ASEAN Journal on Disaster Health Management (AJDHM)
Vol 1 (1) 2025:114-116 https://doi.org/10.22146/ajdhm.v1i1.14247

MASS GATHERINGS EGRESS VULNERABILITY

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Submitted: 03-09-2024 **Revised**: 08-11-2024 **Accepted**: 08-11-2024

ABSTRACT

In this short letter, we discuss the concept of egress from mass gatherings as an unrecognised area of vulnerability in planning and disaster risk reduction. Current approaches isolate egress as a physical exit, and dichotomise the venue exit from transportation away from mass gatherings. We discuss historical mass gatherings disasters that have been contributed by this flawed approach to planning. Instead, we propose that venue exit and outbound transport be considered a singular process during planning, and suggest novel mass gatherings planning strategy for egress to reduce risk of disasters.

Keywords: Disaster Medicine; Mass Gatherings; Disaster Planning

EDITORIAL

Despite the call to develop mass gatherings medicine, specifically to plan and prepare for mass casualty incidents that continue to plague events all over the world, there is still a paucity of evidence-based guidelines (1). Current best practices can be inferred from experience-based policies and emerging research on key focus areas, but existing regulatory documents often dichotomize egress into seemingly separate stages of exiting the physical venue and transportation away from the event (2,3). We propose that venue exit and outbound transport be considered a single (in succession) process of egress when issuing regulations and planning for mass gatherings.

While mass gatherings ingress has been the site of several prior disasters, egress poses particular vulnerabilities. Unlike arrival of crowds at an event with self-determined and naturally interspersed lead times, the conclusion of an event usually occurs at a single time-point, triggering simultaneous movement of large masses of people. The resulting surge in

crowd density can lead to a stampede or crowd crush phenomenon if physical venue exit capacity is exceeded, which was the identified hazard in the 2010 Love Parade when concert-goers exited through a narrow tunnel that also served as the entrance, resulting in 21 deaths and 510 injuries (4). Once outside, the crowd continues to inundate outbound transport resources, which if overwhelmed may leave people stranded between a closed venue and accessible public space, as was reported in the 2002 'Fatboy Slim' Brighton Beach Boutique II event and the 2023 Boston Marathon (5). In the former, the sheer number of concert-goers leaving the venue for the Brighton train station to board the last London-bound train led to crush injuries in and around the train station (6). This post-exit and pre-transport phase of egress may inadvertently fall outside the oversight of event organizers and transport authorities, leading to blind spots in mitigation and preparation plans and unique transportation-related injuries.

Furthermore, when compounded by the predictability of a crowd waiting for outbound transport at designated train, bus, or car stations outside event security, mass gatherings dissolve into easily-accessible, soft targets for terrorism, as occurred in the 2015 Stade de France suicide bomb attacks which targeted the crowd's egress into the streets (7). Recognizing this vulnerability, mass gatherings guidelines should account for the entire process of egress from venue exit through to outbound transport. For example, while holding back or slowing crowds to transportation hubs is one strategy sometimes used, the capacity of outbound transport resources should also be factored into the limit on event attendees (8).

In addition to ensuring safety, linking event capacity to transport resources will align the interests of organizers (to maximize attendance) with local authorities (to provide public safety). While current crowd density calculations using principles of fluid dynamics have been studied and do take physical venue exits into consideration, outbound transport resources can be modelled and should be incorporated to better estimate crowd dynamics during egress (9). Crowd tracking using emerging technologies such as wearable sensors and video tracking software, in combination with the Internet-of-Things that have shown promise in estimating human proxemics during mass gatherings, can broaden monitoring and route planning to the whole process of egress from venue exit to transport out of the event (10). Future mass gatherings regulations that require such modelling and monitoring throughout will ensure safer events (11). In conclusion, mass gatherings egress must no longer be regarded as separate processes of venue exit and outbound transportation, but must rather be planned and executed as a continuous flow of crowds to mitigate their vulnerability in the post-exit pre-transport space.

ACKNOWLEDGMENTS

The authors declare no additional support outside of the authors and references listed.

CONFLICTS OF INTEREST

The authors declare no conflict of interest.

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