

Welcome to the Junior Doctors Development Programme

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Mass Disaster

Medico-legal Response, Victim Identification & Lessons from Bangladesh

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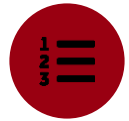
Lecturer

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AWMC

Objectives

:



Mass disaster and its types



Disaster Victim
Identification (DVI) process
and identification methods



Documentation, chain of
custody, and ethical/legal
considerations



Medico-legal and Forensic
Pathologist's role in disaster
response



Analyse Bangladesh's major
mass disasters through a
Forensic lens



Recommend measures to
strengthen disaster
preparedness and response

What Is a Mass Disaster?

“A mass disaster is any event, natural or man-made, that produces a sudden surge of casualties (dead and/or injured) exceeding the resources normally available to manage them, requiring a coordinated multi-agency medico-legal response.”

In Forensic aspect

A mass disaster is considered to have occurred when the number of casualties occurring in a single event exceeds twelve.



Classification of Disasters



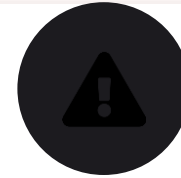
Natural

- Earthquake
- Flood / cyclone
- Landslide, tsunami



Man-made — Unintentional

- Building collapse
- Fire (industrial/residential)
- Transport crash (air/rail/road)



Man-made — Intentional

- Terrorism / bombing
- Armed conflict
- Mass violence

Common incidents in Bangladesh

1. Urban and Commercial Fires
2. Monsoon-Triggered Landslides
3. Road traffic accidents
4. Naval and Riverine disasters



Role of Forensic Medicine in Mass Disaster



Scene management

Advising on body recovery, scene photography, and preservation of evidence



Post-mortem examination

Cause & manner of death, injury pattern documentation for each victim



Victim identification

Coordinating primary/secondary identification methods (DVI)



Record-keeping

Ante-mortem/post-mortem data matching, mortuary logs



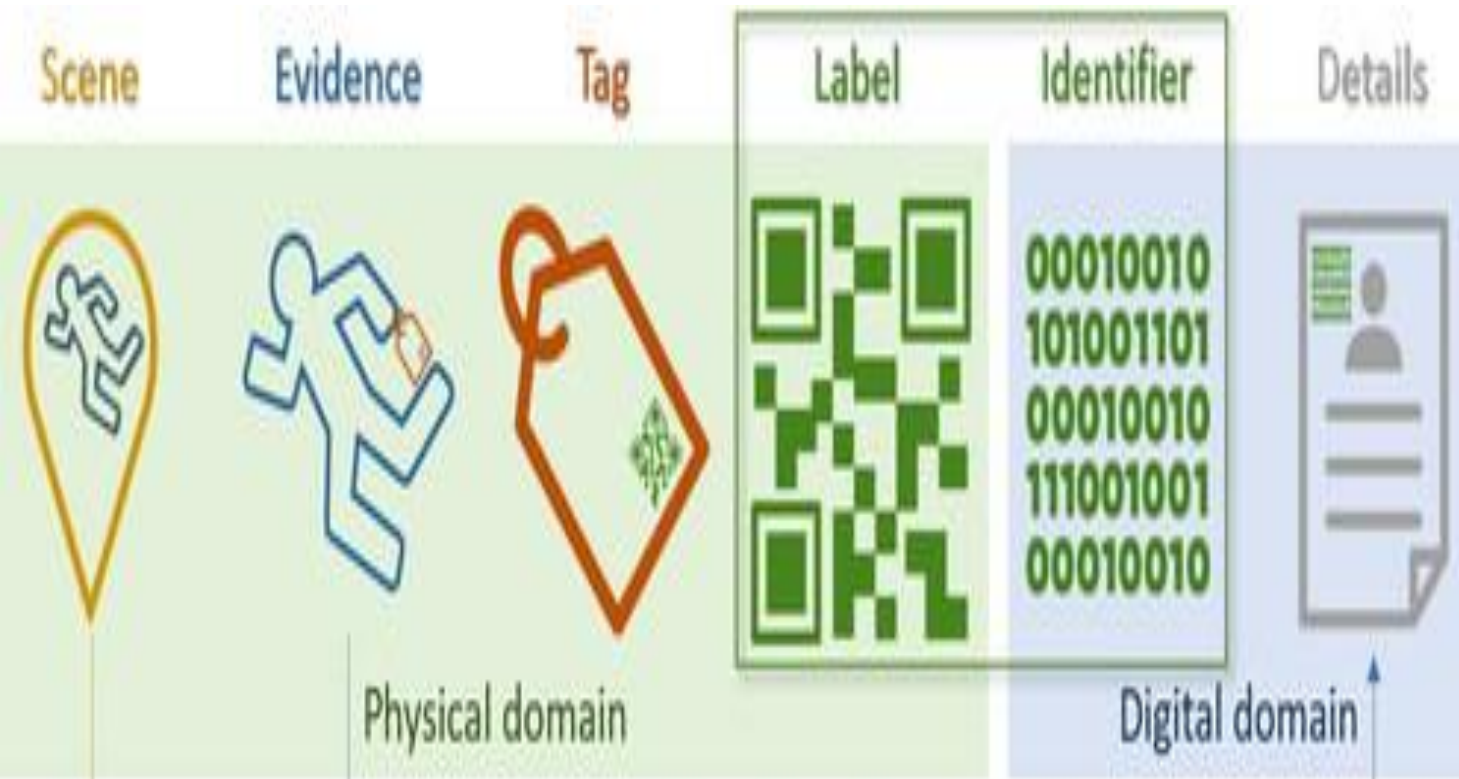
Legal documentation

Death certification, court testimony, chain of custody



Family liaison

Body release, counselling coordination, closure for families



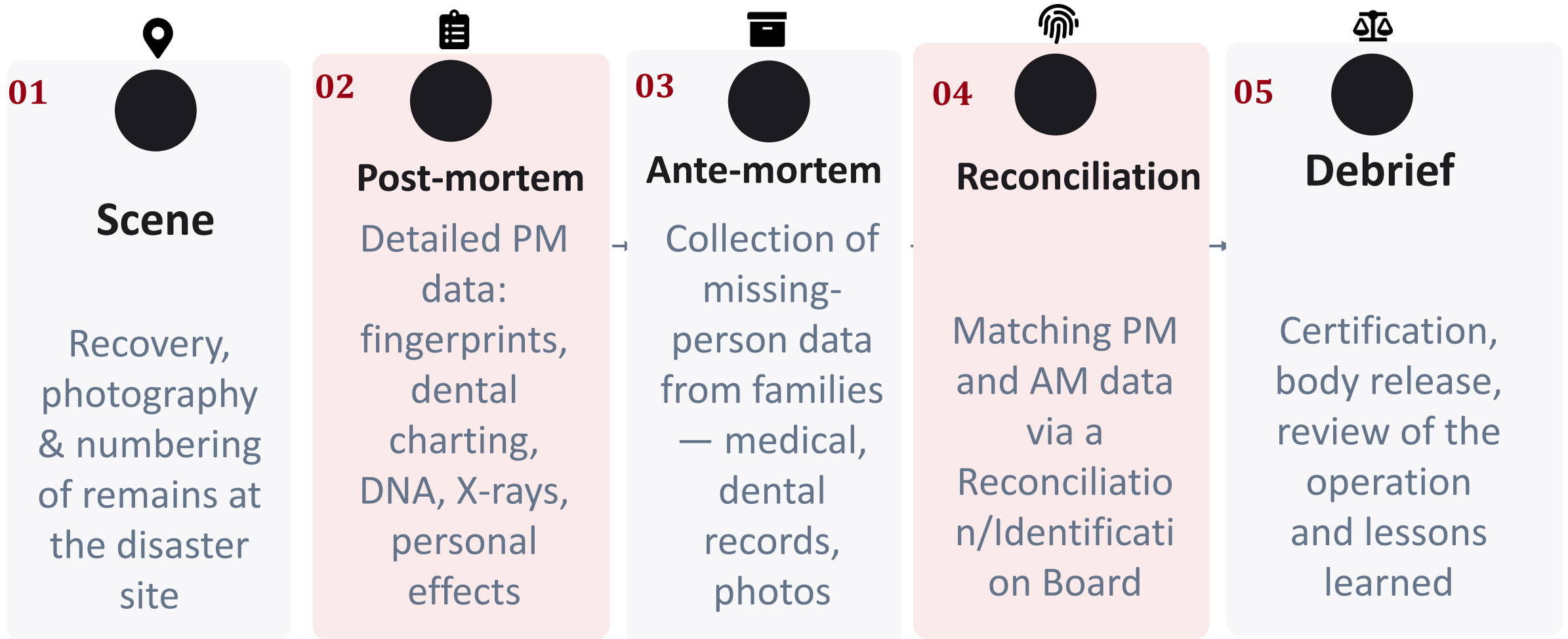
Information about the evidence, e.g., forensic odontology, DNA analysis, ridgeology

Information about the scene, e.g., time, location, photography, 3D reconstruction



Disaster Victim Identification (DVI) — INTERPOL Framework

A standardised 5-phase process used internationally to identify victims of mass fatality incidents.



Methods of Identification

PRIMARY IDENTIFIERS



Fingerprints

Gold standard when prints are recoverable and on file



DNA profiling

Essential for fragmented/charred/decomposed remains



Dental (odontology)

Highly reliable; survives fire and decomposition well

SECONDARY IDENTIFIERS



Personal contents

Clothing, jewellery, ID cards, phones found with the body



Visual recognition

Family identification — reliable only when features are preserved



Medical evidence

Scars, tattoos, prior fractures, implants, X-ray comparison

Note: secondary methods alone are not legally sufficient for identification in mass-fatality contexts — they support and corroborate primary evidence.

Primary Identifier: Fingerprints

- Fingerprints are unique and widely used for identification.
- Most reliable method.



FINGERPRINT BIOMETRIC IDENTITY FORENSIC

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Primary Identifier: Dental Records

- Dental charts and restorations help identify victims.
- Used when fingerprints are unavailable.



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Skeleton



Secondary Identifiers



Triage of the Dead & Mortuary Management



Scene Triage

- Label & photograph remains in situ
- Assign unique body/part numbers
- Secure the scene, prevent commingling



Temporary Mortuary

- Cold-chain storage for volume of bodies
- Sequential PM examination stations
- Separate holding for unidentified remains



Family Reception

- Dedicated area away from remains
- Ante-mortem data collection
- Psychosocial support & counselling

Documentation, Chain of Custody & Legal Aspects

-  **Photographic record** Every body/part photographed in situ and at each examination stage, with a scale marker and case number
-  **Unique numbering system** Single body-number system used consistently across scene, mortuary, and identification records
-  **Chain of custody** Unbroken, signed record of who handled remains/evidence at every step, admissible in court
-  **Death certification** Formal medico-legal death certificates required for legal, insurance, and compensation processes
-  **Ethical & data protection** Confidentiality of ante-mortem/DNA data; sensitive, dignified handling of remains and families

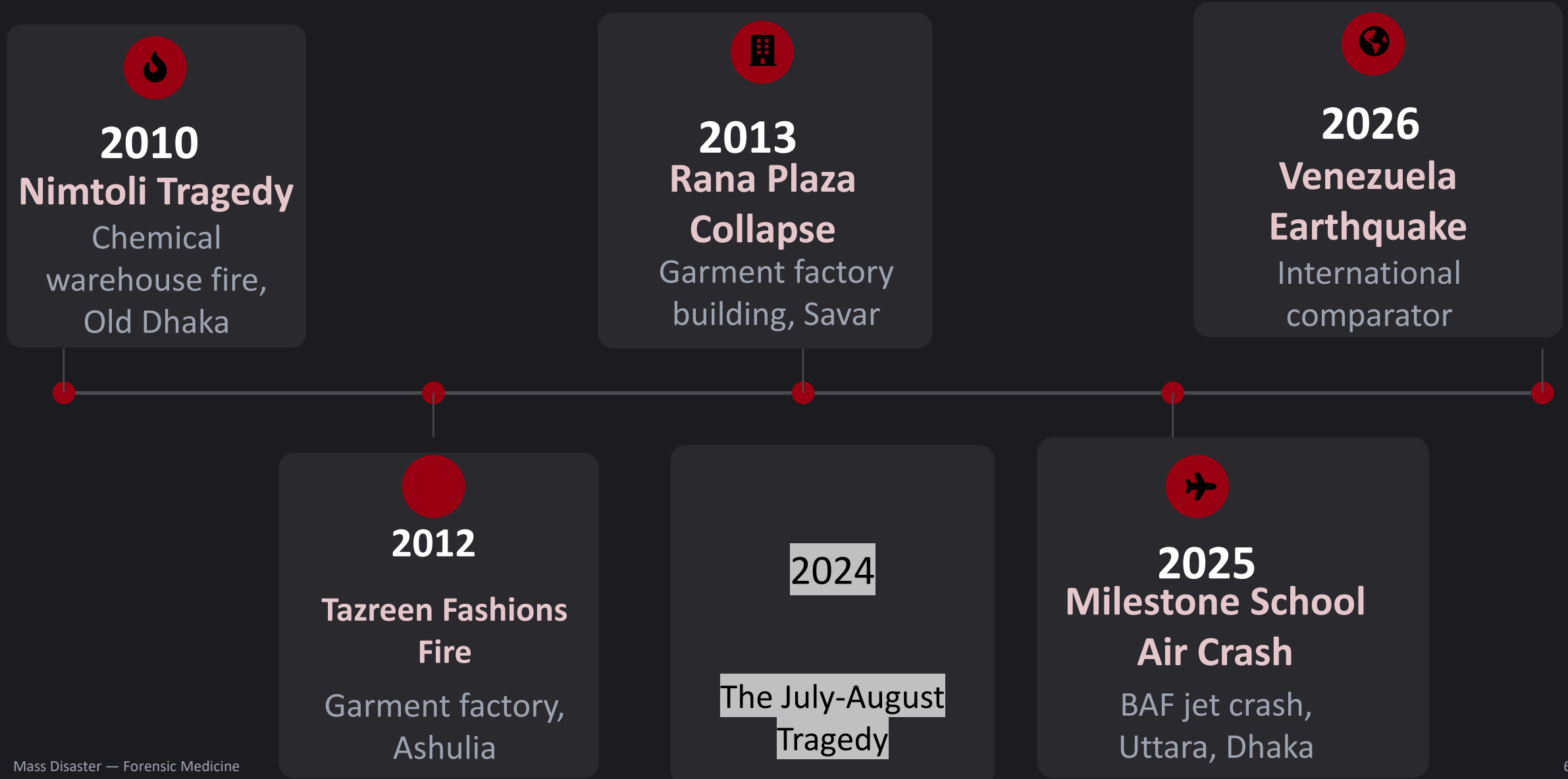
New Technologies

1. Digital data bases
2. Mobile fingerprint scanning
3. Facial reconstruction.



Bangladesh: A Timeline of Mass Disasters

Five case studies examined in this session





CASE I

Nimtoli Tragedy

3 June 2010 · Old Dhaka

~124

Deaths

~200+

Injured

Chemical
godowns

Root cause

What Happened

A fire broke out at a chemical warehouse in the densely packed Nimtoli neighbourhood of Old Dhaka and rapidly spread through narrow lanes and residential buildings storing flammable chemicals.



Root Cause & Contributing Factors

Illegal storage of chemicals in residential buildings; narrow, congested lanes obstructing fire tenders; lack of fire exits and building safety compliance.



Nimtoli — Forensic & Identification Challenges



Charred & fragmented remains

Severe thermal injury made visual identification impossible for most victims



Absent ante-mortem records

Poor dental/medical records in the community delayed identification



Reliance on DNA profiling

Family reference samples were collected for DNA matching of unrecognisable bodies



Commingling of remains

Multiple bodies recovered from collapsed structures required careful segregation

Forensic lesson: fire disasters demand secondary identification (DNA/dental) infrastructure and pre-established ante-mortem data systems.



CASE II

Tazreen Fashions Fire

24 Nov 2012 ·

Ashulia, Dhaka

117+

Deaths

200+

Injured

9-storey

Factory

Building

Mass Disaster — Forensic Medicine

What Happened

A fire started on the ground floor of the Tazreen Fashions garment factory, which had no legal fire exits. Workers on upper floors were trapped as flames and smoke spread through stairwells.



Root Cause & Contributing Factors

Illegally constructed extra floors, blocked/locked emergency exits, flammable materials stored near the only stairwell, and a failure to evacuate on the fire alarm.



Tazreen — Forensic Lessons



Autopsy & Cause-of-Death Findings

- Bodies retrieved showed a mix of burn injuries and injuries from jumping/falling — requiring careful cause-of-death differentiation
- Smoke inhalation (carbon monoxide/cyanide toxicity) was a major cause of death alongside thermal burns
- Numbering & photographing bodies at the scene before removal was critical given the volume of casualties



Identification Approach

- Visual identification by family for recognisable bodies at the scene/mortuary
- Unclaimed/unidentified remains buried with photographic & DNA records retained for future claims
- Highlighted the need for a national mass-fatality DVI protocol — informal, ad hoc process caused delays and disputes over body counts



CASE III

Rana Plaza Collapse

24 Apr 2013

Savar, Dhaka

1,134+

Deaths

2,500+

Injured

**8-storey
building
Structure**

What Happened

An 8-storey commercial building housing several garment factories collapsed after cracks noticed the previous day were ignored and workers were



Root Cause & Contributing Factors

Substandard construction on filled marshland, illegal additional floors, heavy vibrating machinery, and disregard for visible structural warning signs.



Rana Plaza — DVI in a Mass Building Collapse

The scale of Rana Plaza forced Bangladesh's first large, organised DNA-based mass identification effort.

1



Recovery

17-day search & rescue/recovery operation using heavy machinery to clear rubble in phases

2



Documentation

Each body/body part photographed, numbered, and logged at the site before transfer

3



DNA profiling

DNA samples from unidentified remains matched against ~300+ family reference samples via CID's DNA lab

4



Long process

Final identifications and compensation disbursement continued for months to years after the collapse



CASE IV

Milestone School Air Crash

21 Jul 2025 · Uttara, Dhaka

37

Deaths (28 students)

170+

Injured

BAF F-7
training jet
Aircraft

What Happened

A Bangladesh Air Force F-7 BGI training jet suffered a mechanical/control failure shortly after takeoff and crashed into a building of Milestone School and College while classes were in session.



Root Cause & Contributing Factors

Investigation attributed the crash primarily to pilot error/loss of control during a solo training flight, compounded by the aircraft coming down over a densely populated school zone.

Milestone — Forensic Challenges: Paediatric Mass Burn Casualties



Severe burns in children

Most victims were minors with extensive burns, complicating visual identification and consent processes



DNA matching for charred bodies

At least 20 bodies required DNA matching for confirmed identification before release to families



Mass casualty triage

173 injured, mostly under age 12, overwhelmed burn units — needing rapid triage protocols



Transparency & accountability

Public disputes over the true death toll underscored the need for a single, credible casualty registry

Forensic lesson: paediatric mass-casualty events require child-specific identification protocols and rapid, transparent public communication.

THE JULY- AUG Tragedy

1. The Spark (Mid-July 2024)

Protest Origins: What began as a peaceful, student-led demonstration for civil service quota reform rapidly escalated.

The Turning Point: Brutal crackdowns on university campuses unified ordinary citizens, transforming a student movement into a massive national uprising.



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~1,400

Killed nationwide, per
UN estimate



114

Estimated bodies in the
Rayer Bazar mass grave



80 + 34

Unclaimed bodies buried by
Anjuman Mufidul Islam (July
+ August 2024)

What happened

- In July–August 2024, a violent crackdown on the anti-discrimination student movement led to widespread deaths across Bangladesh.
- The volunteer group Anjuman Mufidul Islam buried many unclaimed bodies at Rayer Bazar Graveyard in Dhaka.
- Following the change of government, exhumation of the mass grave began on 7 December 2025, supported by the UN's OHCHR and advised by Argentine forensic anthropologist Luis Fondebrider.



The Role of Forensic Medicine in This Case

A multidisciplinary effort guided by Disaster Victim Identification (DVI) principles

Recovery & Exhumation

Controlled excavation, recovery of remains, and maintenance of chain of custody — carried out by forensic teams from four Dhaka medical colleges.

DNA & Identity Confirmation

Absence of soft tissue requires DNA extraction from bone; matching against family reference samples to confirm identity.



Post-Mortem Examination

Osteological examination of skeletonised remains; establishing cause and manner of death, made more complex by the time elapsed since burial.



International Standards & Accountability

Work conducted under the Minnesota Protocol, with OHCHR oversight and advice from forensic anthropologist Luis Fondebrider, in support of truth, justice, and accountability.

Teaching point: DVI in mass casualty events is not only a technical process — it is directly tied to families' right to truth and to justice.



INTERNATIONAL COMPARATOR

Venezuela Earthquakes

24 June 2026 · Caracas
& La Guaira

M7.2 + M7.5

Back-to-back earthquakes

1,900+

Confirmed deaths, tens of
thousands missing/injured

A geological mass disaster illustrates identification challenges at a completely different scale — useful contrast to Bangladesh's man-made, localised incidents.



Scale

Tens of thousands missing across multiple cities vs. hundreds at a single Bangladeshi site



Recovery

Multi-day/week search-and-rescue through collapsed multi-storey buildings, similar in method to Rana Plaza but far larger



International response

Cross-border rescue teams (Mexico, El Salvador, USA) — highlighting value of pre-arranged mutual-aid protocols



Identification burden

Mass DNA identification and missing-persons registries needed at national scale for weeks to months



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Bangladesh Mass Disasters — At a Glance

Incident	Year	Type	Deaths	Primary ID method challenge
Nimtoli Tragedy	2010	Fire	~124	Charring → DNA & dental reliance
Tazreen Fashions Fire	2012	Fire	117+	Mixed burn/fall injuries; ad hoc process
Rana Plaza Collapse	2013	Building collapse	1,134+	Large-scale DNA identification effort
Milestone Air Crash	2025	Aviation	37	Paediatric burns; public trust in toll
Venezuela Earthquake*	2026	Earthquake	1,900+	National-scale, multi-city DVI

THE July – Aug tragedy

2024

Genocide

1000+

National –scale, multi city DVI

Common thread: identification infrastructure (DNA labs, dental/medical records, unified registries) was the limiting factor in every case.

Key Challenges in the Bangladesh Context



No standard national DVI protocol

Response has historically been improvised for each disaster rather than following a rehearsed plan



DNA lab capacity

Centralised, limited-capacity facilities create bottlenecks for large-scale profiling



Dense urban settings

High population density amplifies casualty numbers and complicates rescue/recovery



Limited ante-mortem data

Dental and medical records are inconsistently kept, slowing secondary identification



Weak enforcement of safety codes

Building, fire, and industrial safety regulations often poorly enforced pre-disaster



Public trust in casualty figures

Delayed or disputed death tolls (as in Milestone) undermine confidence in official response

Media Management

- Controlled press briefings
- Provide verified information and protect victim privacy
- Avoid releasing unverified IDs



Recommendations — Way Forward



Establish a National DVI Authority

A standing, trained, multi-agency body with a rehearsed activation protocol



Expand forensic DNA & dental capacity

Regional labs and standardised sample-collection kits for rapid deployment



Build a national ante-mortem registry

Encourage dental/medical record-keeping to speed future identification



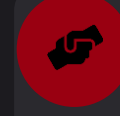
Institutionalise DVI training

Regular multi-agency drills for police, fire, medical, and forensic teams



Enforce safety regulations

Strengthen inspection & enforcement of fire, building, and aviation safety codes



Transparent public communication

Single verified casualty registry updated in real time during a disaster

Conclusion

- Mass disasters — whether fire, structural collapse, aviation, or geological — share a common forensic demand: rapid, dignified, and legally sound victim identification
- Bangladesh's experience (Nimtoli, Tazreen, Rana Plaza, Milestone) shows recurring gaps in ante-mortem data, DNA capacity, and standing DVI protocols
- A trained, rehearsed, multi-agency forensic response — not improvisation — is what ultimately gives victims their identity back and families closure
- Every disaster examined here reinforces that prevention (safety enforcement) and preparedness (DVI systems) are two sides of the same public-health responsibility

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- 2026 Venezuela earthquakes — international news and USGS situation reports (June–July 2026).

*Thank
you!*