

# PILGRIM STAMPEDES AND CROWD CONTROL

Dr W G Prasanna Kumar  
Centre for Climate and Disaster  
Management

Dr MCR HRD Institute

# Stampede

**Two major behavioural reasons of stampede: 1. Anxiety & 2. Panic.**

- Panic come from any where, stampedes just need a small panic trigger.
- Nervous people behave differently without giving it a thought.
- Strange ways decrease chance of survival and become victims of stampede.
- Uncoordinated rush or push of people look for survival typically.
- Some People calm panic, others help those fallen or aid weakest to escape.

**Panics and stampedes: two types:**

- People rush to acquire valuables: better seats, first darshan, glimpse of celebrity
- People run away to save lives from fire and hazard. Can cause human stampede and deaths of hundreds.













- **Akshardham Temple** Sept 25, 2002
- 2 armed terrorists at [Akshardham Monument](#) in [Gandhinagar, Gujarat](#) at 4.30pm
- Scaled [fence](#), opened fire, killing a woman and a [temple](#) volunteer immediately.
- 600 devotees in temple
- 29 killed 79 wounded.
- 25 people killed in first assault, 1 state police officer and 1 commando also died in action.
- One more seriously injured commando [Surjan Singh Bhandari](#) died after 2 years being in coma.





- **5 people killed and 15 injured in a stampede in Andhra Pradesh**
- At Shri Durga Malleswara temple in Vijayawada city
- Four women
- Thousands of devotees pressed forward to garland goddess Durga.



- 140 people died in a stampede at a temple in Himachal Pradesh.
- Nainadevi temple, in Bilaspur 160km Shimla.
- A rain shelter on mountain path to temple collapsed
- Triggering rumours of a landslide.





- Sabarimala Ayyappa Temple Tragedy Jan 14, 2011
- More than 100 dead ON Friday, Jan 14, 2011
- 200,000 Pilgrims returning from Pullumedu in Idukki after Makaravilakku & Makarajyothi on Jan 14, 2011.
- More than a million devotees had gathered on mountains in Sabariamala for [Makarajyothi](#)
- Second largest pilgrimage in world





115 people, including women and children, were killed  
100 injured in stampede, half a million devotees came for a festival.  
Rumors that bridge they were crossing was to collapse triggered panic  
Many jumped into river and died  
25,000 were crossing bridge at time of incident on Ratangarh temple route in MP







- **2010 Love Parade in German city Duisburg ended in tragedy**
- **19 people died and hundreds injured in stampede.**
- **Panic broke out in tunnel after festival site was closed due to overcrowding.**





- Stampede Mandhar Devi temple Maharashtra.
- Thousands panicked in religious procession after fire broke out in roadside stalls.
- Many pilgrims crushed & burned to death as fire forced crowds into a narrow stairway leading to hilltop temple.

- **7 pilgrims killed in stampede at religious festival on Ganges West Bengal.**
- 20 pilgrims injured, hundreds tried to board ferry to festival.
- Sagar island hosts festival, Gangasagar Mela.
- Pilgrims drown in river.
- Thousands of devotees also pray at temple of sage Kapil Muni.

.



- 63 children and women killed 28 injured in stampede at temple in Uttar Pradesh for free food and utensils
- Accident inside hermitage of Hindu spiritual guru Kripaluji Maharaj in Pratapgarh district, 180 kilometres from Lucknow.
- All dead were children and women
- Stampede claims its victims from 'weakest' of crowd.

# TEMPLE TRAGEDIES

## February 11, 2013

37 pilgrims killed and scores injured in a stampede at a railway station in Uttar Pradesh's Allahabad. The devotees were headed home from the Kumbh Mela.

## November 19, 2012

18 killed and several injured in a stampede on a bridge over the Ganga river during Chhath Puja in Patna, Bihar.

## September 23, 2012

2 killed in stampede at Radha Rani Temple of Barsana, 45 kilometers from Mathura in Uttar Pradesh.

## September 24, 2012

9 killed and many injured in a stampede at a religious function in Deoghar in Jharkhand.

## January 14, 2012

10 worshippers died in a midnight stampede during a religious gathering in Madhya Pradesh's Ratlam district.

## November 8, 2011

16 crushed to death and dozens injured at Haridwar in Uttarakhand.

## January 14, 2011

104 pilgrims died on Makara Jyothi Day at Sabarimala in Kerala.



# Weather

In 1988 more than 100 persons died and 700 others were injured at Nepal's National Stadium in Katmandu.

A sudden violent hailstorm caused 30,000 spectators to flee the open grandstand but found the exit gates were locked.

# Religious Events

In 1990, 1426 people killed in crowd crush in annual pilgrimage of 2 million at Mecca, Saudi Arabia.

Crush occurred in 500 m long tunnel joining Mecca and Tent City of Mina. Temperatures 44 deg. C outside the air-conditioned tunnel.

It is speculated that someone fell in tunnel blocking movement.

In 1986, 46 pilgrims died in Hardwar, India on a crowded bridge across Ganga. At 12-year cycle of Khumb Mela festival as many as 4 million Hindus gather to bathe in Ganges.

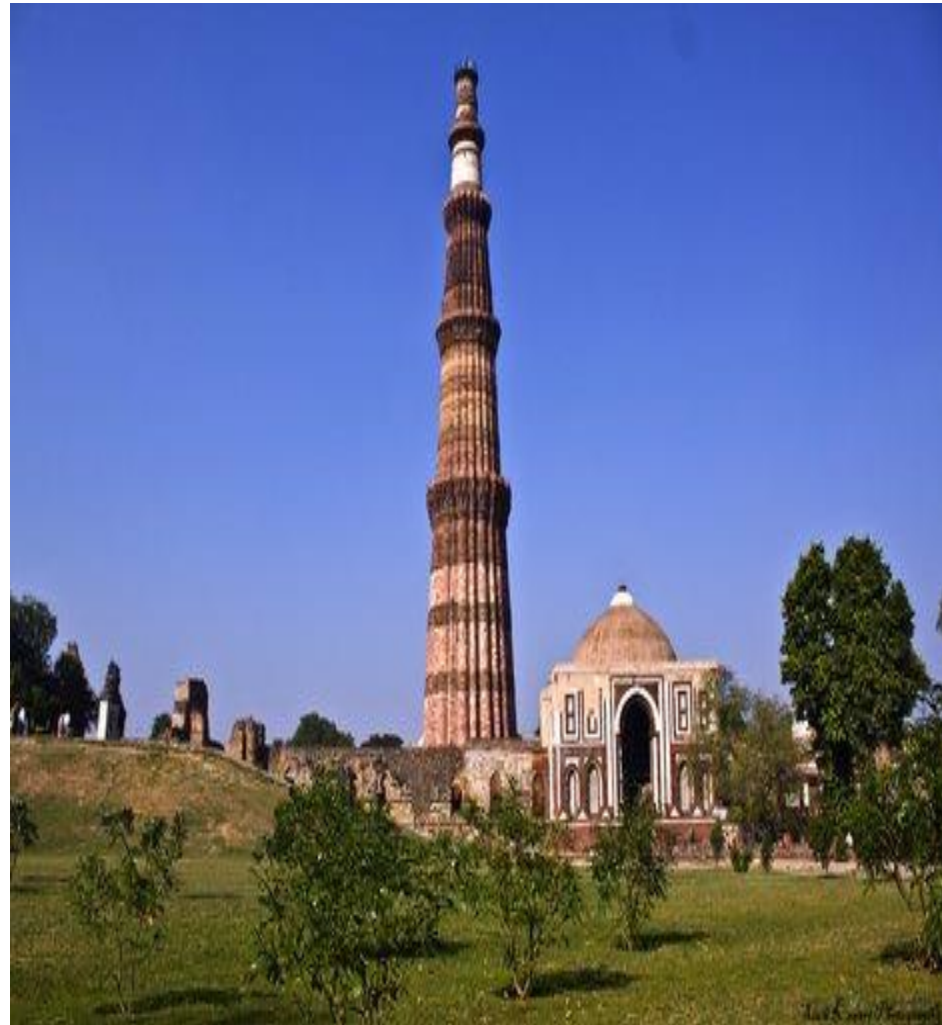
During the 1980 world tour of the Pope, 13 people were killed in two African cities in crowd rushes.





# Power Failure

- In 1981 45 persons died 27 of them children, in Qutab Minar tower, New New Delhi, India.
- Blackout, combined with cries in tower was falling, triggered sudden exodus of 300 to 400 people.



# Food Distribution

In Bangkok, Thailand 19 persons died as crowd of 3,000 assembled to obtain packages of free food.

Crowd was attempting to press through a gate approximately 4m (13 ft.) wide into a meeting hall where food was being distributed.

20 police officers assigned to control the crowd was overwhelmed by the crush.







# CROWDS



# How Crowd Becomes Mob

1. Denial of access
2. Perceived breach of rules
3. Perceived abridgement of rights
4. Lack of organization
5. Excessive or inappropriate use of force
6. Unwillingness to obey rules

**Behaviour is a Function of Person and Environment**



# Emergencies, disasters and the human response

- **Issues around exit decision-making**
  - What are the factors determining when people actually exit? Key predictors:
    - Information on the nature of the threat (rather than a simple siren)
    - Personalization of the warning (i.e. from friends/family rather than a p.a. system)
- Important!* The biggest predictor of survival is time taken to recognize the emergency and move!

# 'Panic' Model

- Crowd:
  - Is less intelligent than the lone individual
  - Will be driven by simple emotions
  - Responds with irrational behaviour
  - Is a source of 'contagion'
- Survival instincts overcome socialization and collective bonds → 'every man for himself'
- Never tell crowds nature of disaster. It leads to panic









# Statistical Correlations:

Threat → We-ness → Helping



# Research on emergency evacuations: General conclusions

- Image of the panicking crowd is overdone
- 'Panic' model should not be used in design, engineering and emergency procedures
- Evidence is that people exit quicker when kept informed
- When people don't help each other it is often due to physical constraints rather than 'selfishness'.



# Don't say 'don't panic'!

- A well-practiced drill
  - WTC bombings of 1993 and 2001:
  - After 1993 they had a well-practiced drill
  - Include fire wardens who know the building and its exits)
- In turn: owners/managers need to take the possibility of emergency seriously
- The formal certification of crowd manager for venues of 500 persons or more is recommended.

# Behavioural Factors in Crowds

- Social Suggestion: Urge to do what others do, feel being in same boat
- Contagion: Collective behaviour and thought where excitement is transmitted from one person to another. Provides crowd with psychological unity, can become a mob.

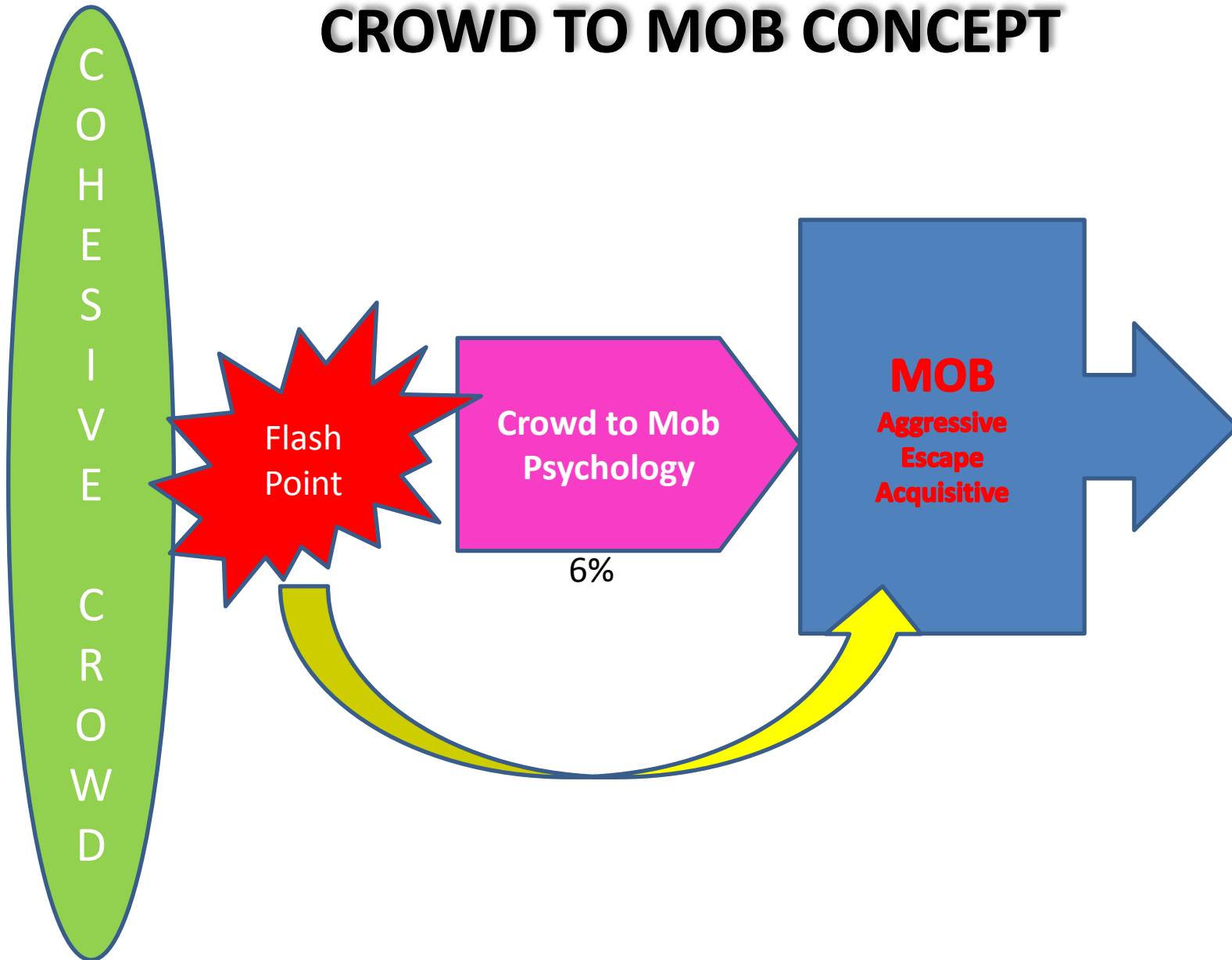
# Mob

“Crowd turns mob when members instilled with purpose and intent to carry out that purpose **regardless** of consequences.”

Strong sense of purpose; Willing to risk arrest, injury, death and destruction.



# CROWD TO MOB CONCEPT



COHESIVE  
CROWD

Flash  
Point

Crowd to Mob  
Psychology

6%

**MOB**  
Aggressive  
Escape  
Acquisitive

# Infiltration, Pass Through, Social Groups



Attractions

# Structural Causes: Crowd Disasters

- Structure collapses
- Barricades/ bamboo railings/wire fence/  
Metal barrier collapse
- Makeshift bridge collapses
- Temporary structure collapses
- Rumours leading to panic and collapse of railings of bridge
- Barriers on way



# Structural Causes: Crowd Disasters

- Poor guard railings, poorly lit stairwells
- Windowless structure, narrow stairs
- Narrow and very few entry/exits
- Absence of emergency exits
- Difficult terrain (hills difficult to access)
- Narrow streets, illegal vendors on sides, sloped gradient,
- Bad weather leading to crushing
- Slippery/muddy roads

# Fire & Electricity

- Building and fire violations
- Elevators catching fire, people on higher floors panic, steep stair designs
- Electricity supply failure creating panic and triggering sudden exodus
- Illegal electric connections
- Short circuit from electrical generator, (synthetic) tent catching fire
- Unauthorised construction surrounded by high brick walls preventing evacuation

# Fire & Electricity

- Fire in makeshift facility, shop
- Cooking in makeshift facility
- Wooden structure/ quick burning acrylic catching fire
- Fire at illegal structure
- Non-availability of fire extinguisher/fire extinguishers not in working condition
- Unauthorized fireworks in enclosed places



# Vulnerability Assessment

## Crowd Crush

- ▣ People need at least 1 square yard of space each to control their movements.
- ▣ Most people who die in crowds die from asphyxiation while standing upright, not from trampling.
- ▣ Compounded force of 5 people crushing in can kill a person.

# Vulnerability Assessment

## Crowd Crush

- ▣ As crowds become more dense, compression increases exponentially.
- ▣ Humans lose consciousness after being compressed for just 30 seconds, they can be brain dead within 6 minutes.
- ▣ Most die without ever falling down.

# Crowd Out of Control

- Mad rush to exit/parking space
- Sudden flow of people in reverse direction
- Wild rush to force way towards entrance/exits
- Crowds attempting to enter venue after start/closing time
- Collision between large inward flows and outward flows



# Crowd Out of Control

- Free distribution of gifts/toys/food/Prasad/alms/blankets/cash/clothes triggering a surge and crush
- Rush during distribution of relief supplies
- Sudden mass evacuation because of natural disaster
- Large number of pilgrims trying to board a bus or ferry
- Mad rush to leave

# Crowd Out of Control

- Tussle to catching a glimpse/autograph of a celebrity
- Rumours of landslide by rains and rush down narrow stairways
- Angry crowd due to delay in start of event/late trains
- Last minute change in platform for train arrival/departure resulting in lots of movements within short time window
- Large (much more than expected) anxious and competitive crowd gathering because of limited period offer

# Crowd Out of Control

- Rush to get covered/free/unnumbered seats at venue
- Scramble to get darshan or pooja tickets
- Crowds trying to re-enter venue (inward/outward flows)
- Sadhus taking wrong route in violation of orders in force
- Unruly and irresponsible crowd behaviour



# Crowd Out of Control

- Security agency firing/teargas/using force leading to panic and stampede
- Weapon brandished in crowd
- Terrorists/separatists/extremists attack/explosions during rush hours
- Tear gas canisters fired towards exits

# Crowd Out of Control

- Crowd forced against sharp metal fencing
- Ineptitude of police in effectively managing crowd and enforcing prohibitory orders
- Fights within groups of crowd and with police, other officials etc.
- Absence of walkie-talkies for police on duty
- Absence of public announcement systems or effective wireless system with police

# Lack of Coordination

- Local decision to remove barricades on administrative route to allow a small group of pilgrims
- Lack of understanding of range of duties entrusted
- Communication delays



# Lack of Coordination

- Coordination gap between agencies (Police, District Magistrate; Forest officials, Revenue officials, temple board)
- Vacant/late/delayed posting of key personnel
- Inadequate water, medical assistance, public transport/parking facilities
- Poor infrastructure (Plans on paper but no implementation)

# **Administrative or Managerial Decisions**

- Sudden opening of entry door
- No access control
- Closed/locked exit
- Reliance on one major exit route
- Limited holding area before entrance

# Administrative or Managerial Decisions

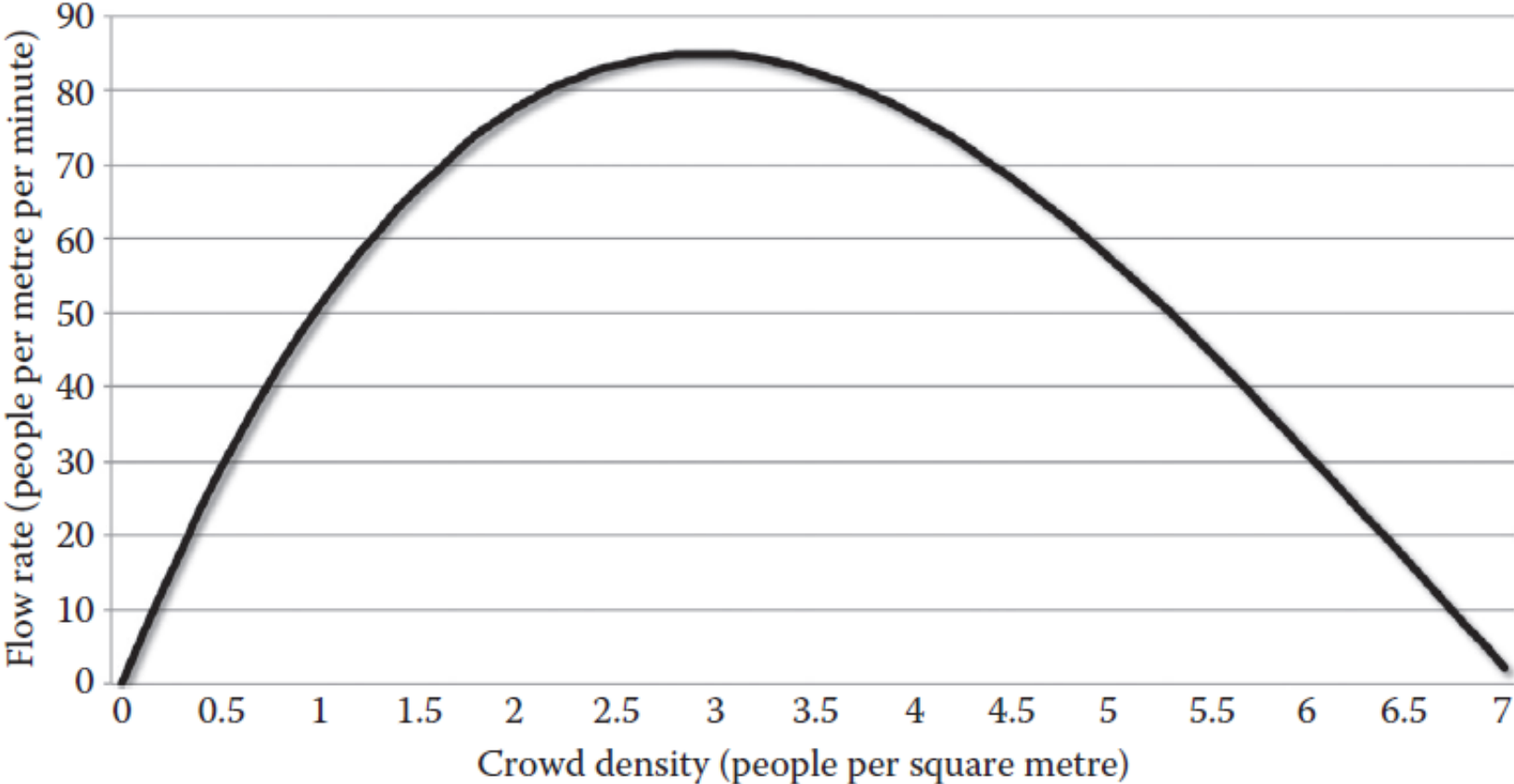
- People allowed in excess of holding capacity due to overselling of tickets
- Underestimation of audience, staffing, services
- More than anticipated crowd at store/mall/political rallies/ examinations/ religious gatherings/ public celebrations
- Uncontrolled parking and movement of vehicles
- Callous indifference in regulating traffic
- Poor Management

# After Stampede

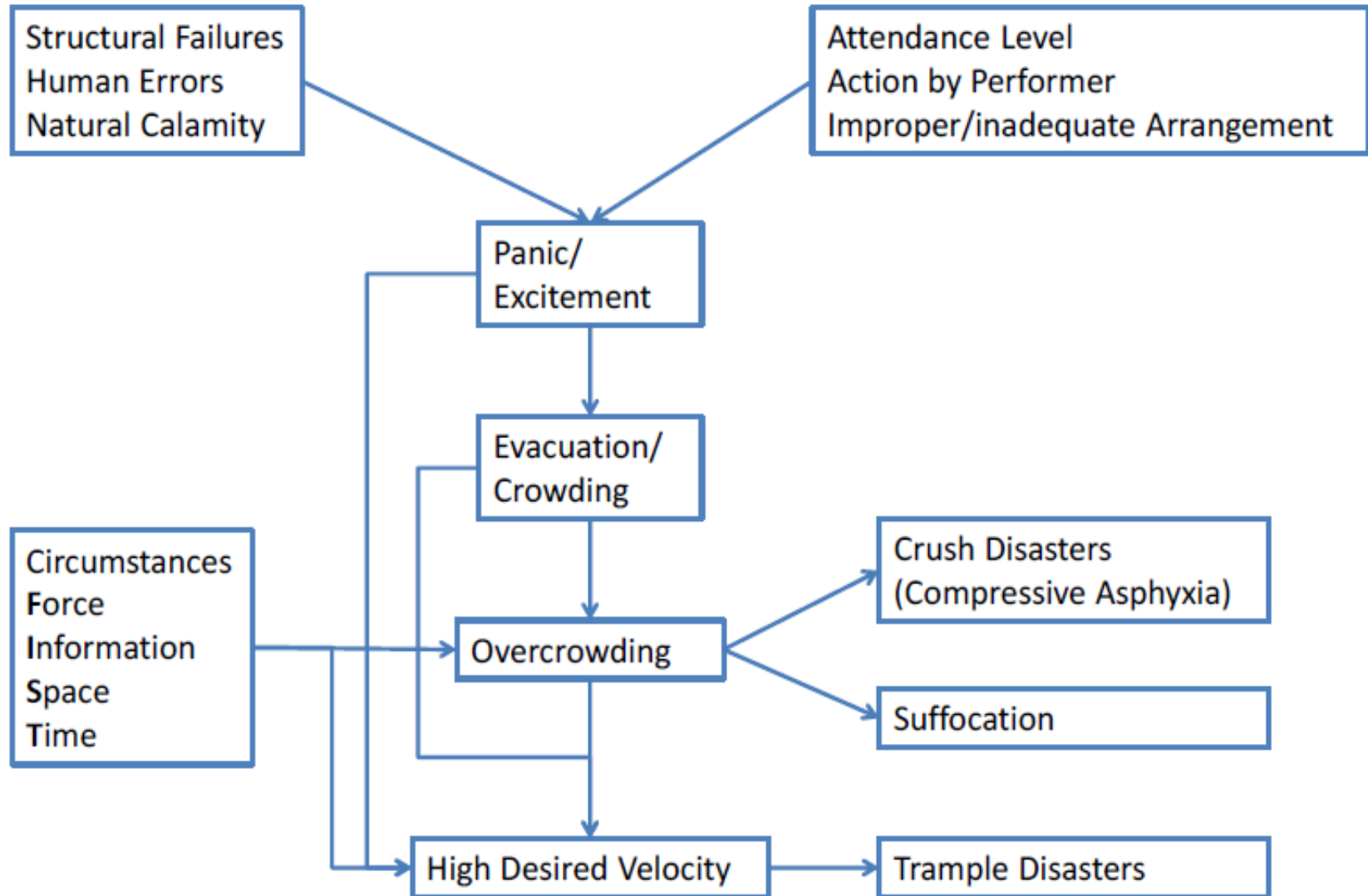




Crowd density versus flow rates



# Crowd Disaster Process



# ESCAPING FROM STAMPEDE

- 1) Avoid being the first person in line waiting for the gates/doors to open.
- 2) This is where crowd pressure can build, just before or as doors open.
- 3) Most injuries and deaths happen during ingress, egress, in celebration and in protests.
- 4) Just like an airplane, there are critical time periods while flying. For planes, it's during take off and landings.
- 5) For Crowd, they can grow to thousands in a matter of minutes.

# ESCAPING FROM STAMPEDE

2) Once inside Pushkaram, familiarize yourself with your surroundings and facility layout, including the location of first aid stations, the presence of security workers, how the crowd is behaving, and what the weather is like.

The most important is locating an alternate exit and redetermine how you would escape should something go wrong.



# ESCAPING FROM STAMPEDE

3) Be aware of the condition of the surface upon which you are standing (muddy, slippery, etc.).

These surfaces may present a problem in a moving crowd. Watch out for broken bottles, cans, and other debris, these too can be a hazard.

# ESCAPING FROM STAMPEDE

4) Don't stand near or climb on temporary structures, which could collapse under too much weight.

# ESCAPING FROM STAMPEDE

5) Do not position yourself near immovable objects such as a door, stage or barricade.

These provide no avenue of escape.

The pressure from the crowd can crush your chest cavity, cutting off your oxygen supply, which could cause asphyxiation.

# ESCAPING FROM STAMPEDE

6) Most injuries and death occurs with young men in 15 to 25 age.

Read the warning signs of crowds, observe their behavior, and recognize when the crowd pressure is building.

Think of a packed elevator.

If you can't raise your hand to touch your nose, or when there is uncontrollable and/or unwanted touching, then the crowd density level is at or near the critical stage.



# ESCAPING FROM STAMPEDE

8) Moving Crowds are like locomotives, once they are in motion they are hard to stop. The energy in a crowd, like the energy of a moving train, must be released and must be allowed to run its course.

Energy is created by the weight and speed of the train and can have a devastating and deadly effect on anything in its path. Like the pressure of a train, the crowd pressure can over take an individual in an instant.

Crowd pressure on the chest cavity can be just as deadly as a train on an individual in a matter of seconds. It is important that participants understand the flow of a crowd and avoid being trapped with no avenue of escape.

# ESCAPING FROM STAMPEDE

9) If you find yourself in the middle crowd don't stand still or sit down – you can easily get trampled.

Keep your legs moving in the direction of the crowd, and try getting to the outside where the flow is weaker.

The last thing you want to do is fall. But if you do, get up quickly. If you can't, get someone to pull you back up. This is when having a friend nearby can be a lifesaver.

# ESCAPING FROM STAMPEDE

10) If you can't get up, keep moving by crawling in the direction of the crowd.

If that's not possible, your last resort is to curl up in a ball, create an air pocket and cover your head.

# ESCAPING FROM STAMPEDE

11) Sometimes, high energy crowds create an ebb and flow of people that could sweep you off your feet.

Fighting against these "waves" will probably knock you over, so keep your legs moving, try not to fall, and take advantage of any space that may open up in front, you may be able to work yourself to the side where the crowd is weaker.

# ESCAPING FROM STAMPEDE

12) Worst place in a surge is at the very front of the crowd against an immovable object, like a fence or stage barricade.

It may be tempting to make your way up close to where the action is on stage. But it's smart to stay away.

Crowd pressure here can build up quickly and be deadly.

People in back will have no idea what's happening up front.



# ESCAPING FROM STAMPEDE

Persons reaching down to pickup a fallen item may found their fingers and hand trapped and mutilated between the treads and the sidewall or in the teeth of the bottom or top plate.

# ESCAPING FROM STAMPEDE

1) Head immediately to the nearest exit. Don't stop to call 108/104, get out as fast as you can, then call.

2) If you fall or are knocked down, get up without delay and if you can't get up, crawl to the side. If that fails, cover up, create an air pocket and protect your head.

3) Again, as you exit, be aware of changing crowd flows, elevations, stairs, escalators and terrain.

Bottlenecks happen at these areas when people are trying to escape. If you're in the flow, it's nearly impossible to turn around, the force of the crowd behind you have no idea of what's going on up front and continues to push forward.

# What is Important

- Public Order

or

- Safety

# ESCAPING FROM STAMPEDE

- 12) The worst place in a surge is at the very front of the crowd against an immovable object, like a fence or stage barricade.
- It may be tempting to make your way up close to where the action is on stage. But it's smart to stay away.
- Crowd pressure here can build up quickly and be deadly. People in back will have no idea what's happening up front.