



Institutional Mechanism for Evaluating Human Deaths from Disasters



National Institute of Disaster Management
(Ministry of Home Affairs, Government of India)



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FOREWORD

India adopted the Sendai Framework for Disaster Risk Reduction (SFDRR) 2015-2030 in 2015 that has seven targets and four priorities for action to prevent new and reduce existing disasters risks. The first target aims to substantially reduce disaster mortality by 2030. Though average annual number of the select five disastrous events decreased during the Hyogo period, it saw an increase of five percent in the post-Hyogo period.

In India, the disaster mortality has varied across five disasters such as Flood cyclone, drought, heat wave, coldwaves, Climate Change (CC) is likely to increase the frequency and intensity of extreme events in India (Krishnan et. al, 2020) with newer geographical areas also witnessing climate extremes. Especially in case of cyclones, they are likely to be of higher severity and increased cyclonic activity along the west coast. Notably, the IPCC Sixth Assessment (WG-I) Report's code red for humanity due to human-induced global warming implies CC as an immediate threat and nobody is safe and it is getting worse faster.

These calls for concerted efforts on disaster management (DM) across all the phases- prevention and mitigation, preparedness, response and relief, reconstruction and recovery. This study is a timely step and would also help India remain on track on the first target of SFDRR on reducing disaster mortality, significantly.

Shri Taj Hassan, IPS

आपदा प्रबंधन महाविचार: पूरा भारत भागीदार



PREFACE

With the changing climate and ever increasing disaster intensity and frequency the threat for human lives has also increased. India is working continuously towards achieving the targets of Sendai Framework for Disaster Risk Reduction (SFDRR) 2015-2030.

Thus assessment of disasters mortality and the reasons behind the fatalities are inevitable to take necessary policy intervention and implementation strategies. Keeping this in the background, the assessment of the deceased in the cyclone Tauktae, Yaas has been done to identify the underlying causes. The study has been carried out in four States i.e, Gujarat, Maharashtra, Odisha and West Bengal.

This study has helped to identify root cause of disaster effects on human lives due to the selected two cyclones. This study also identifies the reasons for the mishaps behind these effects on human lives. Also this study suggests an institutional mechanism at the states/district level to analyze disaster effects on human lives to improve DRR.

The outcome of the study will flag key policy issues related to forecasting and early warning, search and rescue, and preparedness and response for reducing disaster mortality. In addition, the study would help in developing suitable training and awareness, and IEC materials.



Prof. Anil K Gupta

Acknowledgement

We are grateful to Dr. Nupur Tyagi, Ms. Riya Sethia, Dr. Henna Hejazi and Mr. Vikrant Mahajan for support in field assessment and the team of volunteers in each of the project states who conducted field surveys in very challenging contexts and in difficult times, making it possible to complete this study on time and with a high quality.

This study could not have been possible: without the generous time, hospitality and knowledge sharing by the families/ next of kin of deceased due to Cyclones Tauktae and Yaas in the sampled districts of four project states of Gujarat, Maharashtra, West Bengal and Odisha; State Disaster Management Authorities and District Disaster Management Authorities from the corresponding states and districts. In addition, my sincere thanks to Sh. Surendra Thakur, Consultant, I/C (HR & Admin.) for all types of administrative support and to Mr. Santosh Kumar Tiwari (Librarian, NIDM) and the publication cell of NIDM for facilitating the printing and publication of this report especially, Ms. Karanpreet Kaur Sodhi.

We believe that this study will set the course for further learning, as well as improved ground action, strategy formulation and policy guidance for saving loss of lives due to disasters.



Prof. Anil K Gupta
Head, ECDRM, NIDM

Table of Contents

Foreword	i
Preface	iii
Acknowledgement	v
List of Tables	ix
List of Figures	x
Abbreviations	xi
Introduction	1
1. The study	2
1.1 Goal	3
1.2 Objectives	3
1.3 Outcomes	3
1.4 Scope	3
1.5 Methodology	4
2. The Incident Response System (IRS) and evaluation of deaths from disasters	5
3. Existing mechanisms and scope for strengthening recording and reporting cause of deaths	6
3.1 Medical Certificate of Cause of Death (MCCD)	6
3.2 Supporting documentation for ex-gratia payment to families of deceased	7
3.3 Areas for strengthening recording of cause of death	7
4. Field survey on cause of death	7
4.1 Questionnaire	7
4.2 Findings	9
5. Indicators for evaluating human deaths from disasters	12
6. Institutional mechanism for analyzing disaster effects on human lives	15
6.1 Rationale for evaluating human deaths from disaster	15
6.2 Objectives for evaluating human deaths from disasters	15
6.3 Parties in evaluating human deaths from disasters	16
6.4 Period for evaluating human deaths from disasters	16
6.5 Analysis criteria and analysis questions	16
6.6 Approach and Methods for Analysis	16
6.7 Role of NDMA, NIDM and SDMAs	17
7. Policy recommendations and ways forward	17
8. References	18

List of Tables

Sl. No.	List of Tables	Page No.
Table 1:	Field survey details by sampled districts across the project states	5
Table 2:	Suggestive indicator questions for evaluating human deaths from disasters	13
Table 3:	Key parties in various modes of evaluating human deaths from disasters and related pros and cons	16

List of Figures

Sl. No.	List of Figures	Page No.
Figure 1:	Temporal distribution of five select climatological disaster events during 1995-2020	1
Figure 2:	Methodology for the study	4
Figure 3:	IRS organisation	5
Figure 4:	DM interventions for saving lives	12

Abbreviations

- | | | |
|-----|--------|--|
| 1. | CC: | Climate Change |
| 2. | DDMA: | District Disaster Management Authority |
| 3. | ESF: | Emergency Support Function |
| 4. | HFA: | Hyogo Framework for Action |
| 5. | ICD: | International Classification of Diseases |
| 6. | IPCC: | Intergovernmental Panel on Climate Change |
| 7. | IRS: | Incident Response System |
| 8. | IRT: | Incident Response Team |
| 9. | MCCD: | Medical Certificate of Cause of Death |
| 10. | NDMA: | National Disaster Management Authority |
| 11. | NDMP: | National Disaster Management Plan |
| 12. | NDRF: | National Disaster Response Fund |
| 13. | NIDM: | National Institute of Disaster Management |
| 14. | NIO: | North Indian Ocean |
| 15. | NPDM: | National Policy on Disaster Management |
| 16. | SDMA: | State Disaster Management Authority |
| 17. | SDRF: | State Disaster Response Fund |
| 18. | SFDRR: | Sendai Framework for Disaster Risk Reduction |

INTRODUCTION

India adopted the Sendai Framework for Disaster Risk Reduction (SFDRR) 2015-2030 in 2015 that has seven targets and four priorities for action to prevent new and reduce existing disasters risks. The first target aims to substantially reduce disaster mortality by 2030-lower the average per 100,000 mortality between 2020-2030 compared with 2005-2015. At the same time, the annual total number of selected disastrous weather events (Floods, Droughts, Cyclones, Heat Waves and Cold Waves) shows an increasing trend in India in recent five years-since 2015 in the post-Hyogo/ Sendai era as evident in Figure 1 (Gupta et. al, 2021).

There were 420 and 357 such disaster events during the pre-Hyogo and Hyogo period, respectively. While the number of events in just first six years of Post-Hyogo/ Sendai period were as high as 282. Though average annual number of the selected five disastrous events decreased during the Hyogo period, it saw an increase of five percent in the post-Hyogo period.

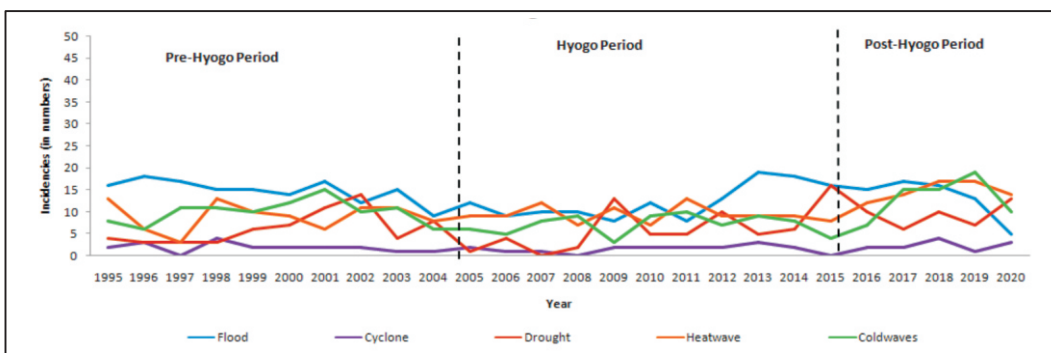


Figure 1: Temporal distribution of five select climatological disaster events during 1995-2020

However, over the three periods, the trend of disaster mortality in India has varied across the select five disasters (ibid.):

- The average annual flood mortality has seen no significant change or in other words remained same over the pre-HFA, HFA and post-HFA periods;
- Mortality due to cyclones was highest in the Pre-HFA period (with 1999 Orissa Super Cyclone occupying the lions share) that has reduced significantly over the successive two periods. However, it is increasing in the western coastal state of Maharashtra.
- While in case of Heat Waves, the mortality has been increasing in several states including Andhra Pradesh, Uttar Pradesh, Bihar, Maharashtra,

Telangana and Jharkhand in the post-Hyogo/ Sendai period.

- Similarly, increasing trend in mortality is seen in several states--UP, Jharkhand, Uttarakhand, Jammu & Kashmir, Assam, Meghalaya, Chandigarh and Tripura, in the post-Hyogo/ Sendai period.

Cyclones accounted for highest mortality (48%), followed by heat waves (26%), floods (18%) and Cold Waves (8%).

Climate Change (CC) is likely to increase the frequency and intensity of extreme events in India (Krishnan et. al, 2020) with newer geographical areas also witnessing climate extremes. Especially in case of cyclones, they are likely to be of higher severity and increased cyclonic activity along the west coast. Notably, the IPCC Sixth Assessment (WG-I) Report's code red for humanity due to human-induced global warming implies CC as an immediate threat--and nobody is safe and it is getting worse faster. All this calls for concerted efforts on disaster management (DM) across all the phases--prevention and mitigation, preparedness, response and relief, and reconstruction and recovery. The efforts would also help India remain on track on the first target of SFDRR on reducing disaster mortality, significantly.

A survey on disaster impacts on human lives due to disasters can provide critical insights into specific areas for action to reduce disaster mortality in all the DM phases--prevention and mitigation, preparedness, response and relief, and reconstruction and recovery, but considering the scope of the study, we focused just on preparedness and response.

1. The study

Especially the past two years, 2020 and 2021, have witnessed unusual level of cyclonic activity in the north Indian Ocean (NIO). Five cyclones formed in 2020 in the NIO--Amphan (Super Cyclonic Storm), Nivar and Gati (Very Severe Cyclonic Storms), Nisarga (Severe Cyclonic Storm), and Burevi (cyclonic storm), while in 2021, two cyclones Yaas (Very Severe Cyclonic Storms) and Tauktae (Extremely Severe Cyclonic Storm) formed. The cyclonic activity was unusual owing to following reasons:

- Amphan was the deadliest cyclone since the 1999 Super Cyclone;
- In 2020, two out of the five cyclones that formed in Arabian Sea, were very severe. Some of the cyclones in the past two years, for example Tauktae, making a landfall on the western coast, had rapidly intensified and sustained, which is very rare especially for the Gujarat coast.

The cyclones caused huge loss of lives, and damage to infrastructure severely impairing the socio-economy of the region. With CC associated global warming the Sea Surface Temperatures (SST) are seeing higher increase resulting in increasing level of deadlier cyclonic activity in the NIO region. Combined with sea level rise, as

anticipated due to CC, they can cause catastrophic havoc through much more intense rainfall, higher storm surge, and higher and sustained wind speed.

1.1 Goal

To carry out a study for institutional mechanism for disaster impacts on human lives with understanding of key causes for the death incidents related to Cyclone Tauktae in states of Gujarat and Maharashtra and Cyclone Yaas in states of West Bengal and Odisha.

1.2 Objectives

- To identify root causes human deaths due to the selected two cyclones;
- To suggest an institutional mechanism at the states/district level to evaluate deaths from disasters to improve DRR; and,
- To understand the reasons for disaster impacts on human lives.

1.3 Outcomes

The outcome of the study will flag key policy issues related to forecasting and early warning, search and rescue, and preparedness and response for reducing disaster mortality. In addition, the study would help in developing suitable training and awareness, and IEC materials.

1.4 Scope

The proposed framework for evaluating disaster impacts on human lives considers the period from activation to deactivation of District Emergency Operation Centres (DEOC). However, the impacts can occur in days/ months following the deactivation time that depend on:

- Severity of injury caused and access to the needed medical treatment to save life; and,
- Unsanitary environmental conditions that develop following/due to a disaster and consequent illness (such as water- or vector-borne) leading to mortality.

For mortalities occurring beyond the deactivation time it becomes difficult to attribute it to disasters or development issues.

The study is conducted in the context of cyclones hazard for which early warning exists. However, the principles of evaluating deaths from disaster will remain the same and can be adapted for other disasters.

1.5 Methodology

The study comprised five key methodological elements as shown in Figure 2.

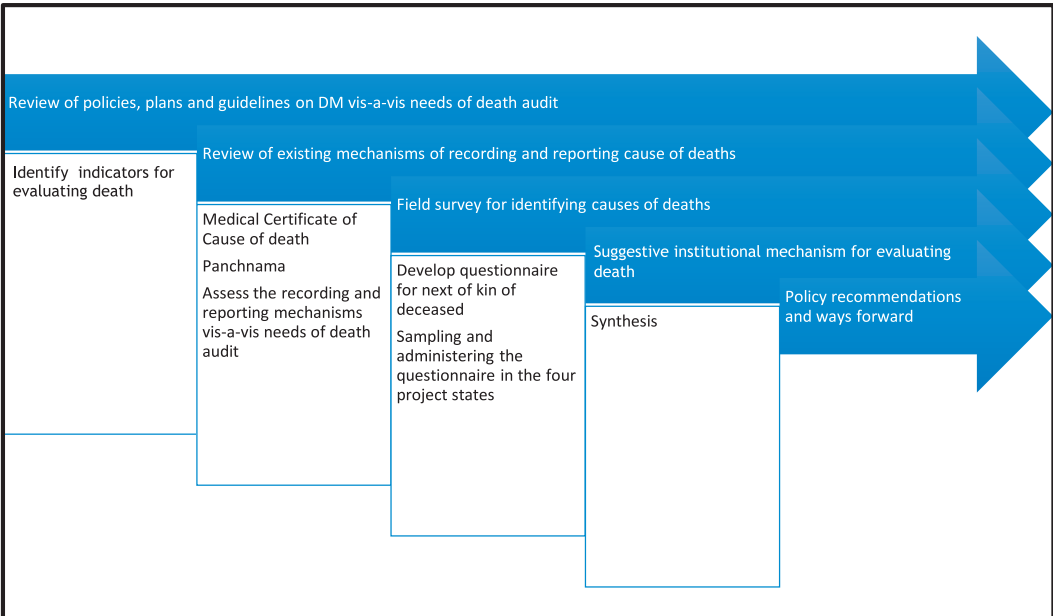


Figure 2: Methodology for the study

Specifically, for the field survey, three districts—two most affected and one moderately affected, by the corresponding cyclones (Yaas and Tauktae) are selected from each of the four project states (Gujarat, Maharashtra, West Bengal and Odisha). The questionnaire is developed based on all potential causes of deaths. The questionnaire is planned to be administered to 100 percent of next of kin of deceased in the sampled three districts in each of the four states. However, the next of kin/ family of all deceased in Odisha and West Bengal could not be identified due to their non-availability in villages due to factors such as they were seasonal migrants. We faced similar challenges for conducting interviews with 100 percent of next of kin in the other two states (Gujarat and Maharashtra). Finally the field survey could be administered in only two of the four states (Gujarat and Maharashtra). The table below provides details of number of surveys in the two states.

Table 1: Field survey details by sampled districts across the project states

State	District	Number dead	Number identified/ available and surveyed
Gujarat	Amreli (worst affected)	26	12
	Gir Somnath (worst affected)	14	9
	Anand (moderately affected)	2	1
Maharashtra	Raigad (worst affected)	4	3
	Palghar (worst affected)	5	0
	Mumbai urban (moderately affected)	No deaths	-

2. The Incident Response System (IRS) and evaluation of deaths from disasters

The IRS put in place in India is flexible and robust system. It aids systematic planning, management, implementation and review of disaster response. It is an effective tool for efficient use of resources (personnel, equipments and facilities), effective communication and coordination across diverse agencies providing Emergency Support Functions (ESFs). Every Incident Response Team (IRT) member has a designated supervisor and there is clear chain of command all through the IRS system.

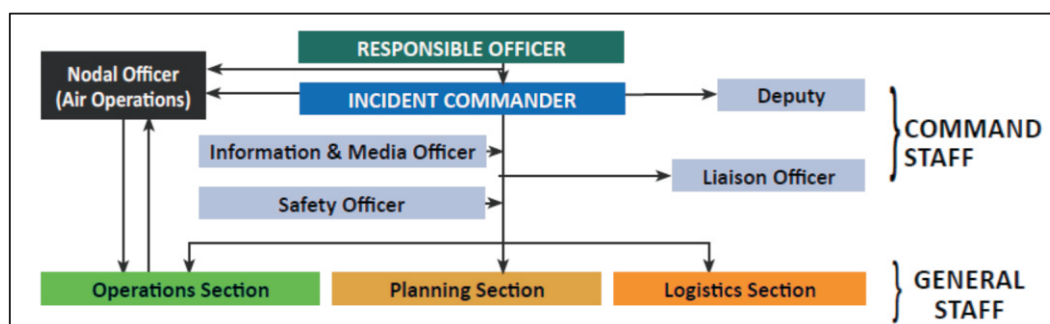


Figure 3: IRS organisation
Source: NDMA Guidelines on IRS

Further various sections-Operations, Planning and Logistics-are subdivided into Branches, Divisions, Units/ Groups.

Key documentation of IRS that could be useful for evaluating deaths are Incident Action Plan (IAP), briefing and debriefing meeting, various IRS-Forms, and Post Action Taken Report. Specifically, the IRS-Forms provide information on scale and timing of deployments of various resources during the disaster response.

3. Existing mechanisms and scope for strengthening recording and reporting cause of deaths

3.1 Medical Certificate of Cause of Death (MCCD)

The Registration of Births and Deaths Act, 1969 has a provision for Medical Certificate of Cause of Death (MCCD) under sections 10(2) and 10(3):

- “Section 10 (2):- In any area, the State Govt. having regard to the facilities available therein in this behalf, may require that a certificate as to the cause of death shall be obtained by the Registrar from such person and in such form as may be prescribed.
- Section 10 (3):- Where the State Govt. has required under subsection (2) that a certificate as to the cause of death shall be obtained, in the event of the death of any person who, during his last illness, was attended by a medical practitioner, the medical practitioner shall, after the death of that person, forthwith, issue without charging any fee, to the person required under this Act to give information concerning the death, a certificate in the prescribed form stating to the best of his knowledge & belief the cause of Death; & the certificate shall be received and delivered by such person to the Registrar at the time of giving information concerning the death as required by this Act.”

The MCCD form has two parts:

- Part I on cause of death statement, which requires three entries to be filled: Line (a): Immediate cause; Line (b): Antecedent condition-due to (or as a consequence of); and Line (c): The underlying condition, if any which gave rise to the antecedent condition on Line (b). If the condition on Line (b) is the underlying cause, nothing needs to be entered in Line (c). In case the sequence of death event comprises more than three stages there is an option to fill Line (d). Normally, the condition in the lowest line-Line (c) / Line (d)- is used for statistical classification of cause of death using the International Classification of Diseases (ICD)- 10 developed by World Health Organisation (WHO).

- Part II on other significant conditions related to all other diseases / conditions that shape the morbid process contributing to death.

The medical part of the MCCD certificate has to be filled by the attending physician while in case of medico-legal cases, cause of death needs to be filled by medical officer who performs post-mortem on the basis of evidence noticed by him/ her.

3.2 Supporting documentation for ex-gratia payment to families of deceased

The assistance under State Disaster Response Fund (SDRF) and National Disaster Response Fund (NDRF) requires certificate of cause of death issued by an appropriate authority certifying that the death occurred due to a notified natural calamity. Panchnama is prepared by the local Revenue Official who provides a complete set of documentation that include post-mortem report, for release of payment of ex-gratia amount to the family of deceased. These two documents (post-mortem report and punchnama) taken together are vital source of information for identifying cause of death--immediate, antecedent and underlying cause (such as disaster).

3.3 Areas for strengthening recording of cause of death

The above two systems of recording the cause of death, as evident, are interlinked. However, the two systems in the current practice are geared to only establish evidence that the death occurred due to a (notified) disaster, for processing ex-gratia payment to the family of deceased. But, these two documents when read in detail carefully can provide leads on whether the death occurred due to gaps in: effectiveness of early warning communication system; appropriateness of community's behaviour when asked to evacuate; and/ or adequacy of capacity and timeliness in executing the IRS (Incident Response System). For further details on cause of death, there would be a need to evaluate additional "survey materials" including forms that are mandated to be filled by key IRT members, as part of the IRS.

4. Field survey on cause of death

4.1 Questionnaire

As mentioned in the methodology, above, a questionnaire for field survey was developed. The questionnaire covers as many possible issues to understand the immediate, antecedent, and underlying causes of death. The key features of the questionnaire are presented below:

- I) Cyclones may lead to direct and indirect death:
 - Direct death: Due to force of nature e.g., wind, flood water gushing, electric pole falling, tree falling, house collapse etc.
 - Indirect death: Existing morbidity can also be a factor for death e.g.,

cardiovascular disease persons may die due to shock from disaster, prolonged stagnation of flood water can lead to water- and vector-borne diseases etc.

II) Time of Death (When):

Understanding in which phase of disaster the person has died:

- Pre-disaster warning phase: This will include documenting factors like receiving of alerts, understanding of alerts by next of the kin of the deceased, quality of evacuation support, fatalities during transportation for evacuation etc.
- During disaster: Understanding time of death, whether during search and rescue operations, due to untimely access to health care, quality/ mishap of/ during transportation to health facility, unsafe/ sanitary shelter conditions etc.
- Post disaster: This will include mostly indirect deaths due to existing morbidity or other health issues.

III) Who died: (if any of the following apply re-check on points under “When”)?

Understanding who has died in such incidents, including their occupation and socio economic conditions.

- First responder/ emergency support staff/ civil defense volunteer
- Differentially abled
- Lower socio-economic status
- Women headed households

IV) What was the person doing at the time of death (location and activity):

- Running to escape from hazard etc.
- Sleeping and unaware of situation (after receiving warning or no warning received)
- Was standing under a tree when lightning struck
- Was restoring critical service (power etc.)
- Fishing in sea or deep sea
- Was working in agriculture field
- Any other

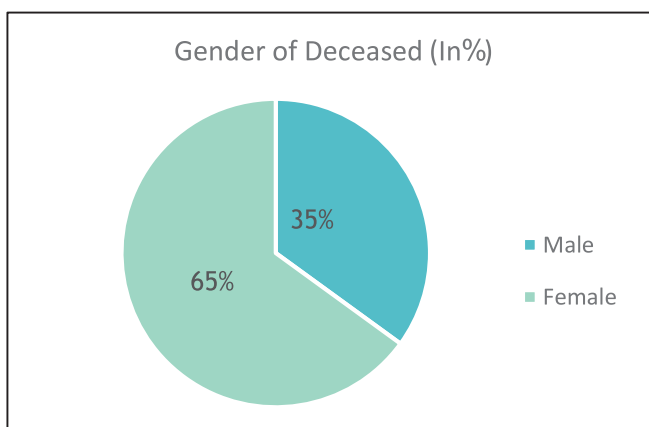
4.2 Findings

As mentioned in the foregoing, we could not trace/ identify the family/ next of kin of deceased in Odisha and West Bengal. Hence, the findings are presented only from Gujarat and Maharashtra.

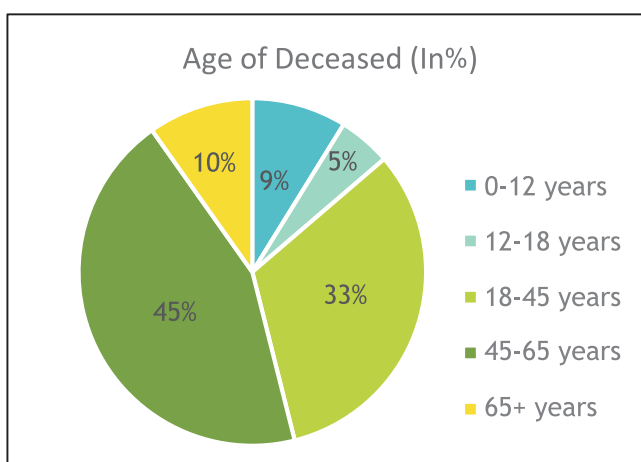
a) Gujarat

We could interview 50 percent of total deaths in the three sampled district. For the remaining we were not able to identify/ trace their next of kin. There were total 79 deaths in the state, 42 in the three sampled districts out of which interviews could be conducted for 21 deaths.

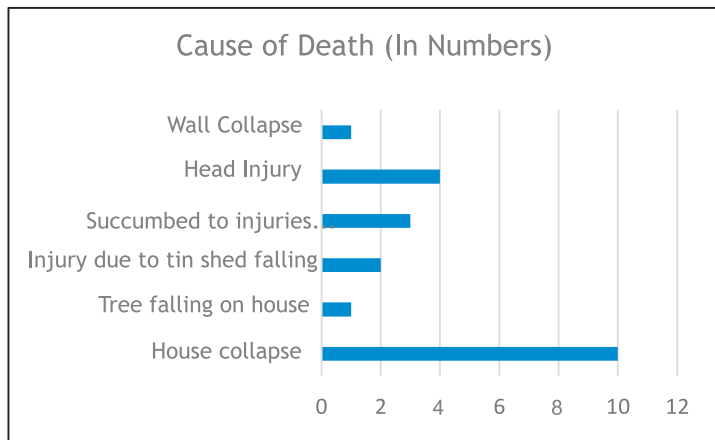
- Most of the deceased were females



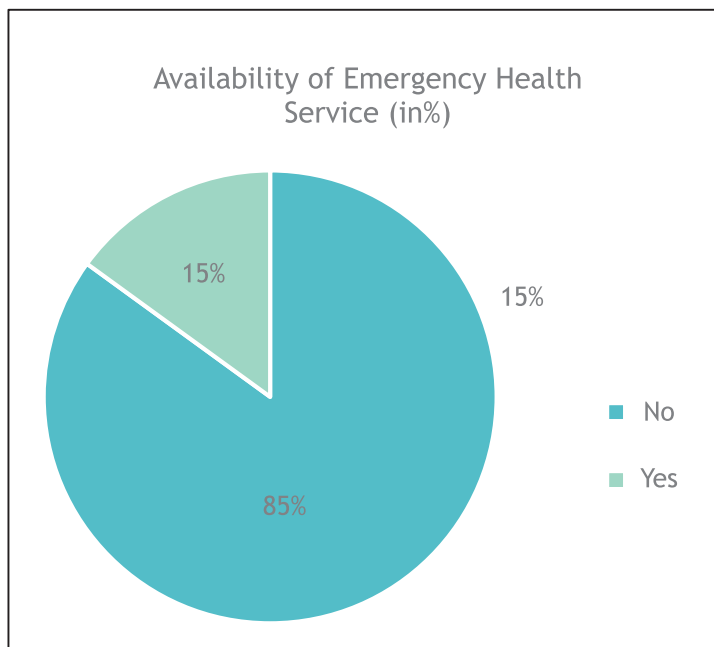
- More middle aged and elderly died (45+ age)



- Majority were caused directly because of the disaster (force of nature).



- Most of the deceased (85%) had no access to emergency health services or received early warning for the disaster.



- A few deceased (three in number) died due to head injuries sustained while they were outside and fell while running from hazard.
- None of the deceased had relocated to safer location as they were not able to understand the intensity of the disaster and they were confident that they will be safe inside the houses.
- During Tauktae cyclone, there was chaos in public transport. So, the village panchayat informed the data on fatality after two days of occurrence.

b) Maharashtra

As mentioned the team could conduct interviews for only three out of the nine deaths from the sampled districts as next of kin of remaining could not be identified/ traced due to factors mentioned in the foregoing.

- Two were females and one male. Of the deceased females, one of them was head of the household.
- Two were above 65 years of age while one was between 45-65 years.
- Two of them were working as vegetable and flower sellers, while one worked as a daily wage worker.
- All the deaths happened directly because of the cyclone (force of nature). One of them was hit by broken tree while other two got hit by the walls that collapsed due to the storm.
- None of the deceased received any early warning information for the disaster.

Overall the findings from field assessment on evaluation of causes of deaths indicate the importance of early warning, and the content and format in which it is communicated so as to enable community to be able to take appropriate decision on ways to respond (such as evacuate or not). However, other factors also influenced decision on whether to evacuate or not.

Other key factors that caused deaths: accessibility/ quality of emergency health service; effectiveness in execution of ESFs; and, vulnerability of housing stock as yet another factor.

We overlay the findings with strategies and actions relevant to saving lives as mentioned in National Disaster Management Plan (NDMP), National Policy on Disaster Management (NPDM) and various guidelines issued by NDMA to arrive at potential list of indicators in the next section.

5. Indicators for evaluating human deaths from disasters

In accordance with the DM Act 2005, a policy and institutional framework for DM has been put in place from national to state to district level. While NDMA, NDRF, NEOC, and NIDM were established at the national level, at the state level SDMA, SDRFs and SEOCs were established. Further below, at the district level, DDMA and DEOCs have been established.

In addition, at the national level, NPDM (2009), NDMP (2019), and several guidelines covering various hazards and features of DM have been issued by NDMA. Similarly, SDMA have issued policies and plans at the state level.

While the NDMP emphasizes decreasing significantly the loss of lives in its vision, the NPDM in its approach flags Community Based Disaster Management (CBDM) and “ensuring efficient response and relief with a caring approach towards the needs of the vulnerable sections of the society”. Both the elements of the approach are crucial for saving lives from disasters. Further both, NPDM and NDMP, highlighted the need for monitoring and review mechanism for DM, which is very much required especially in the changing context of disasters and development.

Key DM interventions that have been established and have linkage with saving lives are presented in Figure 4.

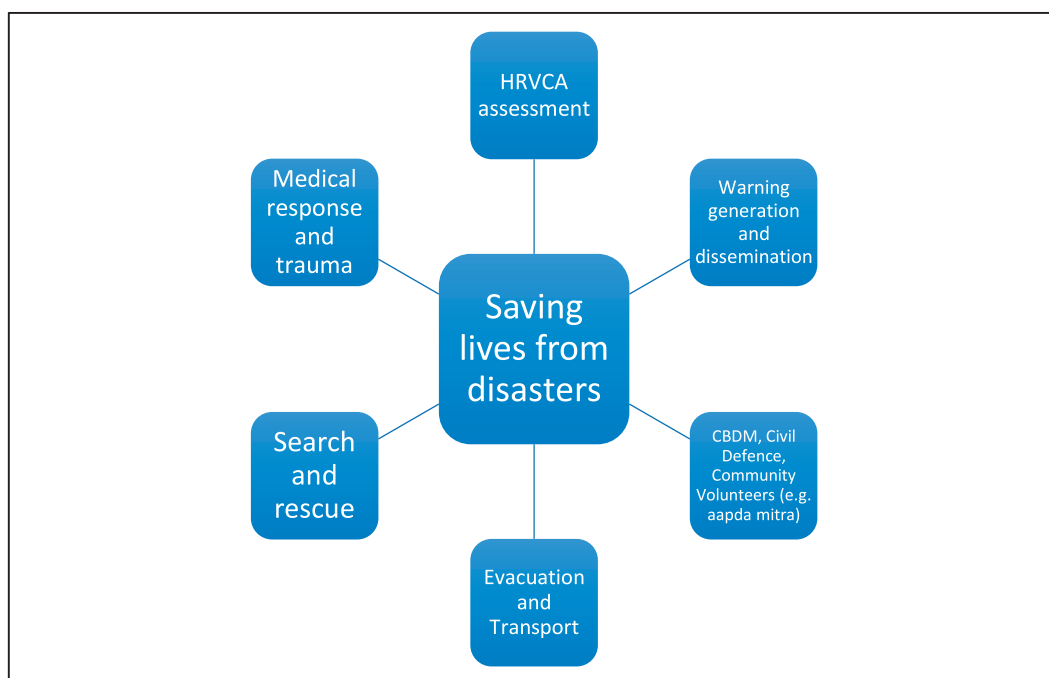


Figure 4: DM interventions for saving lives

Common to all interventions:

- All except HRVCA are ESFs (part of IRS)
- Are part of DM Plans
- Need sustained capacity building
- Need use of ICT to enhance effectiveness

We use the interventions to categorize indicators for evaluating human deaths. The details are presented in Table 2.

Table 2: Suggestive indicator questions for evaluating human deaths from disasters

Intervention	Relevance to evaluating human deaths from disasters	Tentative Indicators
HRVCA assessment	HRVCA assessment at finer scale providing information on locations of community at higher risk to life (vulnerability by age, sex, social groups, disability and co-morbidities) from disasters can aid prompt planning for response to save lives.	Is the HRVCA comprehensive enough to aid planning for response?
Warning generation and dissemination	Warning generated based on overlaying hazard information on the vulnerability assessment (as part of HRVCA assessment) can accurately inform the geographic locations and community groups that need to be prioritized for response to save lives. Dissemination using multiple modes/ channels that reach out to various vulnerable population in easy to access and understand modes/ format can aid them to respond appropriately.	Does the warning have enough information for vulnerable population to respond effectively? Is the warning disseminated in a way that provides adequate information and access to vulnerable population that it enables them to respond to save their lives?
CBDM, Civil Defence, Community Volunteers (e.g. aapda mitra)	Communities are the first to face the brunt of disasters as well as first to respond. Till the time the IRS system is activated and the ESF agencies on search and rescue reach, the community manages the task of saving lives. Availability of specialised skilled individuals on response in the community (civil defence and volunteers) can aid the community to respond better in saving lives.	Level of community awareness on risks and response options? Proportion of vulnerable population having favourable behavioural attitude towards needed response options (e.g evacuation order)? Extent of specialised skilled individuals on response available within the community?

Evacuation and Transport	Timely evacuation of all vulnerable population before the disaster strikes, saves lives. Adequacy of transport alongwith clear plan (routes) for evacuation helps save lives.	Proportion of vulnerable population that evacuated? Were transport arrangement adequate for all the vulnerable population needing it?
Search and rescue	Effective search and rescue saves lives.	Did the search and rescue team reach timely? Extent of adequacy and appropriateness of equipments did the team have?
Medical response and trauma	Timely and appropriate access to medical care saves lives.	Proportion of injured provided first-aid timely? Proportion of injured needing specialised medical treatment referred to an appropriate medical centre?
Common Issues in each of the above interventions (Capacity and ICT issues)		
HRVCA	Advanced technology and capacity are crucial to develop HRVCA, which is required to save lives.	Are technologies (GIS/ RS, predictive risk scenario modelling etc.) used to develop a comprehensive HRVCA? Is geo-spatial database of vulnerable population developed? Extent to which relevant capacity building modules on developing HRVCA using technologies and techniques developed, and state and district governments trained?
Warning generation and dissemination	Warnings can be generated and disseminated effectively if (generation) agency has adequate capacity, technology and resources and the dissemination agency has know-how on the use of advanced technologies to disseminate.	Are the warnings generated impact-based and are geo-spatial? Extent of use of advanced technologies (that demonstrate capacities for the same) to disseminate?
CBDM, Civil Defense, Community Volunteers (e.g. aapda mitra)	Adequately capacitated community and specialised skilled persons (Civil Defence and volunteers) can save lives	Extent of training and awareness programmes conducted for community and the specialised skilled persons on needed community behaviour/ attitude towards evacuation?
Evacuation and transport	Capacitated and ICT-enabled evacuation and transport system can be critical to saving lives	Are training programmes conducted on how to use and benefits of using ICT (GPS-enabled) in evacuation and transport?

		Extent to which ICT (GPS-enabled) are used in evacuation and transport?
Search and rescue	Well capacitated search and rescue system can save lives.	Are table-top simulation exercises and mock exercises conducted regularly? Have (refresher) training programmes conducted on search and rescue?
Medical Response and trauma	Well capacitated medical response system can save lives.	Have training programmes conducted on medical response?

The suggested indicator set could be used for evaluating human deaths from disasters. In the next section we propose how these indicators can be applied in the overall framework for disaster effects on human lives.

6. Institutional mechanism for evaluating human deaths from disasters

In this section we propose a mechanism for evaluating human deaths from disaster at state and district level. It will need to be supported by creating an enabling environment through guidelines, standards, criteria and operational manuals.

6.1 Rationale for evaluating human deaths from disasters

- The evaluation of human deaths from disasters can help identify areas where performance of preparedness, early warning, and response phases including specifically evacuation, search and rescue, and medical response, needs to be improved;
- It can aid the SDMA, DDMA and the ESF agencies to understand priorities for drawing up various policies, guidelines, and investments on personnel capacity, equipment, facilities and technologies to save lives.
- Evaluating human deaths from disasters can foster developing of understanding of other areas needing priority investments to save lives. For example, in resilient housing; and,
- Evaluating human deaths from disasters, can in general, promote a culture of safety from disasters.

6.2 Objectives for evaluating human deaths from disasters

The objective of disaster effects on human lives will be to assess the efficiency, effectiveness and timeliness of interventions for saving lives during preparedness, early warning, and response phases including specifically evacuation, search and rescue, and medical response.

6.3 Parties in evaluating human deaths from disasters

There could be three modes to conduct the disaster effects on human lives:

- Self-audit (attestation/ certification)
- Second-party audit
- Third-party audit

Table 3 provides key parties and pros and cons for various modes.

Table 3: Key parties in various modes of evaluating human deaths from disasters and related pros and cons

Audit attributes	Self-audit	Second-party audit	Third-party audit
Auditor	DDMA(s) who responded to a disaster	Other DDMA(s)	Independent agency
The responsible party	DDMA(s) who responded to a disaster	DDMA(s) who responded to a disaster	DDMA(s) who responded to a disaster
Intended user(s)	DDMA(s) who responded to a disaster, and SDMA	DDMA(s) who responded to a disaster, and SDMA	Governor/ legislature and SDMA
Pros and cons	Can be very biased Easily done since they have full knowledge of subject	Lesser biased Easily done since they have full knowledge of subject	No bias Can be done by hiring/ holding consultation with subject experts

6.4 Period for evaluating human deaths from disasters

The audit will cover the deaths due to disasters from activation to deactivation of IRT in case of hazards where early warning is possible; such as cyclones. The audit would need to be completed within two weeks from deactivation of IRT. The primary factor determining the completion time is availability of next of kin of deceased for interviews as also the prescribed period set for settling of ex-gratia payments.

6.5 Analysis criteria and analysis questions

The indicator questions suggested in Table 2 cover range of key issues/ factors that cause deaths due to disasters. They could be used for evaluating human deaths from disaster and may be further revised/ refined to translate into specific analysis questions, in consultation with SDMAs/ DDMA(s).

6.6 Approach and Methods for Analysis

The approach to evaluate on human deaths from disaster could be a combination of following:

- A system-oriented approach that assesses various management systems for saving lives; and,
- A result-oriented approach that evaluates the outcome of saving lives vis-à-vis various DM programmes and disaster preparedness and response systems.

The methods may include:

- Using existing data: The data and sources could be as described in Section-3 (IRS and evaluation of human deaths from disasters) and Section-4 (existing systems of recording and reporting data on deaths).
- Conducting field surveys: Field surveys provide supplementary evidence for actual effects on human lives. Deaths could also happen due to community's attitude and behavioural issues in evacuation and response phase. The aspects that need to be covered for field survey as provided in Section-5 could be used as guidance.

6.7 Role of NDMA, NIDM and SDMAs

NDMA would need to provide enabling policy environment by issuing guideline for evaluating human deaths from disasters and advocate for the same.

NIDM could develop and implement training programmes on evaluating human deaths from disasters.

Based on the proposed framework the SDMAs would need to:

- Issue office order / amend State Acts to make provision for evaluating human deaths from disasters; and,
- Prepare a detailed operational guideline for evaluating human deaths from disasters containing study design, plan and schedule of activities.

7. Policy recommendations and ways forward

The evaluation study has brought to fore valuable concerns on early warning, and preparedness and response phase that need to be addressed for saving lives. However, for the evaluation system to become an integral part of the DM system in India as also in the larger interest of saving lives from disasters, we recommend the following:

- The study has come up with suggestions on indicators and framework for evaluating human deaths from disasters. NDMA/ NIDM could put in place a process of internal consultations and review to see how the framework can be tweaked for greater relevance and effective application across diverse disaster contexts; Also, NDMA may issue guidelines, manuals, and/ or set benchmarks/ standards for analyzing effects on human lives due to disaster;
- Evaluation of human deaths from disasters needs to become integral part of DM planning on preparedness and response, post-disaster recovery, capacity building and IEC programmes:

- o That mechanism of evaluating human deaths from disasters could be made integral part of SDMPs and DDMPs that would provide it the much needed emphasis; and,
- o The evaluation could be integrated in the Post-Disaster Needs Assessment (PDNA) as an important aspect to be looked into. That way it could inform priority areas for strengthening on early warning and disaster preparedness and response for saving lives;
- The immediate areas of actions for saving lives that emerged from the study:
 - o There is need to provide renewed vigour to capacity building and awareness of communities through training module development and delivery, and IEC and awareness materials to address issues such as on reluctance of community to evacuate, and community preparedness and response;
 - o Table-top simulation exercises and Mock Exercises needed to be accorded greater emphasis and conduct more regularly especially at district and lower levels;
 - o There is need to strengthen/enrich vulnerability assessments that combines geo-spatial mapping especially at district scale of, stock of various housing types and marginalized and vulnerable population disaggregated by age, gender, socio-economic attributes and disability; and,
 - o There is need to develop capacity of state and districts on robust HRVCA assessment using state-of-the-art GIS, Remote Sensing and ICT technologies; also on possibility of using drones for rapid assessment of situation following the disaster to aid appropriate, adequate and timely planning for response under the IRS system.

8. References

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Institutional Mechanism for Evaluating Human Deaths from Disasters

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About the Institute

National Institute of Disaster Management (NIDM) was constituted under an Act of Parliament with a vision to play the role of a premier institute for capacity development in India and the region. The efforts in this direction that began with the formation of the National Centre for Disaster Management (NCDM) in 1995 gained impetus with its redesignation as the National Institute of Disaster Management (NIDM) for training and capacity development. Under the Disaster Management Act 2005, NIDM has been assigned nodal responsibilities for human resource development, capacity building, training, research, documentation and policy advocacy in the field of disaster management.

NIDM is proud to have a multi-disciplinary core team of professionals working in various aspects of disaster management. In its endeavour to facilitate training and capacity development, the Institute has state-of-the-art facilities like class rooms, seminar hall and video-conferencing facilities etc. The Institute has a well-stocked library exclusively on the theme of disaster management and mitigation. The Institute provides training in face-to-face, on-line and self-learning mode as well as satellite based training. In-house and off-campus face-to-face training to the officials of the state governments is provided free of charge including modest boarding and lodging facilities.

NIDM provides Capacity Building support to various National and State level agencies in the field of Disaster Management & Disaster Risk Reduction. The Institute's vision is to create a Disaster Resilient India by building the capacity at all levels for disaster prevention and preparedness.



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