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An Empirical Study on Administrative Failures in Managing Stampede Disasters in Chennai

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ABSTRACT

In cities like Chennai, where sizable crowds are regularly drawn to religious, political, and cultural events, stampede disasters have become a major public safety concern. Even though stampedes can be avoided, repeated occurrences highlight serious administrative shortcomings in preparation, planning, and real-time management. The purpose of this study is to empirically examine the main administrative flaws that lead to stampede disasters in Chennai. Examining current disaster management frameworks, assessing how well they are being implemented, and making useful suggestions for enhancing public safety and administrative effectiveness during large-scale events are the primary goals. With a convenience sampling strategy and a sample size of 210 participants, the researchers used an empirical approach. Questionnaires, site visits, and secondary sources like reports, journals, and articles were used to gather data. The data was analyzed using statistical tools such as bar charts and chi-square tests. In addition to dependent variables like awareness, agreeability, major reason, most significant impact, effective regulation, and rating scale, the analysis is conducted for independent statistics such as gender, age, educational attainment, residence, and occupation. According to the study, stampede disasters are caused by a number of factors, including inadequate crowd control measures, a lack of real-time monitoring systems, outdated infrastructure, a lack of coordination between government agencies, and a lack of trained personnel deployment. For improved crowd monitoring, the study recommends implementing technology-driven strategies like drones, CCTV surveillance, and crowd simulation models. Centralized command systems, more stringent enforcement of safety regulations, and mandatory training for officials can all significantly improve administrative readiness. Future studies can concentrate on creating regional crowd control tools, incorporating international best practices like the UK's Green Guide and Japan's disaster models, and promoting increased public involvement in safety exercises.

Keywords: *Stampede, Disaster, Crowd Management, Disaster Management, Public Safety.*

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I. INTRODUCTION

Stampedes represent one of the most tragic yet preventable forms of human-made disasters. Unlike natural calamities, they do not arise from uncontrollable forces of nature but from lapses in foresight, planning, and administration. In urban centres like Chennai, where religious festivals, political rallies, and large-scale public events routinely draw massive crowds, the threat of stampedes remains ever-present. Despite advancements in global disaster management systems, cities like Chennai continue to grapple with outdated crowd control measures, fragmented coordination among agencies, and a lack of robust preventive infrastructure. Stampedes are often perceived as unfortunate outcomes of overcrowding. However, they are far more symptomatic of deeper systemic issues—poor planning, inadequate risk assessment, insufficient public safety communication, and lack of trained personnel. Such incidents not only result in tragic loss of lives but also highlight the institutional weaknesses of administrative machinery, often exposing the absence of timely intervention, inefficient inter-agency communication, and a reactive rather than proactive approach to disaster management.

This research aims to empirically evaluate the administrative shortcomings in managing stampede disasters in Chennai. The objective is twofold: to critically examine the structural inefficiencies in current disaster preparedness mechanisms and to propose actionable reforms based on comparative global best practices. It focuses on the implementation gaps in existing policies, shortcomings in law enforcement practices, inter-departmental misalignments, and the alarming lack of public awareness and engagement in crowd safety protocols.

For centuries, India has witnessed stampedes at religious and political gatherings. However, only in the wake of high-casualty incidents did administrative attention shift from makeshift responses to more structured disaster governance. The enactment of the Disaster Management Act, 2005 marked a turning point, laying the groundwork for formal institutions such as the National Disaster Management Authority (NDMA) and respective State Disaster Management Authorities (SDMAs). While the NDMA has issued general guidelines on crowd management highlighting pre-event planning, stakeholder coordination, and on-ground risk mitigation these frameworks remain insufficiently implemented at the state and municipal levels. In Tamil Nadu, the TNSDMA has made efforts to align with national objectives through mock drills and SOPs. Yet, in practice, enforcement is often undermined by limited resources, lack of accountability, and political pressures that prioritize crowd numbers over crowd safety.

Chennai's vulnerability to stampede disasters stems from a confluence of infrastructural,

 [ISSN 2581-5369]

administrative, and socio-political factors. Rapid urbanization has led to congested event venues with inadequate ingress and egress facilities. Many public spaces lack scientifically defined crowd capacity limits, and permissions for events are often granted without thorough risk assessments. During mass events, trained personnel such as disaster response teams and crowd managers are frequently under-deployed or unprepared for worst-case scenarios. Triggers such as unverified rumours, sudden weather changes, or celebrity appearances can cause panic, turning dense gatherings into deadly stampedes. Compounding the risk is the underutilization of technology: real-time crowd simulation models, drone surveillance, heat maps, and AI-driven monitoring systems are either unavailable or not integrated into event protocols. Furthermore, the absence of public awareness campaigns on crowd behavior and safety further exacerbates the chaos.

At the core of these failures lies a recurring administrative dilemma balancing the democratic right to assemble with the constitutional duty to protect lives. Efforts have been made at various administrative levels to address these challenges. National and state disaster management bodies have introduced Standard Operating Procedures (SOPs), periodic training programs, and advisories for event organizers. Law enforcement agencies in Chennai, including the police and fire departments, are routinely deployed during major events to manage crowds using tools like barricading, public announcement systems, and CCTV surveillance. Yet, most of these measures remain inconsistent, ad-hoc, and reactive. Enforcement varies widely depending on political and social factors, and coordination between multiple agencies is often marred by jurisdictional confusion. After major stampede incidents, governments tend to respond with short-term fixes, rather than sustained institutional reforms. The lack of a centralised, real-time communication and decision-making system remains a significant shortfall.

Several countries have successfully transitioned from reactive to preventive crowd management models. Japan, for instance, employs crowd simulation software, rigorous public safety drills, and integrated early-warning systems. Public compliance is ensured through continuous education and emergency readiness protocols. The United Kingdom's Green Guide provides detailed standards on stadium and mass event safety, mandating risk assessments, exit strategies, and emergency preparedness for all events. Germany similarly leverages advanced technologies and enforces strict legal accountability for lapses in public safety. These countries emphasize a multi-stakeholder approach, where event organizers, local authorities, law enforcement, and the public work in coordination under clearly defined protocols. In contrast, cities like Chennai continue to struggle with fragmented governance,

 [ISSN 2581-5369]

political interference, and insufficient investment in technology and training.

Chennai's rapid population growth from 7 million in 2011 to an estimated 10 million today has significantly increased pressure on its public infrastructure. According to NCRB data (2023), while stampede-related fatalities are fewer than those from natural disasters, their recurrence during religious and political events signals chronic administrative weaknesses. Informal settlements near event sites, lack of evacuation planning, and dense urban layouts further complicate emergency responses. Moreover, climate change is adding a new layer of unpredictability to mass gatherings. Unseasonal rainfall or extreme heat can provoke panic in already dense crowds. While surveillance technology, such as drones and smart CCTVs, is being adopted incrementally, it remains insufficient without a supporting ecosystem of real-time decision-making and public cooperation.

Indian courts have also acknowledged the role of the State in preventing such tragedies. In Union of India v. Prabhakaran (2008)[2]The Supreme Court held that administrative failures resulting in loss of life amount to a violation of Article 21 (Right to Life). In Kush Kalra v. Union of India (2016)[3], although relating to examination centres, the Delhi High Court emphasized the need for robust safety protocols at all mass events. Earlier, in PUCL v. Union of India (2003)[4]The apex court underscored the importance of transparency and administrative accountability principles equally applicable to disaster and crowd management. These rulings reinforce the constitutional obligation of authorities to prevent stampedes through efficient, science-based, and rights-respecting policies. A recent and tragic example that underscores the continuing administrative failures in crowd management is the RCB (Royal Challengers Bengaluru) stampede incident that occurred on June 4, 2025, outside the M. Chinnaswamy Stadium in Bengaluru. Following the team's historic IPL title win, thousands of fans gathered spontaneously after a sudden announcement of free passes for a celebratory event. With no coordinated pre-event planning, inadequate police deployment, and poor crowd control infrastructure, the situation quickly spiraled into chaos. The incident resulted in 11 confirmed deaths and dozens of injuries, turning a moment of public joy into a catastrophic crowd crush. Investigations revealed major lapses, including the absence of real-time monitoring systems, failure to regulate entry points, and a lack of coordination between the event organizers, local police, and civic authorities. The Karnataka government suspended several officials, and criminal cases were filed against key stakeholders. However, the event laid bare the systemic

[2]9 SCC 527
[3]W.P. (C) No. 4701/2016, High Court of Delhi
[4]4 SCC 399

 [ISSN 2581-5369]

flaws in India's urban disaster management apparatus. It further highlights the urgent need for pre-emptive crowd modeling, mandatory inter-agency SOPs, and strict legal accountability lessons highly relevant for metropolitan areas like Chennai, which regularly host similarly high-density events.

Stampedes are not random tragedies; they are institutional failures. The convergence of urban congestion, administrative inertia, and reactive governance has made cities like Chennai hotspots for preventable disasters. While India has taken commendable steps towards institutionalizing disaster management through the DM Act, the absence of a focused framework on crowd disasters continues to cost lives. This study advocates for a paradigm shift from post-incident reaction to pre-incident prevention. Chennai must adopt a comprehensive and integrated crowd management model inspired by global best practices. These include regular risk assessments, digital monitoring systems, public education campaigns, and transparent enforcement of safety protocols. Ultimately, preventing stampedes is not just a matter of logistics, it is a matter of governance, responsibility, and respect for human life.

A. Literature Review

Madzimbamuto (2003) has documented the hospital response to a soccer stadium stampede disaster in Zimbabwe using a detailed case study approach. The research highlighted the challenges faced in managing mass casualties and the critical role of pre-established triage protocols. The findings stress the necessity of pre-planned emergency medical systems and rapid coordination between healthcare providers and event organizers. The study recommends establishing specialized mass casualty response systems. Future scope involves formulating national-level healthcare preparedness guidelines specifically for crowd disaster scenarios. **Kaur (2006)** addressed administrative challenges in disaster management within the Indian context, based on policy review and historical disaster case studies. The study highlighted bureaucratic delays, insufficient preparedness, and lack of trained personnel as critical obstacles. The author recommends comprehensive disaster education programs for administrators and adopting modern management practices. Future scope includes evaluating the impact of India’s disaster management reforms on administrative efficiency over the past two decades. **Hsu et al. (2009)** have conducted a systematic review of historical and peer-reviewed sources on human stampedes to provide a global perspective on their causes and consequences. Using historical data analysis and literature synthesis, the study identified recurring patterns such as poor planning, limited exit routes, and mass panic. The authors recommend standardized crowd safety regulations, early-warning systems, and international

 [ISSN 2581-5369]

cooperation in data sharing. Future research should focus on longitudinal studies to monitor the long-term effectiveness of implemented safety measures. **Svara and Somers (2009)** have examined the role of local government management in assessing and managing environmental risks within emergency management frameworks. Utilizing policy analysis and case studies, the authors identified gaps in inter-agency coordination and long-term risk mitigation planning. Their findings recommend stronger collaboration between local governments and emergency services, as well as proactive community-based disaster risk reduction. Future research should explore integrated governance models combining local autonomy with national disaster management policies. **Bauckhage and Krausz (2012)** have investigated the Loveparade 2010 disaster through automatic video analysis to study crowd dynamics during the tragedy. Using advanced computer vision and image understanding methods, the researchers processed video footage to analyze density, movement patterns, and congestion points. Their findings showed that excessive density and poor flow management directly contributed to the disaster. The authors recommend integrating real-time video analytics into crowd control systems for continuous monitoring. Future research may focus on developing AI-driven surveillance that can automatically detect and alert authorities to dangerous crowd behaviors. **Burkle and Hsu (2012)** investigated the Cambodian Bon Om Touk stampede, highlighting systemic failures that led to this preventable tragedy. Through incident analysis and review of official reports, the study identified factors like poor crowd control, inadequate emergency response, and lack of proper infrastructure. The authors recommend implementing stricter safety regulations, comprehensive pre-event planning, and improved medical preparedness for future mass gatherings. Future research may focus on cross-country comparative studies to assess implementation of safety protocols at religious and cultural events. **Prabha et al. (2014)** have proposed a context-aware ad hoc network to mitigate crowd disasters by enabling real-time communication among responders and attendees. Using network simulations and hardware prototypes, they demonstrated that decentralized communication networks can significantly enhance situational awareness and response speed during emergencies. The authors recommend deploying context-aware networks at large public gatherings. Future research may focus on integrating these networks with IoT and AI systems for comprehensive disaster management. **Memish et al. (2017)** have analyzed the effectiveness of crowd control measures during the Hajj pilgrimage to prevent stampedes. Utilizing observational studies and historical data, the study found that segmenting crowds, scheduling movement times, and using extensive surveillance significantly reduced stampede incidents. The authors recommend adopting similar strategies in other mass gatherings

worldwide. The future scope includes the integration of AI-powered monitoring systems and international collaborations to create standardized global best practices in managing large crowds. **Gogaert and Scholliers (2017)** have investigated the potential to predict patient influx during mass gatherings using statistical modeling and preliminary data crunching. Their exploratory study found that patient volumes can, to some extent, be predicted based on event type, weather, and crowd size. The authors recommend further development of predictive healthcare demand models for event planners. Future research may integrate real-time data and machine learning algorithms for more accurate forecasting during large-scale events. **Liu et al. (2018)** have conducted an early-warning analysis of crowd stampedes in metro station commercial areas using Internet of Things (IoT) frameworks. The study employed sensor-based data collection and simulation models to monitor crowd density and flow patterns. Findings showed that IoT-based monitoring can detect abnormal crowd behavior before it escalates into a disaster. The authors recommend the widespread deployment of IoT systems in crowded public spaces. Future scope includes integrating these systems with AI for real-time predictive capabilities and automated emergency responses. **Choi and Shahin (2025)** have examined public reactions to the Itaewon stampede across Korean and English-language networked publics using media discourse analysis. The study utilized comparative content analysis of social media and news articles to explore differing narratives and cultural framing. The findings showed divergent blame attributions, emotional responses, and calls for policy changes across linguistic communities. The authors recommend culturally inclusive communication strategies in international disaster reporting. Future research may analyze how multilingual media influence transnational crisis management narratives. **Pratap (2025)** has conducted a computational investigation into stampede patterns at the Mahakumbh using machine learning and natural language processing (NLP). The study adopted a data-driven methodology, analyzing social media, incident reports, and video data. The findings demonstrated that machine learning combined with NLP can identify early signs of overcrowding and potential danger zones. The study recommends integrating AI-powered surveillance with ground-level safety protocols to manage crowd surges proactively. Future research may focus on refining these models for real-time application across various mass gathering events worldwide.

B. Research Methodology

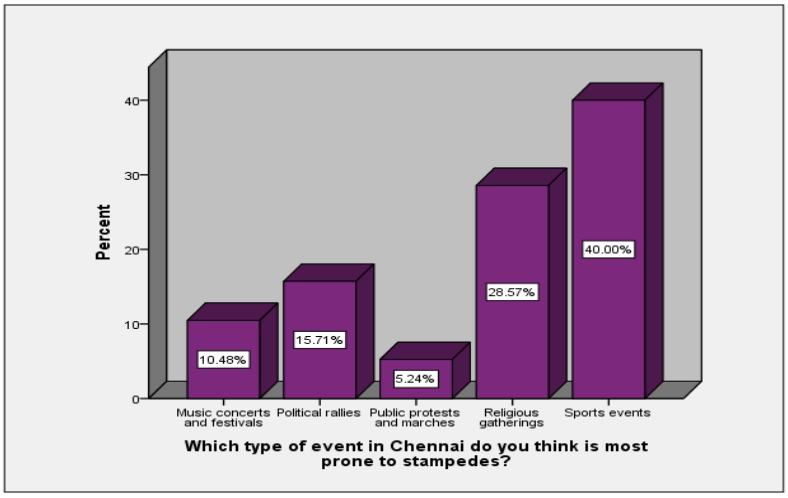
The current study is based on empirical research. It consists of the scientific frame of research. The major contribution of the study is to collect the legal facts of a particular area and to test the hypothesis of a cause-effect relationship between variables. The research design is

 [ISSN 2581-5369]

exploratory and experimental. It explored the problem tested with hypotheses and provided the solution from the analysis. A convenience sampling method is used in the research. The sample size is 210 and the sample frame is in and around Chennai. The data is collected through field visits. Questionnaire is used as the primary data collection and the article, journals, reports, newsletter are considered as the secondary sources. The analysis is done by using the SPSS 21 version. The analysis is carried out for Independent statistics (Gender,Age, Educational qualification, residence and Occupation) and dependent variables like Awareness, agreeability, major reason, most significant impact, Effective regulation and rating scale.

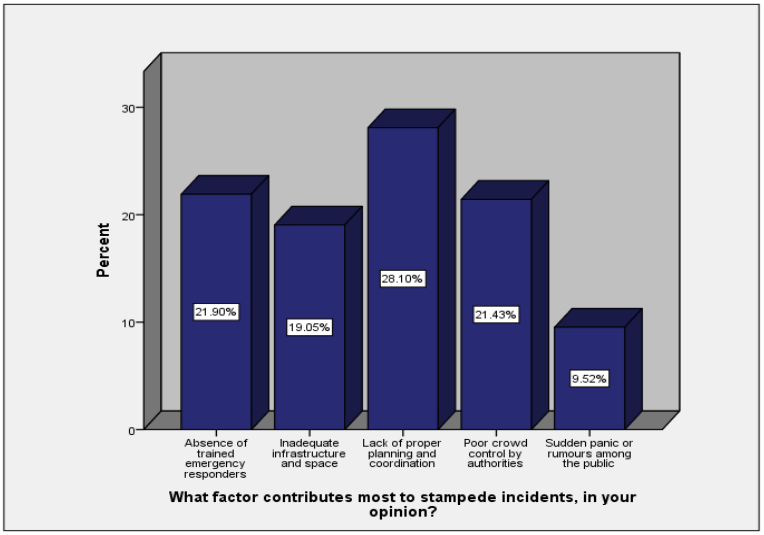
II. ANALYSIS

FIGURE: 1



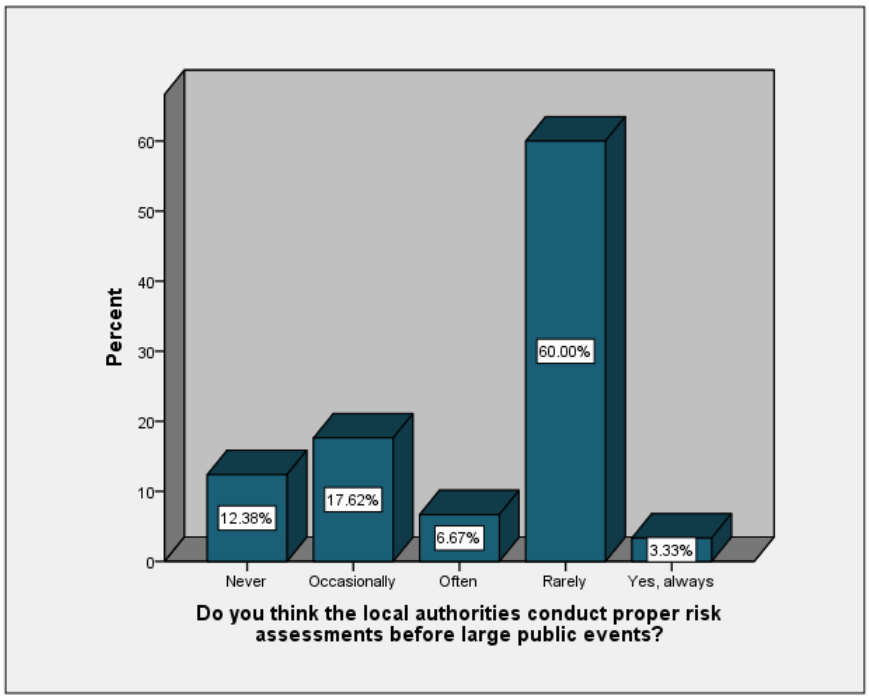
Legend: Fig.1 shows the respondents' opinions regarding the type of event in Chennai most prone to stampedes.

FIGURE: 2



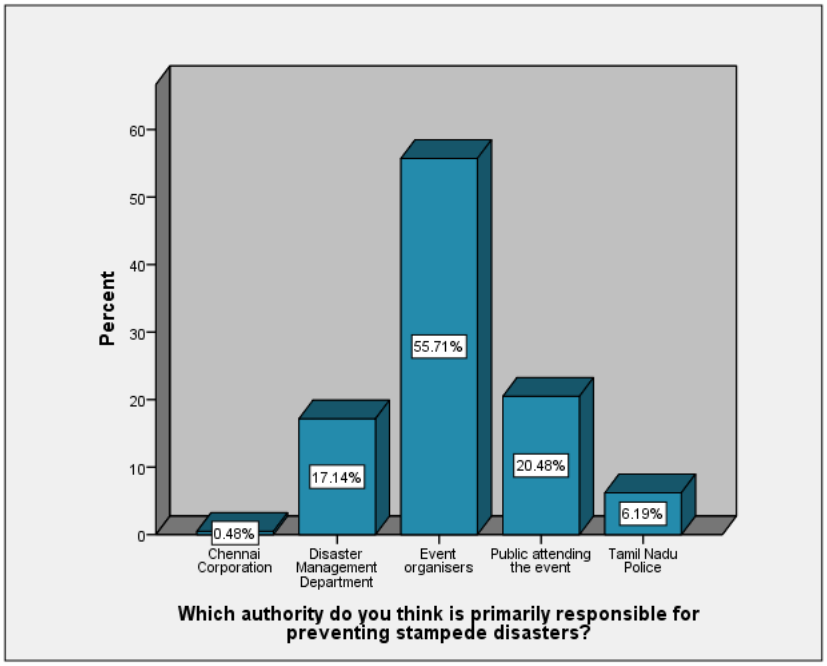
Legend: Fig.2 shows the respondents' opinions regarding the factors that contribute most to stampede incidents.

FIGURE: 3



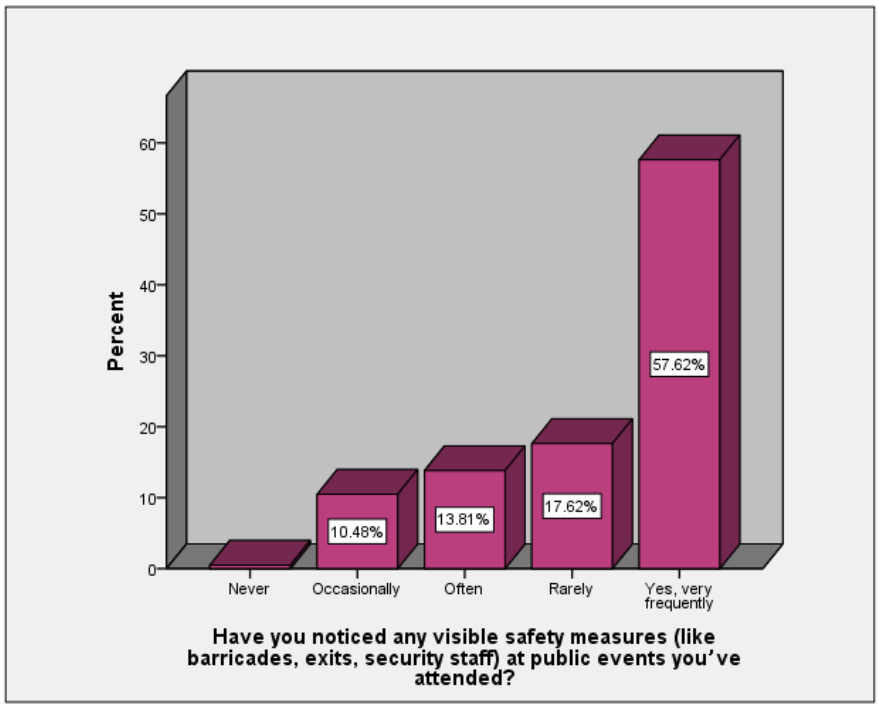
Legend: Fig.3 shows the respondents' opinions on the adequacy of risk assessments conducted by local authorities before large public events.

FIGURE: 4



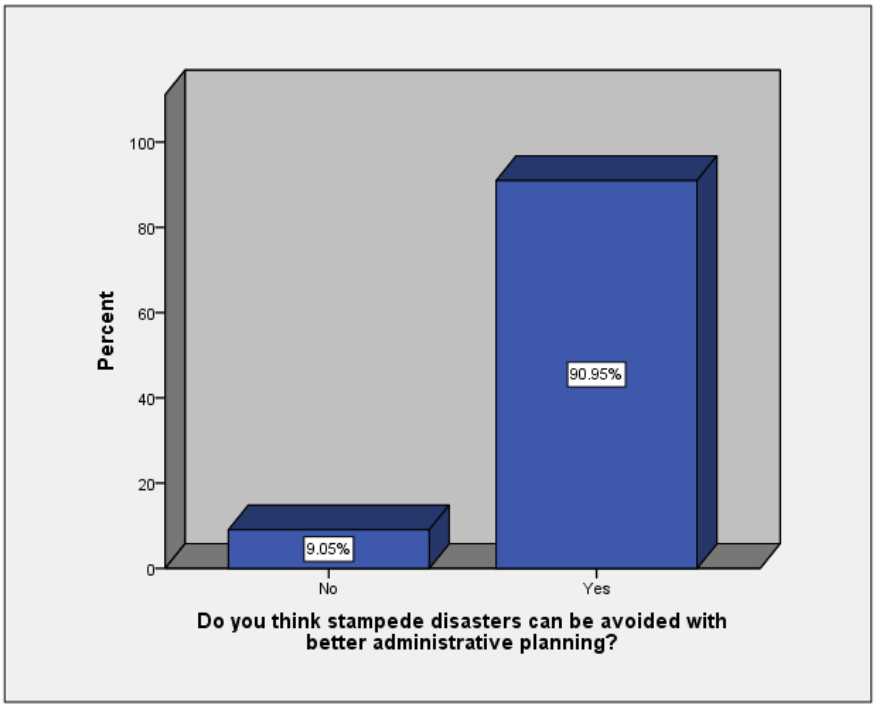
Legend: Fig.4 shows the respondents' opinions regarding the authority primarily responsible for preventing stampede disasters.

FIGURE 5:



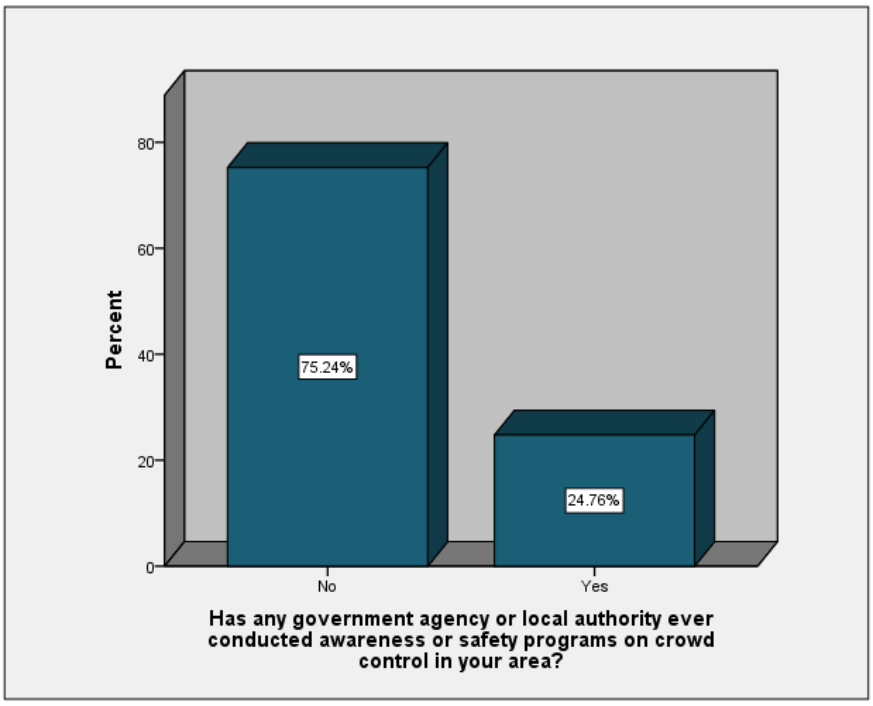
Legend: Fig.5 shows the respondents' observations regarding visible safety measures (such as barricades, exits, or security staff) at public events they have attended.

FIGURE: 6



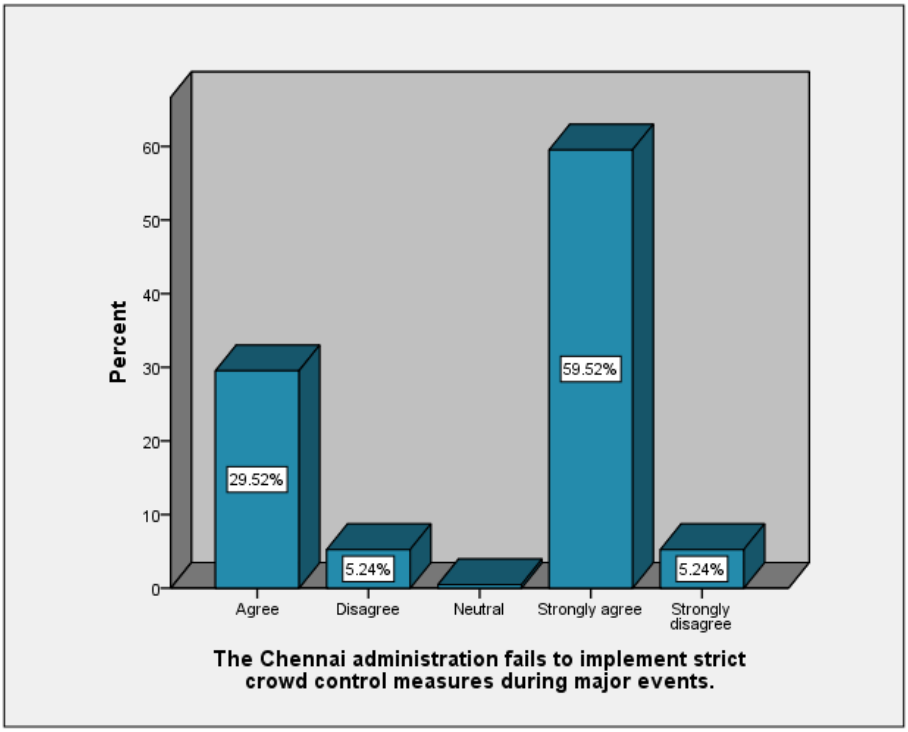
Legend: Fig.6 shows the respondents' opinions on the possibility of preventing stampedes through better administrative planning.

FIGURE: 7



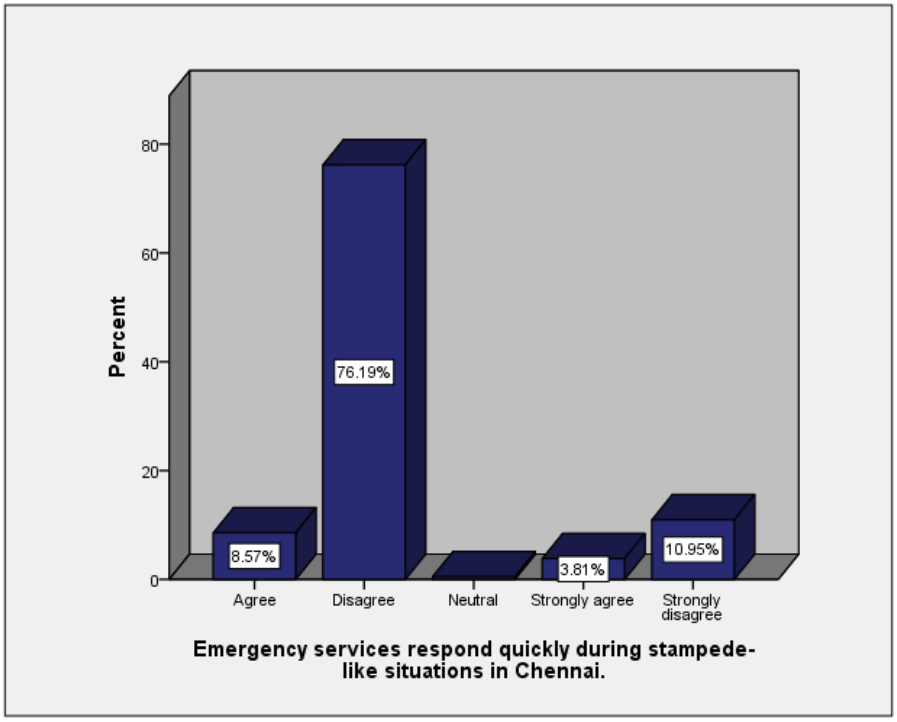
Legend: Fig.7 shows the respondents' opinions on the conduct of awareness or safety programs on crowd control by government agencies or local authorities in their area.

FIGURE 8:



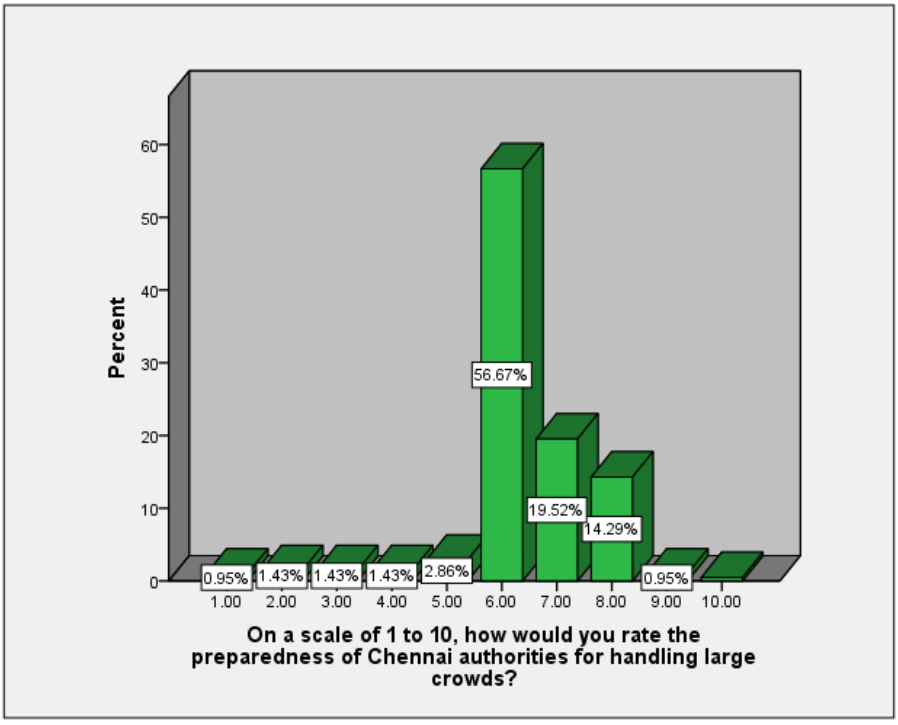
Legend: Fig.8 shows the respondents' level of agreement with the statement: "The Chennai administration fails to implement strict crowd control measures during major events."

FIGURE 9:



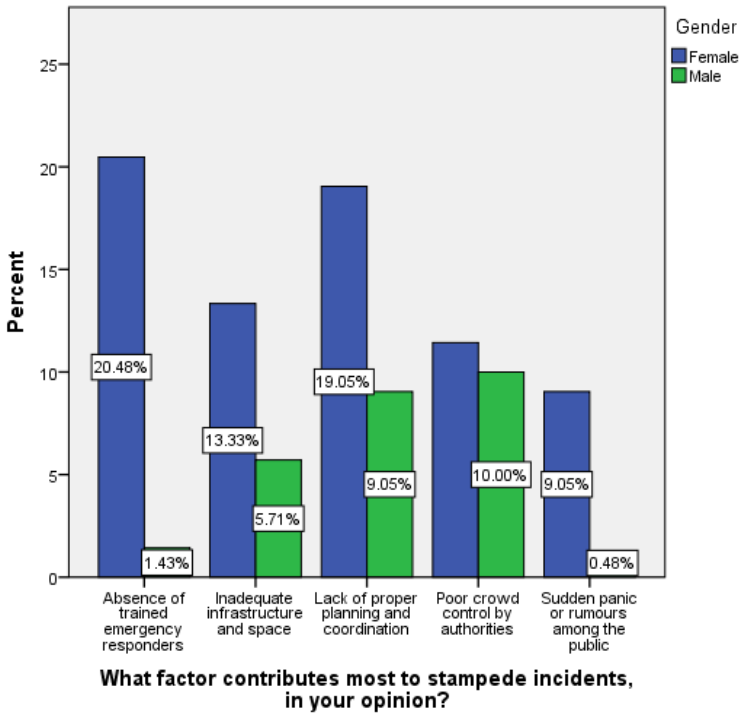
Legend: Fig.9 shows the respondents' agreeability towards the statement: "Emergency services respond quickly during stampede-like situations in Chennai."

FIGURE 10:



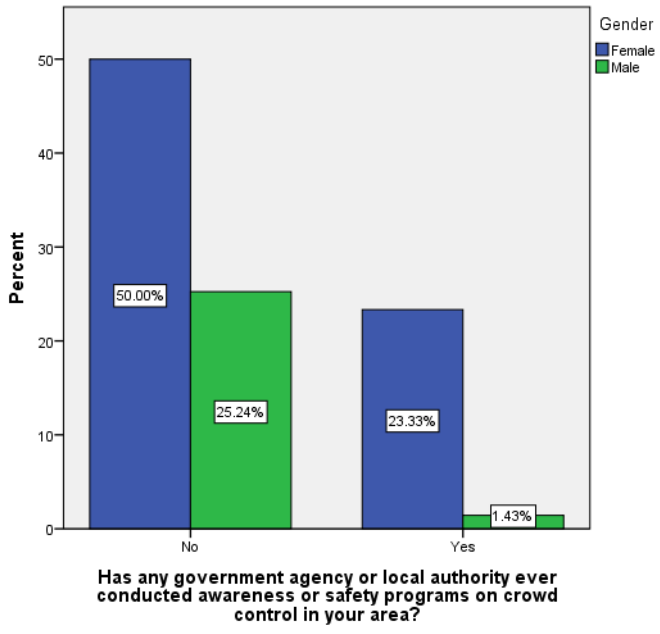
Legend: Fig.10 shows the respondents' ratings (on a scale of 1 to 10) of the preparedness of Chennai authorities in managing large crowds.

FIGURE 11:



Legend: Fig.11 shows the gender of the respondents' and their opinion regarding the factors that contribute most to stampede incidents.

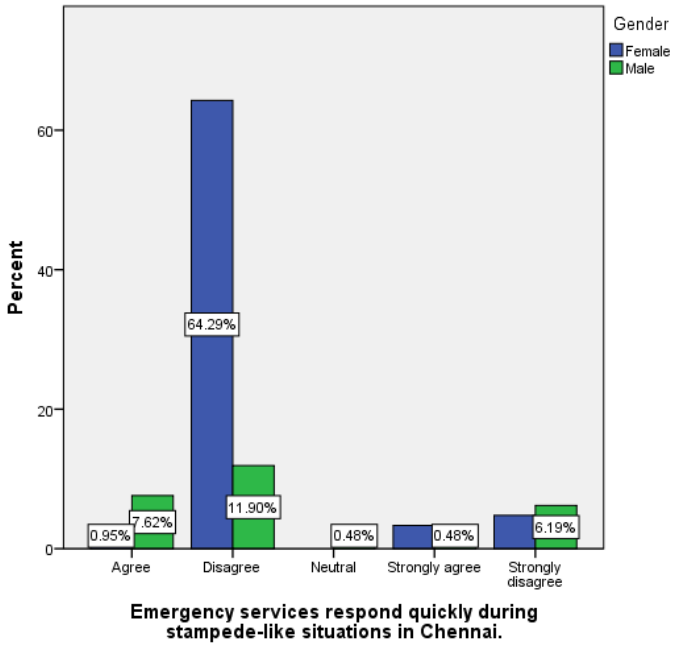
FIGURE 12:



Legend: Fig.12 shows the gender of the respondents' and their opinions on the conduct of

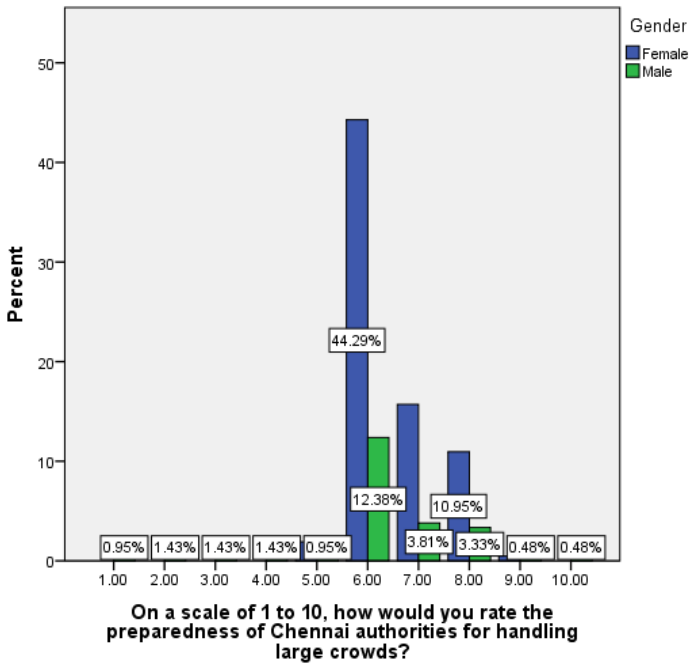
awareness or safety programs on crowd control by government agencies or local authorities in their area.

FIGURE 13:



Legend: Fig.13 shows the gender of the respondents' and their agreeability towards the statement: "Emergency services respond quickly during stampede-like situations in Chennai."

FIGURE 14:



Legend: Fig.14 shows the gender of the respondents' and their ratings (on a scale of 1 to 10) of the preparedness of Chennai authorities in managing large crowds.

TABLE 1:

Ho-There is no association between the age-wise distribution of respondents and their opinion on the adequacy of risk assessments conducted by local authorities before large public events.

Ha-There is an association between the age-wise distribution of respondents and their opinion on the adequacy of risk assessments conducted by local authorities before large public events.

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	14.689[a]	12	.259
Likelihood Ratio	20.014	12	.067
N of Valid Cases	210		

a. 13 cells (65.0%) have expected count less than 5. The minimum expected count is .07.

Legend: Table.1 represents the relationship between the age-wise distribution of respondents and their opinion on the adequacy of risk assessments conducted by local authorities before large public events.

TABLE 2:

Ho-There is no association between the age-wise distribution of respondents and their opinions regarding the authority primarily responsible for preventing stampede disasters.

Ha-There is an association between the age-wise distribution of respondents and their opinions regarding the authority primarily responsible for preventing stampede disasters.

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	16.897[a]	12	.154
Likelihood Ratio	18.133	12	.112
N of Valid Cases	210		

a. 13 cells (65.0%) have expected count less than 5. The minimum expected count is .01.

Legend: Table.2 represents the relationship between the age-wise distribution of respondents and their opinions regarding the authority primarily responsible for preventing stampede disasters.

TABLE 3:

Ho-There is no association between the age-wise distribution of respondents and their

observations regarding visible safety measures (such as barricades, exits, or security staff) at public events they have attended.

Ha-There is an association between the age-wise distribution of respondents and their observations regarding visible safety measures (such as barricades, exits, or security staff) at public events they have attended.

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	7.956[a]	12	.789
Likelihood Ratio	10.506	12	.572
N of Valid Cases	210		

a. 12 cells (60.0%) have expected count less than 5. The minimum expected count is .01.

Legend: Table.3 represents the relationship between the age-wise distribution of respondents and their observations regarding visible safety measures (such as barricades, exits, or security staff) at public events they have attended.

III. RESULTS

Fig.1 shows the respondents' opinions regarding the type of event in Chennai most prone to stampedes. A majority (40.00%) indicated sports events, whereas a minority (5.24%) identified public protests and marches as most prone to stampedes. **Fig.2** shows the respondents' opinions regarding the factors that contribute most to stampede incidents. A majority (28.10%) attributed stampedes to lack of proper planning and coordination, whereas a minority (9.52%) pointed to sudden panic or rumours among the public. **Fig.3** shows the respondents' opinions on the adequacy of risk assessments conducted by local authorities before large public events. The majority of respondents indicated that risk assessments are rarely conducted (60.00%), while a minority stated that they are always conducted (3.33%). **Fig.4** shows the respondents' opinions regarding the authority primarily responsible for preventing stampede disasters. The majority of respondents identified event organisers (55.71%) as primarily responsible, while the minority identified the Chennai Corporation (0.48%). **Fig.5** shows the respondents' observations regarding visible safety measures (such as barricades, exits, or security staff) at public events they have attended. A majority (57.62%) reported observing such measures very frequently, whereas a minority (0.48%) reported never observing them. **Fig.6** shows the respondents' opinions on the possibility of preventing stampede disasters through better administrative planning. The majority of respondents stated "Yes" (90.95%), while the minority stated "No" (9.05%). **Fig.7** shows the respondents'

 [ISSN 2581-5369]

opinions on the conduct of awareness or safety programs on crowd control by government agencies or local authorities in their area. A majority (75.24%) reported that no such programs have been conducted, whereas a minority (24.76%) reported that such programs have been conducted. **Fig.8** shows the respondents' level of agreement with the statement: "The Chennai administration fails to implement strict crowd control measures during major events." A majority (59.52%) strongly agreed, whereas a minority (0.48%) remained neutral. **Fig.9** shows the respondents' agreeability towards the statement: "Emergency services respond quickly during stampede-like situations in Chennai." A majority (76.19%) disagreed, whereas a minority (0.48%) remained neutral. **Fig.10** shows the respondents' ratings (on a scale of 1 to 10) of the preparedness of Chennai authorities in managing large crowds. A majority (56.67%) rated it as 6 out of 10, whereas a minority (0.95%) rated it as 9 out of 10. **Fig.11** shows the gender of the respondents' and their opinion regarding the factors that contribute most to stampede incidents. A majority of female respondents (19.05%) cited lack of proper planning and coordination, whereas a minority of male respondents (0.48%) cited sudden panic or rumours among the public. **Fig.12** shows the gender of the respondents' and their opinions on the conduct of awareness or safety programs on crowd control by government agencies or local authorities in their area. A majority of female respondents (50.00%) stated "No," whereas a minority of male respondents (1.43%) stated "Yes." **Fig.13** shows the gender of the respondents' and their agreeability towards the statement: "Emergency services respond quickly during stampede-like situations in Chennai." A majority of female respondents (64.29%) disagreed, whereas a minority of male respondents (0.48%) strongly agreed. **Fig.14** shows the gender of the respondents' and their ratings (on a scale of 1 to 10) of the preparedness of Chennai authorities in managing large crowds. A majority of female respondents (44.29%) rated it as 6 out of 10, whereas a minority of male respondents (0.48%) rated it as 9 out of 10.

Table.1 represents the relationship between the age-wise distribution of respondents and their opinion on the adequacy of risk assessments conducted by local authorities before large public events. Since P>0.05 (0.259), the Null hypothesis is accepted which indicates that there is no association between the age-wise distribution of respondents and their opinion on the adequacy of risk assessments conducted by local authorities before large public events. **Table.2** represents the relationship between the age-wise distribution of respondents and their opinions regarding the authority primarily responsible for preventing stampede disasters. Since P>0.05 (0.259), the Null hypothesis is accepted which indicates that there is no association between the age-wise distribution of respondents and their opinions regarding the

authority primarily responsible for preventing stampede disasters. **Table.3** represents the relationship between the age-wise distribution of respondents and their observations regarding visible safety measures (such as barricades, exits, or security staff) at public events they have attended. Since P>0.05 (0.789), the Null hypothesis is accepted which indicates that there is no association between the age-wise distribution of respondents and their observations regarding visible safety measures (such as barricades, exits, or security staff) at public events they have attended.

IV. DISCUSSIONS

Fig.1 shows the respondents' opinions regarding the type of event in Chennai most prone to stampedes. A majority indicated sports events as most prone to stampedes. This may be because such events often attract large and emotionally charged crowds, creating high-energy environments where competition for seating, inadequate crowd control, and sudden movements can lead to panic and chaos. Moreover, many sports venues in Chennai may not be fully equipped with proper emergency exits, signage, or trained personnel to manage massive gatherings, increasing the risk of stampede-like situations during peak moments or emergencies. **Fig.2** shows the respondents' opinions regarding the factors that contribute most to stampede incidents. A majority attributed stampedes to lack of proper planning and coordination. This may be because without effective planning, authorities may fail to anticipate crowd size, flow, and behavior, leading to bottlenecks, overcrowding, and confusion. Poor coordination between event organizers, security personnel, and emergency services can result in delayed responses to emerging risks, insufficient crowd control measures, and a lack of clear communication to the public, all of which significantly increase the chances of a stampede. **Fig.3** shows the respondents' opinions on the adequacy of risk assessments conducted by local authorities before large public events. The majority of respondents indicated that risk assessments are rarely conducted. This may be because local authorities often prioritize event permissions and crowd numbers over comprehensive safety evaluations, possibly due to limited resources, lack of technical expertise, or time constraints. Additionally, there may be an absence of strict regulatory requirements or enforcement mechanisms compelling authorities to conduct thorough risk assessments, resulting in inadequate anticipation and mitigation of potential hazards. **Fig.4** shows the respondents' opinions regarding the authority primarily responsible for preventing stampede disasters. The majority of respondents identified event organisers as primarily responsible. This may be because event organisers are directly involved in planning, managing, and executing the event, and are therefore expected to implement adequate crowd control measures, safety

 [ISSN 2581-5369]

protocols, and emergency response plans. They have the responsibility to ensure proper coordination with security agencies, manage entry and exit points, and anticipate crowd behavior to minimize risks, making them the key authority in preventing such disasters. **Fig.5** shows the respondents' observations regarding visible safety measures (such as barricades, exits, or security staff) at public events they have attended. A majority reported observing such measures very frequently. This may be because increased public awareness, previous incidents, and media coverage have pressured event organizers and authorities to prioritize visible safety infrastructure. Additionally, high-profile events often involve collaboration with law enforcement and disaster management teams, resulting in better implementation of crowd control measures such as barricading, signages, surveillance, and visible presence of trained security personnel. **Fig.6** shows the respondents' opinions on the possibility of preventing stampede disasters through better administrative planning. The majority of respondents stated "Yes". This may be because effective administrative planning can help anticipate crowd behavior, design safer venue layouts, allocate sufficient resources, and establish clear protocols for crowd management and emergency response. Proper coordination among stakeholders, timely risk assessments, and strict implementation of safety guidelines can significantly reduce the likelihood of overcrowding and panic, thereby preventing stampede incidents. **Fig.7** shows the respondents' opinions on the conduct of awareness or safety programs on crowd control by government agencies or local authorities in their area. A majority reported that no such programs have been conducted. This may be because crowd management is often not given priority in public safety agendas, and there may be a lack of dedicated funds, trained personnel, or institutional frameworks to organize such programs. Additionally, authorities may assume that crowd behavior is spontaneous and unpredictable, thereby underestimating the importance of public education and preparedness in preventing stampedes. **Fig.8** shows the respondents' level of agreement with the statement: "The Chennai administration fails to implement strict crowd control measures during major events." A majority strongly agreed. This may be because of recurring administrative lapses such as inadequate planning, insufficient deployment of security personnel, lack of coordination between various agencies, and poor enforcement of safety protocols. Furthermore, political pressures, resource limitations, and the sudden surge in crowds during major events may overwhelm the existing infrastructure, leading to ineffective crowd control measures. **Fig.9** shows the respondents' agreeability towards the statement: "Emergency services respond quickly during stampede-like situations in Chennai."A majority disagreed. This may be because emergency response systems in the city are often hindered by traffic congestion, lack

 [ISSN 2581-5369]

of real-time communication, inadequate manpower, and delayed coordination between departments. In many cases, emergency services may not be strategically stationed near event venues, leading to longer response times. Additionally, the absence of crowd-specific emergency protocols and limited public awareness on how to react during such crises may further impede timely intervention. **Fig.10** shows the respondents' ratings (on a scale of 1 to 10) of the preparedness of Chennai authorities in managing large crowds. A majority rated it as 6 out of 10. This may be because while some basic crowd management measures such as barricading, police presence, and traffic control are implemented, there are still significant gaps in areas like real-time monitoring, emergency preparedness, public awareness, and coordination among multiple agencies. The moderate rating reflects a perception that although efforts are being made, there is considerable scope for improvement to ensure comprehensive and effective crowd management during large gatherings. **Fig.11** shows the gender of the respondents' and their opinion regarding the factors that contribute most to stampede incidents. A majority of female respondents cited lack of proper planning and coordination. This may be because women often perceive chaotic or unstructured environments as more threatening, particularly in large gatherings. Poorly organized entry and exit points, insufficient crowd control personnel, and absence of clear communication can heighten anxiety and contribute to a sense of vulnerability. Consequently, female respondents may be more attuned to the importance of thorough planning and inter-agency coordination as critical factors in preventing stampedes. **Fig.12** shows the gender of the respondents' and their opinions on the conduct of awareness or safety programs on crowd control by government agencies or local authorities in their area. A majority of female respondents stated "No," This may be because such programs are either not regularly organized or not effectively publicized, leading to limited public participation and awareness. Female respondents may also be more attentive to the absence of community engagement initiatives, safety workshops, or informational campaigns, especially when it comes to personal and family safety during crowded events. **Fig.13** shows the gender of the respondents' and their agreeability towards the statement: "Emergency services respond quickly during stampede-like situations in Chennai." A majority of female respondents disagreed. This may be because women may perceive delays more critically due to concerns over personal safety and vulnerability in emergency situations. Inadequate emergency infrastructure, slow response times, lack of female-specific medical or security personnel, and chaotic post-incident management may contribute to their perception that emergency services are not sufficiently prompt or efficient during stampede-like situations. **Fig.14** shows the gender of the respondents' and their ratings

(on a scale of 1 to 10) of the preparedness of Chennai authorities in managing large crowds. A majority of female respondents rated it as 6 out of 10. This may be because while some crowd management measures like visible security presence, barricading, and traffic control are being implemented, there are still noticeable gaps in comprehensive safety planning, real-time monitoring, and gender-sensitive measures. Female respondents may feel that although authorities are making efforts, more proactive planning, coordination, and attention to specific safety concerns are required to ensure a higher level of preparedness.

Table.1 represents the relationship between the age-wise distribution of respondents and their opinion on the adequacy of risk assessments conducted by local authorities before large public events. Since the p-value is 0.259, which is greater than the conventional significance level of 0.05. This indicates that there is no statistically significant association between the age-wise distribution of respondents and their opinion on the adequacy of risk assessments conducted by local authorities before large public events. Despite differing personal experiences and awareness levels across age groups, the data suggests that perceptions regarding risk assessment adequacy are uniformly distributed, implying that skepticism or approval of administrative preparedness may not necessarily be influenced by age. **Table.2** represents the relationship between the age-wise distribution of respondents and their opinions regarding the authority primarily responsible for preventing stampede disasters. Since, the Pearson Chi-square test returned a p-value of 0.154, which also exceeds the threshold of 0.05, suggesting that there is no statistically significant association between respondents' age and their opinion on which authority is primarily responsible for preventing stampede disasters. While anecdotal or qualitative insights might hint at generational differences in assigning accountability such as younger individuals blaming event organizers versus older individuals attributing responsibility to the state the statistical analysis indicates that age is not a determining factor in shaping these opinions within the surveyed sample. **Table.3** represents the relationship between the age-wise distribution of respondents and their observations regarding visible safety measures (such as barricades, exits, or security staff) at public events they have attended.Since the p-value is 0.789, the highest among the three, indicating no significant association between age and respondents' observations regarding visible safety measures such as barricades, exits, or the presence of security staff at public events. This suggests that regardless of age, respondents had similar experiences or perceptions regarding on-ground safety measures during public gatherings. The absence of age-based variation may reflect either a consistent standard (or lack thereof) in the visibility of safety protocols across events or a general limitation in public attentiveness to safety infrastructure.

 [ISSN 2581-5369]

Limitation

There is a major constraint in the sample frame as it is limited to a small area. Thus, it proves to be difficult to extrapolate it to a larger population. The sample size of 210 cannot be used to assume the thinking of the entire population in a country.

V. SUGGESTIONS

In light of the research findings, it is recommended that the Chennai administration adopt a proactive, technology-integrated, and multi-stakeholder approach to crowd management during mass gatherings. First and foremost, the deployment of real-time monitoring technologies including drone surveillance, integrated CCTV networks, and crowd simulation software should be prioritized to anticipate surges, identify pressure points, and guide crowd movement dynamically. To strengthen on-ground implementation, mandatory training programs must be instituted for police personnel, event organizers, municipal authorities, and emergency response teams. These programs should focus on crowd psychology, emergency response coordination, and standard operating procedures aligned with national and international guidelines. There is also an urgent need to strictly enforce the guidelines issued by the National Disaster Management Authority (NDMA), especially those pertaining to crowd control and event risk assessment. Periodic mock drills and safety audits should be institutionalized to test and refine these protocols in real-world scenarios. Further, public awareness campaigns via digital platforms, public announcements, and on-site instructions should be conducted regularly to educate attendees about emergency exits, self-protection strategies, and responsible behavior in crowded settings. To address recurring issues of fragmented governance, it is essential to establish a centralized command and communication system that facilitates real-time coordination between police, municipal bodies, health services, and event organizers. This system must be supported by clear accountability frameworks to ensure that lapses are addressed promptly and transparently. Finally, Chennai can greatly benefit from adopting international best practices. For instance, Japan’s technology-driven disaster preparedness model and the United Kingdom’s Green Guide standards on event safety offer replicable templates for structured crowd management, risk evaluation, and emergency response. Integrating such models into Chennai’s urban planning and disaster governance framework will greatly enhance the city's capacity to prevent stampede disasters and ensure public safety during high-density events.

VI. CONCLUSION

Stampede disasters in Chennai expose deep-rooted administrative and infrastructural

deficiencies in managing mass gatherings. Despite existing frameworks like the Disaster Management Act, 2005 and NDMA guidelines, weak enforcement and fragmented coordination continue to hinder effective crowd control. Key issues include inadequate planning, undertrained personnel, outdated infrastructure, and limited use of real-time technologies. Learning from global models such as Japan's disaster protocols and the UK's Green Guide, Chennai must prioritize anticipatory risk assessment, integrated command systems, and public engagement. Strengthening these areas will not only mitigate future tragedies but also establish a resilient model for urban crowd safety management.

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 [ISSN 2581-5369]

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