

Stampede Management For Religious Events In India

Ankita Prasun¹, Prashansa Dixit¹

¹M.Tech, Centre of Excellence in Disaster Mitigation and Management, IIT Roorkee.

Abstract: In Indian scenario, any religious event is a strong reason to gather huge crowd which many a times turn out into a stampede disaster. In this paper the focus is laid on the stampedes in religious gatherings. Two case studies of stampede: a) Sri Kalubai Yatra Mandhardev at Wai, Maharashtra (2005) and b) Dussehra Festival Stampede at Patna, Bihar (2014) have been studied and analyzed for the causes and flaws in management. Important guidelines related to stampede management in religious events have been mentioned and input of more and better considerations have been proposed from our side, like allowable crowd size, maintaining database of the visitors, architectural adjustments, etc. Also the crowd behavior plays an important role in prevention of disasters of such kind.

Keywords: stampede management, religious gatherings, case-studies

1. Introduction

Natural and man-made disasters give quite a well reason for casualties and injuries like collapse of a building, landslides, exposure to harmful chemicals, etc. but there is a very unpredictable man-made disaster where people losing their life seems to be an unreasonable loss. It is the stampede that can happen in a crowded event. Stampede is a word that refers to animals while they flee wildly in panic condition. But the same applies to the humans when in crowd, they start behaving by animal instinct. Thus for a crowd, stampede is a situation when individuality is lost and individuals behave according to the crowd to get into a safer place. Stampede is a self destructing human wave i.e. a panic situation, like fire or rumours, which starts at highly dense crowded area (10 people in an square metre area) [1] and like a wave humans run to escape in a disorderly way. The deaths usually occur due to suffocation and choking. The physically strong people might escape but it is the weaker section like women, children and old who get caught up.

India is a country which is famous for religious festivals and strong faith of people in religion is a call for huge number of gathering in such events. The increasing population, traditions and beliefs, ease of transportation system, open for all system, are the few causes of mass gatherings. This is in a way related to risk of stampede disasters. Following table shows a record of people killed and injured during stampedes that happened in religious gatherings, in past decade:

TABLE I: Stampedes in religious events in recent years, data from various media reports

Year	Religious Event	Number of people killed	Number of people injured
2014	Patna Stampede	33	>50
2013	KumbhMela, Allahabad	37	43
2012	Chhath festival, Patna	20	-
2011	Pullumedu, Idukki	102	71
2008	Navratra festival, Jodhpur	<120	<200
2005	Nainadevi temple, Bilaspur	162	<400

2. Case Studies

2.1. Sri Kalubai Yatra Mandhardevi at Wai, Maharashtra (2005)

Mandhradevi Kalubai temple is a 400 year old temple that was built during the rule of Shivaji Maratha. Kalubai devi is considered as the incarnation of Goddess of strength among Hindus and this is the belief why people gather annually to attend a 10 days pilgrimage. During the yatra, devotees move on a ceremonial slope that leads to temple shrine. It was on January 25th, 2005, when a stampede occurred in the temple premises which became the reason of death of 293 innocent people and 250-300 injuries as well. The crowd gathered was more than 300,000 [2]. The reason of stampede was not clear. Various reasons came from various eye-witnesses, such as steps of the temple became wet and slippery due to spilling of coconut water, falling of an over-head cable, clash between pilgrims and shopkeepers followed by a gas cylinder blast that caused panic. On the other hand, few officials claim that a fire arose from short-circuit at the stalls which created panic [2]. However, no deaths were reported due to fire [3]. Rumours created confusion among the crowd which eventually resulted in panic followed by a deadly disaster. Crowd behavior plays an important role in such cases. The probable causes of such an outbreak were outlined. The most crucial was 'wrong crowd estimate'. More number of pilgrims were present than anticipated. Number of pilgrims outstripped the maximum holding capacity of temple premises. Presence of illegal vendors (few having gas cylinders) on both the sides of pathway leading to temple. Also, there was inadequate provision for safety, security, basic services like: fire, water, medical assistance etc. Illegal electric connections and poor infrastructure were observed at the disaster site. Implementation of plans was found completely missing. Moreover, there was lack of coordination between various stakeholders which emerged as a major hindrance in incidence response system. High negligence in duties by the temple trust and State Electricity Distribution Company worsened the incidence. On a conclusive note, the incident took the form of a tragedy mainly due to the lack of good and efficient management of the event. Considerations which might have been taken into account to avoid such kind of a disaster:

Entry of people should have been regulated at proper intervals. Fixed number of visitors should have been allowed at a time to enter the premises. The time boundation to offer prayer and leave the premises could have facilitated proper movement and allowed equal opportunities to all the worshippers. The staircase was the main ceremonial pathway, which should have been kept dry and neat to avoid slip and trample. Encroachment by vendors was prevalent along the pathways leading to the main temple. There should have been a strict check on encroachment for proper and hustle free crowd movement.

2.2. Dussehra Festival Stampede at Patna, Bihar (2014)

Dussehra is one of the most important religious festivals of Hindus. It is celebrated every year as the victory of Lord Rama over the evil Raavana. People of all ages gather to enjoy watching the burning effigy of the Raavana as it is a belief that witnessing such event purifies oneself from the negativity. On October 3rd, 2014, tens of thousands people had gathered at Gandhi Maidan, the heart of the Patna city, to enjoy the festival when a stampede took place. The stampede outbroke, at the end of the event, due to a rumour of falling of electric cable and 33 innocent people fell prey to a fatal disaster. Actually, the rumour ignited after seeing a broken TV dead cable wire [4]. Among the dead, there were 20 women and five to six children. More than fifty people were severely injured [5]. Faulty management was the sole cause of the incident.

The crowd strength was much larger than the holding capacity of the venue ground, since there was no check on visitors. Also, the peripheral roads have a good number of nodes with heavy traffic. There was no special regulation on traffic on the day of the event. The venue ground has four major broad gates, but the whole crowd was allowed to exit from a single gate which faced a heavy traffic node. This was the biggest flaw in the management part of this event as it created a strong gush at the exit. Insufficient number of control booths and buffer zones were observed on the ground. There was lack of coordination among various stakeholders which are associated with the event. This is an annual celebration and yet no special consideration was taken. Figure No.1 shows the plan of Gandhi Maidan during the event.

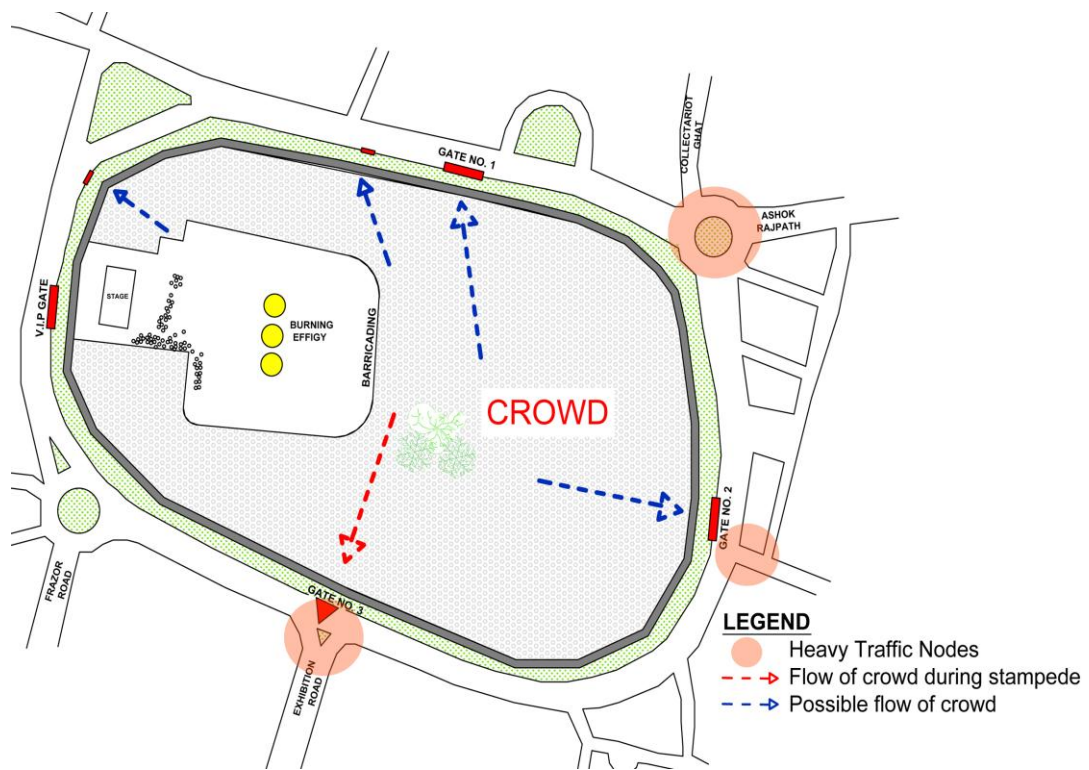


Fig. 1: The plan of Gandhi Maidan, Patna, during the dusshera festival when stampede took place

3. Various Guidelines for stampede management

3.1 Recommendations for religious mass gatherings- ILDM

These guidelines were laid down on March 2015 by Institute of Land and Disaster Management, Government of Kerala. Following guidelines are for the event planners and organizers to manage the mass gathering during religious events [6]:

- Details of the religious events must be recorded and submitted to the local administrative authorities depending on the crowd size.
- Once the recorded data is verified, evaluation of various aspects like safety, security, venue, past data, transport management, public facilities, etc must be done. Based on these aspects emergency response agencies must be prepared for the day of mass gathering.
- The government declares the area/venue and time period for the event. The Health officers of that area must be informed a month prior to the commencement of the event. As a commitment towards public safety, public liability insurance should be taken up if the gathering is expected to be a huge one.
- The resources like man power, facilities and support from agencies or communities should be considered in extra than required.
- Possible risks at the event area must be assessed and the event should be planned accordingly. Hazards like extreme weather, bottleneck entry/exit, etc must be considered. On a layout map, necessary services like fire hydrants, control room, medical facilities, crowd flow patterns, etc must be marked.
- A committee for the festival management can be set up that can coordinate with various agencies and stakeholders taking part in the management of the event.

3.2 Recommendations for managing crowd- NDMA

National Disaster Management Authority (NDMA), Government of India, has prepared a guide for managing crowds at events and venues of mass gathering in 2014. Few of the guidelines that can be related to the religious gathering context are as follows [3]:

- While planning for the religious event, understanding the visitors is important. This will depend on the type of religious event (occurring annually or after years, activities that will be carried out), location of

the event (in remote/urban area, topography, open/confined space, availability of transport) and type of crowd that will participate (age, gender, local or visitor). Expected number of crowd should be estimated depending on previous similar event and general admission should be discouraged.

- Various managers and stakeholders that take part in managing disasters of this kind involve: event planners and shrine management authority, security personnel (police department), agencies (NDRF, fire services, medical facilities), community stakeholders (NGO's, local communities) and media. Coordination between all of them is the key for proper management.
- Most of the religious places are located at difficult terrain usually with encroachment by business stalls. Realizing this, guidelines suggest that 3-4 metre of gap should be provided between a row of 5-6 shops. This will facilitate the crowd to escape during any stampede.
- Provision for separate tracks should be made for visitors on-foot and those travelling by any conveyance (mule, palanquin, etc.)
- Alternative escape routes should always be accessible to release crowd pressure.

4. Additional/Modified Guidelines

Analysis of the case studies and going through the already existing guidelines helped us in bringing forward the following modified guidelines:

- Considering that the stampede situation arises, if the crowd density is 10 persons per square meter area [1], the maximum number of allowable persons in any event should be less than the ten times of the venue area (in square meter).
- Maximum number of allowable persons < Area (square meter) * 10
- Application of this simple relation can help in limiting the number of people in any event and thus reducing the chances of stampede.
- It will be helpful to maintain a dataset that include information from the experienced people/eye witnesses of past events who can provide more accurate information on how things go wrong and what is lacking. A database of visitors attending the event should be maintained through proper registration process which may prioritise new visitors. Worshippers attending for the first time should be given priority over regular visitors. This can be an event specific process of crowd management.
- Architectural consideration like geometrical elements, entry/exit and buffer zones must be dealt carefully so as to manage the incoming and outgoing crowd. It is better to pre decide the event boundaries in simple geometrical shape. Small architectural adjustments can decrease the evacuation time of crowd from an **enclosed** space (covered or open to sky) by 90% [7]. For example, placement of opening plays an important role. Corner openings are preferred over middle ones in a square or rectangular space, as it ensures better escape order in lesser time. Placement of structural elements like column at the exit channelizes the flow in two directions while outflow which helps in avoiding conflicts among individuals [7].

The elements like columns, barricades help in diverting the crowd in a directional way. It is better to divide the event area into various spaces. These spaces can be allotted to crowd according to the gender (i.e. different space for males, females and family) or age groups. Separate spaces for putting up business stalls should be provided as the crowd movement is different in such spaces. Each divided space should be provided with one gate at least or corridor connecting it to the main gate. If a panic situation starts in one space it will be limited to the crowd density in that zone as long as the buffer between different spaces is maintained and security forces are positioned.

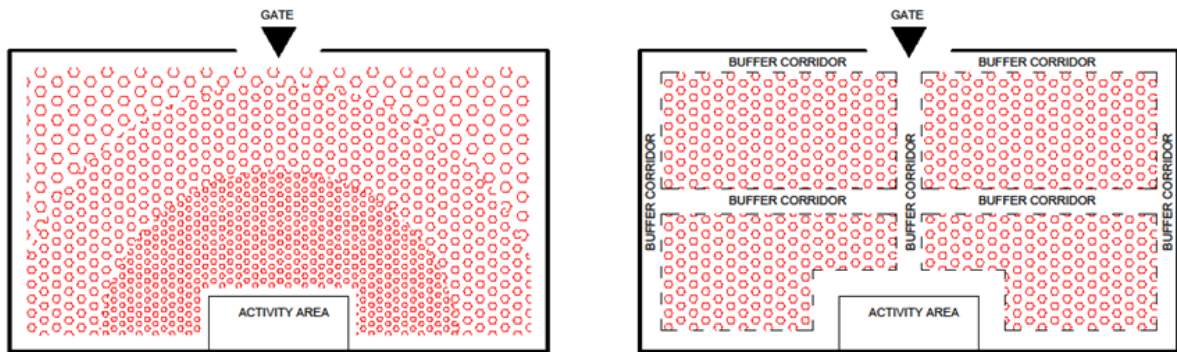


Fig. 2: The first image shows the randomly distributed crowd in an event area while the second image shows spaces dividing the crowd with buffer corridors in between which will be useful in case of emergency.

Though the entry gates must be limited but the exit gates should be more in number and well distributed so that they are within reach of crowd at any point. The escape routes must not open in already crowded zones like the road junctions. A buffer space should be provided on either side of the gate that can hold the crowd. The openings at the event area boundary should be planned strategically.

- **Increasing the time of the event is useful to accommodate more people without creating dense crowd. There are various religious events that happen for days. In such events crowd can be controlled by allowing every person once in the event and everyday number of people must be limited. Pre-registration and ticket system can be a measure of limiting the number of visitors.**
- Both the visual and audio information is important to inform the crowd about various aspects like the emergency exits; updates on the activity; location of facilities like public toilets, police booth, enquiry stalls, etc. The visual information can be conveyed through signages bold enough and the audio information can be conveyed through clear sound loudspeakers. In case of emergency, an authorised person should be allotted the charge of conveying the information to whom crowd can listen and follow. If the crowd is informed intermittently, the chances of hustle are reduced to considerable level.
- Criteria of age should be marked for the entry of children in such heavy gathering events.
- The ambience of the place should be made pleasant and healthy in order to entertain people. This helps the crowd to hold patience while waiting.

5. Conclusion

Stampede disasters have happened since the time people have started to gather with some common interest. In India, religious events are the one where huge crowd gathers than any other event. Maximum stampedes have been witnessed in religious gatherings. Earlier there was lack of guidelines for management of such disasters but government has recently become active. Generalized guidelines have been laid down after learning from various past stampedes. There is still a scope of modifying these guidelines and making them more refine for religious gatherings. Few of the modifications have been projected in this paper. Apart from the guidelines which are mainly for the managing authorities to follow, crowd behavior also plays an important role in preventing such disasters. Lessons from past experience should influence the psychology and activity of individual in a crowd. Every person in the crowd should understand the responsibility at individual level for peaceful commencement of any event. Rumors are the major cause of stampedes. Such activity should be avoided and people should try to remain calm and respond to the managing authority, if panic situation arises. These small measures will help in better management of crowd because it is not only the people who suffer the loss after a tragedy, but the Government also faces unexpected socio-economic loss.

6. Acknowledgements

We would like to express our deepest sense of gratitude to our professors Dr. M.L Sharma, Dr. Amita Sinvhal and Dr. M.K Rao whose valuable assistance has greatly helped us in completing this paper. We are

highly obliged to Dr. B.K Maheshwari (Professor and Head, Centre of Excellence in Disaster Mitigation and Management) who encouraged us for participating in this conference. Our institution, IIT Roorkee has an important role in providing us with this opportunity to participate in this event.

7. References

- [1] Wise, Jeff. Extreme fear: The science of your mind in danger, Post published on Nov 23, 2010 in Extreme Fear
- [2] “Hundreds die in pilgrimage crush”, theguardian, Retrieved 7th August 2015. Available: <http://www.theguardian.com/world/2005/jan/26/india.randeepamesh>
- [3] Managing Crowd at Events and Venues of Mass Gathering, A Guide for State Government, Local Authorities, Administrators and Organizer, National Disaster Management Authority (NDMA), Government Of India, 2014
- [4] “Patna stampede: Rumours may have a hand in tragedy; Bihar CM Jiten Ram Manjhi promises action, trashes 'Dummy CM' tag”, Retrieved 7th August 2015. Available: <http://www.dnaindia.com/india/report-32-people-killed-in-stampede-in-patna-during-dussehra-event-2023339>
- [5] “Dussehra celebrations: At least 32 killed in Patna stampede”, India Today, Retrieved 8th August 2015. Available: <http://indiatoday.intoday.in/story/dussehra-celebrations-patna-stampede-gandhi-maidan/1/394059.html>
- [6] Safety in Religious Mass Gatherings: Guidelines for Event Organizers and Stakeholder Agencies, Version 1, Institute of Land and Disaster Management, Government of Kerala, 2015
- [7] Shiwakoti, Nirajan, and Majid Sarvi. "Enhancing the panic escape of crowd through architectural design." *Transportation research part C: emerging technologies* 37 (2013): 260-267. <http://dx.doi.org/10.1016/j.trc.2013.04.009>