

# Mass-Gathering & Related Hazards

## Objectives

- Define mass gathering.
- List mass gathering characteristics that represent public health risk.
- List and understand the steps of mass gathering risk assessment.
- Identify risk based on event assessment.
- Understand the components of risk identification and characterization.
- Understand the components of risk management: surveillance and response.
- Understand incident response system.
- Understand the role of WHO in mass gathering.

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# Mass-gathering and related hazards

## Definitions



### Mass gatherings (MGs)

1. Are events attended by large numbers of individuals, concentrated in a specific area for a specific purpose and over a limited period of time <sup>1</sup>
  2. Are events attended by a sufficient number of people to strain the planning and response resources of the host community, state/province/, nation, or region where it is being held.
  3. **The World Health Organization (WHO)** definition also takes a broader view of mass gatherings to include the public health dimensions and **defines** mass gatherings as events attended by a sufficient number of people to potentially strain the public health resources of the community, city, or nation hosting the event.
- Number of participants: **>1000 persons**, although most literature suggests >25000 persons

### Mass gatherings medicine

- is an **area of medicine that deals with health aspects during mass gatherings** including the health effects and risks of mass gatherings and strategies for effective health services delivery during these events.
- The formal discipline of mass gatherings medicine was launched at the World Health Assembly of Ministers of Health in Geneva in May 2014.

## Examples of mass gatherings

### Hajj <sup>2</sup>



### The London Olympics 2012

- 10,250 Olympic athletes \ 4,000 Paralympic athletes \ 20,000 press and media \ 180,000 spectators/day
- 17,000 people living in the Olympic Village
- Estimates of 4.5 million visitors to London
- 26 Olympic sports in 30 venues
- 20 Paralympic sports in 21 venues

1. In other words, mass gathering is a lot of people in a confined space
2. During Hajj, the country hosts millions of people. This confined area creates a risk for hazards that threatens public health to spread and injure those people. Such mass gatherings require huge planning and preparation and identifying potential risks and figuring ways to overcome them.

# Mass-gathering and related hazards

## Types of Mass-gathering

Fairs, exhibitions  
(World Expo  
Shanghai)

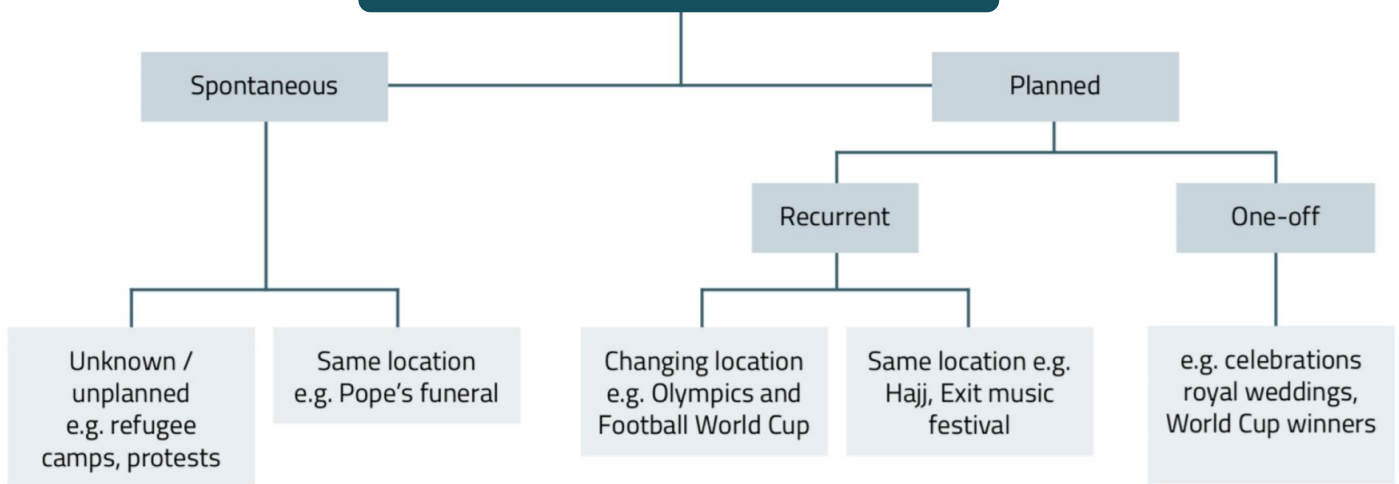
Concerts, festivals  
(Riyadh season,  
Glastonbury, UK)

Sports (Olympics)

Religious (Hajj)

Political (G20)

## Categories of Mass-gathering



## Where is the risk in MG?

- Mass gatherings can pose several significant public health challenges to the health and security authorities both within the host country and abroad.
- They place additional pressures on health systems, which must operate for the duration of the mass gatherings stretched to surge capacity.<sup>1</sup>
- Require intersectoral approaches to risk mitigation and coordination and cooperation across multiple disciplines, agencies, sectors, and ministries

MG  
characteristics  
that represent  
public  
health risk

### Higher population concentration

- Diversity of population characteristics<sup>2</sup>
- Different communities/ parts of the world/ regions
- Imported diseases
- Epidemic prone diseases
- Different health-related behavior

### Pressure on infrastructure

- Hotels
- Food sales
- Healthcare system aviors

### Environmental conditions

- Heat/ cold
- Vectors of diseases

### Political attention

- Terrorism/ bioterrorism

1. For example Iran facing the coronavirus their healthcare system collapsed  
2. Age, gender, disabilities, comorbidities...etc

# Mass-gathering and related hazards

## Risk of Outbreak

- The importation of infectious diseases during a mass gathering may result in outbreaks.
- Mass gatherings health deals with the diverse health risks associated with mass gatherings including **transmission of infectious disease**, non-communicable disease, **trauma** and injuries (occupational or otherwise), environmental effects (such as, heat-related illnesses, dehydration, hypothermia), illnesses related to the use of drugs and alcohol and deliberate acts, such as terrorist attacks

## Examples of outbreaks

Year	Location	Event	Cause	Deaths	Injuries
1993	Madison, WI, USA	Football game (12 000)	Crowd crush	0	69
1994	Athlone, South Africa	Political rally (20 000)	Crowd surge	3	21
1994	Mecca, Saudi Arabia	Religious festival (2 500 000)	Crowd surge	270	Unknown
1994	Baytown, TX, USA	Sports event	Grandstand collapse	1	17
1994	Saugerties, NY, USA	Rock festival (350 000)		2	7500
1995	Rio de Janeiro, Brazil	Rock concert (3 500 000)		Unknown	Unknown
1996	Cleve, Australia	Circus	Stand collapse	0	48
1997	Mecca, Saudi Arabia	Religious festival	Fire	343	2000
1997	Tel Aviv, Israel	Sports event	Bridge collapse	4	Unknown
1997	Ciudad del Este, Paraguay	Political rally	Structural collapse	38	100+

## Risk assessment <sup>1</sup>

### 1 Risk identification

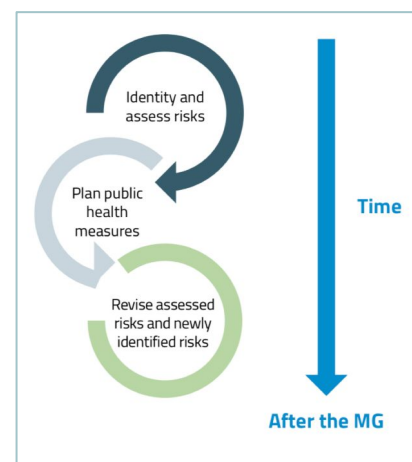
(depending on event assessment)

### 2 Risk characterization

(impact, likelihood)

### 3 Risk management

(surveillance and response)



The aim of risk assessment is to:

- Know the risk **by** risk assessment, identification
- Know when it happens **by** surveillance
- Know what to do when it happens **to prepare** a response

1. Risk assessment starts with risk identification through assessing the type of event. For example, if the event was religious (ex. Hajj) you need to expect elderly and people with comorbidities to gather. After identifying the risk we need to characterize it whether it's major or minor risk. Depending on the risk characterization, a plan must be developed to manage it.

# Risk assessment

## 1 Risk identification

### Host country context assessment

- Systems: need for enhancement in surveillance, testing, reporting, response and command, control and communication
- Training: responsibilities
- Population factors: immunity (hosts, visitors)
- Baseline status for CD

### Examples of MG event assessment characteristics

**For understanding !**

Mass Gathering Features		
Type	Sporting event	<ul style="list-style-type: none"> <li>• Energetic, potentially emotionally aggressive mood. Risks of injuries and violence.</li> <li>• Risk of cardiovascular events</li> </ul>
	Religious event	<ul style="list-style-type: none"> <li>• Higher risk of participants with existing medical conditions which may increase the need for on-site medical care</li> </ul>
	Cultural event	<ul style="list-style-type: none"> <li>• Risk of alcohol and drug use</li> <li>• Risk of sexually transmitted infections</li> <li>• Risk of dehydration, hyperthermia, hypothermia</li> </ul>
	Political event	<ul style="list-style-type: none"> <li>• Energetic and potentially aggressive moods</li> <li>• Risk of demonstrations or riots, injuries</li> </ul>
Activity level	Seated	<ul style="list-style-type: none"> <li>• Risk of collapse if infrastructure inadequate to support attendees</li> </ul>
	Standing	<ul style="list-style-type: none"> <li>• Risk of injuries, fatigue</li> </ul>
	Mobile	<ul style="list-style-type: none"> <li>• Risk of injuries, crushes</li> </ul>
duration	≤ 24 hours	<ul style="list-style-type: none"> <li>• Lack or decrease of perceived vulnerability by participants</li> <li>• Lack of preparations by participants, health systems due to shorter duration</li> </ul>
	1 day - week	<ul style="list-style-type: none"> <li>• Lack or decrease of perceived vulnerability by participants</li> <li>• Lack of preparations by participants, health systems due to shorter duration</li> </ul>
	1 month	<ul style="list-style-type: none"> <li>• Higher risk of communicable disease</li> <li>• Increased duration of strain on public health system</li> </ul>
	> 1 month	<ul style="list-style-type: none"> <li>• Higher risk of communicable disease</li> <li>• Extended strain on public health systems due to need to function at surge capacity for the whole period</li> </ul>
Occurrence	Recurrent	<ul style="list-style-type: none"> <li>• Excessive reliance on previously used systems</li> <li>• Inflexible health systems</li> </ul>
	Single	<ul style="list-style-type: none"> <li>• Inadequate health systems</li> <li>• Lack of planning</li> </ul>
Environmental Factors		
Season	Summer	<ul style="list-style-type: none"> <li>• Risk of dehydration, heat stroke/hyperthermia</li> </ul>
	Winter	<ul style="list-style-type: none"> <li>• Risk of hypothermia</li> <li>• Risk of injuries with snow or ice</li> <li>• Potential for damage to infrastructure</li> </ul>
	Wet	<ul style="list-style-type: none"> <li>• Drowning, flood-related injuries</li> <li>• Waterborne disease</li> <li>• Potential increase in vector-borne and waterborne diseases</li> <li>• Loss of property, damage to infrastructure</li> </ul>
	Dry	<ul style="list-style-type: none"> <li>• Risk of dehydration, waterborne disease</li> <li>• Risk of allergies</li> <li>• Risk of fires, decreased air quality</li> </ul>

# Risk assessment

1

## Risk identification: cont

Participant Characteristics		
Participant origins	National	<ul style="list-style-type: none"> <li>• Complacency/low perceived vulnerability with health risks</li> <li>• Potentially low immunity for imported infectious diseases</li> </ul>
	International	<ul style="list-style-type: none"> <li>• Risk of importation/exportation of disease</li> <li>• Risk of delayed access to healthcare due to unfamiliarity with healthcare system</li> <li>• Risk of delayed detection of pathogens by inexperienced healthcare system</li> <li>• Risk of environmental risks for those not acclimatized such as heat or cold, altitude, pollution</li> <li>• Communicable disease for unvaccinated or vulnerable travellers to endemic pathogens and parasites</li> <li>• Unknown immunity of participants</li> </ul>
Density of participants	High density	<ul style="list-style-type: none"> <li>• Risk of communicable disease</li> <li>• Risk of mass casualty event</li> </ul>
Participants health status	Elderly or chronically ill	<ul style="list-style-type: none"> <li>• Risk of non-communicable disease</li> <li>• May require higher levels of health services</li> </ul>
	Disabled	<ul style="list-style-type: none"> <li>• Local infrastructure may not be adequate</li> <li>• Will need special care</li> <li>• Emergency preparedness requires planning</li> </ul>
Venue Characteristics		
Venue	Indoor	<ul style="list-style-type: none"> <li>• Poor air circulation</li> </ul>
	Outdoor	<ul style="list-style-type: none"> <li>• Potential for inadequate sanitation, food and water preparations</li> </ul>
	Contained venue (fenced)	<ul style="list-style-type: none"> <li>• Overcrowding</li> <li>• Spread of infectious diseases</li> </ul>
	Uncontained venue	<ul style="list-style-type: none"> <li>• Difficulty locating services near attendees due to geographic spread</li> </ul>
	Rural	<ul style="list-style-type: none"> <li>• Increased distance to health services, particularly advanced level care</li> <li>• Increased potential for contact with animals and insects</li> </ul>
	Temporary	<ul style="list-style-type: none"> <li>• May lack infrastructure for safe food and water delivery</li> <li>• May lack infrastructure for emergency medical services</li> <li>• May lack financial capacity to create infrastructure necessary for a safe and successful MG</li> </ul>
	Permanent	<ul style="list-style-type: none"> <li>• Infrastructure may be aged or failing</li> <li>• Infrastructure may need upgrading in order to comply with current standards (e.g. accessibility or fire codes)</li> </ul>
Alcohol sold	Yes	<ul style="list-style-type: none"> <li>• Risk of injuries, including alcohol poisoning</li> <li>• Risk of drunk driving, property damage</li> <li>• Risk of violence</li> </ul>
likely drug use	Yes	<ul style="list-style-type: none"> <li>• Risk of injuries</li> <li>• Risk of overdose</li> <li>• Risk of poisoning due to consumption of unknown, counterfeit or low-quality drugs</li> </ul>
level of medical services at the venues	First aid stations	<ul style="list-style-type: none"> <li>• May provide some basic medical care</li> <li>• Triage services</li> <li>• Potential contact point for higher level medical support services</li> </ul>
	On-site Medical posts	<ul style="list-style-type: none"> <li>• May provide some basic medical care</li> <li>• Triage services</li> <li>• Potential contact point for higher level medical support services</li> </ul>
	On-site hospitals for participants	<ul style="list-style-type: none"> <li>• Easy proximity to higher level medical support services</li> <li>• Increased number of healthcare providers</li> </ul>
Catering	Professional catering	<ul style="list-style-type: none"> <li>• Lower risk of food-borne illness</li> <li>• Improved food security</li> </ul>
	Informal	<ul style="list-style-type: none"> <li>• Increased risk of food-borne illness</li> </ul>
	Self-catering	<ul style="list-style-type: none"> <li>• Increased risk of food-borne illness</li> </ul>
Hygiene / Sanitation services	None	<ul style="list-style-type: none"> <li>• Increased risk of infectious disease, including respiratory and diarrhoeal diseases</li> <li>• Lack of hand washing facilities</li> <li>• Lack of toilets</li> <li>• Increased risk of open defecation</li> </ul>
	Hand washing stations	<ul style="list-style-type: none"> <li>• Decreased risk of infectious disease</li> <li>• May include alcohol-based disinfectants</li> </ul>
	Latrines: temporary	<ul style="list-style-type: none"> <li>• Improved sanitation and waste disposal</li> </ul>
	Latrines: permanent	<ul style="list-style-type: none"> <li>• Preferable to temporary latrines</li> <li>• Requires more infrastructure than temporary latrines for construction and maintenance</li> </ul>

# Risk assessment

## 1 Risk identification: cont

- After we finished assessing the event we need to identify the risks based on event assessment

### Event assessment

Type: Religious event

Season: summer

International

Venue: indoor

Venue: temporary

Catering: informal

Hygiene: hand washing stations

### Risk identification

Older population with NCD, in-site medical care

Risk of dehydration, heat stroke

Imported diseases

Poor air circulation

Poor infrastructure

Risk of food-borne illnesses

Decreased risk of infections

## 2 Risk characterization

- After identifying the risk we need to characterize its impact on the mass gathering and public health (minimal-severe) .
- **In other words, what is the risk likelihood?**

	Potential impact on the mg	Potential impact on public health
<b>Minimal</b>	Little or no consequence or disruption to the MG	Little or no consequences
<b>Minor</b>	Small impact on MG can be managed with little impact on the event	Few illness or injuries which public health and medical services can manage
<b>Moderate</b>	Some controlled impact on the Games and reputation for host	Death and or injuries or illness occur. Public and medical services are strained
<b>Major</b>	Event is disruptive to MG and reputation of host	Many deaths, injuries or illness. Disrupts public health and medical services
<b>Severe</b>	Event causes cancellation of some or all of MG. Significant adverse impact on MGs and host reputation.	Substantial loss of life and serious injuries or illness. Widespread disruption of local services and infrastructure

### Why risk characterization?

- If the risk estimate that a particular event will occur is highly uncertain, **risk management decisions might be more conservative** than in the case of an event deemed to be highly likely <sup>1</sup>

### Then what?

- Once the risks have been mapped on the risk matrix, the objective of public health planning for the MG will be to reduce the likelihood of a threat occurring and to reduce the consequences of each threat: risk management

1. We always need to prioritize the risks we identified after we assessed the mass gathering. Because we can never deal with all risks.



# Risk assessment

3

## Risk management

- What mitigation measures can be put into place to manage the risk and reduce either the probability or impact?

### Management can include:

- Initiating **new surveillance programmes**
- Implementing a range of **special prevention** (risk of food-borne, waterborne, airborne and person-to-person spread of diseases)
- Developing **plans for immediate acquisition** of additional human and material **resources** should a crisis occur

## Surveillance in MG

When planning surveillance for the MG, the questions that public health authorities are likely to ask are:

1. What diseases or syndromes should surveillance be conducted for and what is the risk of these?
2. What is the best type of public health surveillance system(s) to use? (timeliness and sensitivity)
3. What are the special considerations for outbreak or public health response?

Diseases with the following characteristics should be considered for surveillance:

1. Have an outbreak potential (modes of transmission enhanced in the MG e.g. **respiratory spread**)
2. Are known to be of particular potential use as bioterrorism agents
3. May cause severe illness and require investigation and / or the application of control measures even for a single case
4. Imported diseases not usually seen in the host country (especially drug-resistant organisms and unusual serotypes)
5. Endemic diseases for which event attendees may have no immunity.
6. Highly infectious diseases (e.g., **norovirus or measles**).
7. Diseases or events that need to be reported under the IHR (2005).

### Surveillance Problems posed by MGs

1. Short time – problem for collecting information – systems sensitive and responsive
2. Large, diffuse and highly varied population Include diseases not normally surveyed?
3. People arrive from/return to many locations
4. Multiple opportunities for exposure: air travel – food – water – physical contact
5. Varying health surveillance capabilities of – host nation–originating nation(s)
6. Tracking (time/location) and notification – not just in location, but after returning

### Preparing a surveillance plan

1. Identify monitoring resources at all levels
2. Define conditions to look for
3. Establish priorities
4. Set threshold / alert levels
5. Identify mechanism for prompt investigation and feedback
6. Link notification and response plan



# Risk assessment

## MG Planning

### A safe and healthy MG requires

- Early multi-sectoral preparation involving:
  - event organizers
  - health emergency managers
  - public health authority representatives
  - local hospital emergency departments
  - first-aid personnel
  - other sectoral partners (e.g. police, emergency services, security services)
- Depends on risk assessment and risk identification
- **Medical care needs to be offered at the mass gathering but local care needs to be maintained as usual**

Table 1: Examples of conditions included in surveillance at two previous MGs

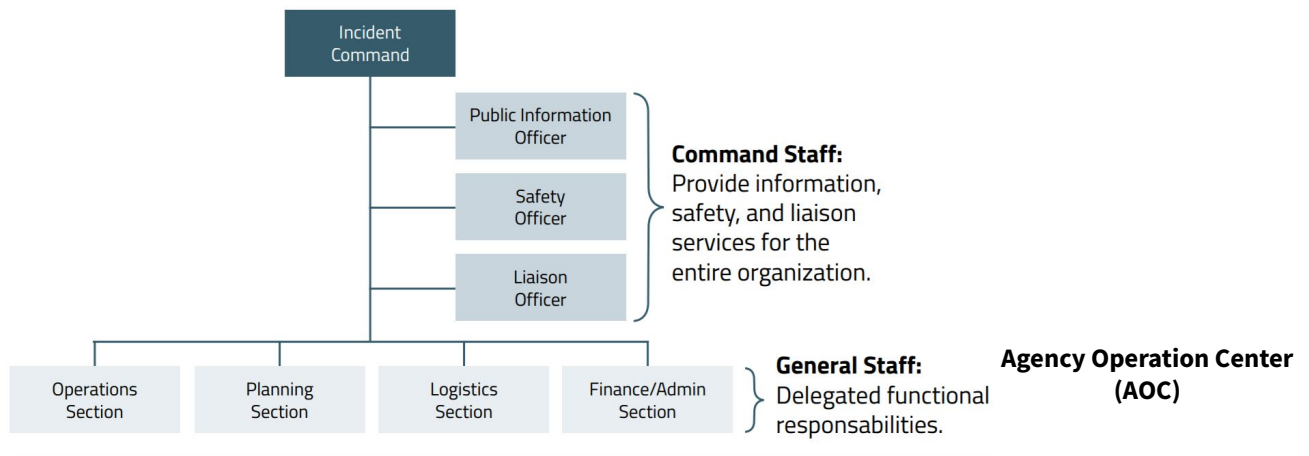
<p>For the ICC Cricket World Cup West Indies 2007 the following syndromes, which were included in the 'usual' reporting requirements, were reported daily:</p> <ul style="list-style-type: none"> <li>• Acute flaccid paralysis</li> <li>• Fever and haemorrhagic symptoms</li> <li>• Fever and neurological symptoms</li> <li>• Fever and respiratory symptoms &lt; five years and &gt; five years</li> <li>• Fever and rash</li> <li>• Gastroenteritis &lt; five years and &gt; five years</li> </ul> <p>In addition the following conditions were added to the MG specific surveillance syndrome:</p> <ul style="list-style-type: none"> <li>• Fever and jaundice</li> <li>• Heat stroke</li> <li>• Injuries</li> </ul> <p>For the 2000 Sydney Olympic and Paralympic Games, an iterative risk assessment process led to the following conditions for surveillance via emergency departments and on-site medical clinics:</p> <ul style="list-style-type: none"> <li>• Injury occurring outside the home</li> <li>• Vomiting</li> <li>• Pneumonia</li> <li>• Diarrhoea</li> <li>• Influenza-like illness</li> <li>• Illicit drug-related</li> <li>• Febrile illness with rash</li> <li>• Meningitis</li> <li>• Bloody diarrhoea</li> <li>• Pertussis</li> <li>• Acute viral hepatitis</li> <li>• Other (Olympic family members only)</li> </ul>
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## Response

### Establish a major incident response system

- Well rehearsed multi-agency and cross government response systems.
- Effective liaison across health sector.
- Public health engagement with: – Police & other emergency services (threat assessment, incident response) – Central government (threat assessment, preparedness, response) – Intelligence services (threat assessment).

Figure 2: Incident Command System (ICS) structure



## Legacy and Evaluation

- The wealth of knowledge and expertise generated from mass gatherings can drive best health promotion, education, and risk mitigation strategies and optimize the planning and delivery of effective health services during future mass gathering events.

Figure 2: framework legacy process

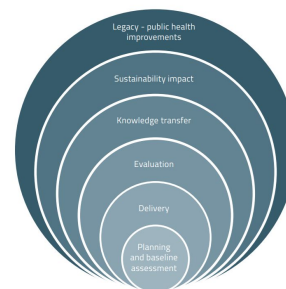
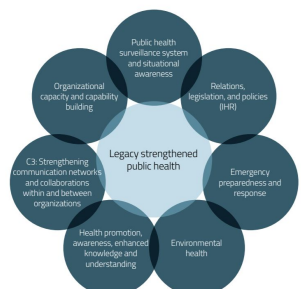


Figure 3: interconnected legacy areas



1. The general staff are divided into sections to plan for the event. In case of any issue they face they immediately report to the agency operation center which in its place report to the commanding staff to decide for an action.

# WHO's role in mass gatherings

**WHO provides advice and technical support to host governments preparing for mass gathering events.**

How does WHO provide support to Member States for mass gatherings?

- To provide advice and technical support to Member States that are hosting mass gatherings, **WHO draws on 5 WHO Collaborating Centres for Mass Gatherings and a Virtual Interdisciplinary Advisory Group (VIAG)**. VIAG is an informal network of mass gathering experts. Their role is to **share expertise on public health requirements** and best practices with any organization considering hosting a mass gathering event.

Activities to support host governments of mass gatherings often include:

- Prior to the event: all-hazard risk assessment, travel medicine and activities to encourage increased physical activity, cessation of tobacco use and avoidance of excess alcohol.
- During the event: international monitoring of potential disease spread and risk assessment, emergency medical services and hospitals and plans to manage fan zones.
- After the event: capture lessons learnt and share expertise with future mass gathering hosts

What governs WHO's work on mass gatherings?

- The decision states that the WHO "Director-General should, where appropriate, work closely with Member States that are planning and conducting mass gatherings to support cooperation and communication between the concerned health authorities in each country, and help Member States strengthen capacities to better utilize the International Health Regulations (2005)".

Does WHO have the power to cancel or move mass gatherings?

- WHO may provide advice and technical guidance to host countries on public health risks, **but has no decision power to uphold, cancel or postpone mass gatherings hosted by Member States.**

# Quiz

## MCQ

1- What is the required number of participants in an event to consider the event as mass gathering ?

- A- >1000 persons
- B- <1000 persons
- C- >100 persons
- D- >20000 persons

2- You were asked to do a risk identification for a sport event which will be held outdoors in summer as part of Riyadh season event. what are the risks that the event may face?

- A- Risk of waterborne diseases , drowning and flood related injuries.
- B- Risk of STDs, hypothermia and non-communicable diseases . poor air circulation, unknown immunity of participants.
- C- Risks of injuries and violence, Risk of cardiovascular events, Risk of dehydration, heat stroke/hyperthermia, Potential for inadequate sanitation, food and water preparation
- D- Risk of communicable disease, risk of food-borne illness, Risk of injuries, Risk of alcohol poisoning

3- What is the definition of " Mass gatherings" ?

- A- Aspect of health and disease related to travel
- B- Health issues that call for actions on the global forces that determine the health of people
- C- Involvement of cities in the work of international organizations
- D- Temporary collection of large numbers of people at one site or location for a common purpose

4- A planned combination of educational, political, regulatory, and organizational supports for actions and conditions of living conducive to the health of individuals, groups, or communities is the definition of ?

- A- Health promotion .
- B- Health education .
- C- Community health.
- D- Mass gathering

3- Which of the following mass gathering category has the greatest threat to public health

- A- Hajj
- B- Pope's funeral
- C- Olympics
- D- Wedding celebration

## Answers

Q1	Q2	Q3	Q4	Q5
A	C	D	A	B

Thank You and  
Good Luck



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