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General principles of chemical hazards and public health

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Content

- Chemical Hazards and Public Health – what's the problem?
- International regulation, mechanisms and indicators
- Identifying the problem
- Preventing and preparing
- **Interactive questions** – please type answers in the chat on Zoom



Why is it important to prevent chemical releases?

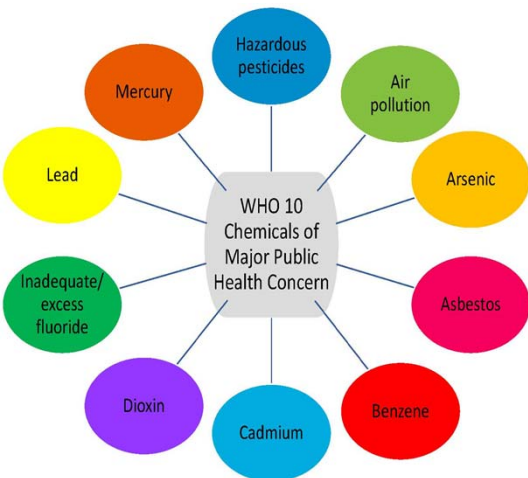
A chemical world

- Chemicals are essential components of our lives
- Some chemicals can severely damage our health or the environment
- 50 million known chemicals (70,000 in common use)
- Detailed toxicity data for only a few hundred
- 200 to 1000 new compounds per year
- WHO estimate 13 million deaths could be prevented every year by addressing environmental problems such as air and water pollution

Chemical Hazards and Public Health – what's the problem?

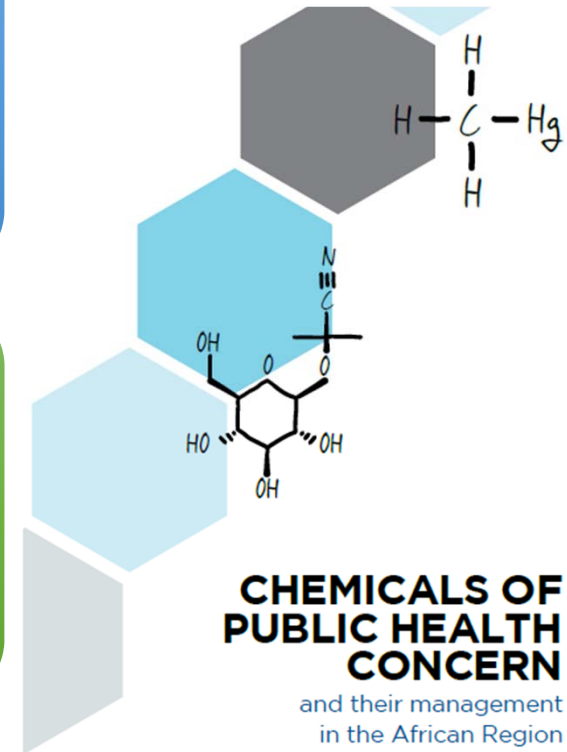
3.6% of all death worldwide attributable to chemical exposures

2.1% of Disability-Adjusted Life Years (DALYs)



WHO, June 2020 [10 chemicals of public health concern \(who.int\)](https://www.who.int)

WHO, The public health impact of chemicals: knowns and unknowns - data addendum for 2019, published July 2021

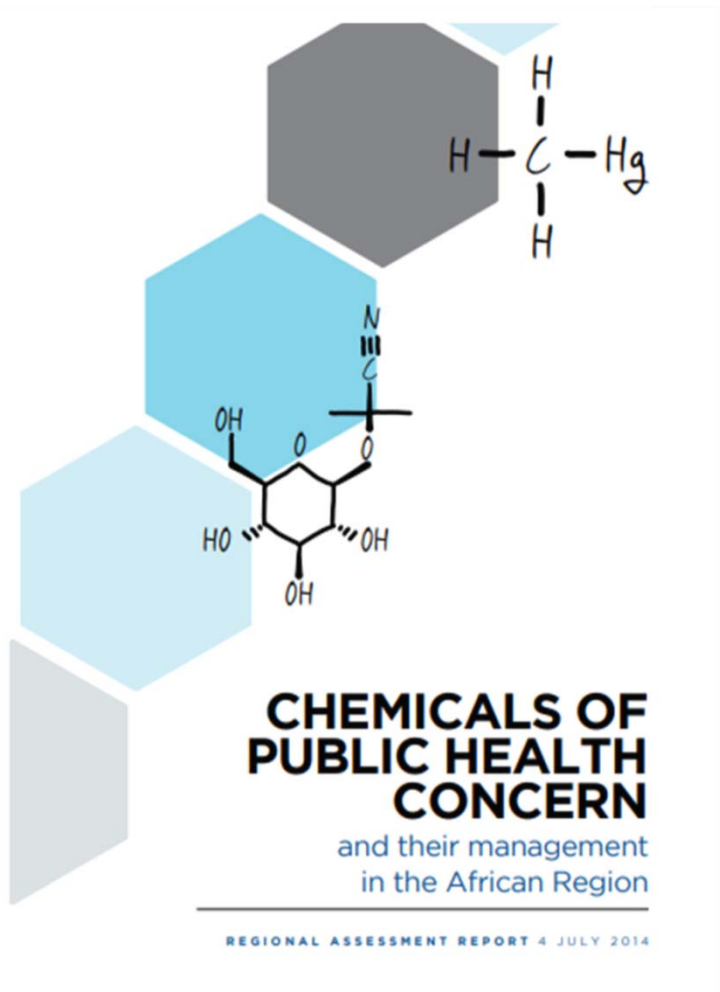


CHEMICALS OF PUBLIC HEALTH CONCERN

and their management in the African Region

REGIONAL ASSESSMENT REPORT 4 JULY 2014

Chemical Hazards and Public Health – what's the problem?



Waste

Waste production in Africa exceeds available capacity for collection and disposal.

According to the United Nations Centre for Human Settlements (UNCHS), only 0.6% of solid waste is recovered and recycled.

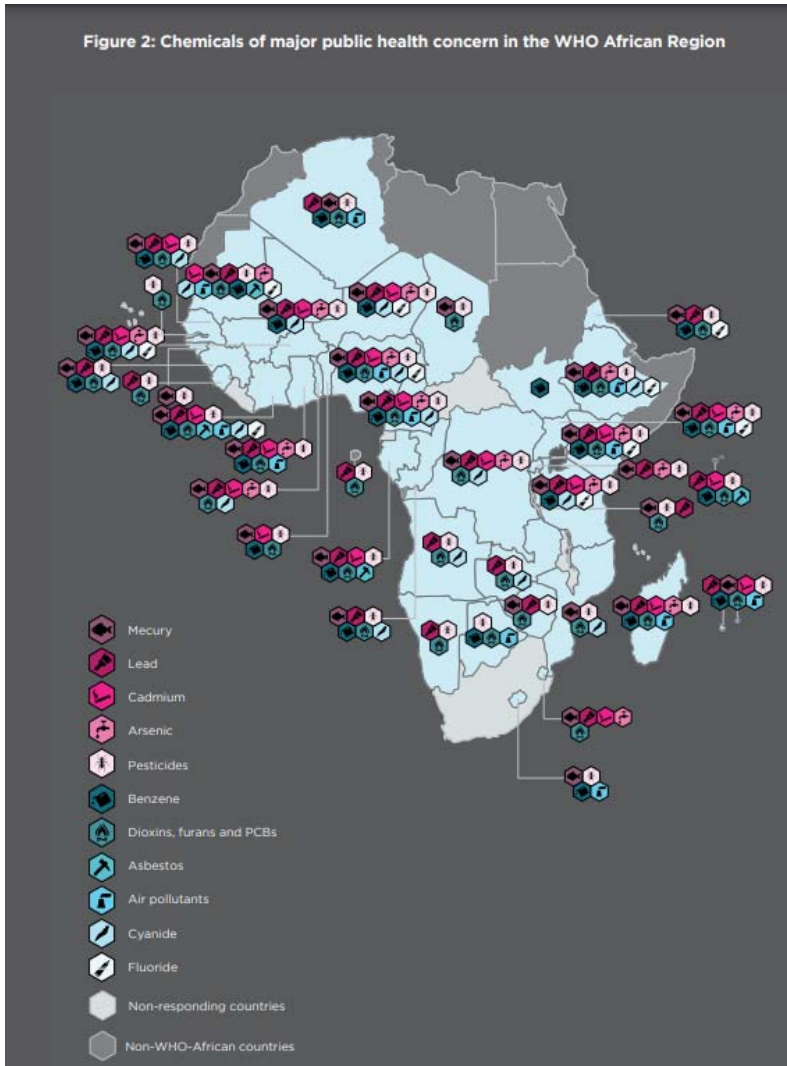
Industrial waste in liquid form is usually discharged into sewerage systems or rivers as effluent, while solid waste is either dumped in landfills or pits within workplace premises.

Question slide

- What are the issues with waste management from your perspective?
- Type answers in meeting chat

Chemical Hazards and Public Health – what's the problem?

Figure 2: Chemicals of major public health concern in the WHO African Region



Chemicals of concern

Heavy metals – mercury, lead, cadmium, arsenic

Fluoride

Cyanide

Air pollutants

Hazardous pesticides – organophosphates and organochlorines

Persistent Organic Pollutants – dioxins & furans, PCBs

Benzene and PAHs

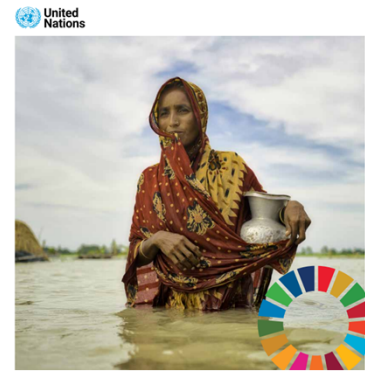
Question slide

- What are the key chemicals of concern in your country from your perspective?
- Please type answer(s) in the chat

International Health Regulations and other Mechanisms



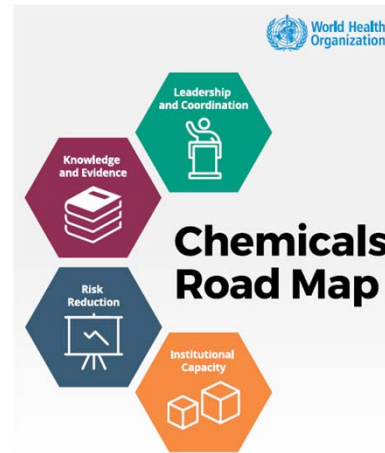
The Sustainable Development Goals Report
2022



International Health Regulations (2005) and chemical events



World Health Organization



Road map to enhance health sector engagement in the Strategic Approach to International Chemicals Management towards the 2020 goal and beyond



INTERNATIONAL HEALTH REGULATIONS (2005)

STATE PARTY SELF-ASSESSMENT ANNUAL REPORTING TOOL



World Health Organization

Indicators

World Health Organization

International Health Regulations - Chemical Events

- Annex 1 - Core competencies concerning chemical incidents and emergencies should include:
 - legislation appropriate for chemical emergency surveillance and response
 - national chemical emergency coordinating structure
 - national surveillance system for chemical events
 - chemical incident and emergency response plan
 - coordination and collaboration between all relevant stakeholders
 - national risk assessment
 - specialist advice on chemical poisonings
 - supplies for managing victims of larger scale chemical incidents

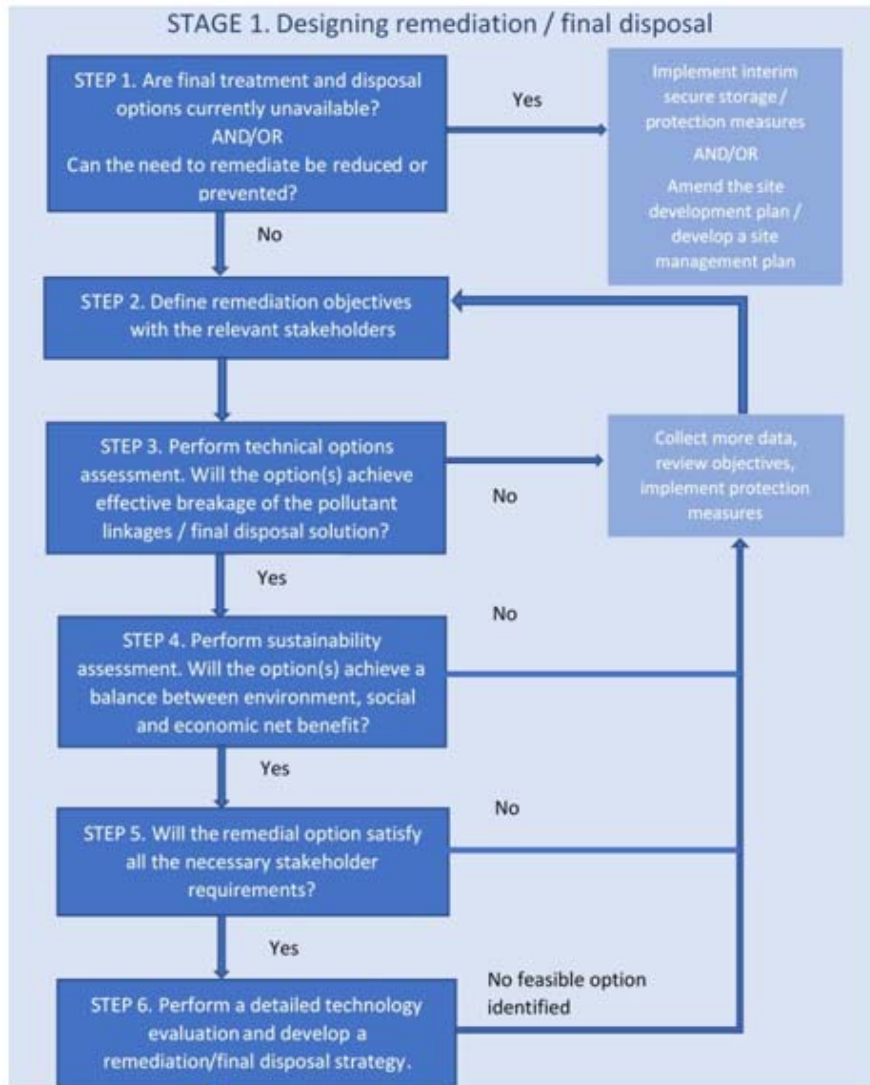


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What are the challenges with establishing and maintaining these core competences for chemicals?

Example IHR Strengthening Activity: Waste management tool



Chemical Events – examples of incidents reported under IHR

International Health Regulations (2005) and chemical events



Table 1: Examples of chemical events of international public health significance (assessed by applying the decision criteria listed in Annex 2 of the IHR (2005))

Year	Location	Description of event (Reference)	Consequences	IHR (2005) Annex 2 criteria*
2006	Côte d'Ivoire	Dumping of waste in the city of Abidjan (UNDAC, 2006; WHO, 2009)	10 deaths, thousands made ill; international assistance was needed	Yes to (i) and (ii); no to (iii) and (iv)
2006	China	Plant explosion releasing 100 tonnes of pollutants in the Songhua River, which crosses international borders (UN, 2006; WHO, 2009)	Five deaths; millions of people without water for several days	Yes to (i), (ii) and (iii); (iv) unknown
2006	Panama	Diethylene glycol in a cough syrup (Rentz et al., 2008; WHO, 2009)	At least 100 deaths	Yes to (i), (ii), (iii) and (iv)
2007	Angola	Sodium bromide confused	At least 460 people ill	Yes to (i) and (ii)

Chemical incident examples - Africa

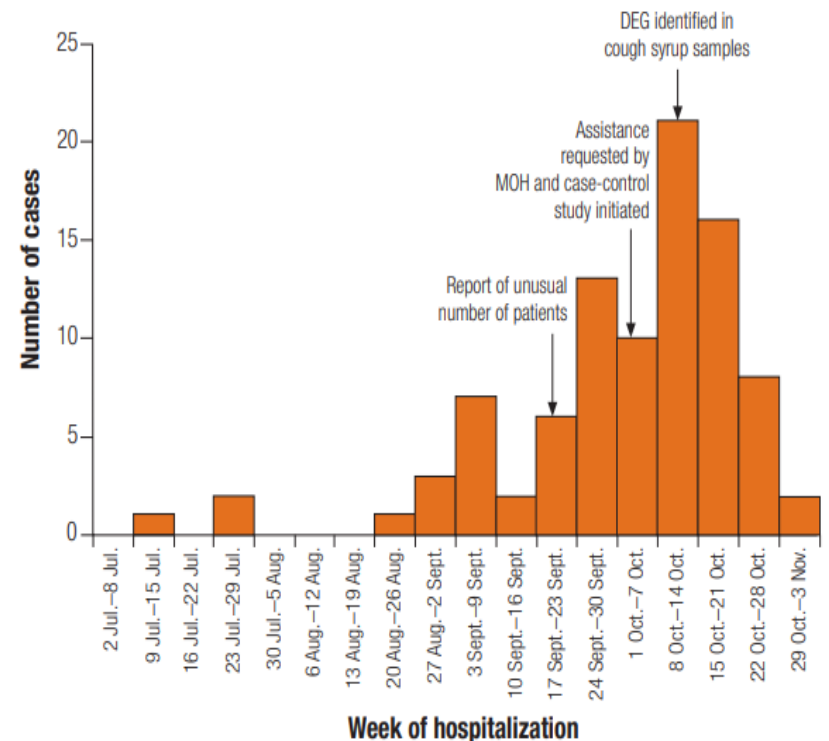
Annex 1: Chemical incidents reported by responding Member States

Country	Chemical event	Period of event	Location	Cases/fatalities
Algeria	Nitrate poisoning	2013	Chlef	Unknown
Angola	Lead poisoning	2012	Luanda	Unknown
	Bromide poisoning (table salt contaminated with sodium bromide)	2 November to 5 December 2007	Municipality of Cacuaco	467 people poisoned, mostly children
	Poisoning of unknown cause in schools	2011-2013	Luanda, Huila and Huambo	Unknown
Botswana	Occupational exposure to benzene	2002	Ceratex locality, Gaborone	Unknown
	Methanol intoxication in students	2003	Macha Senior Secondary School, Kang	Unknown
	Inhalation of sodium hypochloride	2010	Poultry in Gaborone North	Unknown
Burundi	Aldicarb poisoning	2003	Bubenza, Bujumbura Rural in Western Burundi	10 fatalities
Cameroon	Pesticide poisoning	2004	Batcham in Ouest Province	4 fatalities
	Pesticide poisoning	2011	Penja in Littoral Province	No fatalities

Case Study: Detection, reporting and alerting of unusual signs and symptoms

- In September 2006, a Panamanian physician reported an unusual number of patients with unexplained acute renal failure.
- Patients typically presented with abdominal symptoms, such as nausea, vomiting, epigastric discomfort and diarrhoea.
- Many patients also exhibited a spectrum of neurological effects.
- Despite dialysis, 12 out of 21 (57%) patients died.

Fig. 1. Number of patients admitted with acute renal failure due to DEG poisoning in Panama, from 2 July 2006 to 3 November 2006



DEG, diethylene glycol; MOH, Ministry of Health.

Case Study: Detection, reporting and alerting of unusual signs and symptoms

- First, an infectious aetiology was suspected.
- Second, an antihypertensive medication was suspected.
- Finally, when two affected patients presented to a specific CSS hospital with bottles of a Panamanian-produced prescription liquid cough syrup, contaminated medication was suspected.
- Diethylene glycol (DEG) was found as a contaminant of raw materials used in the production of pharmaceuticals. DEG is a colourless and odourless liquid and a human toxicant.



Question

Are there any other common chemical incident scenarios?

Type answer(s) in chat

Identifying the problem

1. Environmental contamination



2. Health effects following known exposure



3. Health effects of unknown aetiology

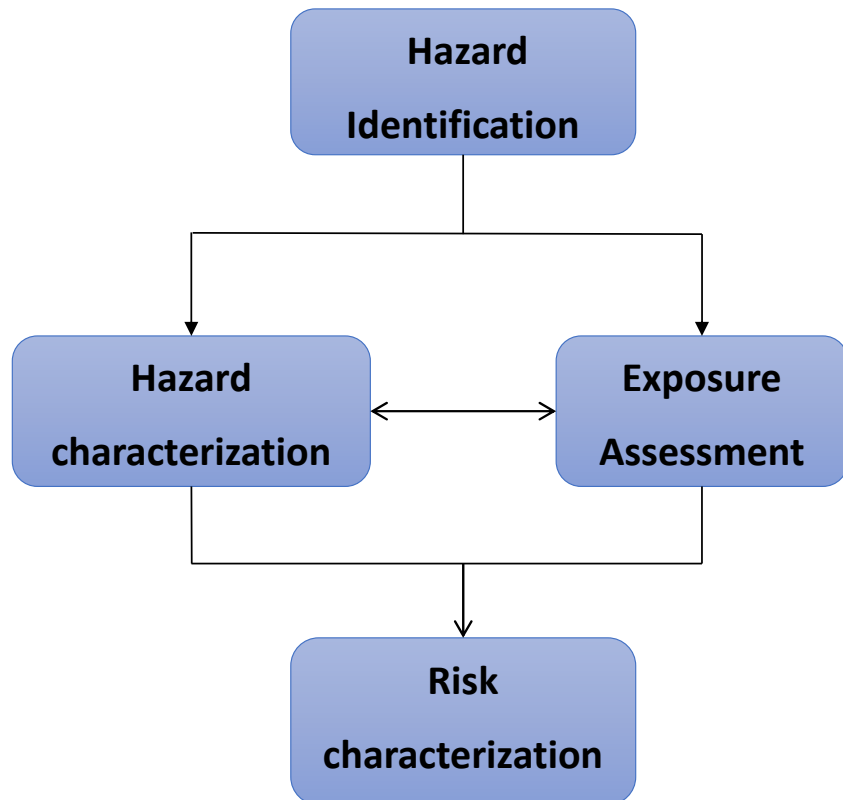


Identifying the problem - consideration of risk assessment

Chemicals released into the environment may cause further contamination (whether direct or indirect) to other individuals.

- The public health impact of this will depend on:
 - Toxicity of the chemical
 - Time period and route of exposure (inhalation, ingestion, dermal contact)
 - Physicochemical properties i.e. how it behaves in the environment
 - Degradation properties (may be worse than the original chemical)
 - The presence of protective environment/media (e.g. buildings)
- The risk assessment process can take this into account and prevent further exposures

Identifying the problem - The Risk Assessment Process



In the event of a chemical incident, competent risk assessors will apply the risk assessment process to:

- Identify the hazard
e.g. what is the chemical, is it hazardous to humans?
- Characterise the hazard
e.g. what properties does the chemical possess?
- Assess the level of exposure
e.g. how would people come into contact with it, how much are they exposed to?
- Characterize the risk
e.g. how does the exposure compare to established guidance values for the chemical?

Prevention of a chemical release

Examples of ways to reduce the likelihood of a chemical incident from occurring:

- legislated environment
- reducing the amount and safer alternatives
- safe location
- technical controls
- public education and awareness



Source: WHO - https://www.who.int/hac/events/drm_fact_sheet_chemical_safety.pdf?ua=1

Preparedness – practical activities

- Risk register
- National all hazards plan
- National chemical plan
- Planning
- being aware of databases on chemicals, sites, transport routes and expertise.



Preparedness – practical activities

- communication
- emergency response guidelines
- Practice
- chemical incident surveillance.



Africa CDC Strategic Objectives

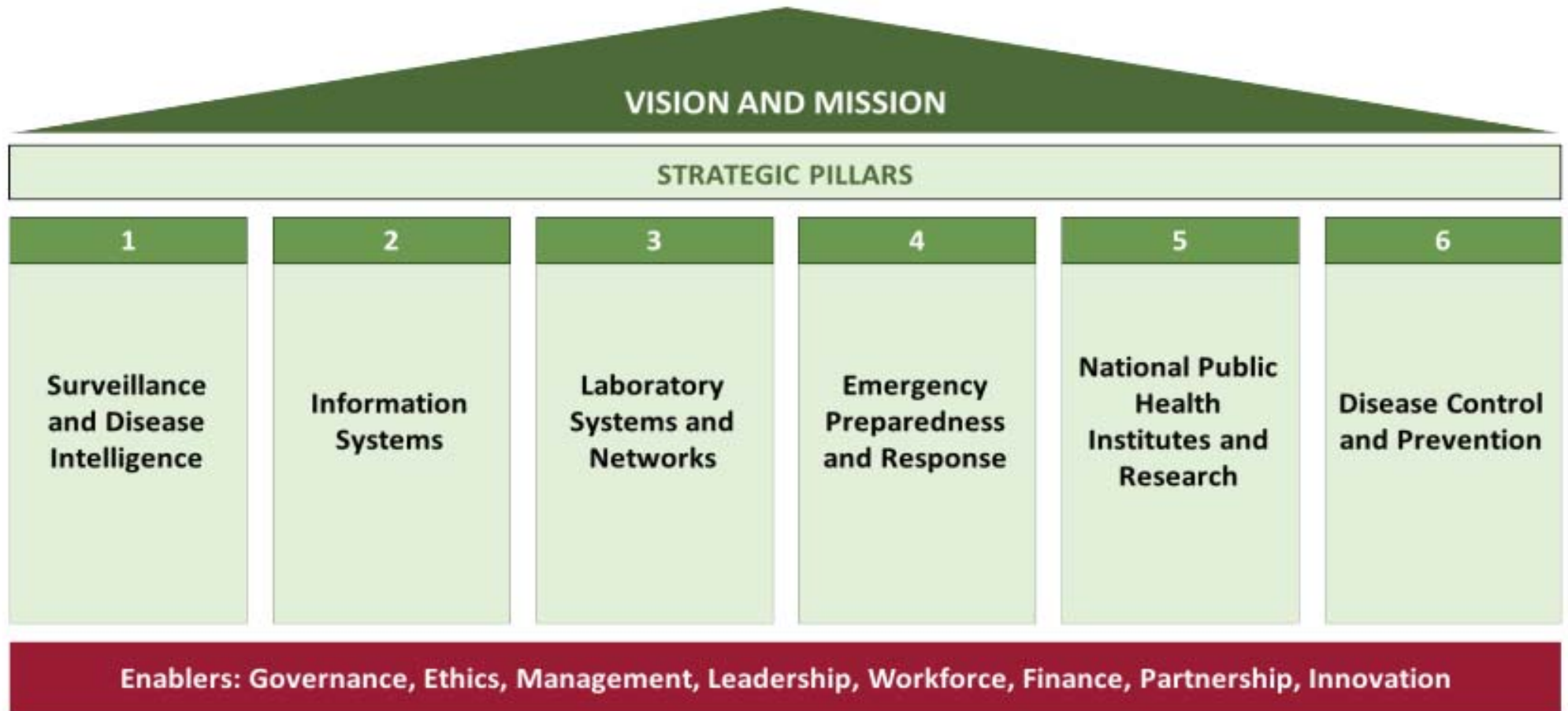


Figure 1. Pillars of Africa CDC

Next session – June 29th

Detection for chemical hazards and public health – surveillance, analysis and poisons information

This session will present some introductory level content around:

- methods & capacities for analysis & detection for chemicals
- common surveillance methods for identification of chemical issues of potential public health concern.
- It will also introduce the role of poisons information centres and how they are an important for both detecting and respond to chemical events.



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Thank you for listening

Any questions?