

Accidents & Injuries: Lessons From a Stampede

Instructor's Note

2017

Overview

This teaching pack uses a case study about a stampede at a mass gathering in 2013 to invite classroom discussion about health conditions, risks, and responses related to unintentional accidents and injuries, particularly in crowded urban settings, mass gathering events, and as part of humanitarian emergencies. The case may be useful in classroom or community learner group discussions about global health, disaster management, and religion and culture. This Instructor's Note summarizes the thematic issue, outlines learning objectives, and suggests key takeaways from the lesson.

The stampede at the Railway Station in Allahabad, India on February 10, 2013, caused 36 deaths and dozens of injuries. It took place at the height of the Kumbh Mela, a Hindu ritual and festival that draws millions of devout pilgrims to the banks of the Ganges River in Allahabad, India, every twelve years, for spiritual purification. It was estimated that the Kumbh Mela drew 20–30 million visitors to the city and nearby Ganges River on the day of the 2013 stampede. The case shows how urban crowding can challenge urban and national infrastructure and advance resource planning, describes the types of accidents, injuries, and related health risks associated with such urban mass gatherings, and outlines preventive measures (actual and potential) that help mitigate related health risks.

This case focuses on unintentional accidents and injuries, but it may be used in a teaching module or class that considers the role of all injuries and accidents in global health. Examples of common unintentional injuries include the effects of natural disasters, motor vehicle accidents, crowd collisions, and related encounters or falls. Intentional accidents and injuries include suicide, domestic and gendered violence, and consequences of armed crime, conflict, or terrorism. The health conditions for, risks of, and responses to such injuries, for affected individuals and communities, will depend on the circumstance. Responses range from bandages to national health policy making (e.g., seat belt laws to reduce traffic accident injuries).

When large populations are at risk from particular types of accidents, prevention is key. Unintentional injuries are usually preventable, even those that relate to natural disasters. Preventing or reducing risks typically requires a cross-disciplinary approach that goes beyond the formal health sector. Some examples of such injury prevention might include, for example, earthquake-resistant architecture; traffic lights and driver education classes; “child-safe” furniture and toys; well-maintained dikes and levees in cities near sea level (as in the Netherlands); and governmental legislation and monitoring of air, water, sewerage, fire, chemical and radioactive waste, and workplace conditions.

More people now live in cities than ever before. Increased population density means greater risks related to crowding. The 2013 stampede in Allahabad, India, was one example of an urban disaster that challenged both the local urban infrastructure and governmental systems. The lessons outlined in this case may help students think about health prevention both in ordinary urban life and as it applies to mass gatherings and humanitarian disasters in many different economic settings around the world.

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Instructor's Note: Accidents & Injuries: Lessons From a Stampede

This Instructor's Note, the associated teaching case, and related accompanying materials have been developed based on classroom discussion, research, and on-site experience at the 2013 Kumbh Mela, as part of the Harvard University collaborative project, "Contemporary Urbanism: Mapping India's Kumbh Mela." More information about the Harvard Kumbh Mela Project is available at

<http://southasiainstitute.harvard.edu/kumbh-mela>. The project invited undergraduate and graduate students and faculty across the university to experience the festival first-hand and consider how its planning, design, history, and practice offer lessons that may help improve contemporary understanding of religion, public health, humanitarian response in low-resource settings, urban architecture and communications, business, and South Asian studies. These teaching materials may also be useful in coursework on the study of topics such as: religion, urbanization in a global world, health governance and governance for health in resource-poor settings, humanitarian aid, and emergency medicine.

The teaching pack is composed of this Instructor's Note and the following companion materials:

Teaching Materials

- Case Study: Stampede at the Kumbh Mela: Preventable Accident?
- Discussion Guide: Stampede at the Kumbh Mela: Preventable Accident?
- Rose Play Exercise: Accidents and Injuries: Learning From India's Kumbh Mela

Additional Resources

- Annotated Bibliography: Learning From India's Kumbh Mela
- Glossary: Learning From India's Kumbh Mela

Learner Level

- Undergraduate, Graduate

Learning Objectives

This lesson will enable students to:

Knowledge-based objectives

1. Name several potential causes of unintentional accidents and injuries, and identify how each poses increased health and injury risks for individuals in cities, mass gatherings, and/or sites where there has been a humanitarian crisis due to natural disaster.
2. List and explain three to five specific preventive measures that either lowered injury risks or might have lowered injury related to the stampede at the Allahabad Railroad Station.

Skill-based objectives

3. Demonstrate ability to think critically about the role of advance planning in preventing a mass gathering emergency.
4. Discuss how health- and non-health-related sectors intersect and work together in both causes and responses to accidental injury risks; will be able to connect the impact of factors such as jurisdictional governance gaps, communication, cooperation, and collaboration in injury- and risk- prevention related to large crowds.

Attitude-based objectives:

5. Argue for and against “blaming” the different factors in the 2013 stampede, and what each could have done differently.
6. Identify cultural factors that influence risk-taking activities at large-scale religious events such as the 2013 Kumbh Mela and envision how the same attitudes might or might not apply in a specific different religious or cultural event. (e.g., large sports event or the Hajj)

Takeaway Points

After case discussion, participants will know and be able to discuss the following points:

1. The Kumbh Mela festival illustrates aspects of *urbanization* that are relevant to health concerns globally; these include: rapid building, rapid population growth, variable supply-demand transitions, and living conditions comparable to refugee camps, emergency housing in humanitarian disasters, and other mass gatherings.
2. Mass gatherings present certain health risks, including *disease and injury*.
3. Most if not all of these risks can be *prevented*.
4. Prevention of injury risks requires cooperation, communication, and collaboration across different areas of *governance*.
5. *Medical response* to a mass gathering emergency requires planning that anticipates needs.
6. The Kumbh Mela 2013 stampede can inform safety planning for other mass gatherings.
7. Prevention must always consider the *cultural, religious, and political context* of the event as it shapes the behaviors of those involved in the mass gathering emergency.

Stampede at the Kumbh Mela: Preventable Accident?

Teaching Case

2017

Early in January 2013, pilgrims began to gather in the dry sands about three miles beyond the city center of Allahabad, India, to attend the Kumbh Mela, an ancient Hindu religious ritual and festival that draws millions of devout pilgrims for spiritual purification. The festival takes place every 12 years at a holy and auspicious location where the Ganges, Yamuna, and the mythical Saraswati rivers meet. Government officials, administrators, and hired workers had spent months preparing, and the site now stretched to the horizon, with hundreds of multi-colored tents, electrical poles and utilities, bridges, and new roads (see Figure 1). From an adjacent hillside bluff, visitors could look down and see the blue and yellow waters of the Ganges and Yamuna meeting in turbulence at the *sangam*, the most sacred convergence of land and water for bathing, just east of an ancient fort. The entire stretch of sand and rivers—under water most of the year until the annual dry season exposed it anew each winter—had special meaning in Hindu religious belief and practice. Here, it was said, “Mother Ganga” offered purification to all who bathed in her waters during the 55-day festival. Religious leaders, pilgrims, tourists, celebrities, and village laborers would be converging on this small strip of land from around the world and across India to take a holy “dip” in the river and perform religious rituals. As many as 100 million visitors were expected in 2013. On the most holy day of all, which fell on February 10 this year, officials predicted as many as twenty to thirty million people would bathe.¹ An event that public health experts called a “mass gathering” due to its high volume and dense crowds, the Kumbh Mela was a festival that Indians regarded with reverence and national pride. The smallest mishap, the 2013 administrative officials knew, would reflect badly on the national, state, and regional government leaders who organized, built, and administered site facilities. If something went wrong, it would attract media publicity like lightning, perhaps become an international incident. Would the Kumbh Mela of 2013 take place safely?

Constructing a Temporary City

The Kumbh Mela at Allahabad (ancient Prayag or Prayaga) had a long history in India’s religious memory. As early as the seventh century CE, a Buddhist monk traveling through India in search of manuscripts wrote about a holy festival along the Ganges at Prayag where, he said, pilgrims came hoping “to escape from birth and death.” He called the flat plain “the field of charity” because their kings and nobles assembled to compete over who could be the most generous. Their extravagant divestment and exchanged gifts benefited people from every social class in the surrounding city, from priests, leaders, and members of other religious groups, to alms for the widows and bereaved, orphans and desolate, poor and mendicants.² The event came to be called the “Kumbh Mela” or “pot festival,” following Vedic tradition that in a fight between the gods some drops from a pot of the elixir of immortality had fallen to earth at four points along the Ganges River; Allahabad was one.³ The ancient tradition of philanthropy, including free gifts for all who came at the expense of local governors, has continued to characterize the festival throughout the centuries.

³ The other three cities in India where the Kumbh Mela festival takes place at different times are Haridwar, Nasik, and Ujjain.

This case was developed by Susan R. Holman, MS, PhD, Senior Writer, Global Health Education and Learning Incubator at Harvard University, and Satchit Balsari, MD, MPH, emergency medicine physician and Research Fellow at the FXB Center for Health and Human Rights at Harvard University, based on research that was part of Harvard University’s multidisciplinary project, “Mapping the Kumbh Mela.” It is used and distributed with permission by the Global Health Education and Learning Incubator at Harvard University. Cases are developed solely as the basis for class discussion. Cases are not intended to serve as endorsements, sources of primary data, or illustrations of effective or ineffective management.

Teaching Case: Stampede at the Kumbh Mela: Preventable Accident?

By India's national independence in 1947, the city of Allahabad and the stretch of land and river where the Kumbh Mela takes place belonged to the Indian State of Uttar Pradesh, and this state's government fully funded and administered the festival's construction and maintenance. The Allahabad Kumbh Mela festivals of 2001 and 2013 were each estimated to cost the government approximately US\$130 million.³

While the state pays the bills, the festival's most powerful leaders are the thousands of religious holy men, or *sadhus*, who lead the sacred rituals. Sadhus compete with one another for the privilege of claiming a land allotment as close as possible to the *sangam* for their congregation or *akhara* (religious compound). Holy bathing also depends on the date, a lunar calendar determining which days are most auspicious.^b In 2013 the festival's most auspicious bathing day, February 10, began before dawn with a spectacular procession of sadhus parading together to the *sangam* to perform their rituals. Following their ablutions, new monks would traditionally undergo their initiation baths, followed by the waiting crowds of pilgrims.

During the 55 days of the festival, the geographical area of the Kumbh Mela is a jurisdictionally discrete township called a *nagri*. It is a temporary city with temporary but official infrastructure; this includes the delivery and management of public services, including police, electrical power, water pipes, health and sanitation, food, and civil supplies.⁴ Appointed officials take time away from their posts elsewhere to direct the site's administration according to an official government schedule. When the festival ends, each official returns to regular employment, many in government posts in Allahabad or other nearby cities.

The event is free. Anyone in the world may attend. There are numerous access routes to the site, with constant traffic to and from the city of Allahabad. Pilgrims may come for a quick dip or they may be *kalpavasis*, pilgrims who remain throughout the entire festival, bathing daily.⁵ Authorities cannot reliably estimate how many will attend or when they will come. Even the ground facilities cannot be mapped out until the river recedes, approximately six or eight weeks before the festival. Officials do as much planning as possible in advance to anticipate the placement of roads, bridges, tent compounds, and utilities.⁶ In 2013, the entire region of the fairground covered 1936.56 hectares,⁷ roughly equivalent to 36 square miles.⁸

Construction materials, new and those saved from previous festivals, are gathered off-site months in advance, cleaned and repaired as needed, and prepared for transport to the festival. By the first auspicious bathing day in 2013, January 14, facilities included 35,000 toilets, approximately 97 miles of roads, 355 miles of water pipes, 497 miles of electric wires, 73 power substations, 30 fire and police stations, four food warehouses, 38 hospitals (14 allopathic, 12 homeopathic, and 12 ayurvedic) with 370 combined hospital beds, 120 ambulances, 56 watchtowers, more than 12,000 state police on site, and 89 CCTV cameras.^{9,10} Eighteen hollow metal pontoon bridges, each weighing six tons, connected land and rivers.¹¹ After the 2013 festival ended, on March 10, the entire site would be taken apart, tents and supplies returned to storage or used for other purposes. All that remained would be abandoned to the rising river and local scavengers.¹²

Will There be Enough Trains?

Religious pilgrimage is a journey. For Hindus, as for pilgrims of other religions around the world, the spiritual benefits of the journey are often believed to be greater when the experience is difficult. For centuries, the most pious Kumbh Mela pilgrims arrived from home on foot. The pilgrims who came in 2013 were predominantly poor villagers from across India,¹³ but in the modern world many chose to journey by train. National, state, and regional planning officials knew that more trains would be needed going to and from Allahabad during the festival. This increased need would be greatest on the major bathing days, when many

^b Major bathing dates for the 2013 Kumbh Mela at Allahabad were: January 14 and 27, February 6, 10, 15, 17, 18, and 25, with February 10 as the most auspicious date in the festival. The 2013 festival officially ended on March 10. <http://www.mahakumbhfestival.com/2012/02/allahabad-maha-kumbh-mela-bathing-dates-for-year-2013>.

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would arrive early, hop off the train in the morning, take their holy dip at the sangam, and then board the evening train home.

Pilgrims who traveled by train would typically arrive at one of four railway stations within the city limits of Allahabad: the stations of Allahabad, Rambagh, Prayag, and Prayag Ghat.¹⁴ Trains were operated by the National Railway Authority, under the administration of the Government of India. All train stations were outside of the *nagri*, and not within the Kumbh Mela's official civic jurisdiction. From their arrival at the train station, pilgrims could typically reach the festival from the city—and return—on foot, bicycle, rickshaw, or motor vehicles. In the dense crowds, pilgrims who traveled the few miles between the stations and the festival grounds often held onto one another as the only way to stay together. As poor villagers, many did not come with suitcases but rather carried their possessions in a round cloth bundle over their shoulders or on their heads. This bundle typically contained all they expected to need for their entire trip. For those who could afford it—and for tourists—"luxury" tents and campsites offered housing around the city and on the nearby hillside bluff. The most pious pilgrims sought a simple ascetic lifestyle as part of the spiritual experience, many sleeping outside on open ground within the *nagri*.

To serve the anticipated crowds, the National Railway Authority had promised that as many as 50 extra trains would run through Allahabad on major bathing days. Indian Railways had added more than 200 special trains to the route,¹⁵ and trains were also scheduled to stop at many nearby stations to minimize congestion at the Allahabad Railway Station. According to one Railway Ministry official, 198 trains served the city on Sunday, February 10, including 61 "special" trains. Each special train had 24 coaches with an estimated capacity of 3000 passengers.¹⁶ For the estimated 30 million people expected on February 10, four color-coded sheds were built just outside the Allahabad Railway Station's main entrance by Platform 1 to help channel passengers, guiding them to waiting areas according to the different directions pilgrims would be traveling home. Inside the station, several small footbridges provided passenger access to the various tracks. Officials knew that these footbridges would be used by many thousands more people during this time than was usual during the rest of the year.

Public Health at the Kumbh Mela

Safety concerns at the Kumbh Mela include many other issues in addition to safe transportation. The officials in 2013 organized carefully planned efforts to ensure public health and safety, related particularly to risks of potential disease and accidents within the *nagri* and along the *sangam*. By the third week in January, the festival was buzzing with noise, music, and ordinary daily life in an Indian religious setting. From 3 AM until 11 PM every day, loudspeakers broadcasted religious music, announcements, drama, and teachings that could be heard for miles. By 5 AM each morning, pilgrims lined up to use the public toilet areas as they prepared for their daily sacred bath at the *sangam*. Some used the built toilet units constructed at regular intervals; others defecated in fenced-in open areas, following cultural customs. The World Health Organization estimates that India has the world's largest number (626 million) of people who practice open defecation.¹⁷ By 8 AM, as the sun rose pink in a haze of smoke from the campfires, pilgrims flocked to the sadhus' religious compounds, where thousands of volunteers from around the world worked together to provide free breakfast. Altars were burning with ritual sacrifices as groups of sadhus gathered in their tents, sitting cross-legged in conversations with followers, pilgrims, and tourists, and smoking *chillum* pipes of cannabis. Children ran and begged along the metal-plate and straw-strewn roads, some dressed as Hindu deities they represented in the nightly theater performances. In the workers' camps, children stood by the water pumps for a morning scrub by their mothers, or peered shyly from the patchwork tents. Utility workers sprinkled sanitizing powder around the toilets; merchants from the city sold fresh fruits, vegetables, and small souvenirs from wheeled carts; and naked, ash-strewn holy men wandered unpredictably. Throughout the day, trucks clattered over the roads, spraying waste water on the dust and blasting clouds of insecticide to

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minimize mosquito-borne disease risks such as malaria and dengue. An estimated 8,000 cleaners worked to tidy up, chasing plastic bags and litter, cleaning toilets, and pushing carts with refuse for removal.¹⁸

Officials worried most about three potential mishaps: disease such as cholera,¹⁹ fatal accidents due to drowning and fire, and both injuries and fatalities that could follow from crowd-related stampedes. A stampede, a “sudden or unreasoning rush or flight of persons in a body or mass,”²⁰ was always a risk of large gatherings, whether the event was religious (such as the Kumbh Mela and the Hajj) or a sports event (such as the Olympics). Allahabad’s Kumbh Mela had suffered deadly stampedes in 1840, 1906, 1954, and 1986.²¹ The stampede of 1954—the first Kumbh Mela after India’s independence in 1947, was especially tragic. The festival that year had suffered from a series of other accidents before the stampede began: several people died in two smaller crowd crushes; 12 pilgrims drowned when their boats overturned; and a fire consumed hundreds of huts when water-and-fire brigades failed.²² Prime Minister Jawaharlal Nehru had come to bathe, increasing the crowds who flocked to see him. On February 3, 1954, crowd control efforts fell apart, as people continued to jam together toward the *sangam*. In the extreme pressure, people began to fall over one another, and disaster followed.²³ Some said that the tragedy that day was aggravated further when pilgrims transgressed over into the sadhus’ sacred procession. The holy men—known throughout the centuries for their reputation for violence²⁴—acted accordingly, and chaos ensued.²⁵ The exact death count remained controversial.²⁶ Many blamed the government; an appointed Fact Finding Commission was accused of “refusing to answer certain questions, presumably to avoid conceding that there were fundamental flaws in the manner in which the government and prominent individuals” responded.²⁷ The 1954 disaster cast a shadow on the nation and resulted in serious efforts to implement a number of safety measures to address these issues and prevent another stampede.²⁸

When officials, festival administrators, and public health leaders reflected on these earlier incidents in planning for the 2013 festival, it was clear that several situations created particular risks of crowd-related injuries. One was the directional flow (and press) of human bodies against each other, in a culture where people in public space are accustomed to pack together very tightly and do not form orderly lines. Second was the capacity of the ground surface, recently dried sand and metal plate roads, including the metal pathways and guard rails of the pontoon bridges, to safely support the human flow. Third, there was the challenging risk that pilgrims encountered every time they entered and submerged in the rapid river currents for the purpose of holy bathing.²⁹ In planning for 2013, officials addressed these risks with a number of proactive measures, described below, related to crowd flow control, ground safety, bathers’ safety, lost and missing person surveillance, and onsite medical care.

Crowd Flow Control

To control the flow of people in competing directions, most of the 97 miles of new roads were wider than is usual in India. On the busiest bathing days, festival police banned motor vehicles within the *nagri*, permitting only those carrying sadhus who lived in the akharas and emergency vehicles such as ambulances (though they could in fact rarely move due to the crowds, and ambulance lanes were nonexistent in the *nagri*, urban Allahabad, and nearby towns). Reserving dedicated space for public figures such as politicians and other VIPs who might come in 2013, the police kept a narrow pedestrian-only corridor cordoned off along each major road. Police also monitored crowd traffic across the pontoon bridges.³⁰ Each bridge had metal cord railings strung along wooden posts along the length of the bridge on each side. (See Figure 2) The bridges became one-way pedestrian routes to and from the *sangam*, with permissible crowd flow direction across the bridges depending on which direction most people were likely to move at different times of the day. On major bathing days one could rarely choose; people were simply pushed along in the press of bodies. The *nagri* administrators also structured bamboo racks of barricade fencing along the sand to guide channeled lanes across open fields down to the *sangam*. This effort was less successful, since many pilgrims simply used the

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racks to dry their clothes after bathing, and slipped under them to move more directly to the sangam. Only a few locations had predictable queues, for example, in the *akhara* precincts, where “tens of thousands of pilgrims are lined up daily in tightly ordered rows to receive communal meals.”³¹

Ground Safety

The ground surface, a mix of earth and sand, easily turned to mud when wet. To reinforce the ground for vehicular traffic, the major roads consisted of large rectangular metal plates laid end-to-end. These plates, when used in previous events, had tended to shift or turn upwards, putting tires at risk. For 2013, the Mela administration bolted them together to keep them in place.³² For pedestrian safety on the remaining open ground, straw was laid over the entire site to fortify the sand and keep paths safe even when the ground was wet. The roads were regularly sprinkled with water from trucks filled with non-potable “grey water” to minimize dust and help visibility. Sandbags lined the banks at the edge of the rivers within the Mela *nagri*, so that pilgrims walked over not earth but sandbags.³³ This extra safety measure also improved traction as bathers stepped down into and out of the water.

Bathers’ Safety

For those in the water itself, boundary fences kept the bathing crowds within the shallow area, within several feet of each shore, minimizing risk of wading or falling into deep water. Lifeguards and rescue boats monitored the entire shoreline. Fencing and sandbags were also projected out into the water like teeth at regular distances. This measure created “eddy breakers” that controlled water flow to help prevent bathers from getting caught in the currents. Since the most sacred spot was mid-stream at the rivers’ confluence, pilgrims could also hire boats with rowers to take them further out if they wished. These boats sometimes capsized. Three capsized on February 9,³⁴ and some reported that the body of a young boy, perhaps an overlooked victim, washed up on the *sangam* the next day.³⁵ In addition, despite all of these efforts, the media reported two deaths following a small stampede within the *nagri* on February 10.³⁶

Bathers also faced risks of disease from contaminated water, since pilgrims often sip small amounts of river water as part of religious ritual. Water safety measures included a variety of efforts to reduce the risk of waterborne diseases. The 2013 festival included a “Green Kumbh” publicity campaign sponsored by several religious groups to highlight the importance of keeping the Ganges clean.³⁷ Water contamination was further limited by controlling upstream factory discharge before and during the festival. Upstream dams scheduled releases to increase flow and volume of fresh water into the bathing area.³⁸ Since sewage in India typically flows directly into the rivers, during the Kumbh “all the city sewers were directed downstream of the *sangam* to keep the bathing ghats free of filth.”³⁹ Piped bore wells provided clean drinking water, and the trucks sprinkling the roads were labeled with signs in Hindi to warn pilgrims that water from these trucks was not safe for drinking.

Lost and Missing Person Surveillance

Another risk pilgrims faced was that of getting lost (or abandoned⁴⁰). Crowd surveillance took several forms. Police monitoring sites included the “Sangam Tower” as well as military surveillance from the nearby Allahabad Fort. People lost, missing, or otherwise displaced during the event were directed to either the nearest police station or to the nongovernmental organizations that have been sheltering and reuniting those lost at the Mela since the 1940s.⁴¹ The site-wide public address system throughout the festival broadcast names of those wishing to be reunited and where to find them.

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Onsite Medical Care

Medical care was organized into services within each of the *nagri's* 14 administrative geographical sectors. Thirteen sectors each had its own (temporary) allopathic medical clinic. A fourteenth facility, a permanent building adjacent to the *sangam*, housed an allopathic medical hospital. Medical personnel in each sector clinic were recruited (or appointed) from nearby hospitals and medical schools. Clinics also contained basic pharmaceutical supplies, two or three camp beds for patients who needed to lie down, and four types of disaster preparedness kits: for stampede, bomb blast, burns, or drowning.⁴² All medical care within the *nagri* during the duration of the festival was free. Across South Asia it is traditional for individuals to rely on a variety of different cultural health care practices, often overlapping advice from diverse practitioners in treating the same complaints. In addition to the allopathic medical care at the festival, the site also included 12 homeopathic and 12 ayurvedic hospitals.

The Most Auspicious Holy Dip

By Sunday morning, February 10, 2013, the festival—and the crowds—were at their peak. This was Mauni Amavasya, the Kumbh Mela's "highest holy day." Pilgrims surging onto the fairground from the railway station that morning had one goal in mind: a bathing experience for spiritual cleansing. Could they reach the *sangam* with time necessary to properly revere Mother Ganga, perform ritual offerings and prayers to wash away sins, taste the holy nectar of immortality, and travel back to the station that evening to catch their train home?

India has many sacred spots for bathing along the Ganges River. But the 2013 Kumbh Mela offered many of the fragile elderly who came in their later years with a once-in-a-lifetime opportunity. According to Dr. Ahmed Shaikh, a physician from Mumbai who attended the 2013 festival to help monitor the medical risks, "most of the people who come for these pilgrimages are... retired from their professions and now they want to be closer to God... So these are elderly people... a huge population at risk... women, disproportionately, and elders."⁴³ Many of these elderly had younger family members with them to help them fulfill this most sacred ritual in hope of a blessed death.

We Have a Stampede: Now What?

Around 6 PM in the evening on Sunday, February 10, 2013, several miles west of the *sangam*, the 21-coach Rajdhani Express—one of the added special trains with a capacity of 1,400 passengers⁴⁴—was approaching the city of Allahabad for its scheduled stop at the Allahabad Railway Station. The train was carrying hundreds of people intent on a holy dip. At the train station, additional throngs of pilgrims who had come that day from the *sangam* after their bathing waited (many still in wet clothing) with luggage, family, and friends, to board the trains and go home.

There were no restrictions on who could enter the station. Unreserved seats on the trains were available—as they are in much of the world's public transport—on a first-come, first-served basis. As Logan Plaster, an American journalist at the site, remembers, "These unreserved cars are packed dangerously full, at two or three times safe capacity;" the result was a "frantic scramble that goes on at each new train's arrival."⁴⁵ (See Figure 3) The Rajdhani Express was due to arrive on Platform 1.⁴⁶ As in many train stations, Platform 1 is the platform closest to the street, the point of greatest intersection between crowds coming in and going out.

The festival's vehicle ban did not apply to the city of Allahabad. Its streets were packed with the press of cows, motorcycles, bicycles, taxis, rickshaws, wagons, cars, trucks, wandering animals such as wild pigs, and pedestrians. The numbers of people waiting at the station had increased as the day progressed. According to reports, "train service was severely delayed during the early evening ... leaving more and more passengers

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stranded in the small station.”⁴⁷ By 6:30 PM, rail officials reported that, “all foot-over-bridges were jam-packed. The travellers’ sheds installed at the entry of the station through platform number one were also chock-a-block and people were waiting for their trains at the platforms... [T]here was little idea about which passenger on which platform wanted to go where.”⁴⁸ Only a fraction of the promised extra trains had actually reached Allahabad Railway Station by early evening.⁴⁹

Suddenly, for reasons that remain unclear, a track change was announced just as the Rajdhani Express was pulling into the station. The train arrived not on Platform 1 but on Platform 6. To reach Platform 6, passengers would need to cross over at least one station track, climbing a set of stairs within the station and crossing a narrow footbridge. According to Dr. Shaikh, only one footbridge connected platforms 1 and 6; this footbridge was located at the far western end of the station.⁵⁰ Those waiting for the train on Platform 1 had to quickly reach and cross the bridge to Platform 6. Those exiting the train to take their holy bath would need to cross the same narrow footbridge, in the opposite direction in order to reach the street. (See Figure 4) As a result, there was virtually no room on bridge, stairs, or platforms for anyone to move in any direction. In the pressure and panic of the following minutes, 36 people died, including 27 women, most of them poor and elderly, and one eight-year-old girl.⁵¹ Thirty-nine more were admitted with injuries to nearby medical facilities. The crowds and the noise in the station were so intense that one person in the station at the time but not involved in the stampede reported, “We were waiting on Platform 9, and the stampede happened on Platform 6 killing 30+ people. Heavy crowd and noise, we didn’t even know such an incident happened on the opposite platform.”⁵²

Where Were the Doctors?

Media reports on the stampede highlighted how “there was no doctor or ambulance for at least two hours after the accident.”⁵³ The medical system in India does not typically include personnel such as paramedics or emergency medical technicians (EMTs). The crowds in and around the station made it difficult for anyone to move in any direction, even after the stampede. Victims who could be moved through the packed crowds at the station began to be transported on foot, in improvised “stretchers,” often covered with white sheets from the trains.⁵⁴ Victims who needed urgent medical care due to deep tissue injuries and fractures required splints before they could be moved safely, said Dr. Shaikh, “and there was no way to ask for help.”⁵⁵ As a result, he noted, it was the victims who could move easily—those least injured and most likely to survive—who most quickly reached nearby medical facilities, while the victims with more serious life-threatening injuries or broken bones took up to seven hours to reach a medical facility.⁵⁶ (See Figure 5)

Could the police have helped? The security and police forces in the city of Allahabad during the Kumbh Mela belonged to one of four different official organizations, and could be distinguished by their uniforms. They included the city police, the state police, the Rapid Action Force (a special armed body that specializes in civic crises and disaster response), and the Indian Army. Each group functioned independently. “I saw the doctors at the [nagri] sectors using walkie talkies but I did not see the security forces [in the railway station] using [them],” said Dr. Shaikh. “There was no way for them to communicate from the station bridge... to clear out the crowds outside so help can get in.”⁵⁷

Medical care would also depend on the type of facility. The city of Allahabad contains a number of permanent medical facilities. At the time of the stampede, these included: a small Railway Clinic; the Northern Central Railway Hospital, across the street from the station; and several area hospitals. The area hospitals included the Swaroop Rani Nehru Hospital (SRN), a 1,000-bed tertiary care facility located one block away from the station, equipped with a trauma center;⁵⁸ Tej Bahadur Sapru Hospital (“Beli” Hospital), about two miles north of the Allahabad Railway Station; and MLN Hospital on Colvin Road (“Colvin”), about a half mile south of the stampede site.⁵⁹

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The Railway Clinic, nearest and easiest to reach, was located in a remote corner of the station. Six of the first stampede victims reached this clinic, two with soft tissue injuries and four who were already dead.⁶⁰ Dr. Shaikh described the facilities at this clinic as he found them the following morning:

This clinic was a single one-room clinic. It had two stretchers, no bed to examine the patient, and it was manned by one doctor who wasn't trained or qualified. And the doctor was working literally out of his suitcase! I'm not exaggerating; I was there; he opened his suitcase, and he's got strips of medication, and some suturing material, and some other stuff, maybe some splints, sanitizer... And there was obviously no dress code... no way to identify in a huge crowd to know this guy's a doctor.⁶¹

The Railway Hospital, across the street from the train station, was primarily an observation unit intended for emergency triage and referrals to the larger area hospitals. The Railway Hospital had X-ray facilities and could bandage wounds. Medical staff at the Railway Hospital on February 11, 2013, said Dr. Shaikh, consisted of a total of two doctors and two nurses.

Those accompanying the injured victims made their way to whatever facility they could find. All stampede victims who arrived at a health care facility and sought treatment were admitted regardless of the severity of their wounds.⁶² This lack of decision-making triage quickly challenged the medical resources that would be available for those who arrived for care last, often the most seriously wounded.⁶³ With resources stretched thin and bed spaces filled, late-arriving patients were referred to the Casualty (emergency) units of other, more distant facilities, further delaying their treatment. One news report estimated that at least 15 of the 36 deaths had been caused by "severe delays in medical treatment."⁶⁴ Since all stampede victims were admitted, Dr. Shaikh recalls, "One guy said to me, 'They're just separating the dead from the alive.'"⁶⁵

By Monday morning, February 11, all available medical personnel in the city, including medical interns at Allahabad Medical College, were mobilized to provide their services to stampede victims across the city's medical facilities.⁶⁶

By Tuesday morning, the National Railway officials posted lists of the dead and injured at various medical facilities where friends and relatives might come looking for them. (See Figure 6) Lists included names and ages (when known), gender, injury type and severity, and the facility where they had been admitted for care. Those injured ranged from ages 18 to 82, and those who died ranged from ages 8 to 72. Notices also directed relatives of those who had died to the Allahabad Medical College, where they had been moved for post-mortem examination.⁶⁷

Who is to Blame?

The immediate question that dominated the media was: who should be held responsible? Mohammad Azam Khan, a cabinet minister in the Uttar Pradesh state government, who had been appointed to head the Kumbh Mela administration during the period of the festival, resigned. He made it clear that his resignation was a symbolic gesture, telling reporters, "Though the incident took place outside the Kumbh Mela premises, I take moral responsibility." With his resignation, however, he blamed the railways authorities for mismanagement, noting that, "[T]he railways appeared to be indifferent and negligent."⁶⁸

Railways Minister Pawan Kumar Bansal denied that the railway was at fault and blamed the crowds. He claimed that the railways had made "adequate arrangements well in advance" to deal with the passenger rush during the festival. In addition to "112 routine trains, we also ran 69 special trains on Sunday," he said. "There were too many people on the platforms. The station was overcrowded."⁶⁹

The initial reports incorrectly attributed the tragedy to the footbridge—or some part of it—collapsing.⁷⁰ Journalist Logan Plaster visited the site the next morning and found the bridge "perfectly intact," he said;

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“The problem wasn’t infrastructure.”⁷¹ Railway Minister Bansal also dismissed the false rumors of a broken footbridge handrail.⁷²

Others blamed the stampede on police use of batons as weapons.⁷³ Dr. Shaikh noted that “What precipitated this is that the police... got frustrated and started using batons to control these crowds. That just triggered a stampede.”⁷⁴ Officials admitted that indeed batons were eventually used in an attempt to control the crowds.^{75,76}

Mohammad Azam Khan also blamed the media for creating panic by its report of the incident that had taken place in the Kumbh that day (See Figure 7), complaining that,

The death of two persons after falling in drain was run as breaking news in channels saying that deaths took place due to stampede in Kumbh...Due to this news, people started moving to the railway station due to which pressure increased there.⁷⁷

Officials responded to the tragedy with promises of monetary compensation for victims. India’s Prime Minister, Manmohan Singh, immediately issued a general promise of compensation for the injured and families of those killed.⁷⁸ While outside the hospital morgue, Dr. Shaikh recalled,

I was following what’s called a magistrate general...moving in his entourage of policemen and these armed force heads, and... suddenly in the middle of it the media [asked about] all these injuries, who’s going to compensate? So he announced a monetary compensation of 5 lakh [500,000] rupees for the ones who are dead and 2 lakh [200,000] rupees for the injured.⁷⁹

The crowds were also unhappy due to a perceived lack of public information about medical services for the victims. At SRN Hospital, for example:

Divisional Commissioner of Allahabad [Devesh Chaturvedi](#) and Dr. [S. P. Singh](#), Principal of Motilal Nehru Medical College to which the hospital is attached, were mobbed by people angry over “lack of proper care and facilities.” The officials, who had visited the hospital to take stock of the relief work, had a tough time assuaging the frayed tempers. Some of the bereaved people complained that they were being prevented from taking away the bodies of their near and dear ones. The official requested them to “have patience till the post-mortem and other formalities” were complete.⁸⁰

Months later, at a follow-up seminar on the Kumbh Mela at the Harvard University Radcliffe Institute in August 2013,⁸¹ Inspector General Alok attributed the stampede to several factors. He was upset that the Railways had arbitrarily cut back the number of trains initially promised, leading to overcrowding at the platform. However, he attributed the more immediate reason for the stampede to crowd behavior. Most pilgrims carried their luggage on their heads. This prevented them from looking down at the steps on the footbridge, as they could only look straight ahead. A landing half way up the stairs is where someone is mostly likely to have misjudged a step. Given the densely packed crowds on the footbridge, a cascade was inevitable.

When journalist Logan Plaster returned to the stampede site on February 11, officials were strictly enforcing queues at the station. He climbed the bridge to view the stampede platform up close, writing later,

I saw a pile of shoes that seemed to have been tossed over the railing. By their positioning, these most likely belonged to the deceased. But besides these jettisoned relics, there was no sign whatsoever that a tragedy had struck so recently. No plaques, no pictures; just streams of passengers moving on with their lives....The obvious lack of pause seems to ignore the dead—and makes it more difficult for authorities to remember the past and learn from mistakes.⁸²

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Conclusion

Although the disaster had not happened on festival property, 36 people died during the 2013 Kumbh Mela in the railway station stampede and 39 others were injured. This may be compared to hundreds who died in the infamous 1954 stampede on the Kumbh ground itself. Was this a sign of failure—or did it prove that preventive measures for the festival had been a success? Whether the 2013 Kumbh Mela was a success or failure, such tragic unintentional injuries and accidents caused by stampedes remain a risk for mass gatherings. How might those who would be responsible to plan and prepare for the next Allahabad Kumbh Mela, in 2025, keep everyone safe?

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Figures

All photos were produced as part of Harvard University's "Mapping India's Kumbh Mela" project and are used here with permission.

Figure 1. View From the Bluff Overlooking the 2013 Kumbh Mela, Looking Southwest Toward the Allahabad Fort



Photo credit: Susan Holman

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Figure 2. Police Monitoring the Crowd Flow and Bridge Security During the Kumbh Mela



Photo credit: The Lakshmi Mittal South Asia Institute at Harvard University

Figure 3. Crowds at the Allahabad Railway Station, the Day After the Stampede



Photo credit: Derek Brown

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Figure 4. Crowds on the Railway Bridge at the Allahabad Railway Station



Photo credit: Derek Brown

Figure 5. Ambulance Wading Through Pedestrian Traffic on February 10. Emergency Response Vehicles Took Several Hours to Ferry Patients Over Distances That Should Have Taken a Few Minutes



Photo credit: Dhruv S. Kazi

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Figure 6. Sample Sheet From the Northern Railways Posted in Public Places Outside Medical Facilities in Allahabad Listing Victims' Injuries, Mortalities, and Medical Facilities Providing Care. A Summary of All Non-Fatal Injuries and Hospital Locations Is Given in the Box at Bottom Right

31	Unknown	55	M	Unconscious	??	At SRN Medical College Hospital ALD
32	Ayushi	18	F	d/o M. P. Sharma	Gwalior	At SRN Medical College Hospital ALD
33	Ajay Prasad Gupta	45	M	s/o Triveni Sahu	Latehar	At TejBahadurSapru Hospital
34	Krishna Devi	65	F	w/o Raja Ram	Sakurbasti Delhi	At TejBahadurSapru Hospital
35	Laxmi Devi	70	F	w/o Ram Kishore Awasthi	Banda UP	At TejBahadurSapru Hospital
36	Rajesh Gupta	45	M	s/o KedarNath Gupta	Farida bad	At TejBahadurSapru Hospital
37	Dhanpati	70	F	w/o Gayadeen	Sultanpur	At TejBahadurSapru Hospital
38	RameshwarMistri	70	M	C/o Ramawtar	Mayapuri, Delhi	Rly Hospital
39	Munish Devi	50	F	W/o Raj Bahadur SHIV RAT	Delhi	Rly Hospital
Summary						Hospital Wise
Greivous-3						At SRN (Medical College)- 30 Patients
Simple -36						At Tej Bahadur Sapru Hospital- 5 Patients
Total -39						At MLN Hospital (Colvin) 2 Patients
						At Railway Hospital- 2 Patients

Photo credit: Ahmed Shaikh

Figure 7. The Site of the Stampede Where Several People Died Inside the Kumbh Mela on Sunday, February 10. The Pool Visible Here Was Quickly Fenced in and All Evidence of Scattered Personal Effects Removed



Photo credit: Derek Brown

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Stampede at the Kumbh Mela: Preventable Accident?

Discussion Guide

2017

Overview

This discussion guide accompanies the case, “Stampede at the Kumbh Mela: Preventable Accident?” The case discusses a stampede that took place at the Railway Station in Allahabad, India on February 10, 2013, causing 36 deaths and dozens of injuries. The station was crowded that day due to travelers arriving to participate in the Kumbh Mela, a Hindu ritual and festival that draws millions of devout pilgrims to the banks of the Ganges River in Allahabad every twelve years for spiritual purification. In 2013, February 10 was the festival’s most auspicious holy day, and it was estimated that 20-30 million visitors attended the Kumbh Mela on that day alone. The case shows how urban crowding can challenge urban and national infrastructure and advance resource planning, describes the types of accidents, injuries, and related health risks associated with such urban mass gatherings, and outlines preventive measures (actual and potential) that help mitigate related health risks.

Related materials available to accompany the case and discussion guide include an instructor’s note, role play exercise, glossary of terms, and annotated bibliography.

This case focuses on unintentional accidents and injuries, but it may also be used in a teaching module or class that considers the challenges of all injuries and accidents in global health, including those that are intentional. Examples of common unintentional injuries include the effects of natural disasters, motor vehicle accidents, crowd collisions, occupational hazards, and related encounters or falls. Intentional accidents and injuries include suicide, domestic and gendered violence, and consequences of armed crime, conflict, or terrorism. The health conditions for, risks of, and responses to such injuries, for affected individuals and communities, will depend on the circumstance. Responses range from bandages to cross-border humanitarian responses to national health policy making (e.g., seat belt laws to reduce traffic accident injuries).

The discussion questions below offer a broad range of approaches. Depending on the class, teachers may choose questions and types of questions most useful for their specific students and classroom goals. Each question is followed by hints (in italics) to guide the teacher in facilitating answers.

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Discussion Questions

Hints to guide the teacher in exploring answers to each question are given in italics in parentheses.

Information-seeking questions

1. What happened at the Allahabad Railway Station on February 10, 2013?
2. Who was responsible for the safety of the crowds at the Kumbh Mela during the festival? (Describe how responsibility was administratively divided between the nagri, the city, the railway station, and state or national responsibility)
3. What measures are established to mitigate crowd-related health risks and how are these measures regulated? (refer to the sections on “Crowd Flow Control,” “Ground Safety,” “Bathers’ Safety,” “Lost and Missing Person Surveillance,” and “Onsite Medical Care”)
4. What factors caused the long delay between the stampede and medical care for the most seriously injured survivors? (refer to section, “Where were the Doctors?”)

Analytical questions

5. How did the stampede at the Allahabad railway station happen?
6. How did the train station regulate crowd flow, compared to crowd flow control measures at the festival site? (refer to sections “Will there be Enough Trains?” and “Who is to Blame?”)
7. Why were Kumbh officials eager to prevent a stampede within the festival grounds? (e.g., national reputation; pride in religious heritage; public relations; not wanting to repeat bad press of the infamous 1954 stampede)
8. Think about the urbanization process of the temporary city of the Kumbh Mela, with its rapid building, rapid population growth, and large-scale transitions in supply and demand; what is the relationship between this “temporal urbanism” and risks to nearby or local infrastructure? (e.g., the festival crowds posed a physical stress on a city designed for less people; food and business transport would have crowded the roads more than usual; the event left lots of trash; medical care depended on volunteers and students; effect on local hospitals)
9. Discuss how the railway station stampede during the Kumbh Mela festival might be compared with risks and risk mitigation in other temporary cities such as refugee camps and emergency housing in humanitarian disasters. (e.g., it was not just the high volume of people but also the panic caused by need to move quickly from one place to another that caused the stampede; like refugees, those most affected were mostly elderly, women, or poor; both use tents for housing; similar need to provide safe water and similar risks of disease due to food and accidents)
10. What challenges does this case suggest about the public health perspective of managing a large religious event effectively, compared to a non-religious crowd event (such as a sports game or refugee camp)?

Challenge questions

11. Why was the railway footbridge a preventable risk? (e.g., if the train had not been redirected to a different track at the last minute, use of the footbridge would have been unnecessary; more alternative bridges across the tracks would have prevented the rush to that one footbridge)
12. Who do you think had final jurisdiction over the footbridge? Why?
13. What social, cultural, or economic factors or determinants might also have played a role in the fact that most of the victims were women or children? (people were hurrying; women and children were less able to move fast and may have been carrying heavier burdens or more dependent on family)

Discussion Guide: Stampede at the Kumbh Mela: Preventable Accident?

members who were separated from them in the rush; the festival attracts elderly who want to die in religious purity; such persons may be sick or less skilled at hurrying through crowds)

14. How might medical service and care delivery to stampede victims have been improved? (see Dr. Shaikh's comments and suggestions)
15. What implications might this event have for global policies as they affect international relations, human rights, and global health? (e.g., the festival draws Hindus from many different countries, as well as tourists and journalists; the media and international presence could provoke or inspire health policy changes in other countries or in international organizations)

Action questions

16. What would you do to improve train transit safety during the Kumbh Mela if you were a
 - Kumbh nagri appointed police officer? (e.g., these officers would have remained in the nagri except for travel to and from the festival; they would likely have little influence on train safety except through political connections)
 - Allahabad city employee? (e.g., lobby to build more footbridges; improve the Railway Station's healthcare services and available healthcare personnel; more liaison with the Kumbh Mela health care service teams during the festival to ensure that the good care available in the nagri is also available to pilgrims in Allahabad city if possible)
 - India Railways official? (e.g., leverage power to deliver total number of extra trains promised; prevent last-minute track changes for all trains during the festival; train Railway workers to provide emergency health care services and supplies; improve cell phone communications for crowd management; improve Railway clinic coverage and signage; more emphasis on use of and festival access to/from all four nearby train stations so people did not automatically crowd to the main station)
 - Physician or medical officer? (e.g., physicians are well-respected community leaders; leverage influence to improve all of the above)

Hypothetical questions

17. If the track change had been announced in advance, would that have kept the flow over the bridge safe? Why or why not? (e.g., would it have prevented use of police batons? What was needed for safety over the bridge, regardless of timing?)
18. Would you consider the outcome—36 dead and 39 injured at the stampede at the railway station on February 10—a mark of success for the 2013 Kumbh Mela, or a failure? Explain your answer. (e.g., review the section “Public Health at the Kumbh Mela” and discussion of past disasters; emphasize that the focus here is on preventable injuries; is a preventable injury ever a mark of “success”?)

Predictive questions

19. What do you think will happen at the next Allahabad Kumbh Mela (in 2025) at the Allahabad Railway Station? Explain your answer. (e.g., discuss: the festival's tradition of long-term planning; advances in telecommunications; what factors will influence whether there are changes in 2025 or not?)

Generalization questions

20. How does urban structure affect health in this story? What aspects of health are affected? (e.g., deaths and injuries were caused by limitations in an urban structure—station and city designs, road traffic access, urban structure of train tracks and timetables)

Discussion Guide: Stampede at the Kumbh Mela: Preventable Accident?

21. Name other aspects of health that you can imagine might be affected by being at the Kumbh during a stampede (whether in the stampede or not); explain your answer. (e.g., increased anxiety and fear for friends and family; all the usual health risks of close crowding even without a stampede, e.g., infectious disease risks, water and sanitation; increased risks of motor vehicle accidents outside the stampede area)
22. What other circumstances could benefit from lessons learned by the February 10 stampede? (e.g., architectural decisions about new and renovated transportation centers; other mass gatherings and refugee camp design and administration; more anticipatory urban planning for roads, exit routes, and related transportation and housing options in areas currently at risk of rising sea levels or hurricane/flood damage due to climate change)

Note: The organization of questions into categories in this discussion guide is based on Austin JE. Teaching Notes: Communicating the Teacher's Wisdom. HBS Case Collection Background Note 793-105. Harvard Business School Publishing 1993. <http://www.hbs.edu/faculty/Pages/item.aspx?num=23299>.

Accidents & Injuries: Lessons From a Stampede

Role-Play Exercise

2017

Purpose

The purpose of this role-play exercise is to engage collaborative student group discussion about a stampede at a mass gathering in 2013, to facilitate understanding of the cross-disciplinary factors needed for effective prevention of unintentional accidents and injuries. The exercise is based on information described in the case study, “Stampede at the Kumbh Mela: Preventable Accident?”

Learner Level

- Undergraduate, Graduate

Time

One 1-hour session

Required Pre-Reading

- Case: Stampede at the Kumbh Mela: Preventable Accident?
- Glossary of Terms: Learning From India’s Kumb Mela

Assignment

Read the case study, “Stampede at the Kumbh Mela: Preventable Accident?” If necessary, refer to the supplementary “Learning from India’s Kumbh Mela: Glossary of Terms” to help you understand its details.

Divide the class into small groups of three students for each group. Each person in the group will play the part of one individual present at or affected by the Allahabad Railway Stampede: (1) Dr. Ahmed Shaikh, whose observations are summarized in the case with supplemental observations quoted below. (2) A pilgrim or tourist (you decide) who attended the Kumbh Mela and who was in the crowds at the Railway Station during the stampede; (3) A local official who is an employee of either the Railway or the local city government (you decide), who was on duty at work on the day of the stampede, and who now feels that the media from the disaster is placing blame on his or her office or job performance as being in some way at fault.

The discussion will focus on one or more of the six specific areas that Dr. Shaikh identifies (below), where preventive measures could improve safety at a future event. The teacher may ask the students to focus on one or two of the six, or they may assign each of the six to a different group.

In each small group, the student who takes the role of Dr. Shaikh will begin by reading aloud the suggested preventive measure under discussion, as it is worded below. “Dr. Shaikh” will then say again—this time in his (or her) own words based on reading of the case—why this point is an important one for keeping people

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Role Play Exercise: Accidents & Injuries: Lessons From a Stampede

safe in large crowds. The group will then spend approximately 30 minutes discussing (all or an assigned selection of) the following group discussion questions:

1. How does this preventive measure affect what you experienced at the festival or the railway station? (begin by telling the group who you are in the role play: i.e., as a health worker; as a government employee; as an ordinary person attending an event that has special significance to you and your culture or religion)
2. How does the point being discussed affect the health-related injury that hurt your family or friend?
3. Does this suggested preventive measure increase your sense of anger or blame about what happened?
4. Based on your reading of the case, what would make this possible solution or preventive measure hard to put into practice?
5. What kinds of injuries or health effects would follow if this measure was not enacted?
6. What do you think is the responsibility of the government to make this change possible? What other sectors would need to be part of this solution (e.g.: education, engineering, national security, local health workers, construction workers, business)?
7. The Kumbh Mela is exemplary because many services are offered free. What kind of costs might be involved in this preventive measure? From your “role play” personality, do you think the cost is affordable and good for your community? Why or why not?
8. How might this discussion relate to injury prevention in other countries or other accident or disaster settings that you can think of or perhaps know from personal experience?

Following the small group discussions, the class may reconvene, and one representative from each of the small groups reports key points based on their group’s discussion.

Students may find it helpful to refer to an [online map of the city of Allahabad](#) to identify locations of the railway stations and hospitals, or a [map of the ground plan of the 2013 Kumbh Mela](#).

Role Play in Small Groups: Discuss with Dr. Shaikh:

Dr. Shaikh: The stampede might have been easily averted. Just a few simple measures could have prevented the needless deaths and injuries. The following measures should be considered by officials as they plan for the future. For example:

1. Clear and coordinated communication for security personnel

The stampede would not have had such a tragic outcome if there had been clear and rapid communication in the minutes following the disaster. What if security personnel had been provided with equipment—such as walkie talkies—and prepared to act according to a deliberate communication plan that would help network response across all types of officials who were in or near the station at the time? Coordination and a clear hierarchy about who makes what calls would have helped trigger a rapid response.

2. Ambulance lanes

Ambulance lanes could easily have been made inside the Kumbh Mela as well as outside it in the city. After all, the roads of Allahabad had recently been paved—re-tarred—and a lot of other adjustments were made.

3. Sector-like clinics in the city of Allahabad

The sector clinics at the Kumbh Mela were all very well equipped. The clinics even had a large supply of pre-packaged first-aid kits specifically for use in case of a stampede. A similar system outside the festival

Role Play Exercise: Accidents & Injuries: Lessons From a Stampede

jurisdiction, in the city of Allahabad, would have helped disperse care and ensure that facilities were adequate for rapid treatment.

4. Railway station control room with response capacity

The Allahabad railway station had a surveillance chamber where television monitors could view all activities that occurred within the station. Chamber entrance required government or official identification. During the brief moment when Dr. Shaikh was permitted to enter this room on the day after the stampede, he noted that staff in the room could observe what was happening, but they could not make announcements or do anything about what they saw. Basic tools for communication technology in such a chamber could aid rapid response and save lives.

5. Controlled access to the railway station

There were no controls on who could enter the station. The crowd density might have been alleviated if officials limited entry to those with a ticket or identification. This is commonly done in India at airports. However, this intervention to control station access would require a change in the national railway policy, since many passengers buy their tickets on the train.

6. Better use of nearby railway stations

The authorities had failed to see the value of developing two other, nearby railway stations that were very close to the Kumbh Mela site. Had the other stations been developed to cater to the bathing pilgrims, Dr. Shaikh reflected, the crowds on February 10 might have been divided into three separate locations. This use of nearby stations would have lessened the density at the main train station, and potentially prevented the stampede.

Note on Source: The six preventive measures identified in this Role-Play exercise were suggested and described by Dr. Ahmed Shaikh during a Skype interview on October 1, 2013, between Dr. Shaikh and Susan Holman, Senior Writer at the Global Health Education and Learning Incubator, they and are used here for discussion of the stampede case with Dr. Shaikh's permission. The interview was undertaken as part of the Harvard University collaborative research project, "Contemporary Urbanism: Mapping India's Kumbh Mela." More information about the Harvard Kumbh Mela project is available at <http://southasiainstitute.harvard.edu/kumbh-mela>.

Annotated Bibliography

Learning From India's Kumbh Mela

2017

Overview

This bibliography is an updated revision of a teaching resource originally created as part of the Harvard University collaborative research project, “Contemporary Urbanism: Mapping India’s Kumbh Mela.” The Kumbh Mela is a Hindu ritual and festival that draws millions of pilgrims to the banks of the Ganges River in Allahabad, India, every twelve years, for spiritual purification. More information about the Harvard project is available at <http://southasiainstitute.harvard.edu/kumbh-mela>. The bibliography includes a curated selection of background readings about the history of the festival, new resources relevant to global health at the Kumbh Mela identified in ongoing literature review, and publications that followed the 2013 Kumbh Mela by Harvard project faculty and researchers (noted with **). Most resources are freely available online.

The bibliography is designed as a companion resource for two Global Health Education and Learning Incubator teaching cases: “Toilets and Sanitation at the Kumbh Mela” and “Stampede at the Kumbh Mela: Preventable Accident?” It may also be used in classroom discussions about the study of religion, urbanization in a global world, health governance and governance for health in resource-poor settings, humanitarian aid, and emergency medicine.

This annotated bibliography includes:

- [The Festival: Background and Description](#)
 - [Kumbh Mela Festival: General and Historical Sources](#)
 - [The Festival as Media Spectacle](#)
 - [Harvard University “Mapping the Kumbh Mela” Project](#)
- [Religious Pilgrimage](#)
 - [Religious Pilgrimage and the Kumbh Mela](#)
 - [Religious Pilgrimage: General](#)
- [Health Risks and Response](#)
 - [Cholera](#)
 - [Water and Sanitation](#)
 - [Stampede and Crowd Management](#)
 - [Mass Gatherings and Health: General Resources](#)
 - [Environment, Pollution, and India’s Sacred Rivers](#)
 - [Health Surveillance Technology](#)
- [Designing the Mobile City](#)

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Selected Resources

*indicates resource listed in GHELI's online Repository

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Annotated Bibliography: Learning From India's Kumbh Mela

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Topic Portal. Kumbh Mela Festival 2001

Kumbh Mela Festival 2001. <https://web.archive.org/web/20160307225744/http://kmp2001.com/index.html>.

This web portal features resources from an expedition of filmmakers, photographers, writers, researchers, sound designers, and composers who traveled to Allahabad, India to experience and document the Kumbh Mela in January 2001. Prior to the 2013 festival, this was one of the definitive sources of information and multimedia representations documenting this event. It includes detailed information about the Kumbh Mela; a sky map with astronomical information during the 2001 festival; an “India Audio Travelogue” page with audio sound files incorporating sounds of the Mela; written excerpts by the team reflecting on their experiences; media information about team’s documentary film, “Kumbh Mela: Songs Of The River”; and samples from the music album, “On The Road To Allahabad: The Delhi Session.”

Article. Making the Colonial State Work for You: The Modern Beginnings of the Ancient Kumbh Mela in Allahabad

MacLean K. Making the Colonial State Work for You: The Modern Beginnings of the Ancient Kumbh Mela in Allahabad. *The Journal of Asian Studies* 2003; 62(3): 873-905.

<https://archive.org/details/TheModernBeginningsOfTheAncientKumbhMelaInAllahabad>.

This article by historian Kama MacLean explores the dynamics of colonialism in India during the early modern Kumbh Mela festivals.

Article. Conflicting Spaces: The Kumbh Mela and the Fort of Allahabad

Maclean K. Conflicting Spaces: The Kumbh Mela and the Fort of Allahabad. *South Asia Journal of South Asian Studies* 2001; 24(2): 135-159. DOI: <http://dx.doi.org/10.1080/00856400108723455>.

In this article, historian Kama Maclean examines the controversies over the administration of religious festivals, or melas under British colonial rule, the risks posed by the warrior-holy men and officiating Brahmins, and concerns to control them. This piece provides an important historical perspective on governmental intervention and colonialism in this religious mass gathering during the nineteenth century.

Annotated Bibliography: Learning From India's Kumbh Mela

Book. Prayaga, The Site of Kumbha Mela

Dubey DP. Prayaga, The Site of Kumbha Mela. Aryan Books International 2001.

https://books.google.com/books/about/Pray%C4%81ga_the_Site_of_Kumbha_Mela.html?id=i43ZAAAAMAAJ.

This book provides an authoritative cultural history of the city of Prayaga (today known as Allahabad), drawing on Vedic, Buddhist, Jain, and foreign sources. The author also draws on archaeological evidence to consider implications for the development of the Kumbh Mela festival and its influence.

Book. Si-Yu-Ki: Buddhist Records of the Western World, Translated From the Chinese of Hiuen Tsiang (AD 629)

Beal S, trans. Si-Yu-Ki: Buddhist Records of the Western World, Translated From the Chinese of Hiuen Tsiang (AD 629).

London 1906. <https://archive.org/details/siyukibuddhisto1bealgoog>.

This book, now freely available online through the Internet Archive's digital library, is an important early historic text for the culture and religious practices in ancient India. It includes one of the earliest known descriptions of the charitable bathing festival on the sand banks of the Ganges River just outside Prayaga (modern Allahabad) which is known today as the Kumbh Mela festival (pages 233-234). The author was a Chinese Buddhist monk who was traveling through India on pilgrimage.

THE FESTIVAL AS MEDIA SPECTACLE

Article. Being Seen, and Not Being Seen

Maclean K. Seeing, Being Seen, and Not Being Seen. Cross Currents 2009; 59(3): 319-341.

DOI: <https://doi.org/10.1111/j.1939-3881.2009.00082.x>.

This article discusses the role—and controversies over—the visual experience and perceptible intrusion of photographers in the Kumbh Mela festival. It highlights important issues about how we “visualize” and objectify persons and experiences that appear very different from ourselves.

Opinion. Mela and Media: Norms in Absence

Mela and Media: Norms in Absence. Economic and Political Weekly 2001; 36(4): 252-253.

<http://www.epw.in/gu/journal/2001/04/editorials/mela-and-media-norms-absence.html>.

This short editorial written during the 2001 Kumbh Mela highlights the festival's media marketing in discussion with the unexpected “Mela Act” ban imposed on journalists for photographs of pilgrimage bathing at the sangam. It illustrates the tensions between religious display and the rise in international media coverage at a holy site.

Film. River of Faith: A Journey to the Maha Kumbh Mela, Prayag (Allahabad), 2013

Arora N. River of Faith: A Journey to the Maha Kumbh Mela, Prayag (Allahabad), 2013. Shunya.net 2013.

<https://www.youtube.com/watch?v=cQNoimABjMQ>.

This 56-minute documentary was created at the 2013 Kumbh Mela festival, by filmmaker Namit Arora, looks at the Kumbh Mela, its history and participants. It focuses on the militant-monastic orders called akharas, whose members, including the naked ash-smeared Naga ascetics, see themselves as part of an ancient lineage of defenders and propagators of Sanātana Dharma. Supplemental material about the film is available in a blog post, “River of Faith,” from February 18, 2013.

Video. Kumbh Mela 2001 – Part 2 of 2

Arora N. Kumbh Mela 2001—Part 2 of 2. Shunya.net 2001. <http://www.youtube.com/watch?v=oFQuxZDg1-Y&feature=relmfu>.

This 9-minute video provides images from the 2001 Kumbh Mela with a contemporary music background without narration. Scenes include the sadhus, processions, and bathing scenes. Part 1 is no longer online.

HARVARD UNIVERSITY "MAPPING THE KUMBH MELA" PROJECT

**** Topic Portal. Mapping India's Kumbh Mela**

Topic Portal. Mapping India's Kumbh Mela. Lakshmi Mittal South Asia Institute at Harvard University, Harvard Global Health Institute 2013. <http://southasiainstitute.harvard.edu/kumbh-mela>.

This web portal contains key resources, including videos, articles, images, and links, from the 2012-2013 cross-university collaborative, "Mapping India's Kumbh Mela." Resources highlight Harvard University's engagement with faculty, staff, and students to experience and study the Kumbh Mela as it relates to religion and culture, urban planning, business, and health.

**** Video. Mapping the Kumbh Mela: All Harvard Video**

Video. Mapping the Kumbh Mela: All Harvard Video. Lakshmi Mittal South Asia Institute at Harvard University 2013. <https://youtu.be/wSDBGaUtkUU>.

This 6-minute video was produced by the Harvard University collaborative "Mapping India's Kumbh Mela" project. It features interviews with faculty directors, students, staff, and university partners on site in Allahabad in January 2013.

**** News Series. Harvard Gazette Series on Mapping the Kumbh Mela 2013**

Koch K. Harvard Gazette Series on Mapping the Kumbh Mela 2013.

This five-part series of articles on the Harvard Kumbh Mela project was published in the *Harvard Gazette* in early 2013; the author was a journalist who accompanied the project's faculty and students on site in January 2013.

Stories in the series include:

- [Inside India's Pop-Up City](#)
- [Mapping a Megacity's Metabolism](#)
- [Saving the Mother River](#)
- [Among Millions, a Blank Slate](#)
- [Tracking Disease in a Tent City](#)

****Teaching Case. Kumbh Mela: India's Pop-Up Mega-City**

Khanna T et al. Kumbh Mela: India's Pop-Up Mega-City. Harvard Business School Case 214-023. Harvard Business Publishing 2013. <https://cb.hbsp.harvard.edu/cbmp/product/214023-PDF-ENG>.

This 36-page case study draws on market and system field research and discusses the 2013 Kumbh Mela from the perspective of finance and business strategy. The case is available for purchase from Harvard Business Publishing.

**** Book. Kumbh Mela: Mapping the Ephemeral Mega City**

Book. Khanna T et al. Kumbh Mela: Mapping the Ephemeral Mega City. Hatje Cantz 2015. <http://www.hatjecantz.de/kumbh-mela-january-2013-6458-1.html>.

This book brings together essays, graphics, maps, photos, and drawings from the 2013 Harvard University collaborative project, "Mapping the Kumbh Mela." It highlights the project's activities in monitoring the large-scale 2013 event from its preparation in 2012 to the demolition of the site in spring 2013. It investigates and documents the prototypes for flexible urban planning, and reviews officials' advice on issues concerning environmental protection. The volume presents the comprehensive research findings useful to urban designers and planners, and includes city maps, aerial images, and photographs.

Annotated Bibliography: Learning From India's Kumbh Mela

RELIGIOUS PILGRIMAGE

RELIGIOUS PILGRIMAGE AND THE KUMBH MELA

Book. Pilgrimage and Power: The Kumbh Mela in Allahabad, 1765-1954

Maclean K. Pilgrimage and Power: The Kumbh Mela in Allahabad, 1765-1954. Oxford University Press 2008.

<https://global.oup.com/academic/product/pilgrimage-and-power-9780195338942>.

This book provides an important scholarly history of the Kumbh Mela festival with a focus on the role of religion and politics in the power dynamics and tensions. The author argues that the festival in its current form began only in the 19th century. For a summary of the book and short interview with the author, see Reddy S. [Child of 1857](#). Outlook 2007; Jan 29.

Article. Glancing: Visual Interaction in Hinduism

Babb LA. Glancing: Visual Interaction in Hinduism. Journal of Anthropological Research 1981; 37(4): 387-401.

<http://www.journals.uchicago.edu/doi/abs/10.1086/jar.37.4.3629835>.

This article highlights the importance of visual interaction between deity and worshippers in Hindu spirituality. Underlying the belief that devotees gain benefit from visual engagement is the concept that “seeing” is an extrusive flow that brings seer and seen into actual contact and, under the right circumstances, taking on something of the inner virtue or power of the deity, including the deity’s own power of seeing. The author explores this practice and belief through reflects on three sources: two modern religious movements and a popular religious film.

Photo Essay. The Householder, the Ascetic and the Politician: Women Sadhus at the Kumbh Mela

Chhacchi S. The Householder, the Ascetic and the Politician: Women Sadhus at the Kumbh Mela. India International Centre Quarterly 2003; 29(3/4): 224-234. https://www.jstor.org/stable/23005828?seq=1#page_scan_tab_contents.

This article features a brief introduction followed by eight selected photos from an ongoing visual project on women ascetics. The author highlights the example of Shri Shri Mahant Mira Puri, one of only three female sadhus in the Juna Akhada, one of the most respected communities of sadhus who serve as spiritual leaders for pilgrims during the Kumbh Mela.

Article. Psychological Well-Being and Pilgrimage: Religiosity, Happiness and Life Satisfaction of Ardh Kumbh Mela Pilgrims (Kalpvasis) at Prayag, India

Maheshwari S, Singh P. Psychological Well-Being and Pilgrimage: Religiosity, Happiness and Life Satisfaction of Ardh-Kumbh Mela Pilgrims (Kalpvasis) at Prayag, India. Asian Journal of Social Psychology 2009; 12(4): 285-292.

DOI: <https://doi.org/10.1111/j.1467-839X.2009.01291.x>.

This article illustrates the viewpoint of many who attend the Kumbh Mela for religious cleansing, who believe it has measurable effects on a sense of well-ness. The authors studied religiosity, happiness, and satisfaction with life among pilgrims during the Ardh-Kumbh Mela (held in Prayag, Allahabad, India) during January and February 2007. The study focuses on a sample population of 154 kalpvasis, pilgrims who live on the festival site throughout the entire fair. Results suggested positive association between religiosity, happiness, and life satisfaction.

Book. A Record of Buddhistic Kingdoms: Being an Account by the Chinese Monk Fa-Hien of his Travels in India and Ceylon (AD 399-414) in Search of the Buddhist Books of Discipline

Legge J, trans. A Record of Buddhistic Kingdoms: Being an Account by the Chinese Monk Fa-Hien of his Travels in India and Ceylon (AD 399-414) in Search of the Buddhist Books of Discipline. Clarendon Press 1886.

<https://archive.org/details/recordofbuddhistoofahsuoft>.

This book, available free online, is an important early historic text describing travel through India, including pilgrimage practices observed among various groups. The accounts are described by a visiting Chinese monk who went to India to collect books.

Annotated Bibliography: Learning From India's Kumbh Mela

Book. Record of the Buddhistic Kingdoms: Translated from the Chinese

Giles HA, trans. Record of the Buddhistic Kingdoms: Translated from the Chinese. London 1900.

<https://babel.hathitrust.org/cgi/pt?id=uva.x030157853;view=1up;seq=7>.

This historic text, free online, offers an alternative translation to an early description of life and cultural practices in India, including pilgrimage, as seen by a visiting Chinese monk who went to India to collect books.

RELIGIOUS PILGRIMAGE: GENERAL

**** Book. India: A Sacred Geography**

Eck DL. India: A Sacred Geography. Penguin Random House 2013.

<https://www.penguinrandomhouse.com/books/44789/india-by-diana-l-eck/9780385531924>.

This book tells the story of the pilgrim's India, considering sacred places of pilgrimage from the ground up, with their stories, connections, and layers of meaning. Pages 152-158 discuss the "great festivals," including the Kumbh Mela.

**** Article. India's Tirthas: Crossings in Sacred Geography**

Eck D. India's Tirthas: Crossings in Sacred Geography. History of Religions 1981; 20(4): 323-344.

https://dash.harvard.edu/bitstream/handle/1/25499831/Eck_India%27sTirthas.pdf?sequence=4.

This classic article explains the sacred crossing places known as *tirthas*, pilgrimage sites that are believed to be particularly holy in India's religious landscape. The Kumbh Mela festivals are all located at *tirthas*.

Article. Encountering the 'Other' Pilgrims, Tourists and Boatmen in the City of Varanasi

Doron A. Encountering the 'Other': Pilgrims, Tourists and Boatmen in the City of Varanasi. The Australian Journal of Anthropology 2005; 16(2): 157-178. DOI: <https://doi.org/10.1111/j.1835-9310.2005.tb00032.x>.

This article examines the boatmen of Varanasi (Banaras), India, and their cultural role in negotiating the sacred city for pilgrims and tourists. The author focuses on their relationship with foreign tourists, and the multiple strategies and tactics they have developed to meet needs and shape negotiations to their advantage. Boatmen are quick to "tune in" to those with whom they are dealing, and their close encounters with tourists enable them to critically view Western culture as well as their own local culture.

Article. Religious Fairs and Festivals in India

Article. Banks AL. Religious Fairs and Festivals in India. The Lancet 1961; 277(7169): 162-163.

DOI: [http://dx.doi.org/10.1016/S0140-6736\(61\)91330-7](http://dx.doi.org/10.1016/S0140-6736(61)91330-7).

This historical article by a British physician reflects on his four days at the 1960 Kumbh Mela in Allahabad.

Film. Mystic India

Mystic India. BAPS Swaminarayan Sanstha 2005. <http://www.mysticindia.com>.

This 45-minute award-winning film, produced by BAPS Swaminarayan Sanstha, a volunteer-based NGO affiliated with the United Nations, provides an educational journey to understanding the geographic and cultural diversity of India. The film is based on a true story of an 11-year-old boy ascetic, Nilkanth, who set out on a spiritual quest in 1792, and walked, barefoot and unclothed, for 7 years and 8,000 miles across India. As the film follows his journey, it highlights India's art and architecture, music and dance, faces and festivals, customs and costumes. The film, shot in more than 100 locations, is narrated by actor Sir Peter O'Toole. The film website offers an accompanying [Teacher's Guide](#).

Book. Hindu Places of Pilgrimage in India: A Study in Cultural Geography

Bhardwaj SM. Hindu Places of Pilgrimage in India: A Study in Cultural Geography. University of California Press 1973.

<https://www.ucpress.edu/book.php?isbn=9780520049512>.

This book is an in-depth study of Hindu pilgrimage sites, including discussion and maps of Kumbh Mela festivals.

Annotated Bibliography: Learning From India's Kumbh Mela

Book. Ascetics of Kashi: An Anthropological Exploration

Sinha S, Saraswati B. Ascetics of Kashi: An Anthropological Exploration. N.K. Bose Memorial Foundation 1978.

<https://catalog.hathitrust.org/Record/000122073>.

This book offers a study of Hindu ascetics and how they are organized.

Book. Warrior Ascetics and Indian Empires

Pinch W. Warrior Ascetics and Indian Empires. Cambridge University Press 2006.

<http://www.cambridge.org/gb/academic/subjects/history/south-asian-history/warrior-ascetics-and-indian-empires>.

This book provides a classic summary of warrior asceticism in India from the 1500s to the present. The author argues that Hinduism is not a religion of non-violence and shows how Hindu warrior ascetics were an important component of the South Asian military labor market.

Book. Wandering with Sadhus: Ascetics in the Hindu Himalayas

Hausner SL. Wandering with Sadhus: Ascetics in the Hindu Himalayas. Indiana University Press 2007.

<https://iupress.org/9780253219497/wandering-with-sadhus>.

This book provides an ethnographic portrait of Hindu sadhus—holy men who renounce the world—in northern India and Nepal. The author focuses on the paradox between their ostensibly solitary spiritual practice and their regular interactions with communities and households in ordinary society. As a mobile alternative community, sadhus meet together regularly through pilgrimage festival circuits. The book identifies shared views of space, time, and the body that create the ground for everyday experiences.

Book Review. A Mahomedan Doctor on the Mecca Pilgrimage

Soubhy S. A Mahomedan Doctor on the Mecca Pilgrimage. The Lancet 1895; 146(3749): 49-50.

DOI: [https://doi.org/10.1016/S0140-6736\(00\)80398-0](https://doi.org/10.1016/S0140-6736(00)80398-0).

This short piece reviews a book, published in French in 1895, by Dr. Saleh Soubhy, a Paris-trained Muslim physician describing his personal journey to the Hajj. The review, written in English, offers a historical summary of the health conditions and risks that pilgrims experienced on their journey to Mecca in the nineteenth century.

Book Series. History of Dharmasastra: Ancient and Mediaeval Religious and Civil Law in India

Kane PV. History of Dharmasastra: Ancient and Mediaeval Religious and Civil Law in India. Bhandarkar Oriental Research Institute 1930-1962.

This classic series provides one of the most comprehensive treatments in print of the religious and civil law in Sanskrit treatises from ancient and medieval India. Originally published in multiple parts between 1930 and 1962, the following volumes are available for free online:

- [Volume 1 \(1930\)](#)
- [Volume 2 Part 1 \(1941\)](#)
- [Volume 2 Part 2 \(1941\)](#)
- [Volume 3 \(1946\)](#)
- [Volume 4 \(1953\)](#)
- [Volume 5 Part 1 \(1958\)](#)
- [Volume 5 Part 2 \(1962\)](#)

HEALTH RISKS AND RESPONSES

CHOLERA

Article. Cholera, the Flickering Flame

Bryceson ADM. Cholera, the Flickering Flame. *Proceedings of the Royal Society of Medicine* 1977; 70(5):363-365.

DOI: <https://doi.org/10.1177/003591577707000530>.

This historical overview summarizes occasions of cholera outbreaks that have been associated with religious festivals in India since 1867.

Article. The Natural History of Hardwar Fair Cholera Outbreaks

Herbert H. The Natural History of Hardwar Fair Cholera Outbreaks. *The Lancet* 1895; 146(3752): 201-202.

DOI: [http://dx.doi.org/10.1016/S0140-6736\(02\)05306-0](http://dx.doi.org/10.1016/S0140-6736(02)05306-0).

This historical article considers the incidence of cholera at Kumbh festivals with a focus on the factors that may have contributed to the “big cholera year” of 1892.

Article. An Address on Tropical Medicine, 1894 Delivered at the Eighth International Congress of Hygiene and Demography, Budapest, 1894

Duka T. An Address on Tropical Medicine Delivered at the Eighth International Congress of Hygiene and Demography, Budapest, 1894. *The Lancet* 1894; Sep 8. Pages 561-564.

<https://wellcomecollection.org/works/n4gmdef9?c=0&m=0&s=0&cv=4&z=-0.7833%2C0.1964%2C2.5343%2C1.2823>.

This article provides an example of historical “colonialist” views of infection and disease in India, with some reference to the Kumbh Mela.

Article. Continuing Challenge of Infectious Diseases in India

John TJ et al. Continuing Challenge of Infectious Diseases in India. *The Lancet* 2011; 377(9761): 252-269.

DOI: [http://dx.doi.org/10.1016/S0140-6736\(10\)61265-2](http://dx.doi.org/10.1016/S0140-6736(10)61265-2).

This article reviews the Indian health system’s progress on controlling infectious diseases, including cholera, and recommends revising national health policy to covers a broader agenda and strengthened public health infrastructure, with a focus on quality and equity. This article is part of the *Lancet* Series, “[India: Towards Universal Health Coverage](#).”

Report. Sanitary Reform in India

Sanitary Reform in India. *The Lancet* 1908; 171(4408): 582-584. DOI: [http://dx.doi.org/10.1016/S0140-6736\(01\)61742-2](http://dx.doi.org/10.1016/S0140-6736(01)61742-2).

This historical article summarizes birth, death, and disease statistics with a discussion of a cholera epidemic associated with the 1906 Kumbh Mela at Allahabad, India.

Report. Ending Cholera—A Global Roadmap to 2030

Ending Cholera—A Global Roadmap to 2030. World Health Organization 2017. <https://www.gtfcc.org/about-gtfcc/roadmap-2030>.

GHELI repository link: <http://repository.gheli.harvard.edu/repository/11799>

This report from the World Health Organization offers an operational roadmap for the new global strategy for cholera control at the country level. It focuses on early detection and quick response to contain outbreaks; a targeted multi-sectoral approach to prevent cholera recurrence; and an effective mechanism to coordinate technical support, advocacy, resource mobilization, and partnerships. This report includes a snapshot of the current state of cholera in endemic countries, introduces the global cholera control strategy along with a monitoring framework, describes the financing considerations related to implementing the strategy, including the required water, sanitation, and hygiene (WASH) interventions; and includes data tables on the disease burden of cholera by country and “hotspot.”

Annotated Bibliography: Learning From India's Kumbh Mela

Organization. Global Task Force on Cholera Control

Global Task Force on Cholera Control. <https://www.gtfcc.org>.

This web portal lists the visions, objectives, meeting reports, and related technical guidance documents of the World Health Organization's Global Task Force on Cholera Control (GT FCC). The Task Force published its global roadmap with a new global strategy for cholera control in 2017.

Teaching Case. Haiti in the Time of Cholera

Gordon R, Moon S. Haiti in the Time of Cholera. Global Health Education and Learning Incubator at Harvard University, Connors Center for Women's Health at Brigham and Women's Hospital, FXB Center for Health and Human Rights, Harvard University 2014. <https://repository.gheli.harvard.edu/repository/10687>.

GHELI repository link: <https://repository.gheli.harvard.edu/repository/10687>

This case examines the United Nations' reactions to the cholera epidemic in Haiti in January 2010. The public health community anticipated Haiti to be at risk for many health threats, but did not consider cholera a likely event until, in October, the first case of cholera in more than 100 years was reported, triggering an epidemic. The case discusses the scientific evidence that later linked the source to poor sanitation management practices at a United Nations peacekeepers camp run by Nepal, and the United Nations' refusal to acknowledge responsibility for the outbreak. The case invites readers to consider the role of global governance and accountability in cholera incidence, particularly in resource-poor environments and nations

WATER AND SANITATION

****Article. Public Health Aspects of the World's Largest Mass Gathering**

Balsari S et al. Public Health Aspects of the World's Largest Mass Gathering: The 2013 Kumbh Mela in Allahabad, India. Journal of Public Health Policy 2016; 37(4): 411-427. DOI: <https://doi.org/10.1057/s41271-016-0034-z>.

This article reviews the serious and uncommon public health challenges at the 2013 Kumbh Mela and the need to initiate crowd safety measures where population density and mobility directly contact flowing bodies of water; provide water, sanitation, and hygiene to a population that frequently defecates in the open; and establish disease surveillance and resource use measures within a temporary health delivery system. The authors review the world's largest gathering by observing first-hand the public health challenges, describing the preparations for and responses to them, and recommending ways to improve preparedness.

**** Article. Water, Sanitation, and Hygiene at the World's Largest Mass Gathering**

Vortmann M et al. Water, Sanitation, and Hygiene at the World's Largest Mass Gathering. Current Infectious Disease Reports 2015; 17: 5. DOI: <https://doi.org/10.1007/s11908-015-0461-1>.

This article describes an evaluation and systematic monitoring initiative, implemented at the 2013 Kumbh Mela, to study preparedness and response to public health emergencies at the event. It describes the water, sanitation, and hygiene components, with particular emphasis on preventive and mitigation strategies; the capacity for surveillance and response to diarrheal disease outbreaks; and the implications of lessons learned for other mass gatherings.

**** Topic Portal. Public Health at the Kumbh Mela**

Public Health at the Kumbh Mela. The FXB Center for Health and Human Rights at Harvard University 2013. <https://fxbkumbh.wordpress.com>.

This blog contains on-the-spot entries reporting on public health at the 2013 Kumbh Mela in Allahabad, India, by a team of doctors, researchers, and medical students affiliated with the Harvard University collaborative project, "Mapping India's Kumbh Mela." The Kumbh Mela Public Health team conducted the first qualitative and quantitative study of the public health parameters of the Kumbh Mela, and documented disease reports at the festival by mapping the complaints, diagnoses, medications, and geographical origins of patients flocking to the organized sector clinics and the central hospital of the Kumbh. Using iPads, volunteers collected information from clinic registries and uploaded it to a central database. While the authors include observations about crowd management and safety, the majority of posts focus on water- and sanitation-related risks and responses.

**** Teaching Case. Toilets and Sanitation at the Kumbh Mela**

Holman SR, Shayegan L. Toilets and Sanitation at the Kumbh Mela. Harvard Global Health Institute, Global Health Education and Learning Incubator at Harvard University 2014. <http://repository.gheli.harvard.edu/repository/10697>.
GHELI repository link: <http://repository.gheli.harvard.edu/repository/10697>

This case describes efforts to balance public health concerns with religious and cultural practices of religion pilgrims in India. It examines the toilet and water sanitation practices of pilgrims attending the 2013 Kumbh Mela, a Hindu festival in Allahabad, India. The case describes government officials' efforts to ensure and maintain adequate and appropriate sanitation facilities and the long-term impact of the observed practices on the physical environment. The case introduces students to the conditions and challenges of water and sanitation as it relates to cultural issues (social determinants of health) in global communities with limited resource for optimal health governance. It is accompanied by a Teaching Note and one-page Companion Note summary.

Article. Impact of Mass Bathing on Water Quality of Ganga River during Maha Kumbh-2010

Sharma V et al. Impact of Mass Bathing on Water Quality of Ganga River during Maha Kumbh-2010. Nature and Science 2012; 10(6): 1-5. http://www.sciencepub.net/nature/ns1006/001_8615ns1006_1_5.pdf.

This article reports on a study to assess the impact of mass bathing on water quality of the Ganges during the 2010 Kumbh Mela. Water samples were collected from three selected bathing locations and analyzed for a number of physico-chemical parameters, including temperature, pH, transparency, turbidity, total dissolved or suspended solid, and more. There was a direct relationship between high parameter values and water disturbance from the bathing pilgrims.

Article. Solid Waste Management at Mansa Devi and Chandi Devi Temples in the Shiwalik Foothills During Kumbh Mela at Haridwar (Uttarakhand)

Article. Kaushik S, Joshi BD. Solid Waste Management at Mansa Devi and Chandi Devi Temples in the Shiwalik Foothills During Kumbh Mela at Haridwar (Uttarakhand). Report & Opinion 2012; 4(8): 39-42.
http://www.sciencepub.net/report/report0408/009_10059report0408_39_42.pdf.

This article reports data measuring solid waste generated over seven days at two temple sites during the Kumbh festival at Haridwar in 2010. Total amount of solid waste generated for seven days of collection was 7615.0 Kg and 4992.7 Kg at Mansa Devi and Chandi Devi temples, respectively. Waste is categorized into biodegradable, non-biodegradable, and miscellaneous.

Article. Cultural Distance between People's Worldview and Scientific Knowledge in the Area of Public Health

Raza G, Singh S. Cultural Distance between People's Worldview and Scientific Knowledge in the Area of Public Health. Journal of Science Communication 2004; 3(4): 1-5. <https://jcom.sissa.it/archive/03/04/A030401>.

This article reports on research results from interviews with 3,484 individuals at the 1989 Kumbh Mela festival in Allahabad, India, which attempted to apply a "cultural distance" model to measure public understanding of science in the area of health and hygiene.

Infographic. The Mighty Ganga Basin

The Mighty Ganga Basin. The World Bank Group 2015.

<http://www.worldbank.org/en/news/infographic/2015/12/30/mighty-ganga-basin>.

This infographic includes three images that illustrate: 1) the geographic location and population of the Ganges River Basin in India and those who live in and near it; 2) the sources, extent, and effects of pollution into the Ganges River; and 3) goals and potential responses to improve water quality, protect biodiversity, enhance ecosystem services, reduce water treatment costs, and enhance economic life for those living in the Ganges River Basin.

STAMPEDE AND CROWD MANAGEMENT

**** Teaching Case. Stampede at the Kumbh Mela: Preventable Accident?**

Holman S, Balsari S. Stampede at the Kumbh Mela: Preventable Accident? Global Health Education and Learning Incubator at Harvard University 2017. <http://repository.gheli.harvard.edu/repository/12027>.

GHELI repository link: <http://repository.gheli.harvard.edu/repository/12027>

This teaching case describes the stampede at the Allahabad train station on February 10, 2013, during the Kumbh Mela festival; 36 people died, including 27 women, most of them poor or elderly. The case outlines the general context and specific risk factors, and it includes an Instructor's Note and Discussion Questions. It is suitable for classes in the study of religion, humanitarian aid, public health, and emergency medicine, with a focus on unintentional injuries and disaster management.

**** Opinion. The Kumbh Mela Stampede: Disaster Preparedness Must Bridge Jurisdictions**

Greenough PG. The Kumbh Mela Stampede: Disaster Preparedness Must Bridge Jurisdictions. *BMJ* 2013; 346: f3254. DOI: <https://doi.org/10.1136/bmj.f3254>.

This opinion brief argues that the 2013 Kumbh Mela stampede, where 36 people died, demonstrated system failure despite extraordinary planning by the Indian state. An honest interagency gap analysis will provide critical lessons that may help make the next Kumbh Mela safer than it already is. The author is an emergency medicine physician who co-led the public health research for the Harvard "Mapping the Kumbh Mela" project.

Article. Human Stampedes during Religious Festivals: A Comparative Review of Mass Gathering Emergencies in India

Illiya FT et al. Human Stampedes during Religious Festivals: A Comparative Review of Mass Gathering Emergencies in India. *International Journal of Disaster Risk Reduction* 2013; 5: 10-18. DOI: <https://doi.org/10.1016/j.ijdrr.2013.09.003>.

This article summarizes stampede data in India during the past 50 years during religious, entertainment, and political events, what triggers the crowd disturbances that lead to the stampedes and outlines a framework for risk reduction dependent on inter-agency cooperation and multidisciplinary efforts.

Article. Ram Janki Temple: Understanding Human Stampedes

Burkle FM, Hsu EB. Ram Janki Temple: Understanding Human Stampedes. *The Lancet* 2011; 377(9760): 106-107. DOI: [http://dx.doi.org/10.1016/S0140-6736\(10\)60442-4](http://dx.doi.org/10.1016/S0140-6736(10)60442-4).

In this "Comment" on the stampede at the Ram Janki Temple in 2010 in Uttar Pradesh, the authors review the health risks caused by stampede events and recommend formal efforts in developing systematic information, data gathering, and analysis to prevent or ameliorate such disasters.

Article. The Dynamics of Crowd Disasters: An Empirical Study

Helbing D et al. The Dynamics of Crowd Disasters: An Empirical Study. *Physical Review E* 2007; 75(4). DOI: <https://doi.org/10.1103/PhysRevE.75.046109>.

This article reports on an analysis of video recordings of the crowd disaster in Mina/Makkah during the Hajj, on January 12, 2006. The results reveal two "flow" transitions that contributed to the pressure which caused sudden displacements and the falling and trampling of people. These findings are significant for understanding critical crowd conditions and the organization of safer mass gathering events and allow one to understand where and when crowd accidents tend to occur.

Article. Chronic Diseases and Injuries in India

Patel V et al. Chronic Diseases and Injuries in India. *The Lancet* 2011; 377(9763):413-428. DOI: [http://dx.doi.org/10.1016/S0140-6736\(10\)61188-9](http://dx.doi.org/10.1016/S0140-6736(10)61188-9).

The authors identify the top causes of chronic disease in India as cardiovascular and metabolic disorders, sensory loss disorders, cancers, mental health disorders, and injuries, which could be addressed most efficiently through primary prevention strategies such as taxation on tobacco products, improved road systems, and integration between existing vertical programs. This article is part of the *Lancet* Series, "[India: Towards Universal Health Coverage](#)."

MASS GATHERINGS AND HEALTH: GENERAL RESOURCES

**** Article. A Retrospective Analysis of Hypertension Screening at a Mass Gathering in India**

Balsari S et al. A Retrospective Analysis of Hypertension Screening at a Mass Gathering in India: Implications for Non-Communicable Disease Control Strategies. *Journal of Human Hypertension* 2017; 31: 750-753.

DOI: <https://doi.org/10.1038/jhh.2017.54>.

This article outlines the potential for reducing non-communicable disease (NCD) mortality in India through opportunistic hypertension awareness screening at a mass gathering, the 2015 Kumbh Mela in Nashik and Trimbakeshwar. More than one-third of those who agreed to a blood pressure measurement screened positive for hypertension, a measure of cardiovascular disease, the leading cause of NCD mortality in India.

Report. Interim Planning Considerations for Mass Gatherings in the Context of Pandemic (H1N1) 2009 Influenza

Interim Planning Considerations for Mass Gatherings in the Context of Pandemic (H1N1) 2009 Influenza. World Health Organization 2009. [https://www.who.int/publications/i/item/interim-planning-considerations-for-mass-gatherings-in-the-context-of-pandemic-\(h1n1\)-2009-influenza](https://www.who.int/publications/i/item/interim-planning-considerations-for-mass-gatherings-in-the-context-of-pandemic-(h1n1)-2009-influenza).

This guide outlines key planning considerations for organizers of mass gatherings in the context of pandemic (H1N1) 2009 influenza. It was designed for use in conjunction with the World Health Organization's communicable disease alert and response for mass gatherings.

Report. Public Health For Mass Gatherings: Key Considerations

Public Health For Mass Gatherings: Key Considerations. World Health Organization 2015.

<https://apps.who.int/iris/handle/10665/162109>.

GHELI repository link: <https://repository.gheli.harvard.edu/repository/10996>

This report from the World Health Organization (WHO) builds on the expertise about health impacts of mass gatherings since 2008, when the WHO published the report, *Communicable Disease Alert and Response for Mass Gatherings: Key Considerations*. The 2015 version has been expanded to cover more than communicable diseases and includes new areas such as legacy, environmental health, and different contexts such as unplanned mass gatherings. The document aims to serve as a resource to support all those who are responsible for the health needs of individuals attending a mass gathering, and to help them plan their actions.

Article Series. Lancet Series 2014: Mass Gatherings Medicine

Mass Gatherings Medicine. *The Lancet* 2014. <http://www.thelancet.com/series/mass-gatherings-medicine>.

GHELI repository link: <https://repository.gheli.harvard.edu/repository/11118>

This three-part series follows up on the 2012 *Lancet* series on Mass Gatherings Health with a focus on public health challenges and recommendations for large sports and religious gatherings. It highlights the London 2012 Olympic and Paralympic Games; the 2012 European Football Championship finals (Euro 2012), and the Hajj pilgrimages of 2012 and 2013.

Series articles include:

- [Infectious Disease Surveillance and Control](#)
- [London 2012 Olympic and Paralympic Games: Public Health Surveillance and Epidemiology](#)
- [Euro 2012 European Football Championship Finals: Planning for a Health Legacy](#)

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Article Series. Lancet Series 2012: Mass Gatherings Health.

Mass Gatherings Health. The Lancet Infectious Diseases 2012. <http://www.thelancet.com/series/mass-gatherings>.

This six-part series described the scope of health-based approaches to mass-gatherings. Mass gatherings are events such as religious occasions, music festivals, or sports events that attract enough people to exceed the capacity of routine health and public safety measures. The series includes papers on: lessons from the Hajj; global perspectives for preventing infectious diseases; non-communicable health risks; crowd and environmental management; cross-national and cross-disciplinary infectious disease surveillance; and the need for new research and action.

Series articles include:

- [Emergence of Medicine for Mass Gatherings: Lessons From the Hajj](#)
- [Global Perspectives for Prevention of Infectious Diseases Associated With Mass Gatherings](#)
- [Non-Communicable Health Risks During Mass Gatherings](#)
- [Crowd and Environmental Management During Mass Gatherings](#)
- [Infectious Disease Surveillance and Modelling Across Geographic Frontiers and Scientific Specialties](#)
- [Research Agenda for Mass Gatherings: A Call to Action](#)

Article. Preparing for Infectious Disease Threats at Mass Gatherings: The Case of the Vancouver 2010 Olympic Winter Games

Khan K et al. Preparing for Infectious Disease Threats at Mass Gatherings: The Case of the Vancouver 2010 Olympic Winter Games. Canadian Medical Association Journal 2010; 182(6): 579-583. DOI: <https://doi.org/10.1503/cmaj.100093>. This article applies an infection control preparedness model to the Vancouver 2010 Olympic and Paralympic Winter Games. It includes estimates on air traffic patterns, global surveillance for infectious diseases, integrated risk assessment, policy considerations, and planning for next steps. The authors highlight the importance of web-based global communication efforts in disease prevention.

Article. Global Public Health Implications of a Mass Gathering in Mecca, Saudi Arabia during the Midst of an Influenza Pandemic

Khan K et al. Global Public Health Implications of a Mass Gathering in Mecca, Saudi Arabia during the Midst of an Influenza Pandemic. Journal of Travel Medicine 2010; 17(2): 75-81. DOI: <https://doi.org/10.1111/j.1708-8305.2010.00397.x>. This article reports on a study of worldwide migration patterns of pilgrims to the 2008 Hajj, using estimates based on airline tickets and countries of origin to assess potential risk of H1N1 and needs for vaccination.

Article. Rapid Spread of Zika Virus in the Americas—Implications for Public Health Preparedness for Mass Gatherings at the 2016 Brazil Olympic Games

Peterson E et al. Rapid Spread of Zika Virus in the Americas—Implications for Public Health Preparedness for Mass Gatherings at the 2016 Brazil Olympic Games. International Journal of Infectious Diseases 2016; 44: 11-15. DOI: <https://doi.org/10.1016/j.ijid.2016.02.001>.

This article summarizes the global spread of the Zika virus since 1947, its known and potential health risks, and implications for enhanced preparedness and surveillance before, during, and after mass gatherings, particularly the 2016 Olympic games in Brazil, to prevent epidemic infectious disease.

Article. Should Cities Hosting Mass Gatherings Invest in Public Health Surveillance and Planning? Reflections from a Decade of Mass Gatherings in Sydney, Australia

Thackway S et al. Should Cities Hosting Mass Gatherings Invest in Public Health Surveillance and Planning? Reflections from a Decade of Mass Gatherings in Sydney, Australia. BMC Public Health 2009; 9: 324. DOI: <https://doi.org/10.1186/1471-2458-9-324>.

This article argues that mass gathering events can help catalyze innovation and new opportunities for ongoing planning, training, and surveillance of public health concerns with positive effects that help the community beyond the events themselves.

Article. Pandemic H1N1 and the 2009 Hajj

Ebrahim SH et al. Pandemic H1N1 and the 2009 Hajj. Policy Forum. Science 2009; 326(5955): 938-940.

DOI: <https://doi.org/10.1126/science.1183210>.

This article reports on the avian flu (influenza A, or H1N1 virus) pandemic affecting the 2009 Hajj pilgrimage. The Hajj is an annual Islamic pilgrimage to Mecca that draws more than 2.5 million Muslim pilgrims from more than 160 countries to the Kingdom of Saudi Arabia; it is considered a mandatory religious duty for Muslims to make this journey at least once in their lifetimes. The authors outline the realities associated with meeting World Health Organization recommendations to mitigate effects of the pandemic influenza A virus during the 2009 gathering.

ENVIRONMENT, POLLUTION, AND INDIA'S SACRED RIVERS

Topic Portal. National Mission for Clean Ganga

National Mission for Clean Ganga. <http://nmcg.nic.in/index.aspx>.

This web portal highlights a national initiative in India to promote public participation among stakeholders to collectively help clean the Ganges River. It identifies and supports efforts being done at state, national, and international levels, and serves as a platform for opinions and shared knowledge.

Organization. Sankat Mochan Foundation

Sankat Mochan Foundation. <http://sankatmochan.tripod.com>.

This non-profit, non-political, secular, non-governmental organization, founded in 1982, is dedicated to alleviating the environmental degradation of the Ganges River.

News. Ganges and Yamuna Rivers Granted Same Legal Rights as Human Beings

Safi M et al. Ganges and Yamuna Rivers Granted Same Legal Rights as Human Beings. The Guardian 2017; Mar 21.

<https://www.theguardian.com/world/2017/mar/21/ganges-and-yamuna-rivers-granted-same-legal-rights-as-human-beings>.

This news article reports on a ruling that grants the Ganges and Yamuna Rivers the legal status of living human entities. The ruling, which follows a legal precedent for a Maori sacred river in New Zealand, may help support environmental protection efforts in India by making damages such as water pollution legally equal to harming a person.

Opinion. What it Takes to Clean the Ganges

Black G. What it Takes to Clean the Ganges. The New Yorker 2016; Jul 25.

<https://www.newyorker.com/magazine/2016/07/25/what-it-takes-to-clean-the-ganges>.

This article summarizes long-term concerns about the pollution of the Ganges River, and the role of controversial Prime Minister Narendra Modi and the Hindu-nationalist government in religious and caste politics as they influence ongoing restoration initiatives. The article is based on the author's forthcoming book: On the Ganges: Encounters with Saints and Sinners on India's Mythic River.

News. The Ganges' Next Life

Stille A. The Ganges' Next Life. The New Yorker 1998; Jan 19. <http://archives.newyorker.com/?i=1998-01-19#folio=058>.

This essay explores the problem of pollution with sewage, human remains, and industrial waste in the Ganges River. In some places at Varanasi, for example, the fecal-coliform count has been known to reach 340,000 times acceptable levels. More than 100 cities dump their raw sewage directly into the river and waterborne illnesses such as amebic dysentery, typhoid, and cholera contribute to child mortality rates. Wastewater plants along the Ganges are ill-suited to India due to common power outages and monsoons. The author describes clean-up attempts by religious leaders, civil engineers, and private organizations with a focus on the Sankat Mochan Foundation, and outlines remaining governmental obstacles.

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Book. Ganga: A Journey Down the Ganges River

Hollick JC. Ganga: A Journey down the Ganges River. Island Press 2008. <https://islandpress.org/books/ganga>.

This book documents a journalist's journey through northern India along the Ganges River from its source high in the Himalayas to the point where the river meets the sea. It details encounters with priests and pilgrims, dacoits and dolphins, fishermen who subsist on the river, and villagers whose lives have been destroyed by the river.

Book. River of Love in an Age of Pollution: The Yamuna River of Northern India

Haberman DL. River of Love in an Age of Pollution: The Yamuna River of Northern India. University of California Press 2006. <https://www.ucpress.edu/book.php?isbn=9780520247901>.

This book traces the Yamuna River, significant for its “sacred” merging with the Ganges at Allahabad, across India's heartland. The author focuses on the region of Braj, where the river is especially revered and an object of ongoing environmental protection efforts. The book combines aspects of religious beliefs and practices, religious environmentalism, poetic contemplation, scientific measurement, and environmental activism. Chapter 1, “[A River of Delights, a River of Troubles](#),” is available as a sample download.

HEALTH SURVEILLANCE TECHNOLOGY

**** Article. Using Mobile Technology to Optimize Disease Surveillance and Healthcare Delivery at Mass Gatherings: A Case Study from India's Kumbh Mela**

Kazi DS et al. Using Mobile Technology to Optimize Disease Surveillance and Healthcare Delivery at Mass Gatherings: A Case Study from India's Kumbh Mela. Journal of Public Health 2017; 39(3): 616-624.

DOI: <https://doi.org/10.1093/pubmed/fdw091>.

This article describes how public health experts developed an inexpensive, tablet-based disease surveillance system with real-time analysis and piloted it at five field hospitals during the 2013 Kumbh Mela in Allahabad, India. The system reported on 43,131 patient visits over three weeks and documented common complaints that included musculoskeletal pain, fever, cough, coryza, and diarrhea, as well as prescribed treatments. The authors highlight the model's importance for effective epidemic surveillance at mass gatherings that take place in resource-scarce settings.

**** Article. Social and Spatial Clustering of People at Humanity's Largest Gathering**

Barnett I et al. Social and Spatial Clustering of People at Humanity's Largest Gathering. PLoS ONE 2016;

DOI: <https://doi.org/10.1371/journal.pone.0156794>.

This article reports on a study to examine population trends using digital cell phone data to understand crowd behavior and social and spatial homophily—“the notion that individuals tend to interact with others who resemble them”—of those who made calls during the 2013 Kumbh Mela festival in Allahabad, India. The data also helped estimate daily and cumulative attendance and trends in calls to particular regions across India.

**** Article. Investigating Population Dynamics of the Kumbh Mela through the Lens of Cell Phone Data**

Onella JP, Khanna T. Investigating Population Dynamics of the Kumbh Mela through the Lens of Cell Phone Data.

arXiv.org 2015. <https://arxiv.org/ftp/arxiv/papers/1505/1505.06360.pdf>.

This paper is the preliminary report of the authors' findings from cell phone data of 390 million records of participants attending the 2013 Kumbh Mela festival. The data helps to illustrate daily fluctuations in location on the site, number of calls, and length of stay, and provides an example of using technology to better understand human behavior.

Report. Technologies for Global Health

Howitt P et al. Technologies for Global Health. The Lancet 2012; 380(9840): 507-535.

DOI: [http://dx.doi.org/10.1016/S0140-6736\(12\)61127-1](http://dx.doi.org/10.1016/S0140-6736(12)61127-1).

This report summarizes findings from a collaboration between *The Lancet* and Imperial College London, UK in a new Commission to examine how medical technology should best be used to improve health in low- and middle-income countries. The report concludes that in many cases, medical technology—almost exclusively developed in rich countries—is simply inappropriate for use in poorer nations.

Article. Use of Telemedicine in Evading Cholera Outbreak in Mahakumbh Mela, Prayag, UP, India: An Encouraging Experience

Ayyagari A et al. Use of Telemedicine in Evading Cholera Outbreak in Mahakumbh Mela, Prayag, UP, India: An Encouraging Experience. *Telemedicine Journal and e-health* 2003; 9(1): 89-94.

DOI: <https://doi.org/10.1089/153056203763317693>.

This article reports on an early pilot project to assess the efficacy of a pilot telemedicine center based at the main hospital of the 2001 Kumbh Mela in Allahabad, on health management. When daily reporting of in-patient and outpatient cases revealed a surge of diarrhea cases among pilgrims, *Vibrio cholerae* was isolated in 22.6 percent (7/31) of the samples. The system facilitated an immediate online alert to the hospital and health authorities, who took prompt measures to improve hygiene, diverting an epidemic disaster.

DESIGNING THE MOBILE CITY

**** Blog Entry. Five Stages of Squatting**

Blog Entry. Mehrotra R. Five Stages of Squatting. *Encountering Urbanism* 2009; Sep 13.

<http://encounteringurbanism.blogspot.com/2009/09/five-stages-of-squatting.html>.

This blog essay by architect, urbanist, and design school professor Rahul Mehrotra, sketches out how populations who arrive in a city and seek low-cost housing come to fill space, and what these transitions mean for establishing market space in the informal economy. The author co-directed the Harvard "Mapping the Kumbh Mela" project.

**** Course Syllabus. Kinetic City: Research Seminar on Temporal Urbanism**

Mehrotra R. Kinetic City: Research Seminar on Temporal Urbanism. Harvard University Graduate School of Design 2013.

<http://www.urbandesignresources.org/wp-content/uploads/2013/12/GSD-09129-Kinetic-City.pdf>.

This syllabus outlines a research seminar class that explores the issue of temporal urbanism. The course aimed to expose students to existing literature and construct new ways and methods to map, understand, and theorize how "temporality" could inform current debates on urbanism more broadly. The course was designed to inform and analyze research on the 2013 Kumbh Mela, as its temporal architectural and design components may inform ephemeral housing that includes celebratory festivals, emergency settlements, and refugee camps.

Report. Mahakumbh: The Greatest Show on Earth

Mishra JS. Mahakumbh: The Greatest Show on Earth. Har-Anand Publications 2007.

<https://books.google.com/books?id=1pCXqynwwQcC&printsec=frontcover#v=onepage&q&f=false>.

This 120-page guide is a valuable handbook on the management process and challenges involved in successful administration of the Kumbh Mela to meet attendees' and pilgrims' basic needs as well as spiritual aspirations. The author is a civil engineer who was the nodal officer for the successful conduct of Mahakumbh 2001.

Report. Perfect Mix of Planning, Teamwork, and Commitment

Dar P. Perfect Mix of Planning, Teamwork, and Commitment. *Manage India* 2011; 3(1): 7-9.

<http://pmi.org.in/manageindia/volume3/issue01/manage.india.pdf>.

This article discusses the factors involved in organization, planning, and management of the 2010 Kumbh Mela in Haridwar.

Report. The Spatial Development of India

Desmet K et al. The Spatial Development of India. Policy Research Working Paper 6060. South Asia Region Poverty Reduction and Economic Management Unit; The World Bank Group 2012.

<https://documents1.worldbank.org/curated/en/768201468269112591/pdf/WPS6060.pdf>.

This report considers the spatial consequences for India of its rapid economic growth, a growth that has also resulted in widening disparities. While cities such as Hyderabad have emerged as major clusters of high development, many rural areas have been left behind with few development benefits. The report asks questions for policy makers to help government planning of space and urban infrastructure.

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*** Report. Hidden Cities: Unmasking and Overcoming Health Inequities in Urban Settings**

Hidden Cities: Unmasking and Overcoming Health Inequities in Urban Settings. World Health Organization, United Nations Settlements Programme 2010. <http://apps.who.int/iris/handle/10665/44439>.

GHELI repository link: <https://repository.gheli.harvard.edu/repository/11501>

This report from the World Health Organization (WHO) and the United Nations Human Settlements Programme (UN-Habitat) examines the global issue of health inequities within urban settings. Aiming to identify health inequities, including those based in economic status and geographic location, and recommend policies and interventions, the report provides several example sources of data, including the WHO's Urban HEART and UN-Habitat's UrbanInfo. The report concludes with a call to action for policy makers and health officials to address these issues, arguing that the global community is collectively responsible to ensure that cities are healthy places for people as the world moves towards an urban future.

Topic Portal. Trash/Track

Trash/Track. SENSEable City Lab; Massachusetts Institute of Technology. <http://senseable.mit.edu/trashtrack>.

This web portal challenges viewers to innovative thinking about household trash. It is based on a trash-tracking project in Seattle that helps users imagine a world that understands the 'removal chain' as well as the 'supply chain' and can use this knowledge to build more efficient and sustainable urban infrastructure and promote behavioral change.

Book Chapter. Virtual Space: The City to Come

Book Chapter. Naban N, Ratti C. The City to Come. Innovation: Perspectives for the 21st Century. Open Mind, BBVA Group 2010. Pages 383-397. https://www.bbvaopenmind.com/wp-content/uploads/static/pdf/27_RATTI_Y_NABIAN_ING.pdf.

This chapter explores how new technologies and cybernetics may change the shape and dynamics of the cities in the future. The authors highlight the potential for urbanity to merge with digital information so that the built environment is dynamically sensed and synchronously actuated to perform more efficiently, intelligently, and sustainably, a desirable place in which to live and work.

Article. Shaping Cities for Health: Complexity and the Planning of Urban Environments in the 21st Century

Rydin Y et al. Shaping Cities for Health: Complexity and the Planning of Urban Environments in the 21st Century. The Lancet 2012; 379(9831): 2079-2108. DOI: [http://dx.doi.org/10.1016/S0140-6736\(12\)60435-8](http://dx.doi.org/10.1016/S0140-6736(12)60435-8).

This article summarizes the analysis and recommendations of a Lancet Commission between 2009 and 2011 that sought to understand how better health outcomes can be delivered through interventions in the urban environment in cities across the world. It draws on examples from the "Healthy Cities" movement, launched in 1984, and outlines recommendations that address the multiple complexities of urban systems.

Glossary

Learning From India's Kumbh Mela

2017

Accidents

An unfortunate and typically unforeseen event, a disaster, a mishap. (Oxford English Dictionary)

Akhara

In India: A convent or monastery, especially of ascetics. (Oxford English Dictionary)

Allopathic Medicine

A system in which medical doctors and other healthcare professionals (such as nurses, pharmacists, and therapists) treat symptoms and diseases using drugs, radiation, or surgery. Also called biomedicine, conventional medicine, mainstream medicine, orthodox medicine, and Western medicine. (National Cancer Institute)

Armed Violence

The use or threatened use of weapons to inflict injury, death, or psychosocial harm, which undermines development. (World Health Organization 2014)

Ayurvedia Medicine

Ayurvedic medicine: Of or pertaining to the traditional Hindu science of medicine. (Oxford English Dictionary)

Cholera

An acute diarrheal infection caused by ingestion of food or water contaminated with the bacterium *Vibrio cholerae*. (World Health Organization 2017)

Defecation Field

Designated field for open defecation, typically constructed for excreta disposal in emergencies, that should be located so they are easily reached by the community but do not pollute water supplies or sources of food. (World Health Organization, Water, Engineering and Development Centre 2011)

Digester

Closed tank in waste-water treatment plants that decreases the volume of solids and stabilizes raw sludge by bacterial action. (UNdata Glossary 2017)

Ganga:

Hindi name for the Ganges River, regarded by Hindus as sacred. (Oxford Living Dictionaries 2017)

This glossary was originally developed by the Global Health Education and Learning Incubator at Harvard University in 2017. It is used and distributed with permission by the Global Health Education and Learning Incubator at Harvard University. The Incubator's educational materials are not intended to serve as endorsements or sources of primary data, and do not necessarily reflect the views of Harvard University.

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Green Kumbh

The Green Kumbh Initiative was an effort to provide portable, eco-friendly toilets for free use by festival attendees in order to improve sanitation at the 2013 Kumbh Mela and to educate the public and the press about the importance and viability of ecologically-sound toilet facilities. (Kumbh Mela 2013)

Greywater

Water from the kitchen, bath and/or laundry, which generally does not contain significant concentrations of excreta. (World Health Organization 2006)

Homeopathic Medicine

A system of medical practice according to which diseases are treated by the administration (usually in very small doses) of drugs which would produce in a healthy person symptoms closely resembling those of the disease treated. (Oxford English Dictionary)

Improved Drinking Water Sources

Piped household water connection located inside the user's dwelling, plot or yard. Public taps or standpipes, tube wells or boreholes, protected dug wells, protected springs or rainwater collection. (United Nations 2015)

Improved Sanitation

An improved sanitation facility is one that hygienically separates human excreta from human contact and can consist of one of the following facilities: Flush/pour-to-flush piped sewer system, septic tank, pit latrine; ventilated improved pit latrine; pit latrine with slab; composting toilet. (United Nations 2015)

Kalpavasi

A pilgrim at the Kumbh Mela who has taken an oath to live at the sangam for the entire month of Magh [January–February]. (Maclean 2008, Pilgrimage and Power: The Kumbh Mela in Allahabad, 1768-1954)

Mass Gathering

A gathering of persons at a specific location for a specific purpose for a defined period of time. Public health risks can occur if the number of people attending is sufficient to strain the planning and response resources of the community, state, or nation hosting the event. (World Health Organization 2015)

Nagri

Temporary city. (Mehrotra 2014, Constructing the World's Biggest (Disassemblable) City)

Open Defecation

When human faeces are disposed of in fields, forests, bushes, open bodies of water, beaches or other open spaces or disposed of with solid waste. (United Nations 2015)

Pilgrim

A person who makes a journey (usually of a long distance) to a sacred place as an act of religious devotion. (Oxford English Dictionary)

Pit Latrine

Latrine with a pit for collection and decomposition of excreta and from which liquid infiltrates into the surrounding soil. (United Nations 2015)

Pontoon Bridge

A temporary floating bridge supported by boats, hollow metal cylinders, or other floats. (Oxford English Dictionary)

Sangam

In India, a river confluence, especially of the Ganga, Yamuna, and mythical Saraswati at Allahabad. (Oxford English Dictionary)

Sanitation

Improvement of environmental Access to, and use of, excreta and wastewater facilities and services that ensure privacy and dignity, ensuring a clean and healthy living environment for all. “Facilities and Services” should include the ‘collection, transport, treatment and disposal of human excreta, domestic wastewater and solid waste and associated hygiene promotion’ to the extent demanded by the particular environment conditions. (United Nations 2015)

Sanitation

Improvement of environmental conditions in households that affect human health by means of drainage and disposal of sewage and refuse. (UNData Glossary 2017)

Sewage Lagoon

Shallow pond, usually human-made, where sunlight, bacteria and oxygen interact and help purify wastewater. The term is synonymous with sewage oxidation pond and stabilization pond. (UNData Glossary 2017)

Stampede

A sudden or unreasoning rush or flight of persons in a body or mass. (Oxford English Dictionary)

Unimproved Drinking Water Sources

Unprotected dug well, unprotected spring, cart with small tank/drum, surface water (river, dam, lake, pond, stream, canal, irrigation channels), and bottled water. (United Nations 2015)

Unimproved Sanitation Facilities

Facilities which do not ensure hygienic separation of human excreta from human contact. Unimproved facilities include pit latrines without a slab or platform, hanging latrines and bucket latrines. (United Nations 2015)

Violence

The intentional use of physical force or power, threatened or actual, against oneself, another person, or against a group or community that either results in or has a high likelihood of resulting in injury, death, psychological harm, maldevelopment or deprivation. (World Health Organization 2014)

WASH

The collective term for Water, Sanitation, and Hygiene. Due to their independent nature, these three core issues are grouped together to represent a growing sector. While each a separate field of work, each is dependent on the presence of the other. For example, without toilets, water sources become contaminated; without clean water, basic hygiene practices are not possible. (UNICEF 2016)

Glossary: Learning From India's Kumbh Mela

Wastewater

Used water, typically discharged into the sewage system. It contains matter and bacteria in solution or suspension. (UNData Glossary 2017)

Water Pollution

Presence in water of harmful and objectionable material—obtained from sewers, industrial wastes and rainwater run-off—in sufficient concentrations to make it unfit for use. (UNData Glossary 2017)