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Acronyms and abbreviations

ADMD	Dominican Disaster Mitigation Association
AM	*Ante mortem*
COE	Centro de Operaciones de Emergencias, Dominican Republic
CRID	Centro Regional de Información sobre Desastres, América Latina y el Caribe
DC	Developing country
DESASTRES	Disaster Documentation Center Collection
ID	Identification
LILACS	Latin American and Caribbean Health Sciences
MCND	Mass casualty natural disaster
PAHO	Pan American Health Organization
PM	*Post mortem*
SCIELO	Scientific Electronic Library On line
UNDAC	United Nations Disaster Assessment and Coordination
WHO	World Health Organization

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Executive Summary

Disasters resulting from natural hazards cause a large number of fatalities in a very short period of time. Such events disproportionately affect the poorest and most vulnerable people in the world, particularly those living in developing countries.

The management of dead bodies after a natural disaster is a complex, laborious and multidisciplinary operation, which unlike other aspects of disaster management, is frequently the result of an improvised response.

The absence of a plan to manage the sudden appearance of large number of corpses and the persistent myths about the health hazards associated with unburied bodies have sometimes led to the inappropriate disposal of bodies in mass funerals and mass cremations. These practices do not allow proper identification of the deceased and supersede one of the most universal and oldest human values: the respect for the dead.

This thesis adapts a framework used in health policy analysis to the management of dead bodies following a natural disaster, by systematically describing the context, the processes and the actors involved in selected mass casualty incidents from both developed and developing countries.

Although further research is needed, particularly to understand how the dead are handled in developing countries, this document recommends that the proper management of mass casualties should be part of every national disaster preparedness plan, and highlights the need for comprehensive guidelines supported by a legal framework.

1. INTRODUCTION

Natural events or phenomena that are potentially harmful to human beings or their property are considered natural *hazards*.[1] But a natural *hazard* is not necessarily a natural *disaster*. A natural disaster, defined by the WHO is "a sudden ecological phenomenon of sufficient magnitude to require external assistance." [2]

Natural disasters deeply disrupt peoples' lives [3] by causing substantial property damage, disabling public services, communication and transportation facilities and, in certain cases, a large number of fatalities in a very short time period. These catastrophic events are known as *mass casualty natural disasters* (MCND). Due to the sudden presence of many dead bodies following a MCND, "the management of the dead is one of the most urgent, complicated and socially delicate tasks facing the national authorities immediately following the rescue and the attention of any survivors." [1]

However, one of the first documents in the management of mass casualties after a natural disaster reports that "handling the sudden appearance of a large number of dead bodies is an *ad hoc* process and it does not seem to be well planned for in any society." [4]

A previous study,[5] described how bodies are handled following natural disasters as essentially: "an excursion into a work situation and its *activities*, *actors*, and *settings*." While various authors have independently analyzed the context, the process, and the actors around the management of dead bodies following a MCND, these elements have not been yet developed into a comprehensive framework. However, a related framework has been developed by Gill Walt (1994) for health policy analysis.[6]

This thesis adapts the Walt framework to bring the context, the process and the actors together into an analytical framework specifically designed for the management of dead bodies following a MCND. For the particular specific techniques of the process i.e., body identification methods, embalming and photographic techniques, the reader should consult other specialized sources.

The document presents findings of a literature review in the management of the dead following natural disasters Due to the little direct evidence of body handling after natural disasters, some of the information presented is drawn on wider published literature from "site-specific" mass casualty incidents such as aviation crashes, explosions and maritime tragedies. In parallel and using the same analytical framework, selected examples of disaster body handling from developed and developing countries are used to highlight the practical applications of the framework.

1.2 Aim

To enhance understanding of the process of managing dead bodies following MCND, particularly in developing countries.

1.3 Objectives

i. To develop a theoretical framework for the analysis of disaster body handling by conducting a systematic description of the context, the process and the actors involved in the management of dead bodies following natural disasters.

ii. To apply this framework of disaster body handling in the management of dead bodies to selected MCND.

1.4 Background information

Sudden single natural disasters have killed more people than any other single man-made events, including war.[4] In July 1931, a flood in China killed 3 700 000 people, and in November 1970, more than 300 000 were killed by a typhoon in Bangladesh. In the Region of the Americas, the May 1970 earthquake in Peru killed 66 794 people. More recent events include the 1999 floods in Venezuela that resulted in 30 000 deaths.[7] Fortunately, absolute numbers are not always as high, but even when relatively "few" deaths occur, they can still be proportionally high for the population involved, "as there

can be as many deaths in a few minutes as the community might normally sustain over a period of months." [4]

The UN International Decade for National Disaster Reduction (IDNDR) 1990-1999 "ended with more deaths from more disasters than when it began," [8] partly because the number of people at risk has been increasing by 70 to 80 million per year, 90% of them living in developing countries. [8] (annex 1)

When a MCND occurs, the community naturally refers to the services and procedures for death that operate under customs set by culture and legal dispositions. These services are in most cases, seriously disabled and under-resourced to appropriately manage an unexpectedly large numbers of bodies

In addition to the chaotic situation created by the disaster and the presence of many bodies, many operational decisions are quickly made and "unlike some other areas of disaster management, how we deal with the dead is seldom the result of any prior planning." [4]

Despite extensive experience handling the dead following site-specific disasters (airplane crashes, explosions, fires, etc.), "there has been little opportunity for research into how bodies are handled after natural disasters." [9] As a result, there are no practical guidelines to manage the dead in such events, particularly in DC. It is now widely recognized that disaster body handling is a crucial aspect of emergency response that "deals directly with a sudden rise in the needs for an effective medical, social and psychological intervention, exceeding the normal capacities of the local facilities to manage the dead." [10]

The persistence of disaster myths is also a significant problem, "because they influence the way agencies and authorities think and act." [11] One of the most prominent myths is that "large number of bodies can cause epidemics amongst the survivors of a disaster." [12] Such widespread fears, media misinformation, the absence of a response plan from the

authorities, and "political pressure have led to the rapid and unplanned disposal of the dead in mass burials or mass cremations." [13]

Such practices, do not allow proper identification of bodies to occur and this can have significant mental health consequences for the survivors [13] Currently, there is an understanding that for the relatives, "viewing the body of the deceased is clearly an important part of accepting what might be called the "certainty of death", particularly after a sudden violent death." [14] It has also been emphasized that the ritualized behavior of the funeral helps in "promoting and maintaining the emotional well-being of the individual as well as the social cohesion and structural integration of the group." [15] As Blanshan and Quarantelli (1981) conclude, "the dead are not socially dead unless the right steps are taken leading to an individual's funeral." [4]

Furthermore, there are underlying legal and sociological reasons for which "dead bodies must be found, brought out of the disaster area, taken to a formal body handling staging area, identified, issued a certification of death and distributed to their relatives." [5] Several cross-cultural studies performed in Italy, Iran and USA suggest that although how societies deal with the dead is essentially a culturally based process, "there are some pan-human similarities which emphasize a common pattern of respect to the dead," [16] including a dignified burial.[5] This is evidenced by the almost violent public resistance to mass burials in the Halifax explosion in Canada in 1917,[9] in the 1985 Earthquake in Mexico,[17] and the 1963 Vaion Dam disaster in Italy.[16]

At this point, if we acknowledge the existence of a universal respect for the dead and recognized the minimum health risk that unburied bodies pose for the surviving population, why are we still observing mass burials and/or mass cremations after natural disasters, particularly in developing countries? Is there a suspension at times of catastrophes of the usual respect accorded to the dead?[16] , What do we know about the process of handling the dead following natural disasters in those settings? How can we ensure that the minimum medical and legal requirements for handling dead bodies are followed in such situations?, and who has the ultimate responsibility to manage the

dead?. These are just some of the questions that need to be address in order to improve our understating and thus, our response to the management of dead bodies after a MCND.

2. METHODOLOGY

A **literature review** was carried out on the following sources using the search terms: "management of mass casualties", "disaster body handling", "disposal of the dead", "identification of mass casualties," "disaster victim identification" and "cadaveres."

- Online Libraries: SCIELO.
- Online databases: Pub Med, Medline, Virtual Health Library Services (DESASTRES and LILACS), WHO, PAHO, Interpol and CRID.
- ADMD and COE.
- The Internet: Relief Web and Google.

Three types of documents have been reviewed:

- Articles published in peer-reviewed journals.
- Policy documents and reports from International organizations and National Institutions. (Grey literature)
- News articles.

3. Limitations of the study

Due to the little direct evidence on the experiences of managing the dead following natural disasters, particularly in developing countries, this literature review also draws on wider published literature from other type of mass casualty incidents such as aviation disasters, massive explosions and maritime tragedies. The management of the fatal victims after the floods occurred in Dominican Republic in May 2004 is briefly described. There are inevitable data gaps as it is a recent event, and it has not been possible to build up a complete case study, for this, further research is required.

4. FINDINGS

4.1 THE CONTEXT

There are important contextual differences between handling dead bodies under normal death conditions,[i] and the more complex process of handling large number of casualties following a natural disaster. This can be categorized as[18]:

- *Situational factors;*
- *Cultural factors;*
- *International factors; and*
- *Structural factors.*

Situational factors

First, the "*chaotic emergency setting*" and the wide disruption of public services created by the disaster, is a significant factor that complicates the process of body handling.[5] For example, in the town of Jimani, Dominican Republic, the flood in May 2004 devastated several neighborhoods along with the Health Center and the local cemetery. The General Hospital was inundated, and water, sanitation, electricity and communication facilities were disrupted.[19] Extensive damage to highways and village roads isolated the affected communities from relief efforts.[20]

Second, the infrastructure and personnel involved in routine body handling are usually unprepared, under-resourced and inexperienced in handling large number of bodies, which results in a need for external resources and technical assistance. For example, in the Rapid City flash floods, South Dakota in 1972, an additional funeral home was set up and staffed with morticians from outside the community as "the two operating funeral homes were extensively over-burdened by the large number of bodies." [16]

Third, the *nature and scope of the disaster* directly influences the type of personnel and the resources required for body handling, particularly in the identification process.

[i] Single deaths occurring as a result of natural causes

Practice has shown that a distinction has to be made between disasters with "known" and quantifiable number of victims such as airplane crashes (names are known), and those with "unknown" large number of victims e.g., MSND (where names and numbers are unknown).[21]

Additionally, in a MCND, instead of dealing with one body at a time, the body handlers are confronted with many bodies. This will result in the need to involve additional actors in the process, i.e., the "volunteers", who are usually not trained in the profession of body handling.[5] In a normal death situation, the professional body handler, i.e., the funeral director performs the handling of each individual body.[5] Due to the excessive number of bodies in a MCND and the additional people involved, a division of labor tends to emerge, resulting in allocation of responsibilities among the professional body handlers and the volunteers.[5]

Another contextual modification in the management of dead bodies following a MCND is that the body handling staging areas are not the typical service organizations of death[5] (e.g., funeral homes); instead, other improvised places are used such as airport hangars, funeral home garages, temporary morgues at former hospitals, etc. Furthermore, while the handling of bodies in a normal death situation occurs primarily in one place, the process may take place in several locations after a MCND. In the Rapid City flash flood, for example, "the bodies were initially handled at the garage of a community funeral home, and then transported to several private funeral homes for embalming, and finally taken to the temporary morgue in a former hospital." [5]

Cultural factors

The cultural, religious and social values of the community affected also modulate the relationship between the dead and the living, and thus determine the procedures and legal practices related to the management of the dead. [22]

For example, after the air crash in September 1992 over Katmandu, Nepal, access to the bodies was given to the general public to help release the souls of the deceased in

accordance with Hindu and Buddhist custom.[23] In contrast, in the Tenerife disaster where two Jumbo jets collided in March of 1970, 570 corpses were embalmed and coffined within 48 hours of their death according to the Spanish law, forcing body handling teams to adapt their methodology [21]

International factors

In some situations, international factors directly influence the way bodies are handled, particularly in disasters with victims from different nationalities. For example, international regulations on transportation of dead bodies require that corpses undergo specific procedures prior to their repatriation. These additional measures may certainly not be part of the routine body handling process in many countries, particularly in DC.

Structural factors

Structural factors such as the country's economic, political and domestic situation previous to the disaster, considerably affect the conditions required for disaster preparedness[24] and the actual emergency response, consequently, influencing the process of disaster body handling. The lack of a recognized or functioning state or the long-term impoverishing effect of conflict, can substantially weaken the national capacity to cope and respond to a natural disaster.[24] On the other hand, the unique political nature of certain disasters and its economical impact, such as the 9/11 World Trade Center disaster in New York, may have significantly affected the determination of the government officials for the unprecedented and effective management and identification of the 2 734 victims.[25] As they can either facilitate or further complicate the process of disaster body handling, structural factors need to be taken into account.

4.2 THE ACTORS [ii]

The emergence of specific tasks in the process of body handling after a MCND leads to development of *well-defined, multidisciplinary* working groups of actors: [16]

- the coordinating group;

[ii] Actor is a short hand term, and may be used to denote individuals, groups or even an organization

- the search and recovery group;
- the missing persons group;
- the identification group; and
- the psychosocial supporting group.

Each group is formed by "professional body handlers" such as funeral directors, morgue attendants and coroners, and by "volunteer body handlers". There are three general types of volunteer body handlers: [5]

- volunteers from medical organizations: doctors, dentists, and nurses;
- volunteers from community safety organizations: police department, fire department or the Army; and
- volunteers from identification organizations: forensic and fingerprint experts, anthropologist, etc.

The safety personnel play an important role, as it is evidenced by their involvement in all the "additional" non-routine body handling tasks arising after MCND.

Although the involvement of actors in each of the 5 groups is a voluntary and *ad hoc* process, a characteristic pattern of involvement has been observed which is dependent on their profession, their previous work experience and their availability.[5] For instance, the search and recovery team is usually made up of individuals connected with the police, fire department or the army, while judges, dentists and funeral directors may compose the identification group. [5] In general, the professional body handlers remain involved in the "routine tasks" of the process (embalming, death certification, etc), while the volunteer body handlers play a much more active role in the "additional" non routine stages of the process such as the search, recovery and transportation of bodies out of the disaster zone.[5]

4.2.1 COORDINATING GROUP

As the first identifiable group to emerge in the aftermath of a MCND, the main objectives of this team are: 1) to carry out a preliminary situational analysis, 2) to develop a general program of action, and 3) to coordinate activities between other groups.[16]

Although the formation of this group is usually an *ad hoc* process,[16] it usually involves individuals with legal authority, and should include at least a sanitation officer, a law enforcement official, a community leader, a medical officer (preferably a pathologist or a forensic doctor), and a national security representative. In the Rapid City flash flood, for example, this improvised group was composed of a county commissioner, the county sheriff, a local National Guard representative, a local judge and a probation officer.[16]
Within this group, it is particularly important to select a "commander" to lead the overall operation.[26] This person is in charge of 3 specific tasks: 1) managing communications with the public, e.g., the media, families, NGOs and others, 2) to ensure the resources and support needed by the different groups, and 3) to evaluate the possible risks for the rescue teams.[10]

4.2.2 MISSING PERSONS' GROUP

"One of the emergent groups following a mass casualty disaster that is actively involved in the process of managing the dead is the missing persons group." [16] This group is consistently formed by personnel such as police officers, investigators and relief workers (e.g., Red Cross staff) with experience in taking detailed reports, and who can fill Victim Identification forms.[16] The members of this group are also involved in the collection of all possible identification information that has been gathered previous to the death of an individual, that is, the *ante mortem* data (AM).

4.2.3 SEARCH AND RECOVERY GROUP

While relatives, friends and survivors usually carry out the initial "informal" phase of the search and recovery, the more "organized period" usually involves volunteers under the supervision of safety personnel and other community and international organizations.[3] For example, in the Dominican Republic floods,

> *"...bodies were initially located and retrieved by the people who miraculously survived the flood."* [27]

In both the Halifax explosion in 1917 and in the 1963 Vaion Dam disaster in Italy, after the "informal" response,

> *"...hundreds of soldiers were brought to assist in the "coordinated" search and recovery of bodies."* [28]

The identification process starts at the site of the incident,[28] therefore, it is important to consider the benefits of including professionals who are accustomed to looking at body fragments and other human remains such as doctors, dentists and forensic anthropologists.

Each search and recovery team should consist of a minimum of three people: a team leader (policeman for example), a recovery specialist (e.g., a dentist), and a photographer. The group coordinator is usually in charge of organizing a structured search and recovery of bodies in liaison with other disaster managers, particularly those from the health department, the police and international relief agencies.[29]

4.2.4 IDENTIFICATION GROUP

There are two types of identification teams, one involved in the "technical ID or *post mortem* (PM) examination" and the other in the "tactical or positive ID."

The first group is usually composed of police identification personnel, but professional and non-professional volunteers have prove to be useful as well. Experience in recent disasters shows that contribution from medical specialists is particularly important in determining the various physical characteristics,[21] and so, the need to include forensic anthropologists, pathologists or dentists in the disaster ID teams has been widely recognized.[30]

The technical ID team consists of a minimum of three people, one who actually handles the body (the non-professional volunteers for example), one who examines the body (the

medical expert) and one person who records the particulars.[21] It has been suggested that members of the first group should also be part of the "tactical identification group", but in general this will depend on the selection of the identification method to be used during the investigation. For instance, if body or dental radiographs prove to be a useful ID tool, then radiologists or odontologists should be involved as members of this team. As bodies and personal effects also need to be photographed during the PM examination, photographic personnel should also be deployed at the earliest opportunity.[29]

An additional and important subgroup in the ID team that has received less attention, is the "Relatives and Friends group." [31] Relatives and friends represent a primary source of relevant information (AM data), they are able to provide the visual identification of the victims, and they are also a primarily source of volunteers.[23] For these reasons, authorities should ensure that "the whole procedure is explained to the relatives, as it might allow them to feel that they are part of the process." [23]

4.2.5 PSYCHOSOCIAL SUPPORT GROUP

In addition to the four sets of actors identified by Hershiser and Quarantelli (1976), there is another important group that tends to emerge in the aftermath of recent MCND: the psychosocial supporting team. Members of this group include social workers, psychologists and staff from international relief organizations. They provide family survivors and body handlers with "the most psychosocially sensitive, efficacious interventions that can be fielded." [31] For example, a week after the floods in the Dominican Republic, several international NGO's, in collaboration with the Departamento de Salud Mental of the Ministry of Health (SESPAS), provided training sessions to prepare facilitators to support children suffering from the traumatic loss of their relatives and belongings.[27]

It has been stressed that the members of this group should be familiarized and trained in the general crisis counseling principles, which include: 1) immediate interviewing in order to mitigate negative consequences, 2) gathering facts so that the family survivors

know what has happened, 3) fostering expression of feelings to reduce tension, and 4) empowering the survivor family to accept the reality of the event.[31]

4.3 THE PROCESS

For the management of the dead, there are two clearly identified procedures: the handling of individual dead bodies under "normal death situations", and the handling of many deaths following a MCND. In a normal death setting, the procedure for handling single bodies is relatively routine and simple: legal identification, certifying the death, embalming, storing, removing and presenting the dead.[5] Following a MCND, however, the entire procedure is expanded and becomes a significantly more complex set of tasks.[5]

In a review of several disasters, Blanshan (1977) and Quarantelli (1981) identified 11 sequential tasks that tend to emerge in the handling of mass deaths: [28]

1. Search and
2. Recovery of corpses;
3. Transportation of the bodies out of the disaster area;
4. Clean-up of bodies;
5. Initial identification;
6. Positive or legal identification;
7. Embalming;
8. Storage;
9. Death certification;
10. Distribution of bodies to the relatives; and
11. Presentation.

These common patterns would not be surprising if they were the response of prior disaster planning, but "none of the communities studied was really prepared for handling a large number of dead." [28] The first six tasks of disaster body handling (search, recovery, transportation, clean up, initial identification and positive identification) are "all focused on regaining one single element which has been lost in a disaster: body identity," [5]

therefore, as Blanshan (1977) has concluded, "it is the goal of victim identification which makes the process of disaster body handling unique."

Due to the inextricable connections between the different tasks and the actors involved in each of them, it is possible to regroup them in 7 clearly identified sets of tasks: 1) search, recovery and transportation of bodies, 2) missing persons' list, 3) clean up and initial identification, 4) positive or tactical identification, 5) conservation of bodies and storage, 6) death certification, and 7) disposal of the bodies (corresponding to distribution and presentation).

4.3.1 SEARCH, RECOVERY AND TRANSPORTATION OF BODIES

After a MCND, a first response is to start locating and retrieving the dead bodies. This is in part due to quickly find the injured, "but even when most of the victims have been located, the hunt for dead bodies is usually still carried on." [9]

Despite the minimum health risks that unburied dead bodies pose for the public, [28] complicated and collective efforts have been undertaken after many MCND to recover bodies from collapsed buildings, wreckage, earth or mud. This highlights "the compelling point of the human desire to claim one's own relative for proper burial." [28] As an Italian general observed after the Vaiont Dam disaster in 1963:

> *"It's seems absurd to dig down 10 feet of rocks and stones to find a body so we can rebury it in only 5 feet of dirt but that is what people want."* [4]

In the immediate emergency period after a sudden disaster, "many of the bodies are initially recovered in an uncoordinated and unorganized way by family members and friends as well as by people who just happened upon a body." [16] For example, in the Rapid City flash flood and in the Dominican Republic floods:

"...many of the bodies were initially brought to the funeral home by family members or friends of the deceased even before rescue operation were started." [27]

As several people initially move the bodies to a number of different locations, and injured persons may die in ambulances or at first aid facilities, a central body holding area must be identified as soon as possible and the general public and the health services need to be inform as to its location. For this reason, some of the search and recovery teams should be in charge for the recovering of such bodies after a MCND.[29]

This contrast with major site-specific incidents where "the disaster area is rapidly controlled by law enforcement and bodies are marked before they are moved," [9] as it occurs in the aftermath of airplane crashes. Therefore, after a MCND, "the families and relatives of the victims are not entirely excluded from this initial task of body handling." [9]

"Once this informal response has passed and external aid is starting to arrive to the disaster site, a more coordinated or formal period of the search-recovery phase starts to take place." [16] The strategy and equipment for this second phase varies considerably and is "dependent upon the location and the nature of the disaster." [4] In the Rapid City flash flood, for example, the recovery of bodies was done on foot and in helicopters[5] while in the Dominican Republic flood, a boat operator and an outboard engine were used to recover some bodies that were swept into a nearby lake.[32]

Furthermore, several MCND illustrate that "the chances of identification of victims are influenced by the way in which the search and recovery operation is carried out." [21] Search-recovery teams play an important role in information gathering at the disaster site as well as in making sure that information on the position of the bodies and the objects around them are gathered before moving the corpses. After major site-specific accidents, the procedure to be followed prior to body removal is: tag, photograph, mark, and note on a diagram of the disaster site,[26] including an annotation of "difficult to identify" or "easy to identify" depending whether personal identification items (e.g., credit cards or

passports) are found on the victims. This is particularly helpful for the selection of the ID method and enables the full ID procedure to be confined to essential cases only.[21] However, in the initial phase after a MCND, bodies are often moved to different collection points without any record of where that person had come from, further complicating the identification process.

Regarding the importance of involving trained personnel in the search and recovery operation, Brannon et al. (1999) in a review of 50 disasters "recognized that the absence of a dentist in the search-and-recovery teams at the disaster scene was an obstacle to accurate identification, as dentists are much more likely to recognize dental evidence than those who are unfamiliar with dentistry." [33]

The search for bodies will generally persist on for several days and even weeks, particularly when it is uncertain who may have died or when there is no hope to find more victims. The search for bodies after the floods in the Dominican Republic went over 1 month and "despite great efforts by the authorities to recover the bodies, many of the corpses were not found." [27]

Once the bodies have been located, recovered and tagged with a unique recovery number, their transportation from the disaster scene to the work place for body handling is dependent on both accessibility to the disaster zone and the number of dead. Many personnel involved in this activity emphasize following the process with as much respect as possible by "keeping the bodies covered with either blankets or plastic sheeting, or by using closed vehicles. This can be interpreted as an act to preserve the "dignity" of the body." [16]

Although search and recovery of bodies after a MCND is a two-phase process, the course of action is clearly not linear and thus, overlap usually may exist between both periods.