	"Boxer" US Navy ship	Isolation of cases

Annex 10 Norovirus outbreaks on ships and at ports in the world, 1990 – 2013

Title of papers	Author	Date of occurrence	Agent	Cases/ deaths	Transmission mode	Place of occurrence	Port	Ship	Type of ship	Investigation details
An outbreak of viral gastroenteritis on board a cruise liner	CDR weekly	April 1998	Norovirus	375	Not identified	Dominican Republic to Caribbean area	No	Yes	Cruise ship	Environmental control measures were applied.
Explosive outbreaks of gastroenteritis in the shipboard environment attributed to Norovirus	Bohnker BK	August 2002	Norovirus	2000	Person to person	Indian Ocean; Pacific; Mediterranean and USA Atlantic coast.	No	Yes	US Navy ships (5)	No data
Passenger behaviours associated with Norovirus infection on board a cruise ship--Alaska, May to June 2004	Chimonas MA	May 2004	Norovirus	210	Person to person	Vancouver (Canada) to Alaska coast (USA)	No	Yes	Cruise ship	No data
Shipboard impact of a probable Norwalk virus outbreak from coastal Japan	Corwin AL	September 1997	Norovirus	450	Not identified	Japan	No	Yes	US Naval aircraft carrier	No data
Outbreaks of gastroenteritis associated with Noroviruses on cruise ships--United States, 2002.	Cramer EH / CDC / Widdowson MA	July 2002	Norovirus	395	Not identified	Vancouver (Canada) to Alaska (USA)	No	Yes	Cruise ship	When passengers disembarked of the first itinerary, the ship was disinfected but the outbreak continued during the second journey; the ship cancelled a subsequent cruise and voluntarily took the ship out of service for 1 week for aggressive cleaning and sanitizing.
		October 2002	Norovirus	399	Not identified	Washington to Florida (USA)	No	Yes	Cruise ship	Cruise line voluntarily withdrew the ship from service for 10 days for aggressive cleaning and sanitizing.
		September - October 2002	Norovirus	369	Food-borne	Florida (USA) to Caribbean	No	Yes	Cruise ship	CDC recommended reinforcing sanitation practices and excluding ill food handlers from the work place.
		October - November 2002	Norovirus	131	Not identified	Spain to Florida (USA)	No	Yes	Cruise ship	With the passengers aboard, control measure included isolation of ill crew members until symptoms-free for 72 hours, disinfection of the ship and reinforcement of sanitation practices.
Outbreaks of gastroenteritis associated with Noroviruses on cruise ships--United States, 2002 / Norovirus transmission on cruise ship	Cramer EH / CDC / Widdowson MA / Isakbaeva ET	November 2002	Norovirus GII	492	Food-borne and person to person	Florida (USA) to Caribbean	No	Yes	Cruise ship	Implementation of disinfection and sanitation measures.
Bound for Sydney town: health surveillance on international cruise vessels visiting the Port of Sydney	Ferson MJ	December 1999	Norovirus	30	Person to person	South Pacific	No	Yes	Cruise ship	No data
		December 2003	Norovirus	259	Person to person	South Pacific	No	Yes	Cruise ship	Intensive sanitisation program, closure of eating and other common areas, and encouraging ill passengers to visit medical clinic and otherwise remains in their cabins.
Detection of multiple enteric virus strains within a food borne outbreak of gastroenteritis: an indication of the source of contamination	Gallimore CI	April 2003	Norovirus (GII-6; GI6; GI-3?); Sapovirus and Rotavirus (Group A) .	37	Food-borne	Northern Arabian Gulf	No	Yes	British Royal Fleet Auxiliary ship Argus	No data

Title of papers	Author	Date of occurrence	Agent	Cases/ deaths	Transmission mode	Place of occurrence	Port	Ship	Type of ship	Investigation details
Concurrent outbreak of Norovirus genotype I and Enterotoxigenic Escherichia coli on a U.S. Navy ship following a visit to Lima, Peru	Gonzaga VE	June 2008	Norovirus genotype 1 and Enterotoxigenic E. coli.	130	Common exposure (Pizza Alley)	Lima (Peru)	Yes	Yes	US Navy ship	An investigation was conducted to identify the etiologic agent, to evaluate factors associated with the outbreak and to provide recommendations to the ship's commander on how to control the current and prevent future outbreaks.
Characterization of a variant strain of Norwalk virus from a food borne outbreak of gastroenteritis on a cruise ship in Hawaii	Herwaldt BL / Tood EC	March 1990	Norovirus	217	Food-borne.	USA	No	Yes	Cruise ship	No data
Norwalk virus-associated gastroenteritis traced to ice consumption aboard a cruise ship in Hawaii: comparison and application of molecular method-based assays	Khan AS / Tood EC	1992	Norovirus	202	Water-borne	USA	No	Yes	Cruise ship	No data
Sick cruise ships. Cleaning vessels	Levine S	December 2002	Norovirus	203	Person to person	No data	No	Yes	"Fascination Carnival" cruise ship	Use of bleach and chlorine. Recommendations of hand washing.
An outbreak of viral gastroenteritis on a cruise ship	McEvoy M	May - June 1995	Norovirus	378	Person to person	Mediterranean western	No	Yes	Cruise ships (4)	The tour operator took prompt action to ensure that satisfactory hygiene standards were achieved.
Passenger behaviours during Norovirus outbreaks on cruise ships	Neri AJ	January - April 2006	Norovirus	101	Not identified	Caribbean	No	Yes	Cruise ship	No data
			Norovirus	252	Not identified	Caribbean	No	Yes	Cruise ship	No data
			Norovirus	112	Not identified	Mexican ports along the Baja Peninsula	No	Yes	Cruise ship	No data
Gastroenteritis outbreaks associated with Norwalk-like viruses and their investigation by nested RT-PCR	O'Neill, H.J.	August 1998	Norovirus	14	Not identified	United Kingdom	No	Yes	Ferry	No data
A review of outbreaks of waterborne disease associated with ships: evidence for risk management	Rooney RM / Glynn MK	March 1997	Norovirus	388	Water-borne	Miami (USA)- Lesser Antilles - San Juan (USA) - Miami (USA)	No	Yes	"Royal Odyssey" cruise ship	No data
Multiple viral infections and genomic divergence among Norovirus during an outbreak of acute gastroenteritis	Sasaki Y	October 1999	Norovirus and Astrovirus	26	Not identified	Tokyo Bay (Japan)	No	Yes	Cruise ship	No data
Epidemiology of Norwalk virus during an outbreak of acute gastroenteritis aboard a US aircraft carrier	Sharp TW	1992	Norwalk like-virus	338	Person to person	Florida (USA) to Mediterranean Sea	No	Yes	US aircraft carrier	Cases were excluded from food-related responsibilities until they were asymptomatic.
		April 2006	Norovirus GGII.4.2006a.	15	Environmental	Zutphen (Netherlands) to Antwerp (Belgium)	No	Yes	Cruise ship	The ship was thoroughly cleaned before the arrival of a new group of passengers.

Title of papers	Author	Date of occurrence	Agent	Cases/ deaths	Transmission mode	Place of occurrence	Port	Ship	Type of ship	Investigation details
Recent Norovirus outbreaks on river and seagoing cruise ships in Europe / Environmental swabs as a tool in Norovirus outbreak investigation, including outbreaks on cruise ships / Coordinated European actions to prevent and control Norovirus outbreaks on cruise ships / Emergence of new Norovirus variants on spring cruise ships and prediction of winter epidemics	Takkinen J / Verhoef L (Cruise ship B) / Boxman IL / Depoortere E / Verhoef L	May 2006	Norovirus GGII.4.2006a.	48	Several	Kiel (Germany); Nijmegen (Netherlands); Vienna (Austria)	No	Yes	Cruise ship	No data
		May - June 2006	Norovirus GGII.4.2006a.	113	Not identified	Harwich (UK); Bergen, Flam, Gudangan, Rosendal (Norway) and Harwich (UK)	No	Yes	Cruise ship	No data
		May 2006	Norovirus GGII.4.2006a.	76	Not identified	Kiel (Germany); Nijmegen (Netherlands); Vienna (Austria)	No	Yes	Cruise ship	No data
	Takkinen J / Verhoef L (Cruise ship B) / Boxman IL / Depoortere E	May 2006	Norovirus		Not identified	Vigo (Spain) to Southampton (UK)	No	Yes	Cruise ship	No data
		May - June 2006	Norovirus	85	Not identified	Estonia ; Copenhagen (Denmark); Stockholm (Sweden); Helsinki (Finland); St Petersburg (Russia)	No	Yes	Cruise ship	No data
		June 2006	Norovirus	116	Not identified	United Kingdom	No	Yes	Cruise ship	No data
Detection of Norwalk-like virus infection aboard two U.S. Navy ships	Thornton S	August - September 1999	Norovirus	587	Not identified	Southeast Asia	No	Yes	"US Peleliu (LHA 5)" and "US Constellation" (CV 64) navy ships	No data
Norovirus outbreak in a cruise ship sailing around the British Isles: investigation and multi-agency management of an international outbreak	Vivancos R	October 2008	Norovirus GG II, genotype4 variant 6 (GII-4v6)	196	Person to person	British Isles, calling ports in England, Guernsey, Republic of Ireland, Northern Ireland, Scotland and the Netherlands.	No	Yes	Cruise ship	No data
Disease transmission and passenger behaviours during a high morbidity Norovirus outbreak on a cruise ship, January 2009	Wikswo ME	January 2009	Norovirus GII.4 Minerva	236	Person to person	No data	No	Yes	Cruise ship	No data

Annex 11. Enterotoxigenic Escherichia Coli (ETEC) outbreaks on ships and at ports in the world, 1990 – 2013

Title of papers	Author(s)	Date of occurrence	Agent	Cases/deaths	Vehicle	Place of occurrence	Port	Ship	Type of ship	Investigation details
Enterotoxin-producing Escherichia coli O169:H41, United States	Beatty ME	March 1996	Enterotoxigenic *E. coli* O169:H41/ST; O6:H16/LT,ST, O27:H7/ST; O34:H10/ST;	652	Drinking water	Caribbean	No	Yes	Cruise ship	No data
		April 1998	Enterotoxigenic *E. coli* O6:H16/LT,ST; O169:H41/ST; O148:H28/LT,ST; O27:H7/ST	397	Not identified	Mexico to Hawaii (USA)	No	Yes	Cruise ship	No data
		May 2000	*Enterotoxigenic E. coli* O169:H41/ST	100	Basil	USA	No	Yes	Cruise ship	No data
Outbreaks of Enterotoxigenic Escherichia coli infection in American adults: a clinical and epidemiologic profile	Dalton CB	January 1990	Enterotoxigenic *E. coli* O153:H45/ST; *E. coli* O27:H7/ST	96	Scallops	Caribbean	No	Yes	Cruise ship	No data
		January 1991	Enterotoxigenic *E. coli* O--:H7/LT; *E. coli* O--:H32/LT	100	Scallops	Caribbean	No	Yes	Cruise ship	No data
		April 1991	Enterotoxigenic *E. coli* O6:H16/LT,ST	183	Noodles	Caribbean	No	Yes	Cruise ship	No data
		January 1995	Enterotoxigenic *E. coli* O153:H45/ST; *E. coli* O27:H7/ST; *E. coli* O27:H7/ST; *E. coli* O169:H41/ST; *E. coli* O6:H16/LT,ST; *E. coli* O8:H9/LT; *E. coli* O148:H28/LT,ST	431	Zucchini	Costa Rica	No	Yes	Cruise ship	No data
Traveller's diarrheal at sea: three outbreaks of waterborne Enterotoxigenic Escherichia coli on cruise ships / Enterotoxin-producing Escherichia coli O169:H41, United States	Daniels NA / Beatty ME	April 10 1997	Enterotoxigenic *E. coli* O169:H41/ST; *E. coli* O148:H28/LT/ST; *E. coli* O27:H7/ST; *E. coli* O78:H12/ST	429	Ship's tap water and beverages with ice	Acapulco (Mexico) to New York (USA)	No	Yes	Cruise ship	No data
		December 22 1997	Enterotoxigenic *E. coli* O169:H41/ST; *E. coli* O8:H9/LT; *E. coli* O167:H5/LT/ST; *E. coli* O153:H45/ST; *E. coli* O27:NM/ST	485	Beverages with ice and ice water obtain from pitches in the dining room.	Tampa Bay (USA) – Mexico - Florida (USA)	No	Yes	Cruise ship	No data

Title of papers	Author(s)	Date of occurrence	Agent	Cases/deaths	Vehicle	Place of occurrence	Port	Ship	Type of ship	Investigation details
		May 22 1998	Enterotoxigenic *E. coli* O169:H41/ST; *E. coli* O25:NM/LT; *E. coli* O6:H16LT/ST; *E. coli* O169:H41/ST; *E. coli* O25:NM/ST; *E. coli* O64:NM/LT; *E. coli* O153:H45/ST *E. coli* O169:NM/ST *E. coli* O148:H28/LT/ST	504	Un-bottled water and any beverage with ice.	Montego Bay (Jamaica) - Caribbean - Jamaica	No	Yes	Cruise ship	No data
A review of outbreaks of waterborne disease associated with ships: evidence for risk management	Rooney RM / Cramer E	March 24 - April 5 2002	Enterotoxigenic *E. coli*: O27:H7 (5), O148:H28 (2), O79: Hund (1), O25:NM (1), O6:H16 (1)	225	Potable water and ice	Mexico; Guatemala; Costa Rica; Panamá; Colombia; Jamaica and Florida (USA)	No	Yes	"Caronia" cruise ship	No data
		June 2 - 5 2000	*Enterotoxigenic E. coli*, serogroup O25: NM and serogroup O6:H16.	224	Lunch buffet (Cooked and raw frozen shrimp)	Port Canaveral (USA) - Bahamas - Port Canaveral (USA)	No	Yes	"Disney Magic" cruise ship	No data

Annex 12. Salmonellosis outbreaks on ships and at ports in the world, 1990 – 2013

Title of papers	Author(s)	Date of occurrence	Agent	Cases/deaths	Transmission mode	Place of occurrence	Port	Ship	Type of ship	Investigation details
Bound for Sydney town: health surveillance on international cruise vessels visiting the Port of Sydney	Ferson MJ	December 2002 - January 2003	Salmonella and Norovirus	42	Presumed food-borne on shore	Hawaii (USA) and South Pacific	No	Yes	Cruise ship	No data
Maritime health emergencies	McKay MP	May 2001 - May 2005	*Salmonella* Typhi	8	Not identified	No data	Yes	Yes	Commercial ships	No data
Onshore catering increases the risk of diarrhoeal illness amongst cruise ship passengers / Bound for Sydney town: health surveillance on international cruise vessels visiting the Port of Sydney	Pugh RE / Ferson MJ	May 1999	*Salmonella* Typhi	19	Food or water-borne on shore	Papua New Guinea to Australia	Yes	Yes	Cruise ship	No data
A review of outbreaks of waterborne disease associated with ships: evidence for risk management	Rooney R.M. / de Jong B	April 2002	*Salmonella* enteric serovar Hadar and Salmonella Enteritidis phage type 21,	352	Food-borne	Sweden to Poland	No	Yes	"M/ Polonia" ferry	Cleaning of the kitchen, suspension of buffet service, and not allowing staff that either showed symptoms or had tested positive for salmonella to return to work.
Sanitation on ships: compendium of outbreaks of food borne and waterborne disease and Legionnaires' disease associated with ships, 1970-2000	WHO / CDSC report	1992	*Salmonella* Infantis	20	Food-borne	United Kingdom	No	Yes	Cruise ship	No data
	WHO / CDSC report	1993	*Salmonella* Enteritidis PT5A	21	Food-borne	United Kingdom	No	Yes	River cruise ship	No data
	WHO / CDSC report	1994	*Salmonella* Enteritidis PT4	6	Food-borne	United Kingdom	No	Yes	Cruise ship	No data
	WHO / Dudley MDC	2000	*Salmonella* Enteritidis PT6a	47	Food-borne	Mediterranean sea	No	Yes	Cruise ship	No data
	WHO / Kaye	September 2000	*Salmonella* Bareilly and *Escherichia coli* O157	No data	Food-borne	No data	No	Yes	Cruise ship	No data

Annex 13. Ciguatera fish poisoning outbreaks on ships and at ports in the world, 1990 – 2013

Title	Author(s)	Date of occurrence	Agent	Cases/deaths	Type of fish	Place of occurrence	Port	Ship	Type of ship	Investigation details
Ciguatera fish poisoning-Texas, 1997	MMWR	October 1997	Ciguatoxin	17	Barracuda from Bahamas	USA	Yes	Yes	Norwegian cargo ship	No data
An outbreak of ciguatera poisoning in a group of scuba divers	Adams MJ	November 1991	Ciguatoxin	8	Coral trout	Hamilton island to Queensland, (Australia)	No	Yes	Yacht	No data
Tropical fish poisoning in temperate climates: Food poisoning from ciguatera toxin presenting in Avonmouth	Kipping R	No data	Ciguatoxin	0	Snapper fish	United Kingdom	Yes	Yes	No data	No data
Documented case of ciguatera on the Mexican Pacific coast	Lechuga-Deveze CH	May 1993	Ciguatoxin	0	Serranidae and Labridae fish	West coast of USA	No	Yes	"Tungui" fishing boat	No data
Yes, they still bring strange diseases back home: The story of Ciguatera	Nikolic N	No data	Not identified	6	Frozen fish	Croatia	No	Yes	No data	No data
Ciguatera fish poisoning in industrial ship crewmembers: a retrospective study in a seaport general practice in Trinidad and Tobago	Poon-King CM	November 1992 - October 1998	Ciguatoxin	42 (4 outbreaks)	Fish	Trinidad and Tobago	No	Yes	Industrial ships	No data
Outbreak of ciguatera fish poisoning on a cargo ship in the port of Hamburg	Schlaich C	July 2009	Ciguatoxin	14	Reef fish: from the Caribbean	Port of Hamburg, (Germany)	Yes	Yes	Refrigerator vessel	The frozen fish was removed for the prevention of further disease.
Food borne pathogens: the risk to the health of merchant seafarers	Tabbot PN	March 1999	Ciguatoxin	9	Barracuda	Virgin Islands	No	Yes	Merchant ship	No data

Annex 14. Shigellosis outbreaks on ships and at ports in the world, 1990 – 2013

Title of papers	Author(s)	Date of occurrence	Agent	Cases/deaths	Transmission mode	Place of occurrence	Port	Ship	Type of ship	Investigation details
Outbreak of Shigella flexneri 2a infections on a cruise ship	Anon	August - September 1994	*Shigella flexneri*	1180 / 1	Not identified	USA to Mexico	No	Yes	"Viking Serenade" cruise ship	No data
Bound for Sydney town: health surveillance on international cruise vessels visiting the Port of Sydney	Ferson MJ	February 2003	*Shigella spp*	154	Presumed food-borne on shore	Around the world	No	Yes	Cruise ship	No data
Shigellosis on an Italian cruise ship	Gikas A	August 24 - 27 1996	*Shigella dysenteriae* type A1	330	Food-borne	Eastern Mediterranean	No	Yes	Cruise ship	Isolation and control measures for the passengers and crew members were established.

Annex 15. Legionnaire's outbreaks on ships and at ports in the world, 1990 – 2013

Title of papers	Author(s)	Date of occurrence	Agent	Cases/ deaths	Source	Place of occurrence	Port	Ship	Type of ship	Investigation details
Outbreak of Legionnaire disease / Perspectives in fatal epidemics / State of the art: public health and passenger ships / Outbreak of Legionnaires' disease among cruise ship passengers exposed to a contaminated whirlpool spa / Legionellosis associated with ships: 1977 to 1997	CDC / Butler JC / Mouchtouri VA / Jernigan DB / Rowbotham TJ	April - July 1994	*Legionella pneumophila* serogroup 1 (Lp1)	50/1	Whirlpool baths	New York (USA) - Bermuda (USA)	No	Yes	"Horizon" cruise ship	Epidemiological, environmental and microbiological studies. Hyper chlorination of the ship's potable water supply, removal of the whirlpool filters and discontinuation of the whirlpool baths.
Legionella on board a cruise ship / Outbreak of Legionnaires' disease on a cruise ship: lessons for international surveillance and control	CDR weekly / Regan CM	May - June 1998	*Legionella pneumophila* serogroup 1 subtype Olda	6/1	Cabin supplies and spa pool (Ship's water system)	Liverpool (UK)- southern Mediterranean - Liverpool (UK)	No	yes	"SS Edinburgh Castle" cruise ship	A thorough supervised water distribution treatment programme was started (replumbing, pasteurisation of hot and cold distribution systems, super chlorination and installation of a chloride dioxide continuous dosing plant for the potable supply)
Cruise-Ship--Associated Legionnaires Disease, November 2003--May 2004	MMWR	November 2003 - May 2004	*Legionella pneumophila* serogroup 1 (Lp1).	8/2	Not identified	Caribbean to Mexico; Caribbean to Central America; Trans-Atlantic; Caribbean; Caribbean to Mexico; Trans-Atlantic and Mediterranean	No	Yes	Cruise ship	No data
Legionnaires' disease outbreak associated with a cruise liner, August 2003: epidemiological and microbiological findings	Beyrer K	August 2003	*Legionella pneumophila* serogroup 1, monoclonal antibody (mAb) subgroup "Knoxville"	8/1	Hair washing station in the beauty salon and air jets of one of the spa pool	Greenland; Iceland and Scotland (UK)	No	Yes	Cruise ship	After the first diagnosed, an outbreak was declared; the remaining passengers were contacted for receiving urgent medical attention if they developed symptoms; an epidemiological and environmental investigation was conducted and different samples taken.
Legionnaires' disease on a cruise ship linked to the water supply system: clinical and public health implications	Castellani-Pastoris M	September 1995 - October 1996	*Legionella pneumophila* serogroup 1, subtype Pontiac, genotype A	3/1	Ship's water supply	Mediterranean sea	No	Yes	Cruise ship	Epidemiological and environmental investigation.
A small outbreak of Legionnaires' disease in a cargo ship under repair	Cayla JA	February 1999	*Legionella pneumophila*, serogroup 1, subgroup Pontiac (Knoxville)	2/2	Ship's water pumps and distribution system; cooling water circuit valve of the ship's water pump.	Spain	Yes	Yes	Cargo ship	The hotel and working area of ship were closed during the investigations. The contaminated water system was treated with sodium hypochlorite.
Outbreak of Legionnaires' disease on a cruise ship linked to spa-bath filter stones contaminated with Legionella pneumophila serogroup 5	Kura F	January 2003	*Legionella pneumophila* serogroup 5	3	Porous natural stones (Maifanshi) in the filters of the ship's indoor spa.	Japan	No	Yes	Cruise ship	No data

Title of papers	Author(s)	Date of occurrence	Agent	Cases/ deaths	Source	Place of occurrence	Port	Ship	Type of ship	Investigation details
Infectious diseases on cruise ships / Legionnaires' disease surveillance: England and Wales 1994 / Legionellosis associated with ships: 1977 to 1997	Minooee A / Joseph C / Rowbotham TJ / Anon	1994	*Legionella pneumophila* serogroup 1 and 3	2	Air handling units	Mediterranean sea	No	Yes	Cruise ship	The ship's water supply and air conditioning units were investigated.
Legionellosis associated with ships: 1977 to 1998	Rowbotham TJ / Josep C	1997	*Legionella spp*	5/1	A Chlorine-treated whirlpool spa.	Rhine river	No	Yes	"Rhine-Moselle" cruiser (3)	No data
	Rowbotham TJ	1993	*Legionella spp*	2	No data	Corsica	No	Yes	Ferries	No data
	Rowbotham TJ	1992	*Legionella pneumophila* serogroup 3	4	Water on ship	No data	No	Yes	Sail training ship	No data
Outbreak of respiratory infection on a cruise ship	Sedgwick J	July 27 / 2007	*Legionella spp*	40	Water outlets on the ship	Baltic sea	No	Yes	"Black Watch Fred Olsen" cruise ship	The use of the pools and other risk facilities on board were suspended for the remainder of the cruise.
Sanitation on ships: compendium of outbreaks of foodborne and waterborne disease and Legionnaires's disease associated with ships, 1970-2000.	WHO	May - June 1998	*Legionella spp*	3	Legionella found in hot water samples from showerheads.	Mediterranean and Norwegian Fjords	No	Yes	Cruise ship	The pipe work for both the hot and cold supplies was treated by pasteurisation followed by shock dosing with chlorine dioxide and the installation of a continuous chlorine dioxide dosing plant.
Sanitation on ships: compendium of outbreaks of foodborne and waterborne disease and Legionnaires's disease associated with ships, 1970-2000.	WHO	September / 2000	*Legionella spp*	12/2	No data	South Pacific	No	Yes	Cruise ship	No data

Annex 16. Food and water-borne diseases outbreaks caused by other bacteria on ships and at ports in the world, 1990 – 2013

Title of papers	Author(s)	Date of occurrence	Agent	Cases/deaths	Vehicle	Place of occurrence	Port	Ship	Type of ship
Vibrium cholera O139 Bengal infections among tourists to Southeast Asia: an intercontinental food borne outbreak	Boyce TG	March 1994	*Vibrio cholera* O139 Bengal	6	Food on shore in Thailand.	China; Malasya; Borneo; Indonesian; Singapore and Thailand.	No	No	Cruise ship
Disease outbreak of botulism food poisoning on a mini cruise / Cluster of botulism among Dutch tourists in Turkey, June 2008	De Boer MG / Swaan CM	June 2008	*Clostridium botulinum* type B	8	Unprocessed black olives	Turkey	No	Yes	Cruise ship
An outbreak of Yersinia enterocolitica O:3 infections on an oil tanker	Klismanic Z	January 2002	*Yersinia enterocolitica* O:3	22	Not identified	Croatia to Italy	No	Yes	"Asirat" Oil tanker
Outbreak of Vibrio parahaemolyticus gastroenteritis associated with Alaskan oysters	McLaughlin JB	2004	*Vibrio parahaemolyticus* serotype O6:K18	62	Raw oysters	USA	No	Yes	Cruise ship
Sanitation on ships: compendium of outbreaks of food borne and waterborne disease and Legionnaires' disease associated with ships, 1970-2000	WHO / CDSC report	1997	*Clostridium perfringes*	90	Fish	United Kingdom	No	Yes	River boat

Annex 17. Food and water-borne diseases outbreaks caused by parasites on ships and at ports in the world, 1990 – 2013

Title of papers	Author(s)	Date of occurrence	Agent	Cases	Transmission mode	Place of occurrence	Port	Ship	Type of ship
An outbreak of Cyclospora infection on a cruise ship	Gibbs RA	2010	Cyclospora	241	Food-borne	Australia	No	Yes	Cruise ship
State of the art: public health and passenger ships	Mouchtouri VA / Anon	March - April 1997	Cyclospora	220	Food-borne	USA	No	Yes	Cruise ship
A review of outbreaks of waterborne disease associated with ships: evidence for risk management	Rooney RM / Moss DM	March 1993	*Cryptosporidium parvum*	58	Water-borne	USA	Yes	Yes	US Coast Guard cutter
A review of outbreaks of waterborne disease associated with ships: evidence for risk management	Rooney RM / Yund J	April 1998	*Giardia lamblia*	200	Water-borne	Indonesia	No	Yes	US Naval ship

Annex 18. Food and water-borne diseases outbreaks caused by other viruses on ships and at ports in the world, 1990 – 2013

Title of papers	Author(s)	Date of occurrence	Agent	Cases/deaths	Transmission mode	Place of occurrence	Port	Ship	Type of ship
Cluster of Hepatitis A Cases Among Travellers Returning from Egypt, Germany, September Through November 2008	Bernard H, Frank C	September - November 2008	Hepatitis A virus	34	Food-borne	Nile river	No	Yes	River cruise ship (6)
Cluster of Cases of Hepatitis A with A Travel History to Egypt, September-November 2008, France	Couturier E, Roque-Alfonso AM	September 13 2009 - January 9 2009	Hepatitis A virus	26	Food-borne and water-borne	Nile river	No	Yes	River cruise ship (5)
Hepatitis E outbreak on cruise ship	Said B	2008	Hepatitis E virus genotype 3	33	Food-borne and water-borne	Worldwide cruise	No	Yes	Cruise ship

Annex 19. Others food and water-borne diseases outbreaks caused by multiple organism on ships and at ports in the world, 1990 – 2013

Title of papers	Author(s)	Date of occurrence	Agent	Cases/deaths	Vehicle	Place of occurrence	Port	Ship	Type of ship
Multi-pathogen waterborne disease outbreak associated with a dinner cruise on Lake Michigan	Serdarevic F	September 2008	*Shigella sonnei*; Giardia and Cryptosporidium	41	Ice consumption	Lake of Michigan (USA)	No	Yes	Cruise ship
Sanitation on ships: compendium of outbreaks of foodborne and waterborne disease and Legionnaire's disease associated with ships, 1970-2000	WHO / Cramer EH	June 2000	Enterotoxigenic *E. coli* O25: NM; *Salmonella* Newport and Java; Giardia; and Salmonella.	224	Shellfish	USA	No	Yes	"Disney Magic" cruise ship

Annex 20. Food and water-borne diseases outbreaks without identified agent on ships and at ports in the world, 1990 – 2013

Title of papers	Author(s)	Date of occurrence	Agent	Cases/deaths	Transmission mode	Place of occurrence	Port	Ship	Type of ship
Outbreaks of diarrheal disease: a ship is a ship / Diarrheal diseases aboard a US Navy ship after a brief port visit t a high risk area / Explosive outbreak of gastroenteritis on an aircraft carrier: an infectious diseases mass casualty situation	Bohnker BK / Haberberger RL	No data	Not specified	777	Not identified	Eastern Mediterranean	No	Yes	US Aircraft carrier
		No data		600	Not identified	Port au Prince bay (Haiti)	No	Yes	US Navy
Bound for Sydney town: health surveillance on international cruise vessels visiting the Port of Sydney	Ferson MJ	October 1999		3	Person to person	Australian east coast	No	Yes	Cruise ship
An outbreak of Brainerd diarrheal among travellers to the Galapagos Islands	Mintz ED	1992		392	Waterborne	Galapagos Islands (Ecuador)	No	Yes	Cruise ship
Epidemic infectious gastrointestinal illness aboard U.S. Navy ships deployed to the Middle East during peacetime operations – 2000–2001	Riddle MS	October 2000 - September 2001		1351 (11 outbreaks)	Not data	Persian Gulf and nearby seas	No	Yes	US Navy ship
A review of outbreaks of waterborne disease associated with ships: evidence for risk management	Rooney RM / McDuffie K	May 23 2000		51	Foodborne	USA	Yes	Yes	"Palm Beach" Princess cruise ship
Viral gastroenteritis: The USS THEODORE ROOSEVELT experience	Whittaker DR	December 2002		451	Not identifined	USA	No	Yes	"Theodore Roosevelt" US Navy ship
Sanitation on ships: compendium of outbreaks of food borne and waterborne disease and Legionnaire's disease associated with ships, 1970-2000	WHO / CDSC report	1994		4	Foodborne	United Kingdom	No	Yes	River cruise ship
Sanitation on ships: compendium of outbreaks of food borne and waterborne disease and Legionnaire's disease associated with ships, 1970-2000	WHO / CDSC report	September 1998		46	Not identified	United Kingdom	No	Yes	River cruise ship

Annex 21. Vaccine-preventable diseases outbreaks on ships and at ports in the world, 1990 – 2013

Title of papers	Author(s)	Date of occurrence	Agent	Cases/deaths	Place of occurrence	Port	Ship	Type of ship	Investigation details
Varicella at sea: a two-year study on cruise ships	Acevedo F	2009 - 2010	Varicella zoster	89 cases (8 cluster)	No data	No	Yes	Cruise ship	Vaccination.
Rubella among crew members of commercial cruise ships-Florida, 1997 / Rubella outbreaks on cruise ships	Anon / Hoey J	April - May - June 1997	Rubella virus	7	Florida (USA) to Bahamas	No	Yes	Cruise ship	Vaccination.
		July 1997	Rubella virus	25	Florida (USA) to Bahamas	No	Yes	Cruise ship	
Management and control of Varicella on cruise ships: a collaborative approach to promoting public health	Cramer EH	2009	Varicella zoster	66 cases (18 outbreaks)	USA	No	Yes	Cruise ship	Isolation and vaccination..
Mumps outbreak aboard the USS Reuben James	Kuhlman JC	June - August 1992	Mumps virus	9	Japan to Hawaii (USA)	No	Yes	"US Reuben James" Navy ship	Disembarkation of cases to hospital.
Measles, rubella, and Varicella among the crew of a cruise ship sailing from Florida, United States, 2006	Mitruka K	April 2006	Rubella virus; Measles virus and Varicella zoster virus	15	Florida (USA) to Caribbean	No	Yes	Cruise ship	Vaccination.
Measles outbreak in Campo de Gibraltar, Cadiz, Spain, during the Period February-July 2008	Nieto Vera J	February 4 2008	Measles virus	155	Algeciras (Spain) - Tanger (Morocco)	Yes	Yes	Fast ferry	No data
Cluster of invasive Neisseria meningitidis infections on a cruise ship, Italy, October 2012	Stefanelli P	October 2012	*Neisseria meningitidis*, serogroup C ST-11.	4 / 1	Italian coast	No	Yes	Cruise ship	No data
An outbreak of rubella aboard a ship of the German Navy	Ziebold C	May - June 1996	Rubella virus	35	No data	No	Yes	German Navy	No data

Annex 22. Emerging and Vector borne diseases outbreaks on ships and ports in the world, 1990 – 2013

Title of papers	Author(s)	Date of occurrence	Agent	Cases/deaths	Source	Place of occurrence	Port	Ship	Type of ship
Harbour-acquired Plasmodium Falciparum malaria	Delmont J	1993	*Plasmodium falciparum*	2	Containers of ship	Marseille port (France)	Yes	No	Not aplicable
SARS hits Star	Elias R	April 2003	SARS Coronavirus (SARS-CoV)	14	Person to person	Singapore and Malasya	Yes	Yes	"Superstar Vigo" and "Superstar Leo" cruises ships
A decade of plague in Mahajanga, Madagascar: insights into the global maritime spread of pandemic plague	Vogler AJ	1991 - 1999	*Yersinia pestis*	44	*Xenopsylla cheopis* and the black rat (*Rattus rattus*).	Seaport city of Mahajanga (Madagascar)	Yes	No	Not aplicable

Annex 23. Others infectious diseases outbreaks on ships and at ports in the world, 1990 – 2013

Title	Author	Date of occurrence	Agent	Cases/deaths	Source	Place of occurrence	Port	Ship	Type of ship
Pruritic dermatitis on an oil tanker after a visit to French Guyana	Hassing RJ	June 2006	*Hylesia metabus*	21	Contact with a moth	French Guyana	Yes	No	Oil tanker
Brote de lepidopterismo, Hylesia metabus, en la población de tripulantes de la estación de transferencia, boca grande, buque fondeado en la desembocadura del Caño Macareo en el Delta Amacuro – Venezuela.	Yendis HJ	No data	*Hylesia metabus*	0	No data	Delta Amacuro River (Venezuela)	Yes	Yes	Anchored vessel
Tonsillitis on the tall ships	Lake L	No data	Not identified	0	Person to person	Garwick (UK) to Canary Islands (Spain)	No	Yes	"Malcolm Miller" Ship
Sentinel cases of community-acquired Methicillin-resistant Staphylococcus aureus onboard a naval ship	LaMar JE	July 2001	Methicillin-resistant *Staphylococcus aureus* (MRSA)	8	Not identified	No data	No	Yes	US Navy ship
Unexpected hazard of illegal immigration: Outbreak of viral Myocarditis exacerbated by confinement and deprivation in a shipboard cargo container	Li MK	2003	Coxsackie virus B3 genome	4 deaths	Not identified	China to USA	No	Yes	Container vessels
Maritime health emergencies	McKay MP	May 2001 - May 2006	Not identified	8 cases	Not identified	African ports	Yes	Yes	US commercial ships
State of the art: public health and passenger ships	Mouchtouri VA / Ellyson	July 1995	*Sarcoptes scabies*	102	Not identified	China to Hawaii (USA)	No	Yes	"Jung Sheng Nº8" ship

Infectious diseases prevalence studies and others

Annex 24. Respiratory diseases studies on ships and at ports in the world, 1990 – 2013

Event	Title	Author	Date of occurrence	Agent	Cases/deaths	Source	Place of occurrence	Port	Ship	Type of ship	Investigation details
Tuberculosis	A tuberculosis event on a Navy assault ship	Foote FO	September 2003	*Mycobacterium tuberculosis*	47 PPD reactor (Latent TB cases)	Not identified	Mediterranean sea; Persian gulf and East and West Africa	No	Yes	US Navy amphibious assault ship	In a routinely reactor study of TB, the normal rate (0 to 1%) suddenly jumped to 6.3%, prompting screening of the entire crew and embarked Marines. Intensive investigation was developed and all new reactors received treatment with isoniazid.
	Infectious disease rates in the U.S. Navy, 1980 to 1995	Gunderson EK	1980 - 1995	No data	258	Not identified	No data	No	Yes	US Navy ship	No data
	Elevada incidencia de tuberculosis en marineros de altura	Pesqueira Fontán P	2000 - 2005	*Mycobacterium tuberculosis*	29 (active cases)	Person to person	Pontevedra (Spain)	No	Yes	Fishing vessels	No data
Respiratory Streptococcal infection	The manifestations of an epidemic process in a respiratory streptococcal infection among ships' crews under commercial sailing conditions	Obernikhin IM	No data	*Streptococcus spp*	No data	Not identified	Russia	No	Yes	Russian ships	No data

Annex 25. Food and water borne diseases studies on ships and at ports in the world, 1990 – 2013

Event	Title	Author	Date of occurrence	Agent	Cases/deaths	Source	Place of occurrence	Port	Ship	Type of ship	Investigation details
Gastrointestinal illness	Travellers' diarrheal among U.S. Navy and Marine Corps personnel during a Western Pacific deployment	Adkins H	No data	Enterotoxigenic *Escherichia coli*; *Giardia lamblia*; Salmonella; rotavirus; Shigella; *Campylobacter jejuni* and *Entamoeba histolytic*	157	Not identified	Western Pacific	No	Yes	US Naval ship	No data
	Epidemiology of gastroenteritis on cruise ships, 2001-2004	Cramer EH	2000 - 2004	No identified (It was suspected that Norovirus could be associated with the increase of the AGE incidence)	6747	Not identified	Northwest of USA	No	Yes	Cruise ship	The cruise ship industry has cooperated with CDC in implementing rigorous containment strategies, cleaning protocols and disinfection regimens.
	Medical practice during a world cruise: a descriptive epidemiological study of injury and illness among passengers and crew	Dahl E	June 2004 - June 2005	Not identified	138	Not identified	Around the world	No	Yes	Cruise ship	Isolation of cases
	Infectious disease rates in the U.S. Navy, 1980 to 1995	Gunderson EK	1980 - 1995	Salmonella	153	Not identified	No data	No	Yes	US Navy ships	No data
				Other GI organism	153	Not identified	No data	No	Yes		
				Shigella	105	Not identified	No data	No	Yes		
				Protozoa	96	Not identified	No data	No	Yes		
				Entamoeba spp	87	Not identified	No data	No	Yes		
				Salmonella Typhi / Paraty	61	Not identified	No data	No	Yes		
				Others GI organisms	1958	Not identified	No data	No	Yes		
				No data	1217	Not identified	No data	No	Yes		
	Surveillance of deaths on board Danish merchant ships, 1986-93: implications for prevention	Hansen HL	January 1986 - February 1993	Not identified	6 deaths	Not identified	Denmark	No	Yes	Danish merchant ships	No data
	Infectious Disease Outbreaks on Cruise Ships	McCarter YS	2008	Norovirus (10 outbreaks); ETEC (4 outbreaks); other (1 outbreak)	15 outbreaks	Not identified	No data	No	Yes	Cruise ships	No data
			2007	Norovirus (18 outbreaks); Salmonella, Shigella, Enterobacter and *Entamoeba histolytic* (1 outbreak); specimen no obtained (3 outbreaks); unknown (1 outbreak)	23 outbreaks	Not identified	No data	No	Yes	Cruise ships	No data

Event	Title	Author	Date of occurrence	Agent	Cases/deaths	Source	Place of occurrence	Port	Ship	Type of ship	Investigation details
			2006	Norovirus (32 outbreaks); Enterotoxigenic *E. coli* (1 outbreak); unknown (4 outbreaks)	37 outbreaks (no specific data of cases)	Not identified	No data	No	Yes	Cruise ships	No data
			2005	Norovirus (28 outbreaks); Enterotoxigenic *E. coli* (1 outbreak); Salmonella (1 outbreak); specimen not obtained (6 outbreaks); unknown (14 outbreaks).	50 outbreaks (no specific data of cases)	Not identified	No data	No	Yes	Cruise ships	No data
			2003	Norovirus (15 outbreaks); specimen not obtained (10 outbreaks); unknown (2 outbreaks).	27 outbreaks (no specific data of cases)	Not identified	No data	No	Yes	Cruise ships	No data
	Epidemiology of Enterotoxigenic Escherichia coli-associated diarrheal disease occurring on board U.S. Navy ships visiting Asian ports	Orndorff GR	March 1994 - March 1995	*Escherichia coli*; *Salmonella spp* and Staphylococcus.	40	Drinking beer and drinks with ice; eating in local restaurants.	Southeast and western Asia: Ports of Hong Kong, Singapore, Kuwait city, Jebal Ali, Bali, and Surabaya.	Yes	Yes	US Navy ships	No data
	A multivariate analysis of factors associated with differential disease and no battle injury and morbidity aboard ships of the U.S. Naval 5th Fleet during peacetime deployment	Riddle MS	October 2000 - September 2001	No data	331 (23% gastrointestinal infectious)	No data	Middle East (Persian Gulf and nearby seas)	No	Yes	44 US Navy's	No data
	Epidemiology of diarrheal disease outbreaks on cruise ships, 1986 through 1993	Koo D	1986 – 1993	Not identified	2893 passengers and 156 crews (ten outbreaks)	Caribbean; Mexico; Panama; Alaska; trans-Atlantic Hawaiian island	No	Yes	Cruise ship	No specified	No data
Enterotoxigenic Ecoli (ETEC)				Enterotoxigenic *E. coli* (ETEC)	1094 passengers and 61 crews (five outbreaks)	Not identified	Caribbean; Mexico; Panama; Alaska; trans-Atlantic Hawaiian island	No	Yes	Cruise ship	No data
Shigellosis				Shigella	375 passengers and 75 crews (Four outbreaks)	Not identified		No	Yes		
Salmonellosis				*Salmonella* Enteritidis	361 passengers and 19 crews (Two outbreaks)	Not identified		No	Yes		
Staphylococcosis				*Staphylococcus aureus*	160 passengers and 5 crews (one outbreak)	Not identified		No	Yes		

Event	Title	Author	Date of occurrence	Agent	Cases/deaths	Source	Place of occurrence	Port	Ship	Type of ship	Investigation details
Norovirus				Norwalk or Norwalk-like virus	2473 passengers and 285 crews (Nine outbreaks)	Not identified		No	Yes		
Legionelosis	Travel-associated Legionnaires' disease in Europe, 2010	De Jong B	2010	*Legionella spp*	3 clusters with 14 cases in the largest cluster.	Not identified	No data	No	Yes	Cruise ship	No data
	Travel-associated Legionnaires' disease in Europe, 2009	Joseph CA	2009	*Legionella spp*	2 cluster with 12 cases	No data	No data	No	Yes	Cruise ship	No data
	Travel-associated Legionnaires' disease in Europe, 2008	Ricketts KD	2008	*Legionella spp*	1 cluster with 12 cases	No data	No data	No	Yes	Cruise ship	No data
	Travel-associated Legionnaires' disease in Europe, 2007	Ricketts KD / Josep CA	2007	*Legionella spp*	3 cluster with 11 cases	No data	No data	No	Yes	Cruise ship	No data
	Travel-associated Legionnaires' disease in Europe, 2006	Ricketts KD	2006	*Legionella spp*	11 cases	No data	No data	No	Yes	Cruise ship	No data
	Travel-associated Legionnaires' disease in Europe, 2005	Ricketts KD	2005	*Legionella spp*	1 cluster	No data	No data	No	Yes	Cruise ship	No data
	Travel-associated Legionnaires' disease in Europe, 2004	Ricketts KD	2004	*Legionella spp*	1 cluster	No data	No data	No	Yes	Cruise ship	No data
	Travel-associated Legionnaires' disease in Europe, 2003	Ricketts KD	2003	*Legionella spp*	3 clusters in cruise ships	No data	No data	No	Yes	Cruise ship	No data
	Travel-associated Legionnaires' disease in Europe, 2000 and 2001	Ricketts KD / Lever F	2000 – 2001	*Legionella spp*	11 cases in cruises and ferries	No data	No data	No	Yes	Cruise ship and ferries	No data
Schistosomiasis	Surveillance on Schistosomiasis of boat fishermen along Yangtze River in Nantong City from 2006 to 2010	Ding GS / Yang G	2006 – 2010	*Schistomosa spp*	17	Not identified	Yangtze river (China)	No	Yes	Boats	No data
Travellers' diarrheal	Epidemiology of traveller's diarrheal in Spanish tourists travelling in developing countries	Gascón J	July - October 1992	Not identified	32%	Not identified	Nile and Amazon river	No	Yes	Fluvial cruise ships	No data
Helicobacteriosis	Elevated risk of Helicobacter pylori infection in submarine crews	Hammermeister I	1992	*Helicobacter pylori*	63	Person to person	No data	No	Yes	German submarines	No data

Event	Title	Author	Date of occurrence	Agent	Cases/deaths	Source	Place of occurrence	Port	Ship	Type of ship	Investigation details
Diarrheal and respiratory diseases	Diarrheal and respiratory disease aboard the hospital ship, USNS-Mercy T-AH 19, during Operation Desert Shield	Paparello SF	August / 1990 - April / 1991	Enterotoxigenic Escherichia coli; Shigella and Salmonella; Campylobacter and Norwalk virus. Respiratory (Not identified)	Diarrhoea (334 cases); Upper respiratory symptoms (570 cases)	Diarrhoea: Food supplies. Upper respiratory diseases: Person to person.	Persian gulf (middle east)	No	Yes	"USNS Mercy T-AH 19" hospital Ship	No data

Annex 26. Vaccine-preventable diseases studies on ships and ports in the world, 1990 – 2013

Group of event	Event	Title	Author	Date of report or publication	Date of occurrence	Agent	Cases/deaths	Place of occurrence	Port	Ship	Type of ship	Investigation details
Preventable disease	Chickenpox	Management and control of Varicella on cruise ships: a collaborative approach to promoting public health	Cramer EH	July 2012	2000 - 2009	Varicella zoster virus	278	USA	No	Yes	Cruise ship	
	Chickenpox	Varicella among seafarers: a case study on testing and vaccination as a cost-effective method of prevention	Idnani N	2010	December 1 - 28 / 2008	Varicella zoster virus	100 positive and 20 negative	Mumbai and Goa (India)	Yes	No	Cruise ship	Vaccination of seafarers as part of their pre-employment medical examination.
	Chickenpox	Public health significance of chickenpox on ships - conclusions drawn from a case series in the port of Hamburg	Schlaich C	2010	November / 2007 - April / 2008	Varicella zoster virus	5	Port of Hamburg (German)	Yes	Yes	Cruise ship (2) and cargo ship (1)	Isolation of cases
	Chickenpox	Infectious disease rates in the U.S. Navy, 1980 to 1995	Gunderson EK	June 2001	1980 - 1995	Varicella zoster virus	6690	No data	No	Yes	US Navy ships	
	Measles					Measles virus	254	No data	No	Yes		
	Mumps					Mumps virus	297	No data	No	Yes		

Annex 27. Emerging and vector borne diseases studies on ships and at ports in the world, 1990 – 2013

Group of event	Event	Title	Author	Date of occurrence	Agent	Cases/deaths	Place of occurrence	Port	Ship	Type of ship
Emerging and vector borne diseases	Rickettsiosis and other arthropod-borne diseases	Infectious disease rates in the U.S. Navy, 1980 to 1995	Gunderson EK	1980 - 1995	No data	67	No data	No	Yes	US Navy ship
	Malaria	El Paludismo en los trabajadores del mar de Costa de Marfil	Herrador Aguirre J	1993 - 1994	*Plasmodium spp*	15	Abidjan (Ivory coast)	No	Yes	Fishing vessels
		Malaria, a travel health problem in the maritime community	Raju N	1990 - 1993	No data	36	Croatia. 9 cases acquired the infection in Angola.	Yes	Yes	Merchant ship
		Malaria among seamen in Klaipeda during 1999 - 2008	Scerbaviciene R	1999 - 2008	*Plasmodium falciparum*	33 (2 deaths)	West Africa, Nigeria, Cameroon and Angola.	Yes	No	No data
		Malaria in seafarers. 1. The magnitude of the problem and the strategy of its control	Tomaszunas S	Before 1997	No data	500 to 1000	Ports of Africa, Asia, and America	Yes	Yes	No data

Annex 28. Sexual transmitted diseases studies on ships and at ports in the world, 1990 – 2013

Title	Author	Date of report or publication	Date of occurrence	Agent	Cases	Source	Place of occurrence	Port	Ship	Type of ship	Investigation details
STD history, self treatment, and healthcare behaviours among fishermen in the Gulf of Thailand and the Andaman Sea	Entz A	December 2001	April 1998	No data	245	Person to person	Thailand: coastal provinces	Yes	No	Fishing vessels	No data
Risk factors for sexually-transmitted diseases among deployed U.S. military personnel	Malone JD	September 1993	1989 - 1991	*Treponema pallidum*; *Neisseria gonorrhoea*; others	Before: 387 cases; During: 166 cases	Person to person	South America; west Africa and Mediterranean	Yes	Yes	US Navy ships	Critical need for continued educational efforts.
Infectious disease rates in the U.S. Navy, 1980 to 1995	Gunderson EK	June 2001	1980 - 1985	*Neisseria gonorrhoea*	599 Gonococcus infections	Person to person	No data	No	Yes	US Navy ship	
				Treponema pallidum	582 Early syphilis	Person to person	No data	No	Yes		
				Treponema pallidum	192 Other and unspecified syphilis	Person to person	No data	No	Yes		
				Treponema pallidum	59 Neurosyphilis	Person to person	No data	No	Yes		
				Others microorganism	308 Other venereal diseases	Person to person	No data	No	Yes		
HIV-1 prevalence, HIV-1 subtypes and risk factors among fishermen in the Gulf of Thailand and the Andaman Sea	Entz A	February 2000	April 1999	HIV-1 (Subtype E, B, undetermined)	127	Person to person	Thailand: coastal provinces	Yes	No	Fishing vessels	
Reducing AIDS risk among port workers in Santos, Brazil / HIV infection and risk behaviours among male port workers in Santos, Brazil	Hearst N / Lacerda R	January 1999	1994 - 1996	HIV	395	Sex with men	Port of Santos (Brazil)	Yes	No	No data	More than 140.000 free condoms were distributed and 56 port workers were trained as peer educators.
Registro de la infección por el VIH en trabajadores del mar en España	ML Canals Polina	June 1 1998	1994 - 1997	HIV	1994: 390 cases; 1997: 607 cases	70% intravenous drug use	Spain	Yes	No	Fishing vessels	
Prevalence of HIV-antibodies in maritime workers and in other selected population groups in Poland	Towia+äska A	1992	1987 - 1992	HIV	20	No data	Region of Gda+äsk and Szczecin (Poland)	Yes	Yes	No data	
HIV antibodies in seafarers, fishermen and in other population groups in the Gda+äsk Region (1993-1996)	Towia+äska A	1996	1993 - 1996	HIV	14	No data	Region of Gda+äsk (Poland)	Yes	Yes	No data	
HIV and HCV prevalence among trawler crew	Kaldor J	1998	February 1996	HIV and HCV	51 surveyed (no HIV cases and 14 HCV	Not specified (possibly injecting drugs)	Australian ports	Yes	Yes	Trawlers	

Annex 29. Other infectious diseases studies on ships and at ports in the world, 1990 – 2013

Title	Author	Date of report or publication	Date of occurrence	Agent	Cases	Source	Place of occurrence	Port	Ship	Type of ship
Injury and illness aboard an Antarctic cruise ship	Bledsoe GH	2007	November 20 2004 - March 10 2006	Not identified	39	Not identified	Antarctic cruises: Ushuaia (Argentine) to Antarctic	No	Yes	Cruise ship
Shipboard medicine: a new niche for emergency medicine	DiGiovanna T	March 30 1992	January 4 - June 10 1989 and October 13 - November 10 1990	No data	640	Not identified	Caribbean	No	Yes	Cruise ships
Surveillance of deaths on board Danish merchant ships, 1986-93: implications for prevention	Hansen HL	April 1996	January 1986 - February 1993	Not identified	8 deaths	Not identified	Denmark	Yes	Yes	Danish merchant ships
Injury and illness at the Newport-Bermuda race	Nathanson AT	2008	1998 - 2006	Not identified	3	Not identified	Newport (Bermuda)	Yes	Yes	Yacht
Estimating the risk of communicable diseases aboard cargo ships	Schlaich C	November 2009	2000 - 2008	No data	1880 (68 outbreaks)	No data	Port of Hamburg (Germany)	Yes	No	No data
Life and death on the Amazon: illness and injury to travellers on a South American expedition	Shaw MT	September 2003	October - December 2001	No data	19	No data	Amazon River	No	Yes	Yacht, riverboat and jungle canoe.
Illness and injury to travellers on a premium expedition to Iceland	Shaw MT	May 2008	2004	No data	31	No data	Iceland	No	Yes	Cruise ship
Deaths in international travellers arriving in the United States, July 1, 2005 to June 30, 2008	Lawson CJ	March 2012	July 1 2005 - June 30 2008	HIV/AIDS (2); *Neisseria meningitidis* (2); *Burkholderia pseudomallei* (1); Hepatitis C (1); *Haemophilus spp*. (1); HIV and *Streptococcus pneumonia* (1); *Klebsiella pneumonia* (1); Leptospira spp. And cytomegalovirus (1); *Neisseria gonorrhoeae*-diseminated and Hepatitis C (1); Rabies (1); *Streptococcus spp*.-no pneumococcal (1); viral hepatitis-unspecified (1); unknown (12)	26 deaths	Not identified	No data	No	Yes	No data
Health of U.S. Navy submarine crew during periods of isolation	Thomas TL	March 2003	January 1 - September 30 2000	No data	76 officers and 805 enlisted men	No data	No data	No	Yes	US Submarine patrols
Infections onboard ship--analysis of 1290 advice calls to the Radio Medical (RM) doctor in Sweden. Results from 1997, 2002, 2007, and 2009	Westlund K	2011	1997 - 2002 - 2007 and 2009 (1º semester)	No data	No data	No data	All over the world	Yes	Yes	Swedish Navy and Coast Guard.
Infectious disease rates in the U.S. Navy, 1980 to 1995	Gunderson EK	June 2001	1980 - 1989	Streptococcus	1294	Not identified	No data	No	Yes	US Navy ship
				No data	212 sepsis	Not identified	No data	No	Yes	
				Meningococcus	64	Not identified	No data	No	Yes	

Title	Author	Date of report or publication	Date of occurrence	Agent	Cases	Source	Place of occurrence	Port	Ship	Type of ship
				Other bacterial	1153	Not identified	No data	No	Yes	
				Viral meningitis	618	Not identified	No data	No	Yes	
				Herpes simplex virus	602	Not identified	No data	No	Yes	
				Herpes zoster	228	Not identified	No data	No	Yes	
				Other viral exanthema	435	Not identified	No data	No	Yes	
				Hepatitis virus	3310	Not identified	No data	No	Yes	
				Epstein Barr virus	3198	Not identified	No data	No	Yes	
				No data	137 Conjunctivitis cases	Not identified	No data	No	Yes	
				Other diseases attributable to viruses and Chlamydia	1848	Not identified	No data	No	Yes	
				Unspecified viral and Chlamydia infections	3711	Not identified	No data	No	Yes	
				No data	927 Dermatophytosis	Not identified	No data	No	Yes	
				Candida albicans	241	Not identified	No data	No	Yes	
				No data	181 dermatomycosis	Not identified	No data	No	Yes	
				Unknown	350 Sarcoidosis cases	Not identified	No data	No	Yes	
				Trichomona	142	Not identified	No data	No	Yes	
				Calepitrimerus vitis	78	Not identified	No data	No	Yes	
				No data	87 infestation cases	Not identified	No data	No	Yes	
				Other and unspecified infectious diseases	95	Not identified	No data	No	Yes	
Antibodies against hepatitis viruses in merchant seamen	Hansen HL	1995	April - December 1993	Hepatitis A, B and C virus	79 Anti-HAV (1 previous vaccinated); 47 Anti-HBc; 6 Anti-HCV	Not identified	Denmark	No	Yes	Danish ships

Title	Author	Date of report or publication	Date of occurrence	Agent	Cases	Source	Place of occurrence	Port	Ship	Type of ship
Risk of viral hepatitis among military personnel assigned to US Navy ships	Hawkins RE	April 1992	1989 - 1991	Hepatitis A, B and C virus	210 (anti-HAV); 76 (Anti-HBc); 9 (anti-HCV)	Not identified	South America; west Africa and Mediterranean sea	No	Yes	US Navy ships(6)
Suspected Methicillin-resistant Staphylococcus aureus infections at sea	Lucas R	2007	2002 - 2006	*Staphylococcus aureus* (MRSA)	2002: 200 cases (11 confirmed); 2006: 520 cases (46 confirmed)	Not identified	No data	No	Yes	Ocean going; Tugs; Fishing; Pleasure; others (all US-flagged)
Study of the association of Malassezia furfur with chronic Urticaria among the ship crews	Tang XP	August 2003	No data	*Malassezia furfur*	82	Person to person	No data	No	Yes	No data

Annex 30. Respiratory diseases single case studies on ships and at ports in the world, 1990 – 2013

Group of event	Event	Title	Author	Date of occurrence	Agent	Fatal case	Source	Place of occurrence	Port	Ship	Type of ship	Investigation details
Respiratory diseases	Tuberculosis	Latent Tuberculosis Infection Among Sailors and Civilians Aboard U.S.S. Ronald Reagan --- United States, January - July 2006 / Investigation of Mycobacterium tuberculosis transmission aboard the U.S.S. Ronald Reagan, 2006	MMWR / Buff AM	June 29 - July 6 2005	*Mycobacterium tuberculosis*	No	Person to person	Hawaii to California	No	Yes	"US Ronald Reagan" aircraft carrier	Contact tracing All positive sailors began isoniazid treatment for latent tuberculosis infection.
	Tuberculosis	Health of Chinese illegal immigrants who arrived by boat on the West Coast of Canada in 1999	Allan GM	June 14 - September 9 1999	*Mycobacterium tuberculosis*	No	Not identified	West coast of Canada	Yes	Yes	Four boats	No data
	Tuberculosis	Tuberculosis in the crew of a submarine	Suzuki S	No data	*Mycobacterium tuberculosis*	No	Person to person	No data	No	Yes	Submarine	The air- conditioning system of submarines requires completely closed recirculation of air.

Annex 31. Food and water borne diseases single case studies on ships and at ports in the world, 1990 – 2013

Group of event	Event	Title	Author	Date of occurrence	Agent	Fatal case	Source	Place of occurrence	Port	Ship	Type of ship	Investigation details
Gastrointestinal infections	Parasite infection	Parasite infection in an officer of an ocean liner	Kato H	No data	*Taenia saginata*	No	Beef	Japan	No	Yes	Ocean liner	
	Cyclosporiasis	A Human Case of Cyclosporiasis after travelling in the Subtropics	Turgay N	No data	Cyclospora	No	No data	Greek island	Yes	Yes	Sailing boat	
	Gastroenteritis	Use of morbidity and mortality conferences to analyze causes of death at sea: a useful tool in the process of training in maritime medicine.	Valle B	No data	*Escherichia coli*	Yes	No data	Papua New Guinea	No	Yes	Oceanographic research ship	
Legionellosis	Legionellosis	Severe Legionella pneumophila pneumonia associated with the public bath on a cruise ship in Japan	Kobayashi A		*Legionella pneumophila* serogroup 5	No	Men's bathroom of the ship	Osaka (Japan) to Taiwan	No	Yes	Cruise ship	No data
		Legionellosis associated with ships: 1977 to 1997	Rowbotham TJ		Legionella pneumophila serogroup 1	No	No data	Barcelona (Spain)	No	Yes	Cruise ship	No data
			Rowbotham TJ		*Legionella spp*	No	No data	New York to Los Angeles (USA)	No	Yes	Cruise ship	No data
			Rowbotham TJ		*Legionella spp*	No	No data	Florida (USA), Caribbean and Mexico	No	Yes	Cruise ship	No data
			Rowbotham TJ		*Legionella spp*	No	No data	Mediterranean sea	No	Yes	Cruise ship	No data
			Rowbotham TJ		*Legionella pneumophila* serogroup 1, Pontiac subgroup	No	No data	Caribbean	No	Yes	Cruise ship	No data
			Rowbotham TJ		*Legionella pneumophila* serogroup 1 and serogroup 4, Portland subgroup	Yes	No data	Mediterranean sea	No	Yes	Cruise ship	No data
			Rowbotham TJ		*Legionella spp*	No	No data	Lymasso (Cyprus) l to Israel and Egypt	No	Yes	Cruise ship	No data
			Rowbotham TJ		*Legionella pneumophila* serogroup 1, Knoxville subgroup	Yes	Air conditioned cabin	Spain, Morocco, and Portugal	No	Yes	Cruise ship	No data
			Rowbotham TJ		*Legionella pneumophila* serogroup 1	No	No data	Switzerland, Spain, Morocco, and Portugal	No	Yes	Cruise ship	No data
			Rowbotham TJ		*Legionella pneumophila* serogroup 1	No	No data	Caribbean	No	Yes	Cruise ship	No data
			Rowbotham TJ		*Legionella pneumophila* serogroup 1 and 5	Yes	Dry air conditioning system	Sidney (Australia)	No	Yes	Cruise ship	No data

Group of event	Event	Title	Author	Date of occurrence	Agent	Fatal case	Source	Place of occurrence	Port	Ship	Type of ship	Investigation details
			Rowbotham TJ		*Legionella pneumophila* serogroup 1	No	Steam boiler from a external tank	UK, The Neatherlands, Baltic ports, Kiel canal, Channel ports and Ireland	No	Yes	Cruise ship	No data
			Rowbotham TJ		*Legionella pneumophila* serogroup 1	No	No data	Rhine river	No	Yes	"Rhine cruiser" 1	No data
			Rowbotham TJ		*Legionella pneumophila* serogroup 1	Yes	No data	Nile river	No	Yes	River cruise ship	No data
			Rowbotham TJ		*Legionella pneumophila* serogroup 1	No	No data	Rhine river	No	Yes	"Rhine - Moselle cruiser" 2	No data
			Rowbotham TJ		*Legionella pneumophila* serogroup 1	Yes	No data	Rhine river	No	Yes	"Rhine - Moselle cruiser" 2	No data
			Rowbotham TJ		*Legionella spp*	No	No data	United Kingdom	No	Yes	Ferry	No data
			Rowbotham TJ		*Legionella pneumophila* serogroup 1	No	No data	UK to The Neatherlands	No	Yes	Ferry	No data
			Rowbotham TJ		*Legionella pneumophila* serogroup 1	Yes	No data	Germany to United Kingdom	No	Yes	Ferry	No data
			Rowbotham TJ		*Legionella pneumophila* serogroup 1	No	No data	Greece	No	Yes	Ferry	No data
			Rowbotham TJ		*Legionella spp*	Yes	No data	Trieste (Italy) to Patras (Greece)	No	Yes	Ferry	No data
			Rowbotham TJ		*Legionella spp*	No	No data	No data	No	Yes	Ship	No data
			Rowbotham TJ		*Legionella spp*	No	No data	No data	No	Yes	Danish ship	
			Rowbotham TJ		*Legionella spp*	Yes	Cutting fluid	No data	No	Yes	US Navy nuclear-powered guided missile cruiser	The water system on the ship was hyper chlorinated.
			Rowbotham TJ		*Legionella pneumophila* serogroup 1	No	Water supply	Northeast of Scotland	No	Yes	Trawler fishing	No data
	Legionellosis	Sanitation on ships: compendium of outbreaks of food borne and waterborne disease and Legionnaire's disease associated with ships, 1970-2000	WHO		*Legionella spp*	No	No data	Rotterdam (The Netherlands)	No	Yes	River cruise ship	No data
			WHO		*Legionella spp*	No	No data	No data	No	Yes	Cruise ship	No data
			WHO		*Legionella spp*	No	No data	No data	No	Yes	Cruise ship	No data
			WHO		*Legionella spp*	No	No data	No data	No	Yes	Ferry	No data
			WHO		*Legionella spp*	No	No data	United Kingdom	No	Yes	Cruise ship	No data
			WHO		*Legionella spp*	No	No data	No data	No	Yes	Ferry	No data
			WHO		*Legionella spp*	No	No data	No data	No	Yes	Cruise ship	No data

Group of event	Event	Title	Author	Date of occurrence	Agent	Fatal case	Source	Place of occurrence	Port	Ship	Type of ship	Investigation details
			WHO / EWGLI		*Legionella spp*	No	No data	Corsica (France)	No	Yes	Ferries (2)	No data

Annex 32. Vaccine-preventable diseases case study on ships and at ports in the world, 1990 – 2013

Group of event	Event	Title	Author	Date of occurrence	Agent	Source	Place of occurrence	Port	Ship	Type of ship	Investigation details
Vaccine-preventable diseases	Diphtheria	Diphtheria acquired during a cruise in the Baltic Sea	Anon	No data	*Corynebacterium diphtheria*	Not identified	Norway – The Neatherlands round the Baltic sea	No	Yes	Cruise ship	She was given diphtheria antitoxin. Swabs were taken from close family contacts and hospital staff. Some received antibiotic prophylaxis and low dose diphtheria boosters.
	Meningococcal meningitis	Suspected meningococcal meningitis on an aircraft carrier	Farr W	2003	*Neisseria meningitidis*	Not identified	Atlantic ocean	No	Yes	Aircraft carrier	Chemoprophylaxis to close contacts from the ship. Contact tracing of close contacts during a port call a few days before onset of symptoms..

Annex 33. Emerging and vector borne diseases case study occurred on ships and ports in the world, 1990 – 2013

Group of event	Event	Title	Author	Date of occurrence	Agent	Fata case	Source	Place of occurrence	Port	Ship	Type of ship
Emerging and vector borne diseases	Israeli Spotted Fever (ISF)	Fatal case of Israeli Spotted Fever (ISF) after Mediterranean cruise	Boillat N	No data	*Rickettsia conorii* subsp. Isralenesis	No	Not identified	Mediterranean sea; he was probably infected in Libya, where he spent days 6-10 before onset of symptoms.	Yes	No	Cruise ship
	Malaria	Malaria desenlace fatal, ¿negligencia o desconocimiento?	Yendis HJ	September 2004	*Plasmodium falciparum*	Yes	Vector	Venezuela	Yes	Yes	Merchant ship
	Malaria	Use of morbidity and mortality conferences to analyze causes of death at sea: a useful tool in the process of training in maritime medicine.	Valle B	No data	*Plasmodium falciparum*	No	Vector	Gulf of Guinea	No	Yes	Supply ship

Annex 34. Radiological events on ships and at ports in the world, 1960 – 2013

Title of papers	Author(s)	Date of occurrence	Agent	Cases/deaths	Place of occurrence	Port	Ship	Type of ship	Investigation details
Operational and accident survey of Russian nuclear submarines for risk assessments using statistical models for reliability growth	Reistad O.	August 1983	Radioactive substances not specified	14 deaths by radiation sickness	No data	No	Yes	Nuclear submarine K-122-123	No data
		August 1985	Radioactive steam and gas	All crew exposed	Mediterranean Sea	No	Yes	Nuclear submarine K-462	No data
		1970	No data	No data	Krasnoye Somovo shipyard in Gorki (Russia)	Yes	Yes	Nuclear submarine K-320	No data
Radioactive waste disposal in seas adjacent to the territory of the Russian Federation / Accidents in nuclear ships	Yablokov A.V / Olgaard PL	August 1985	Radioactive substances	290 exposed with 10 acute radiation sickness and 39 displayed radiation reactions / 10 deaths due to their injuries at the time of the accident	Chazhma Bay, Vladivostok (Russia)	Yes	Yes	Nuclear submarine k314/431	Continuous monitoring of radiation.
Level 2 event on INES scale for the detection of an orphan source of Cs-137 in a steel mill	Spanish Nuclear Security Council	May 2012	Cs137	0	Kenitra Port (Morocco) to Sevilla Port (Spain)	Yes	Yes	Ship	Immobilization of truck; detection and isolation of the radioactive source.
Nuclear accidents	Bellona NGO	July 1961	Radioactive noxious gases and steam	8 deaths	North Atlantic	No	Yes	Nuclear submarine K-19	Crew were evacuated to other submarine and K-19 towed to base (Kola Peninsula).
		February 1965	Radioactive substances not specified	7 persons with radiation injuries	Naval Yard in Severodvinsk (Russia)	Yes	Yes	Nuclear submarine K-11	The reactor compartment had to be replaced.
		May 1968	Gamma radiation; radioactive gases	124 exposed, 12 crew members received doses in the range of 600 to 1000 Rontgen and 5 died	No data	No	Yes	Nuclear submarine K-27	The radiation alarm was activated, all doors between compartments were closed, and the submarine sailed towards its base using the starboard reactor.
		1970	Radioactive substances not specified	No data	Shipbuilding yard Krasnoe Sormovo in Nizhny Novgorod (Russia)	Yes	Yes	Nuclear submarine K-429	No data
		June 1989	Radioactive iodine	0	Norwegian sea	No	Yes	Nuclear submarine K-192	No data

Title of papers	Author(s)	Date of occurrence	Agent	Cases/deaths	Place of occurrence	Port	Ship	Type of ship	Investigation details
		October 1960	Radioactive gasses	13 exposed, 3 with radiation injuries and 1 death	Barents Sea (North of Norway and Russia)	No	Yes	Nuclear submarine K-8	The crew used a provisional system for supplying water to the reactor in order to stop the leak. The submarine was decontaminated in the base.
Accidents in nuclear ships	Olgaard PL	April 1973	Radioactivity contamination	4 crew exposed	Purget sound, Washington (USA)	No	Yes	Nuclear submarine: US SNN Guard fish	The boat surfaced, ventilated, decontaminated and closed the leak without external assistance
Review of chemical spills at sea and lessons learnt.	Mamaca E, Girin M, Le Floch S, and El Zir R	1997	Radioactive sources (Cs137)	No data	Atlantic Ocean	No	Yes	"MSC Carla" container carrier	The 34 crew members were safely evacuated.

Chemical events

Annex 35a. Chemical events on ships and at ports in the world, 1940 – 2013.

Title of papers	Author(s)	Date of occurrence	Agent	Cases	Source	Place of occurrence	Port	Ship	Type of ship	Investigation details
Two fatalities by hydrogen sulphide poisoning: variation of pathological and toxicological findings	Ago, M.	No data	Hydrogen sulphide	10 (2 deaths)	Water ballast tank	No data	No	Yes	Cargo ship	Epidemiological, chemical and environmental investigation
Acute benzene poisoning: a report of three fatalities	Avis SP	No data	Benzene	4 (3 deaths)	Pipeline	No data	No	Yes	Chemical cargo ship	Epidemiological, chemical and environmental investigation
A fatal case of benzene poisoning	Barbera,N.	No data	Benzene	1	Tankers	No data	No	Yes	Cargo ship	The rescuer received first aid and was hospitalized three days for acute benzene intoxication
Methylbromide intoxication: a clinical case study	Breeman.	2006	Pesticide: Methyl-bromide	5	Containers	Port of Rotterdam (The Neatherlands)	Yes	No	Cargo ship	Two victims were admitted to the intensive care unit for respiratory support; other three employee's milder symptoms and received supportive care but were no admitted to the hospital.
Accidental exposure to polychlorinated biphenyls (PCB) in waste cargo after heavy seas. Global waste transport as a source of PCB exposure	Budnik,L.T.	2012	Polychlorinated biphenyls	6	Containers of transformer oil (Aroclor 1254)	Port of Bangkok - Arab port – Hamburg Port	No	Yes	Cargo ship	After the coaster reached its destination port in Europe, 7 weeks after leaving Bangkok, a thorough cleaning of the hatches followed, and the walls of the vessel were also sandblasted. Epidemiological and environmental investigation was performed.
Deaths from asphyxia among fisherman	Glass RI	July 1978	Ammonia, sulphur dioxide and hydrogen sulphide	3	Ship's hold	No data	No	Yes	Fishing vessel (Shrimp trawler)	The captain was evacuated by helicopter and brought to the hospital
		September 1974	No data	3	Ship's hold	Texas (USA)	No	Yes	Fishing vessel (Shrimp trawler)	Epidemiological, chemical and environmental investigation
		November 1973	Sulphur dioxide	2	Ship's hold	Texas (USA)	No	Yes	Fishing vessel (Shrimp trawler)	Epidemiological, chemical and environmental investigation
		September 1977	No data	2	Ship's hold	Texas (USA)	No	Yes	Fishing vessel (Shrimp trawler)	Epidemiological, chemical and environmental investigation
		August 1978	Sulphur dioxide	3 (two deaths	Ship's hold	Louisiana (USA)	No	Yes	Fishing vessel (Shrimp trawler)	Epidemiological, chemical and environmental investigation
		July 1971	No data	5 deaths	Ship's hold	Louisiana (USA)	No	Yes	Fishing vessel	Epidemiological, chemical and environmental investigation
		August 1976	Hydrogen sulphide	6 deaths	Ship's hold	California (USA) and Mexico	No	Yes	Fishing vessel	Epidemiological, chemical and environmental investigation
		October 1976	No data	2 deaths	Ship's hold	Louisiana (USA)	No	Yes	Fishing vessel	Epidemiological, chemical and environmental investigation
		July 1977	Carbon monoxide	2 deaths	Ship's hold	Alaska (USA)	No	Yes	Fishing vessel	Epidemiological, chemical and environmental investigation
		October 1973	Carbon tetrachloride	2 deaths	Ship's hold	Louisiana (USA)	Yes	Yes	No data	Epidemiological, chemical and environmental investigation

Title of papers	Author(s)	Date of occurrence	Agent	Cases	Source	Place of occurrence	Port	Ship	Type of ship	Investigation details
		December 1974	No data	2 deaths	Ship's hold	Louisiana (USA)	No	Yes	No data	Epidemiological, chemical and environmental investigation
		June 1978	Hydrogen sulphide	7 deaths	Ship's hold	Hawaii (USA)	No	Yes	Commercial vessel	Epidemiological, chemical and environmental investigation
Poisoning at sea: injuries caused by chemicals aboard Danish merchant ships 1988-1996.	Hansen H.L	February 1988 – December 1996	Propane gas, Hydrogen sulphide, Mixture of phenols and cresols, oil-based drilling mud, Butyl mercaptane, acrylonitrile, vinyl nitrile, organic solvents, detergents, pesticides, aluminium phosphide	66 (13 deaths)	Ships	No data	No	Yes	Danish merchant ships	Epidemiological, chemical and environmental investigation
Acute mercury vapour poisoning in a shipyard worker--a case report.	Hsu L.F	No data	Mercury vapours	1	Shipyard (ship carrying oil contaminated with mercury)	No data	Yes	Yes	Oil ship	Epidemiological, chemical and environmental investigation
Overview of Maritime Accidents Involving Chemicals Worldwide and in the Baltic Sea. Experiences and findings in connection with the casualty involving the ship Cason. Independent investigation into the leakage of dangerous goods on board the Liberian registered container ship Kota Pahlawan off the coast of Australia on 16 June 2006. Reviews of chemical spills at sea and lessons learnt.	Häkkinen J.M. / Marchand M. / Mamaca E. / (EMSA-HNS-Action Plan_2007) / Madiedo JA.	1987	Sodium metal, aniline oil, orthocreosol and Diphenyl methane di-isocyanate and others	23	Cargo	Atlantic Ocean (Spain)	No	Yes	"Cason" cargo ship	Plans to unload hazardous material from the ship hampered by bad weather conditions and fire onboard. Evacuation of the local population
		1947	Ammonium nitrate	5000	Cargo	Texas city port (USA)	Yes	Yes	"Grand camp" cargo ship	Fire fighting and rescuing the wounded.
		1947	Ammonium nitrate	26	Cargo	Bay of Brest (France)	Yes	Yes	"Ocean Liberty" cargo ship	The ship was towed away with the available means and salvors undertook to flood the holds. In spite of these measures an explosion happened.
		February 1997	10 dangeroussubstances, main risk: calcium carbide,	25	Cargo	Bay of Biscay (Spain)	No	Yes	"Albion 2" cargo ship	Epidemiological, chemical and environmental investigation
		2004	Ethanol; fuel	18	Bunker fuel	Atlantic Ocean	No	Yes	"Bow marine" cargo ship	Epidemiological, chemical and environmental investigation
		2001	Styrene, methyl-ethyl-ketone (MEK), isopropanol (IPA) plus fuel oil, gas oil and clorinate	No data	Cargo	Channel (France)	No	Yes	"Ievoli sun" chemical tanker	The MEK and IPA were removed by a controlled released from the wreck. The styrene and oil were removed to the salvage vessel
		2002	Corn (H_2S)	2 deaths	Cargo	Pacific Ocean	No	Yes	"Co-Op venture" cargo ship	Epidemiological, chemical and environmental investigation
		1944	Munitions (bombs, fragmenting bombs, semi-armour-piecing-bombs, demolitions bombs and small arm ammunitions.	No data	Cargo	Thames River (Great Britain)	No	Yes	"SS Richard Montgomery" cargo ship	Routine surveys have been undertaken to assess the condition of the wreck and to check for the new signs of possible danger.
		1979	Chlorine	No data	Cargo	North Sea (The Neatherlands)	No	Yes	"Simba" cargo ship	Locating and rapid recovery of 7 cylinders; others 5 recovered by fishermen without safety measures. 5 years 27 cylinders were found and destroyed

Title of papers	Author(s)	Date of occurrence	Agent	Cases	Source	Place of occurrence	Port	Ship	Type of ship	Investigation details
		1989	Epichlorhydrin	No data	Cargo	North Sea and Elba River (Germany)	Yes	Yes	"Oostzee" cargo ship	Inspection of the ship, the crew taken to hospital for medical checks; towing and unloading of the ship; cleaning operation on board.
		1997	Hazardous materials (liquid gases, flammable solids, corrosive substances and oxidized substances)	No data	Cargo	Channel (France)	No	Yes	"Rosa M" cargo ship	Towing and voluntary grounding of the ship outside the port zone; water pumped from the ballast to rebalance the ship correctly.
		1998	Ureum-formaldehyde and kerosene	No data	Cargo	North Sea (The Neatherlands)	No	Yes	"Apus" cargo ship	Recovery of fire lighters over several m3 of sand on the beaches.
		1998	Sulfur-phospine	No data	Cargo	North Sea (The Neatherlands)	No	Yes	"Ban-Ann" cargo ship	Recovery and destruction of packets grounded on the coast line.
		1999	Hazardous materials (cyanide, organic lead and pesticide)	No data	Cargo	North sea (Great Britain)	No	Yes	"Ever Decent" cargo ship	Epidemiological, chemical and environmental investigation
		1988	Acrylonitrile and Dodecylbenzene	No data	Cargo	North Sea (The Neatherlands)	No	Yes	"Anna Broere" cargo ship	Establishing of a safety perimeter. Unsuccessful attempts to lift the ship. Ship cut into two and cargo lightened.
		1991	Acrylonitrile and Dichloro ethane	No data	Cargo	Mediterranean Sea (Italy)	No	Yes	"Alessandro Primo" cargo ship	Localization of the wreck beginning of a cargo recovery.
		1998	Sulphuric acid	No data	Cargo	Atlantic Ocean	No	Yes	"Panama pearl" cargo ship	Recovery operation involving pumping the acid from the double hull. Neutralization of acid lost by bicarbonate.
		1998	Sulphuric acid	No data	Cargo	Atlantic Ocean (Brazil)	Yes	Yes	"Bahamas" cargo ship	An internal crisis on board ship was kept secret, resulting in a catastrophe. No means of stocking the diluted acid on land or on other ship, neutralization impossible because no basis neutralizing agent was available. Cargo slowly pumped and dumped the product on the port. This situation culminated in the abandon of the ship.
		1993	Xylene	No data	Cargo	Channel (Great Britain)	No	Yes	"Grape one" cargo ship	Crew evacuated and put to safety. Ship stranded and shipwrecked with the cargo in the channel.
		1995	Styrene	No data	Cargo	China Sea (China)	Yes	Yes	"Nº1 Chung Mu" cargo ship	Attempt to limit the leakage and to stop the spill by using dams. Organoleptic test carried out on fishing produce. Environmental monitoring of species affected by the pollution.
		1996	Wheat	No data	Cargo	Mediterranean Sea (France)	No	Yes	"Fenes" cargo ship	Pumping of the cargo, dumped over 20 m on the sea bead; transferred onto a barge and re immersed into the sea to very low depths.

Title of papers	Author(s)	Date of occurrence	Agent	Cases	Source	Place of occurrence	Port	Ship	Type of ship	Investigation details
		1974	Propane and Butane and Naphtha	No data	Cargo	Tokyo Bay (Japan)	No	Yes	"Yuru Maru N°10" cargo ship	Epidemiological, chemical and environmental investigation
		1999	Vinyl acetate	No data	Cargo	North Sea (Great Britain)	Yes	Yes	"Ascania" cargo ship	Evacuation of the crew due to the fire; ship stranded at least half a mile from the coast. Establishment of a temporary exclusion zone (evacuation of 600 residetns from therir homes)
		1985	Acetone, Butyl acetate, Toluene, trichloroethylene and xylene	No data	Cargo	Indian Ocean	Yes	Yes	"Ariadne" cargo ship	Salvage attempts failed. Part of the deck collapsed and a fire started above on the decks. Evacuation of the port area was ordered.
		1997	Flammable, combustibe products, poisonous and corrosive substances	No data	Cargo	Atlantic Ocean	No	Yes	"MSC Carla" container carrier	The 34 crew members were safely evacuated.
		2001	Marine pollutant	No data	Cargo	Atlantic Ocean	No	Yes	"Melbridge Bilbao" container ship	The ship was towed to a waiting area for inspection and verification of the hazards related to the catalyst; there, it was decontaminated and repaired.
		January 2007	Explosives, flammables, pollutants…	No data	Cargo	Channel (France)	No	Yes	"Napoli" container ship	Crew members were evacuated; the risk for responders and marine environment were analyzed; the ship was towed to the port. 103 containers were lost overboard.
		2008	Highly toxic pesticides	No data	Cargo	South China Sea	No	Yes	"Princess of the starts" ferry	A 5 km zone was set up around the wreck; fishing and aquaculture activities were prohibited. Finally the containers were removed undamaged from the hold.
		1984	Vinyl Chloride Monomer -VCM	No data	Cargo	Adriatic Ocean	No	Yes	"Briggitta Montanari" cargo ship	It was decided almost 3 years later to refloat the ship and to pump out the VCM. A leak was detected and a hole was bored in the bridge; the divers connected PVC tubes to the hole through which VCM was released at the water surface, where it dispersed and was burnt.
		1994	Caustic soda	No data	Cargo	Atlantic Ocean	No	Yes	"Cynthia M" barge	Epidemiological, chemical and environmental investigation
		2001	Sulphuric acid	No data	Cargo	Channel (France)	No	Yes	"Balu" chemical tanker	Epidemiological, chemical and environmental investigation
		2005	Benzene	No data	Cargo	Western Pacific Ocean	No	Yes	"Samho brother" chemical tanker	Two years later bombers made to explode the shipwreck with containment and recovery vessel standing by. No benzene was detected later, neither in the air nor in water or at shore.

Title of papers	Author(s)	Date of occurrence	Agent	Cases	Source	Place of occurrence	Port	Ship	Type of ship	Investigation details
		2003	Deoxidized iron balls	No data	Cargo	Indian Ocean	Yes	Yes	"Adamandas" bulk carrier	There was no adequate structure in the port and due to the risks for the population, the authorities moved the ship 10 nautical miles away and scuttled it in waters 1700m deep
Review of maritime and port-related HNS accidents: Port-related chemical accidents	Jani Häkkinen / Antti Posti / Christou M. / Ronza A. / Ellis J.	1944	Oil drums, explosives, sulphur	More than 2000	Vessel	India	Yes	Yes	SS Fort Stikine cargo ship	Epidemiological, chemical and environmental investigation
		1989	Kerosene	62	Tanker	Iran	Yes	Yes	No data	Epidemiological, chemical and environmental investigation
		1979	Crude oil	50	Tanker	Ireland	Yes	Yes	No data	Epidemiological, chemical and environmental investigation
		1985	Gasoline, Naphtha	40 (32 deaths)	Ships	Spain	Yes	Yes	No data	Epidemiological, chemical and environmental investigation
		1975	Crude oil	37	Tankers	USA	Yes	Yes	No data	Epidemiological, chemical and environmental investigation
		1980	Vegetable oil, ammonia, acetylene, oxygen (gas)	200 (3 deaths)	Warehouse	Malasya	Yes	No	No data	Epidemiological, chemical and environmental investigation
		1979	Benzene, explosives, flammable liquefied gas	140 (7 deaths)	Drums	Greece	Yes	Yes	No data	Epidemiological, chemical and environmental investigation
		1974	Chlorine	120 (4 deaths)	Tank -valve	Spain	Yes	Yes	No data	Epidemiological, chemical and environmental investigation
		1985	Gasoline, gas-oil, fuel oil	100 (4 deaths)	Tank	Italy	Yes	Yes	No data	Epidemiological, chemical and environmental investigation
		1986	Ammonia	100	No data	Philippines	Yes	No	No data	Epidemiological, chemical and environmental investigation
		1997	Crude oil, kerosene, liquified petroleum gas, petroleum products	76 (56 deaths)	Ship	Port Andhra Pradesh (India)	Yes	Yes	No data	Epidemiological, chemical and environmental investigation
		1979	Crude oil	55 (52 deaths)	Ship	Port of Istanbul (Turkey)	Yes	Yes	No data	Epidemiological, chemical and environmental investigation
		1975	Crude oil	61 (26 deaths)	Tanker	Port of Pennsylvania (USA)	Yes	Yes	No data	Epidemiological, chemical and environmental investigation
		1992	Crude oil	22 deaths	Tanker and container vessel	Malasya	Yes	Yes	No data	Epidemiological, chemical and environmental investigation
		1987	Methyl methacrylate	15 deaths	Tanker	Port of Manila (Philippines)	Yes	Yes	No data	Epidemiological, chemical and environmental investigation
		1992	Toluene, xylene	13 deaths	Chemical tanker	Port of Kelang (Malasya)	Yes	Yes	Chemical tanker	Epidemiological, chemical and environmental investigation
		1987	Liquified petroleum gas	13 deaths	Carrier	Port San Vitale (Italy)	Yes	Yes	Carrier	Epidemiological, chemical and environmental investigation
		1974	Crude oil	21 deaths	Tanker	Port of Pennsylvania (USA)	Yes	Yes	Tanker	Epidemiological, chemical and environmental investigation

Title of papers	Author(s)	Date of occurrence	Agent	Cases	Source	Place of occurrence	Port	Ship	Type of ship	Investigation details
		1979	Butane	12 deaths	Cargo vessel and barge	Port of Louisiana (USA)	Yes	Yes	Cargo vessel and barge	Epidemiological, chemical and environmental investigation
		2006	Xanthates	0	Containers with dangerous goods	Coast of Australia	No	Yes	"Kota Pahlawan" container ships	Epidemiological, chemical and environmental investigation
		2006	Pesticides	15	Containers with dangerous goods	No data	No	Yes	"Horizon Producer" container ship	Epidemiological, chemical and environmental investigation
		2006	Titanium tetrachloride	8	Containers with dangerous goods	Port of Hamburg (Germany)	Yes	Yes	"Hanjin London" container ship	Epidemiological, chemical and environmental investigation
		2006	Sulphuric acid	0	Containers with dangerous goods	No data	No	Yes	"Bermuda Islander" container ship	Epidemiological, chemical and environmental investigation
		2006	Chloroacetic acid		Containers with dangerous goods	Port of Charleston (USA)	Yes	Yes	"Star Fuji" container ship	Epidemiological, chemical and environmental investigation
		2006	Fireworks	1	Containers with dangerous goods	No data	No	Yes	"Hyundai Fortune" container ship	Epidemiological, chemical and environmental investigation
		2007	Ethylenediamine	0	Containers with dangerous goods	No data	No	Yes	"APL Chile" container ship	Epidemiological, chemical and environmental investigation
		2007	Pesticides	0	Containers with dangerous goods	No data	No	Yes	"CMA-CGM Fidelio" container ship	Epidemiological, chemical and environmental investigation
		2007	Calcium hypochlorite	0	Containers with dangerous goods	No data	No	Yes	"Zim Haifa" container ship	Epidemiological, chemical and environmental investigation
		2007	Methyl methacrylate	0	Containers with dangerous goods	No data	No	Yes	"OOCL Keelung" container ship	Epidemiological, chemical and environmental investigation
Acute health effects of the Tasman Spirit oil spill on residents of Karachi, Pakistan	Janjua N.Z.; Kasi P.M.;	July 2003	Crude oil	216	Fumes of volatile organic compounds and mist containing hydrocarbons	Coastline in Karachi (Pakistan)	Yes	No	"Tasman spirit" tanker	Epidemiological and environmental investigation (included chemical analysis) was made for assessing the immediate health impact of oil spill
Oil spill accident in the Sea of Japan	Kizu R.; Ando K.; Hayakawa K.	January 1997	Heavy oil	> 800 (4 deaths)	Heavy oil	Coastline of Japan	No	Yes	"Nakhodka" tanker	Much efforts was made to remove the reached oil; the greater part of the oiled coastline was cleaned shortly after the oil pollution but sands, rocks and sea water of the shore were contaminated with chemical for a long time. Extensive scientific studies were conducted
An accidental death due to Freon 22 (Monochlorodifluoromethane) inhalation in a fishing vessel	Koreeda A.	No data	Monochlorodifluoromethane (Freon 22)		Freezing system	Pacific Ocean	No	Yes	Fishing vessel	Rescued and hospitalization of injured persons
Maritime transport of chemicals in the Baltic Sea	Luhtala H	January 1976	Ammonia	2	Cargo	Port of Landskrona (Sweden)	Yes	Yes	"René 16" Belgian tanker	Epidemiological, chemical and environmental investigation
		July 1971	Sodium chlorate and rapeseed oil	9 (3 deaths)	Chemical cargo	Port of Gothenburg (Sweden)	Yes	Yes	"Poona" Danish tanker	Epidemiological, chemical and environmental investigation

Title of papers	Author(s)	Date of occurrence	Agent	Cases	Source	Place of occurrence	Port	Ship	Type of ship	Investigation details
Contamination of tap water on an ocean-going vessel	Meyer G	October 2004	Xylene and ethylbenzene	0	Coating of the fresh water tank	No data	No	Yes	Container vessel	According to the German drinking water instruction (2001) water was not consumable and was only utilized for personal hygiene. The crew was advised to ventilate and clean the fresh water tanks
Irreversible anoxic encephalopathy due to nitrogen in a worker cleaning a tank that had contained tetrachloroethylene in the port of Barcelona	Nogué S.	No data	Tetrachloroethylene	1 death	Tank -valve	Port of Barcelona (Spain)	Yes	Yes	Tanker	The man was rescued from the tank after 10-15 minutes, at which time it was in cardiac arrest
Operational and accident survey of Russian nuclear submarines for risk assessments using statistical models for reliability growth	Reistad O.	1968	Mercury gas	126	No data	No data	No	Yes	Nuclear submarine K-172	Epidemiological, chemical and environmental investigation
Mercury Exposure Aboard an Ore Boat	Roach R.	June 2000	Mercury vapours	2	Bottle of mercury located in storeroom of vessel	No data	No	Yes	Ore boat	Medical attention to injured. Both were removed from the environment, showered and discarded all clothing. Decontamination procedure in the storage compartment.
Chlorine leak on Mumbai Port Trust's Sewri yard: A case study	Sharma R.K	July 2010	Chlorine	120	Gas cylinder located in Haji Bunder hazardous warehouse	Mumbai Port (India)	Yes	No	No data	The population was completely evacuated. For over 6 hours rescue and relief teams struggled to control the situation to identify, seal and clamp the leaking of the other cylinders. Fire fighters created water curtains in the area diluting the gas cloud that was spreading because the leakage. Caustic soda and water was used for the neutralization of the chlorine filled cylinders.
Carbon monoxide poisoning among recreational boaters	Silvers S.M	July 1984 - Jun 1994	Carbon monoxide	473	Engine, water heater, space heater and generator.	Seattle (US)	No	Yes	Recreational boats	All patients were attended and stabilized in the hospital; the investigation suggested boat exhaust systems; installation of CO detectors within the cabins and electronic sensor that emits an audible alarm.
Chronic neuropathic symptoms after exposure to mustard gas: a long-term investigation	Thomsen A.B.	1984	Mustard gas	7	Gas bombs	Baltic Sea	No	Yes	Fishing vessel	Medical attention to fishermen in two hospitals of Copenhagen
Analysis of a petrol plume over England: 18-19 January 1997	Welch F	January 1997	Petrol vapour plume	No data	Unleaded petrol spilt for the collision	North west of Ostend in the French part of the Channel	Yes	Yes	"Bona Fulmar" tanker and "Teotal" chemical tanker	Epidemiological, chemical and environmental investigation

Annex 35b. Chemical events on ships or at ports, 1980 – 2013, reported to the Major Accident Reporting System (eMARS)

Accident description	Date of occurrence	Agent	Cases	Source	Place of occurrence	Port	Ship	Type of ship	Investigation details
During ship unloading operations, a leak of flammable/explosive liquid from tank No 17 occurred. The vapours were ignited resulting in a violent explosion which involved 25 tanks (SIF area) containing flammable substances. The explosion was followed by a fire that involved the SIF area.	21/12/1985	Petroleum Products (gasoline, gasoil, fuel oil):	104 (4 deaths)	Pipeline	Naples (Italy)	Yes	Yes	Cargo ship	Fighting the fire for avoiding its propagation to the nearest tank No 101 full of diesel oil and the ignition of the other tanks in case of their rupture and escape of flammable liquid.
The accident occurred after the loading of a ship's tank with benzene. An explosion occurred in the last filled chamber of the ship's tank. The person in charge of the sampling was injured. About 80 tonnes of burning benzene ended up in the Rhine river	26/06/1986	Benzene	1	Pipeline	No data	No	Yes	Tanker	No data
The accident occurred during the loading of gasoline into a ship at the refinery pier.	06/07/1989	Gasoline	8	ship was loading gasoline	No data	Yes	Yes	Tanker	The refinery firefighting crew and the technical personnel were activated.
During phenol unloading from a ship to a tank in the ground storage area a leakage on board of the ship occurred	17/12/1994	Phenol	1	Pipeline	No data	No	yes	No data	Intervention of external fire-fighting services
After loading a tank(no 12) with almost 1000 tonne of petroleum from a ship in the dock the line was pigged.	04/08/1994	Sulphur Dioxide, Propylene, Hydrogen Fluoride, Sulphur Trioxide, Hydrogen, Chlorine, Bromine	1	Valves had been left open from a previous operation	No data	Yes	Yes	Vessel	Emergency measures
Incident during cylinder filling resulted in release which ignited. Jet flames from 3 cylinders involved in the initial fire impinged on the storage vessels.	20/07/1995	Liquid petroleum gas Propane	1	cylinder filling installation	No data	No	yes	Vessel	Minor injury to one employee involving in filing. Premises were evacuated (150 people)
Flash fire following a gasoline spill during tanker unloading.	23/11/1998	Gasoline	4 deaths	The gasoline burnt	Thessaloniki (Greece)	No	yes	No data	Firefighting