

POST-DISASTER EPIDEMIC SURVEILLANCE IN NEPAL

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ABSTRACT

The survey report on post-disaster epidemic surveillance in Nepal highlights the collaborative efforts of various organizations in collecting data during and after disasters. The study aimed to assess the current state of post-disaster epidemic surveillance in Nepal and explore opportunities for integrating these data into the EM-DAT International Disaster Database.

The results emphasized several strengths of Nepal's disaster data management system, such as the capability to record data on a daily or weekly basis during and after disasters. However, several gaps were identified, including the need to differentiate between epidemics triggered by disasters and seasonal outbreaks, the necessity for standardized data collection formats, and the establishment of regular reporting systems.

The report identifies the National Disaster Risk Reduction and Management Authority (NDRRMA) as the emerging central disaster database in Nepal, which may have significant potential to address the current shortcomings in the data management system. The report suggests exploring partnerships with identified organizations and developing a continuity plan as potential strategies for including post-disaster epidemic data in the EM-DAT database.

TABLE OF CONTENT

1	INTRODUCTION	1
2	METHODS	2
3	RESULTS	3
	3.1 Organizational Involvement.....	3
	3.2 Data Collection Practices.....	4
	3.3 Data Types collected.....	5
	3.4 Data on Epidemics.....	6
	3.5 Data Utilization and Accessibility	7
4	DISCUSSION	8
	4.1 Strengths of Post-Disaster Epidemics Management in Nepal.....	8
	4.2 Limitations	9
	4.3 Potential EM-DAT Collaboration Strategies	9
5	CONCLUSIONS	10
6	REFERENCES	11
7	ANNEXES	12

LIST OF FIGURES

i.	Figure 1. Frequency of natural disaster types in Nepal as per EM-DAT (2000-2023) .	1
ii.	Figure 2. Number of organizations that responded to the survey by type (based on the responses from 33 out of 33 organizations).....	4
iii.	Figure 3. Frequency of data collection (based on the responses from 23 out of 33 organizations).....	5
iv.	Figure 4. Collected indicators related to epidemics (based on the responses from 16 out of 33 organizations).....	6
v.	Figure 5. Source of data collection for epidemics data (based on the responses from 16 out of 33 organizations).	7
vi.	Figure 6. Frequency of data collection (based on the responses from 21 out of 33 organizations).....	8

1 INTRODUCTION

Nepal is vulnerable to various types of disasters, including floods, earthquakes, and landslides due to factors such as fragile geology, extreme topography, and climate conditions. A growing population along with relatively high levels of poverty and illiteracy, further contribute to Nepal’s susceptibility to disasters (1) (2) (3) (4). This exposure and vulnerability has resulted in a continual increase in the number of casualties, injuries, and economic losses (5). Previous studies indicate that approximately 80% of the Nepalese population is exposed to disaster risk (6). According to the Emergency Events Database (EM-DAT), various types of disasters occurred in Nepal between 2000 and 2023, including floods, mass movements, epidemics, extreme temperatures, earthquakes, storms, droughts, and wildfires. As shown in Figure 1, floods, mass movements, and epidemics are the most frequently occurring disasters.

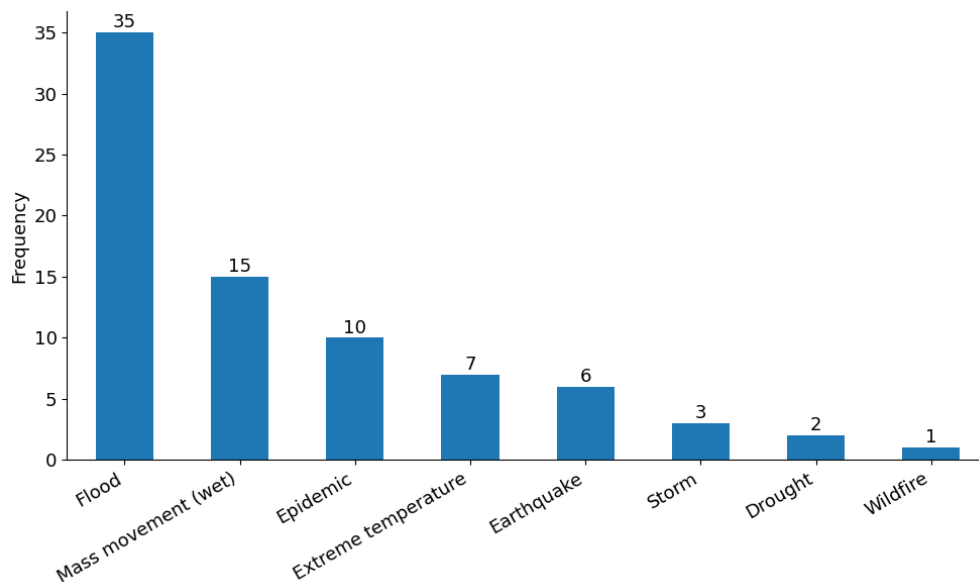


Figure 1. Frequency of types of disasters in Nepal as per EM-DAT (2000-2023)

Disasters and resulting epidemics pose significant challenges for Nepal's underdeveloped healthcare system. Certain factors associated with disasters, such as population displacement, may lead to the occurrence of post-disaster epidemics (7). Due to insufficient capacity and resources, the healthcare system lacks the ability to effectively respond to post-disaster epidemics (8).

While Nepal has monitoring systems, there are gaps in the systematic collection and analysis of epidemiological data needed to monitor, predict, and respond to infectious disease outbreaks, including post-disaster epidemics (1).

Community-based surveillance methods such as mobile phone-based systems are used to capture temporal disease patterns (9) by enabling real time reporting of cases from local communities. Additionally, the media has been identified as an important source of health information, with news reports and articles contributing to the detection and tracking of epidemic events (10).

To assess the current state of post-disaster epidemic surveillance in Nepal, the Centre for Research on the Epidemiology of Disasters (CRED), conducted a study in partnership with the National Society for Earthquake Technology-Nepal (NSET). The study contacted various organizations involved in data collection, both on disasters and post-disaster epidemics. The study aimed to provide key insights into the current situation, challenges and opportunities, particularly among organizations that focus on post-disaster epidemics data.

The primary objective of this study was to explore the potential in incorporating post-disaster epidemics data into the Emergency Events Databases (EM-DAT), with Nepal as a case study. Specifically, the study aimed to:

- i. Compile a comprehensive list of organizations involved in data collection during and after disasters in Nepal.
- ii. Gather information on the variables, methodologies, and processes utilized for collecting data on disasters and post-disaster epidemics.
- iii. Determine techniques and processes used for validating the collected data.

2 METHODS

An online survey was conducted to investigate post disaster epidemics data collection in Nepal using Qualtrics software. The survey questionnaire was developed with inputs from experts in disaster management, epidemiology, and survey methodology. It comprised 21 sets of multiple choice and open-ended questions aimed at identifying

organizations and collecting information on their post-disaster epidemic-related data collection system (Annex 1).

The survey was distributed via email to a wide range of stakeholders directly involved in or contributing to the disaster database management system of Nepal, as listed by the National Society for Earthquake Technology-Nepal (NSET). These included government agencies, hospitals and health centres, academic institutions, international NGOs, local NGOs, humanitarian organizations, media, and UN agencies. Representatives from these organizations were personally contacted to encourage participation in the survey. Responses were collected between November 22, 2023, and January 30, 2024. Following the data collection, descriptive statistics were generated to characterize the types of organization involved, the frequency and levels of data collection, and the types of data collected.

3 RESULTS

3.1 The survey was sent to 74 organizations, out of which 43 responded, resulting in a response rate of 58%. However, 10 organizations were excluded either because they did not answer the entire questionnaire (n=8) or did not consent to share their information (n=2). This resulted in 33 organizations providing complete responses (Figure 2).

3.2 Organizational Involvement

The survey included responses from government agencies, international organizations, NGOs, healthcare providers, and educational institutions. These organizations reported collecting data for a wide range of disasters, including earthquakes, floods, landslides, epidemics, droughts, fires, monsoons, glacial lake outburst floods, cyclones, heatwaves, and other extreme weather events (Annex 2).

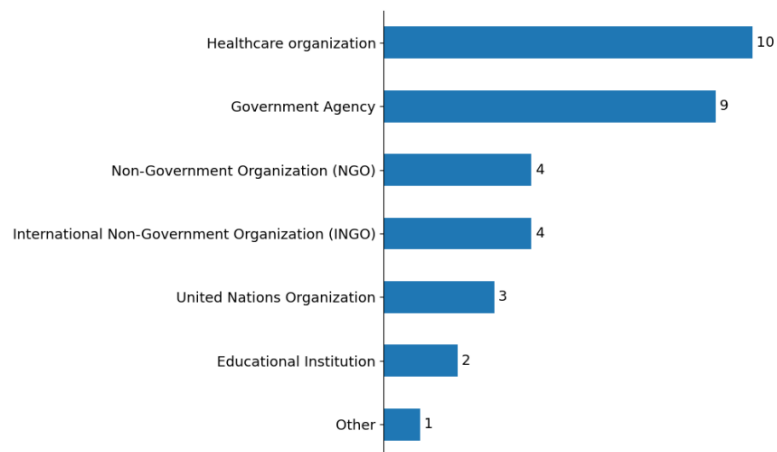


Figure 2. Number of organizations that responded to the survey by type
(based on the responses from 33 out of 33 organizations).

3.3 Data Collection Practices

A significant number of organizations collaborate with the health sector to collect health-related data on epidemics during and following disasters. This includes monitoring case numbers, fatalities, geographical location, population demographics, pathogens, epidemic duration, vaccination rates, and other relevant factors. The frequency of data updates varied as shown in Figure 3. Of the 23 organizations that answered the question, 13 provided irregular or event-based updates, three provided daily updates, three provided weekly updates, and four provided monthly updates. These updates covered all types of epidemics, including post-disasters epidemics and those not linked to disasters.

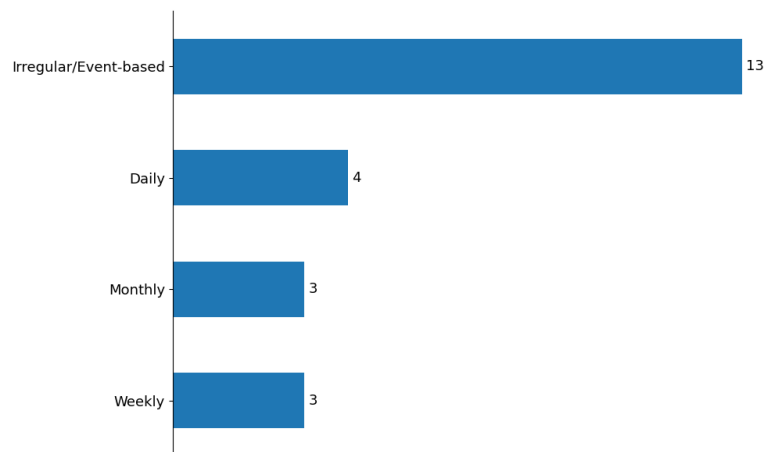


Figure 3. Frequency of data collection (based on the responses from 23 out of 33 organizations).

Twenty-four organizations responded regarding the administrative areas of data collection: 63% collect data at the municipal/local level (n=16), 58% at the national level (n=14), 46% at the provincial level (n=11), and 46% at the district level (n=11). Out of the 33 organizations, 10 organizations do not record health data, while 23 provided responses on their collaboration with the health sector. Of these, 17 indicated they collaborate with the health sector for data collection while six reported no notable collaboration.

3.4 Data Types collected

Of the 24 organizations that provided responses, 14 reported collecting demographic and socioeconomic data such as age, gender, income levels, and disability status. This data contributes to the understanding of how disasters and post-disaster epidemics may affect various population groups, including disadvantaged or vulnerable groups. Additionally, all 24 organizations provided responses on their methods of compiling information on epidemics. Their approaches include summarizing data by disaster events (n=10), according to time frames (n=3), or using both methods (n=11).

Regarding data collected immediately after a disaster, 23 organizations reported the following: 61% collect incident reports (n=14), 57% collect real-time data (n=13), 39% collect damage records (n=9), 35% collect resource allocation data (n=8), and 17% do not collect data directly after a disaster (n=5).

During the recovery phase, 70% of the 23 responding organizations collect health and social data (n=16), 52% collect damage assessment data (n=12), 30% collect housing and infrastructure data (n=7), 22% collect economic data (n=5), 17% collect other types of data (n=4), and 13% do not collect data during the recovery phase (n=3).

Additional data collection includes health issues (n=4; Knowledge, Attitude, and Practice data (n=1); hydrometeorological data (n=1); and data about marginalized and socially excluded groups (n=1).

3.5 Data on Epidemics

Of the 10 organizations that responded, six distinguish post-disaster epidemics from general epidemics in their data collection, and four do not. This is essential for understanding the specific challenges and consequences of epidemics triggered by disasters.

Among 33 organizations, 16 provided information about post-disaster epidemic indicators they collected. Most recorded indicators such as the number of deaths (n=14), affected (n=14), reported cases in medias (n=13) or hospitalized (n=12). Additional indicators include demographic data, pathogens, duration of epidemics, population affected, geographic distribution of epidemics and vaccination coverage as shown in Figure 4.

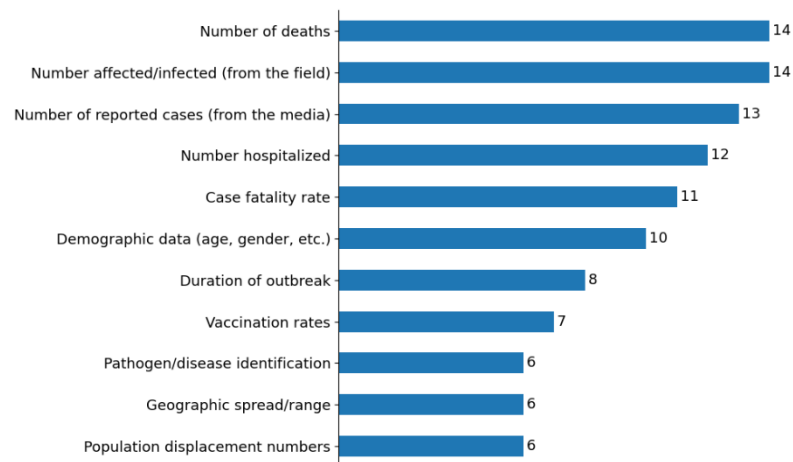


Figure 4. Collected indicators related to epidemics (based on the responses from 16 out of 33 organizations).

As shown in Figure 5, primary data collection methods for post-disaster epidemics include government agency reports, laboratory confirmed case counts, and health/aid organization situation reports, with alternative methods such as community informants, interviews, and extrapolation from existing data sources.



Figure 5. Source of data collection for epidemics data (based on the responses from 16 out of 33 organizations).

The most common types of analyses performed in relation to epidemics include descriptive and spatial analyses, with some organizations also employing time-series, epidemiological, and comparative analyses.

3.6 Data Utilization and Accessibility

As shown in Figure 6, the purposes of the data collected by the 21 different organizations that responded to this question are varied: 79% use it for decision-making (n=16), 52% use it for research, project implementation, or public awareness (n=11 for each), and 48% use it for policy development, database updates, or resource allocation (n=10 for each). Data sharing practices revealed that key entities in the network include the National Disaster Risk Reduction and Management Authority (NDRRMA) and the United Nations Office for Disaster Risk Reduction (UNDRR). The NDRRMA's National Disaster Database, also known as the Bipad Portal, was reported to play a crucial role in managing disaster-related data. While most organizations reported that their data is fully accessible to the public, some indicated that access is restricted or requires permission.

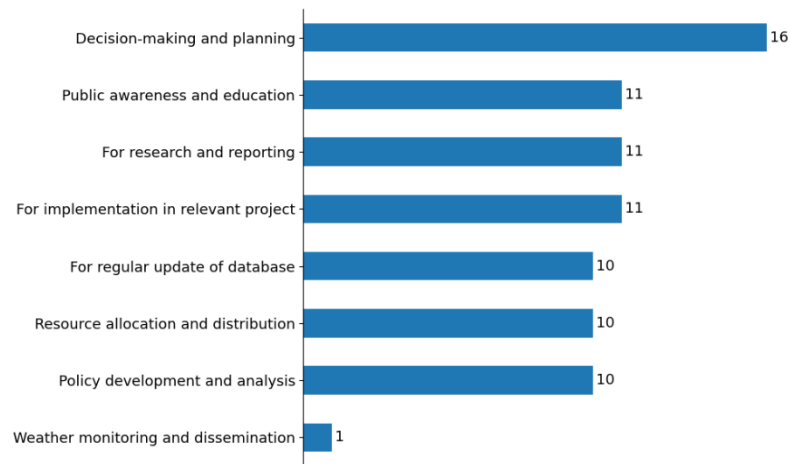


Figure 6. Frequency of data collection (based on the responses from 21 out of 33 organizations).

4 DISCUSSION

This study provides insightful perspectives on post-disaster epidemic surveillance in Nepal, highlighting opportunities and challenges for integrating Nepal’s data into the EM-DAT database.

Various organizations in Nepal collect extensive data on epidemics following major disasters, including case numbers, fatalities, geographical distribution, pathogens, and demographic details.

Data collection spans various administrative levels—national, provincial, district, and local—offering both detailed local insights and a broad national perspective. The practice of frequent data updates facilitates real-time monitoring of ongoing outbreaks, ideally on a weekly basis.

According to the survey report, while there are notable strengths in the data collection efforts of individual organizations in Nepal, there are also significant limitations concerning the overall management of these efforts.

4.1 Strengths of Post-Disaster Epidemics Management in Nepal

- i. A collaborative data collection system involving various organizations across multiple administrative levels, aiding in understanding the impact at both national and local levels.

- ii. The capability to update and monitor real-time data during epidemics, allowing for timely responses and interventions.
- iii. A centralized data management system established through the Bipad portal by NDRRMA, offering unrestricted access to public data, ensuring data consistency and accessibility.
- iv. The application of data analysis, including descriptive and spatial analysis within the data management system, supporting informed decision making and effective epidemic response.

4.2 Limitations

Based on the responses collected through the survey, there are some notable limitations in the Nepalese epidemic data management system

- The survey responses revealed that although Nepal has an established system for collecting and managing data, this system is not fully developed or centralized. This was evident from several organizations involved in the survey either failing to complete it entirely or providing insufficient information.
- No organization is solely dedicated to gathering data related to post-disaster epidemics, leading to a lack of coordination among stakeholders.
- This lack of coordination leads to challenges in ensuring the completeness and accuracy of data that could potentially be integrated into EM-DAT. Specifically, it can result in the duplication of data collection efforts, gaps in coverage, and insufficient utilization of data.

4.3 Potential EM-DAT Collaboration Strategies

This section outlines possible strategies to integrate post-disaster epidemic data of Nepal into EM-DAT database system.

- EM-DAT may explore potential collaboration with key stakeholders like NDRRMA to facilitate data integration in order to streamline data sharing and improve data quality.

- To achieve data standardization, a generic format for data collection and recording could be developed. This would promote consistency and uniformity across different organizations, making the data easier to integrate into EM-DAT.
- A periodic and regular reporting system might be established, with identified focal personnel within each organization to ensure continuous and consistent data sharing between EM-DAT and NDRRMA.
- Comprehensive and comparative reports published regularly using EM-DAT data might provide a deeper understanding of the situation and enable informed decision-making.

5 CONCLUSIONS

This study evaluated disaster surveillance in Nepal, particularly focusing on post-disaster epidemics. It revealed both strengths and weaknesses within the current framework. Organizations involved in data collection demonstrated their capacity to gather data from various administrative levels and monitor it in real-time during disasters. However, there seems to be a gap in establishing a fully functional centralized data management system and ensuring effective coordination among stakeholders.

Feedback from the survey highlights potential opportunities for collaboration and data sharing, particularly with global databases like EM-DAT. EM-DAT could investigate the possibility of forming partnerships with key stakeholders such as the NDRRMA to develop standardized data collection formats, implement regular reporting systems, and organize capacity-building programs.

Collaboration between EM-DAT and Nepal could improve Nepal's disaster management systems and serve as a model for other countries that have yet to integrate their disaster data into a global platform.

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1. SURVEY QUESTIONS

Q1

Participant Information and Consent

Purpose of the survey:

The Centre for Research on the Epidemiology of Disasters (CRED) together in partnership with National Society for Earthquake Technology Nepal (NSET), intends to investigate data collection process regarding epidemics as part of its global Emergency Events Database (EM-DAT) project. The current focus is on Nepal, where the goal is to identify critical institutions proficient in collecting high-quality disaster-related data in epidemics.

Survey Details:

This brief survey contains 21 questions and should take around 15 minutes to complete. The questions focus on gaining insights into your organization's disaster-related data collection, usage, availability and validation. By sharing your knowledge and experience, you will help us better understand current practices and opportunities to strengthen epidemiological research and policies for disaster preparedness.

Survey Disclaimer:

We are committed to secure and responsible handling of your survey responses. Please take a moment to read and understand the following important points: Your survey responses will be treated with the utmost security, and we take measures to protect your data from unauthorized access. Your responses will only be used for the purposes explicitly mentioned in this survey. Your survey responses will be kept confidential. No personally identifiable information will be disclosed without your explicit consent. We are accountable for handling your data with care and following applicable data protection regulations. Please note the survey does not include questions related to sensitive information or personal data.

I have read and understood the information provided in this consent form.

Yes, I agree (1)

No, I don't agree (2)

Q2 Kindly share your email address for the purpose of further communication and updates.

Q3 What is the name of your organization?

Q4 What is the type of your organization?

- Government Agency (1)
- International Non-Government Organization (INGO) (2)
- Non-Government Organization (NGO) (3)
- United Nations Organization (9)
- Humanitarian and Relief Organization (4)
- Educational Institution (5)
- Healthcare organization (6)
- Media and News (7)
- Other (Please specify) (8) _____

Q5 Which disasters do you collect data for?

- Earthquakes (1)
- Floods (2)
- Landslides (3)
- Epidemics (e.g., malaria, other infectious diseases) (4)
- Droughts (5)
- Fires (Both forest and structural) (6)
- Monsoon-related disasters (7)
- Glacial lake outburst floods (GLOF) (8)
- Cyclones and storms (9)
- Heatwaves (10)
- Extreme weather events (11)
- Man-made disasters (E.g., Industrial accidents) (12)

Q6 Does your organization distinguish between post-disasters epidemics and general epidemics, while recording?

- Yes, we label epidemics as 'post-disaster' when they occur following a disaster event. (1)
- No, we do not differentiate between epidemics related to disasters versus general epidemics. (2)

Q7 At what level do you collect disaster epidemics data in Nepal?

- National (1)
- Provincial (2)
- District (3)
- Municipal/Local/Ward (4)
- Other (Please specify) (5) _____

Q8 Do you include information such as age, gender, income levels, disability categories, or additional variables to evaluate the impact on disadvantaged or vulnerable groups?

- Yes, we do collect this information. (1)
- No, we do not collect this specific information. (6)

Q9 How do you generally summarize, or group data collected about Nepal's disasters?

- By disaster events (1)
- Over time frames (e.g., days, months, years) (2)
- Both by disaster events and time frames (3)
- Other (Please specify) (4) _____

Q10 How frequently is the data updated?

- Daily (1)
- Weekly (4)
- Monthly (5)
- Irregular/Event-based (6)

Q11 What type of data does your organization collect immediately after a disaster?

- Real time data (e.g., immediate impact, casualties, death, missing) (1)
- Incident reports (e.g., medical needs, humanitarian needs) (2)
- Resource allocation (e.g., equipment, supplies to the affected area) (3)
- Records of communication among agencies and organizations (4)
- We do not collect such data. (6)
- Other (Please specify) (5) _____

Q12 What type of data does your organization collect during a recovery phase of a disaster?

- Damage Assessment Data (e.g., infrastructure, housing, the environment) (1)
- Economic Data (e.g., economic loss, unemployment) (2)
- Health and social data (e.g., displacement, impact on education, impact on health facilities, mental health) (3)
- Housing and Infrastructure Data (e.g., housing damage, temporary housing solutions, and housing assistance programs. (4)
- We do not collect such data. (5)
- Others (please specify) (6) _____

Q13 Is there any other disaster related data that your organization collects but hasn't been mentioned? Please share any additional details or types of data you consider relevant.

Q14 Where does your organization primarily utilize the collected data?

- For implementation in relevant project (1)
- For regular update of database (2)
- For research and reporting (3)
- Decision-making and planning (4)
- Policy development and analysis (5)
- Resource allocation and distribution (6)
- Public awareness and education (7)
- Others (Please specify) (8) _____

Q15 Is your organization connected with the health sector for collecting data related to health and healthcare during and after disasters?

- Yes, our organization is affiliated with a health-related sector and collects health-related disaster data. (1)
- No, our organization is not affiliated with a health-related sector. (2)

Display This Question:

If Q15 = Yes, our organization is affiliated with a health-related sector and collects health-related disaster data.

Q16 For post-disaster epidemics specifically, which of the following indicators do you collect data on?

- Number of reported cases (1)
- Number of deaths (5)
- Case fatality rate (6)
- Number affected/infected (7)
- Number hospitalized (8)
- Geographic spread/range (9)
- Demographic data (age, gender, etc.) (10)
- Pathogen/disease identification (11)
- Duration of outbreak (12)
- Population displacement numbers (13)
- Vaccination rates (14)
- None of the above (15)
- Others (Please specify) (4) _____

Q17 How does your organization primarily collect data about epidemics occurring after disasters?

- Government agency reports (23)
- Health/aid organization situation reports (26)
- Field team assessments (27)
- Healthcare provider case reporting (28)
- Laboratory confirmed case counts (29)
- Public health surveillance systems (30)
- News reports and media (31)
- Social media and crowdsourcing (32)
- Satellite imagery and remote sensing (33)
- Community informants and interviews (34)
- Extrapolation/modeling using existing data (35)
- Other (Please specify) (36)

Display This Question:

If Q15 = Yes, our organization is affiliated with a health-related sector and collects health-related disaster data.

Q18 Which types of analysis does your organization perform on the epidemic data collected in the context of disasters?

- Descriptive analysis (summaries, visualizations) (1)
- Statistical analysis (correlations, significance testing) (4)
- Spatial analysis (maps, geographic trends) (5)
- Time series analysis (trends over time) (6)
- Epidemiological modeling (forecasting, transmission patterns) (7)
- Comparative analysis across disasters (8)
- None, we do not perform data analysis (9)
- Other (Please explain) (10) _____

Q19 Does your data contribute to any of these data management systems or organizations?

- National Disaster Risk Reduction Management Authority of Nepal (1)
- DesInventar (2)
- UNDRR (United Nations Office for Disaster Risk Reduction) (3)
- EM-DAT (Emergency Events Database) (4)
- IFRC (International Federation of Red Cross and Red Crescent Societies) (5)
- Other (Please Specify) (6) _____



Q20 Is the disaster-related data your organization collects accessible to the public or other stakeholders?

- YES, it is fully accessible to the public (1)
- NO, it is accessible only with the permission (2)
- NO, it is not accessible publicly (3)

Q21 If your organization had the opportunity and capacity to collect additional data related to disaster management to address specific needs, what types of data would be essential for you to gather? Please share any data requirements or areas that you believe are crucial.

2. NAME OF ORGANIZATION AND FIELD OF DATA COLLECTION

Organizations	Earth quakes	Floods	Landslides	Epidemics	Droughts	Fires	Monsoon related disasters	GOLF	Cyclones and storms	Heatwaves	Extreme weather events	Man-made accidents
Adventist Development and Relief Agency (ADRA) Nepal	✓	✓		✓			✓					
Alka hospital pvt.ltd	✓											
Armed Police Force Nepal	✓	✓	✓	✓	✓	✓	✓					✓
B. P. Koirala Institute of Health Sciences	✓	✓	✓	✓	✓	✓						✓
Bhaktapur cancer Hospital	✓			✓		✓			✓			
Department of Hydrology and Meteorology		✓			✓		✓			✓	✓	
Disaster Preparedness Network (DP-NET)	✓	✓	✓	✓	✓	✓	✓					
Freelancer	✓		✓	✓								
Healthcare Consultant (Freelancer)	✓					✓						✓
Ipas	✓											
Ministry of Health and Population	✓			✓			✓		✓	✓	✓	
Multi-Cluster Initial Rapid Assessment (MIRA)- Nepal	✓			✓		✓	✓					
National Society for Earthquake Technology-Nepal (NSET)	✓	✓	✓			✓	✓	✓			✓	✓
Nepal Aarogya Kendra	✓	✓		✓								

Nepal police	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Nepal Red Cross Society (NRCS)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
NDRRMA	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Provincial Health Emergency Operation Center, Koshi province	✓	✓	✓	✓		✓	✓	✓				✓	✓
Pulchowk campus, Institute of Engineering, TU	✓											✓	
Sancho health care pvt	✓												
Smart Health Center	✓	✓											
Tansen School of Health Science	✓												
The Lutheran World Federation Nepal	✓	✓	✓			✓	✓					✓	
UN Resident Coordinator's Office (UN RCO)	✓	✓	✓										

The table showcases the various organizations in Nepal involved in data collection for multiple disaster types. A " ✓ " indicates the organization collects data for that disaster, while blanks signify no involvement in data collection for that specific disaster.