# Biological and Chemical Threats to Public Health and Safety in the Philippines

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**Abstract**

*The Philippines has no clear system in place on management of biological and chemical threats. The objective of this paper is to help shape public policy that will guide the country's public health system in dealing with this problem. To do this, the paper attempts to measure the level of awareness of biological and chemical threats to public health and safety in the Philippines; to assess the response capacity of the country; and to identify lessons from the experience of other countries that can be applied in the Philippine setting.*

*It is proposed that in the Philippines, the greater threat is the non-terrorist threats like disease outbreaks and accidental chemical release, including oil spills. The social and economic impacts of these threats are emphasized.*

*It is recommended that the Philippine government embark on several measures, viz, education of the public, enhancement of the public health system's capacity to respond through development of a national database. The need for preventive legislation to regulate materials that can be used in developing weapons and to enable government to monitor activities that may be intended for dispersal of toxic materials is also stressed.*

*Keywords: biological and chemical threats (BCTs), public health and safety, Philippine public health system*

## Introduction

In recent years, biological and chemical threats to the public have grown. In the Philippines, fear of the use of terror weapons is not something to be brushed aside lightly. After all, it was in one of the suspected lairs of the Jimaah Islamiya in Mindanao that manuals for the production of toxic weapons were discovered in 2003. More recently, Interpol revealed that captured terrorists have admitted to growing interest in the use of biological and chemical weapons. In addition to such international threats, there is also concern about Philippine ability to deal with accidents and outbreaks of natural diseases.

The goal of this paper is to help shape public policy that will guide the Philippine public health system deal with biological and chemical hazards to health and safety. Specifically, it aims to

1. measure the level of awareness of biological and chemical threats to public health and safety in the Philippines
2. assess the response capacity of the country
3. identify lessons from the experience of other countries that can be applied in the Philippine setting.

It is hoped that by showing the gaps and deficiencies in the response system, this paper can lead to relevant policy directions.

## BIOLOGICAL AND CHEMICAL THREATS DEFINED

For the purpose of limiting the scope of this paper, biological and chemical threats (BCT's) are defined as dangerous biological or chemical agents which may be released by design or accident resulting in any number of casualties within a relatively short period of time.

This definition excludes, for instance, certain carcinogens found in cosmetics and perfume, or dioxins in stack gases. What this definition refers to is either an accidental exposure to biological or chemical agents, or use of a biological or chemical weapon. In both cases, the result may be death, disability, maiming or illness of an individual or a group of individuals.

A biological agent is a microorganism or a substance (e.g., a toxin) produced by an organism which can cause illness or death. On the other hand, a chemical agent is one which causes harm by its toxic effects rather than from burns or injuries associated with an explosion.

During the public forum "Chemical and Biological Threats to Public Health and Safety" organized by the Department of Health (DOH) in collaboration with the UP Center for Integrative and Development Studies in October 2005, Dr. Titos Quibuyen of the Institute of Chemistry of U.P. Diliman defined chemical weapons as "chemical substances, whether gaseous, liquid or solid, which might be employed in warfare because of their direct toxic effects on man, animals and plants". During the same forum, the definition was expanded to include "not only toxic chemicals but also ammunition and equipment for their dispersal". A toxic chemical was defined as any "chemical which, through its chemical effects on living process may cause death, temporary loss of performance, or permanent injury to people and animal". To be used as a weapon, such a substance must satisfy the following requirements:

1. high toxicity
2. not too difficult to handle
3. good shelf life without degradation and corroding packaging
4. resistant to atmospheric water and air
5. ability to withstand heat when dispersed

## TERRORISM VERSUS ACCIDENTS

Attention has been focused on the widely publicized terrorist dimension of BCT's. However, public awareness should not be deflected from natural outbreaks and accidental releases which are no less dangerous. Both types of threats may be present at any given time but the relative importance of each may vary from region to region or from country to country. In the United States and the United Kingdom, for example, the terrorist threat appears to be the principal concern. In the case of other countries, the threat appears to come more from natural events and accidents than from terrorists. Typical of these are China, Vietnam, Thailand and the

Philippines, which have been threatened by the avian flu virus, although this natural contagion eventually reached Japan, Romania and other European countries, and even the United States.

A study [1] of reported terrorist use of toxic weapons between 1990 and 1999 showed that most of the reports occurred in Canada and the U.S. However, most of these so-called incidents turned out to be hoaxes. In Asia, where the number of reports were only roughly a fifth of those in Canada and the U.S., most of the incidents involved actual use of toxic materials. The same study revealed that aside from the 81 anthrax cases in the U.S., only 14 incidents involving biological agents were reported worldwide. As for chemical weapons, tear gas was the most widely used. Other chemicals used were non-warfare or household chemicals. The number of reported incidents appears to decrease up to the present. It would appear then from these data that the real use of toxic weapons by terrorists is at a rather low level.

Indeed, even after the September 11 bombing, some scientists believe that only a tiny minority of terrorists had the motivation to use toxic weapons indiscriminately and even fewer had the technical means to carry it out [6].

## Biological and Chemical Agents as Terrorist Weapons

So far, terrorists have preferred conventional explosives as their principal weapon. Such weapons allow them to inflict mass casualties and at the same time achieve spectacular psychological impact. Terrorist use of toxic weapons has up to now involved only small amounts with predictably limited local effects. In March 2006, however, Mr. Ronald Noble, secretary-general of Interpol, has warned that al-Qaeda is preparing to launch biological attacks.

It is important to note that toxic weapons are more attractive as terror weapons rather than as effective components of military arsenals. From a military point of view, such weapons are of limited value because of the many difficulties associated with storage, handling and even deployment. However, because biological and chemical agents are generally invisible, odorless, tasteless and silent, they are more useful to the principal objective of terrorism: to sow fear, confusion and uncertainty.

Chemical agents are usually designed to kill in minutes and many tend to persist in the area where they are dispersed. Thus, their potential for disrupting activities and sowing chaos makes them very suitable terror weapons. The main disadvantages are that they are hazardous even to the users, unpredictably affected by environmental and meteorological factors, and are easily neutralized if intervention is timely. Moreover, chemical weapons require large amounts to be effective. For example, to kill or incapacitate one person drinking a cup of untreated water from a 5 million liter reservoir, 10 tons of potassium cyanide are needed[5].

On the other hand, biological agents require a lag time to attain a lethal or debilitating effect. Even in small amounts, they can be very effective if delivered properly[5]. Thus, to effectively contaminate the 5-million liter reservoir just cited, only one half kilogram of *Salmonella typhi* is necessary. This makes them suitable for covert delivery while affording the attacker time to conceal his tracks and escape. However, this lag time, may also make biological agents unappealing. The results are less spectacular than those of chemical agents or explosives and can even be mistaken for natural outbreaks.

There are also other reasons why terrorists have not used toxic weapons on a large scale. Some of the hurdles include the difficulties in the [5]:

- acquisition of chemical-weapon ingredients or virulent microbial strains,
- acquisition of equipment and know-how for production and dispersal of agents,
- creating an organizational structure capable of resisting infiltration or, early detection by law enforcement.

## Non-Terrorist Threats

Non-terrorist threats have effects that are comparable to those of toxic weapons. As the recent oil spill in Guimaras has shown, any combination of the following can lead to a large-scale scenario involving hazardous chemicals or biohazards:

(a) lack of competence among personnel handling, storing or transporting agents,

(b) lax implementation of laws regulating not only handling, storing and

transporting of agents but also licensing of personnel and companies involved,

(c) an ageing transportation system,

(d) weather and natural occurrences.

The effect of accidental releases of toxic materials can be exacerbated by failure to intervene immediately, absence of a cohesive strategy, and lack of know-how.

## EFFECTS OF BIOLOGICAL AND CHEMICAL THREATS

The effects of BCT's may be divided into acute and long-term. This section will no longer discuss the immediate physical effects of exposure to biological and chemical agents as these are already covered in the vast open literature. Rather, focus will be placed on the disruptive effects of BCT's. The main immediate social and psychological effects of an actual dispersal of toxic materials can be panic. This can be anticipated if the public is not sufficiently educated on how to respond to emergencies involving BCT's. Another immediate effect that can emerge is sociogenic illness. An example of this occurred in October 2001 in Manila when text messages about a bioterrorist attack caused students from schools with mundane flu-like symptoms to deluge hospitals[7]. Even the reported rash of meningococcemia in Baguio caused people with ordinary illnesses to exhaust the supply of an antibiotic. These two examples illustrate how panic and mass sociogenic illness can cause an overload on hospitals, the transportation system and other public services.

More long-term psychological effects result from amplification of fears aroused by an attack[7]. Psychiatric cases may be exacerbated and chronic illnesses may tend to worsen anxiety in affected communities. Failure to address the public fear could cause loss of confidence in public health officials and government, complicating efforts aimed at accelerating recovery.

There are also economic effects to reckon with. Tourism in Baguio was adversely affected by the highly publicized "outbreak" of meningococcemia. When a group identifying itself as the Arab Revolutionary Army Palestinian Commandos poisoned

Israeli citrus products exported to Europe, the result was a 40% reduction of those exports.

## RESPONSE TO BCT'S

### The American Response

Initial activities of the American preparedness and response program included "planning,improved surveillance and epidemiologic capabilities, rapid laboratory diagnostics, enhanced communications and medical therapeutics stockpiling".

The priority focus of the program was the *identification of potential biological and chemical terrorism agents and substances.* This identification enhanced efforts to monitor and secure potential biological terrorism agents, thereby reducing the risk of these agents getting into the hands of terrorists and other aggressive groups. Identifying agents also helped in the planning and coordination of federal agencies, state and local emergency response units, public health agencies and the medical community in the event of an attack.

However, not all the agents and substances identified are capable of affecting public health on a large scale. It was clear that the plethora of possible weapons should be narrowed down to the most likely agents. With the help of the U.S.military, biological "high-impact" agents were identified and categorized. After identification, selection was made between which agents are so-called "covert" and "overt".

Several criteria are used in assessing and categorizing the potential threat of these agents to civilian population, these are as follows:

(a) public health impact based on illness and death,
(b) delivery potential to large populations based on stability of the agent, ability to mass produce and distribute a virulent agent, and potential for person-to-person transmission of the agent,
(c) public perception in relation to public fear and potential civil disruption,
(d) special preparedness needs based on stockpile requirements, enhanced surveillance, or diagnostic needs.

However, these categories of agents (Table 1) are considered not definitive and may change as new information and methods of assessment are established.

New agents may be removed or added to the list as a result of disease elimination and eradication or as populations lose their natural or vaccine-induced immunity to these agents.

**Table 1: Categorizing Agents according to potential threat**

| Category | Characteristics |
|---|---|
| A | • greatest potential for adverse public health impact with mass casualties<br>• most require broad-based public health preparedness(e.g.,improved surveillance and laboratory diagnosis, stockpiling of specific medications)<br>• moderate to high potential for large-scale dissemination or a heightened general public awareness that could cause hysteria and civil disruption |
| B | • some potential for large-scale dissemination with generally less resultant illness and death<br>• require some improvement in public health and medical awareness<br>• includes agents that do not meet the criteria of Category A, biological agents which threaten food and water safety |
| C | • not believed to present a high bioterrorism risk to public health but could emerge as future threats |

Despite the continuing risks and probability that terrorist groups and "rogue nations" may use biological and chemical agents as small-and large-scale weapons in the future, the selection and prioritization of potential bioterror agents were made based on their adverse effect on civilians rather than on the probability of their use.

In assessing biological threats, it is also important *to determine the vulnerability of chemical facilities.* Chemical facilities(CF's) are potential sources of chemical agents and any breach in the handling, transport and processing of these agents, materials and products could have serious effects on the security of a nation.

Thus, as part of the preparedness and response program against bioterrorism, the vulnerability assessment methodology (VAM) was developed by the U.S. National Institute of Justice and Department of Energy's Sandia National Laboratories[3]. The assessment methodology identifies potential security threats, risks and vulnerabilities and guides the chemical facility industry in making security improvements. This method is limited to preventing terrorist and criminal actions

such as the release of hazardous chemicals that would compromise the integrity of the facility, contaminate adjoining areas especially populated ones, or injure and kill employees or the populace. It only addresses physical security at fixed sites but not cyber and transportation security issues. A similar assessment method like VAM was also developed for other critical infrastructure components like dams, water treatment and supply facilities and correctional facilities. The vulnerability assessment method (VAM) is a systematic method with risk-based approach taking into consideration the severity of consequences of an undesired event, the likelihood of adversary attack, the likelihood of adversary success in causing damage. The method has twelve basic steps in assessing the vulnerability of a chemical facility[3]:

1. Screening for the need for a vulnerability assessment.
2. Defining the project.
3. Characterizing the facility.
4. Deriving the severity level.
5. Assessing threats.
6. Prioritizing threats.
7. Preparing for the site analysis.
8. Surveying the site.
9. Analyzing the system's effectiveness.
10. Analyzing risks.
11. Making recommendations for risk reduction.
12. Preparing the final report.

In analyzing chemical risks, severity levels are defined (Step 4) and determined based on the consequences and are assigned a severity value for each level. These are shown in Table 2.

In assessing threats (Step 5), a description is first required to determine the probability that the adversary might attempt an attack. This description includes the type of adversary and the tactics and capabilities associated with the threat, the number of adversaries, their modus operandi, the type of tools and weapons to be used and the type of events or acts they are willing to commit.

**Table 2 : Severity v alues**

| Severity Value | Description |
|---|---|
| S1 | Cause: a chemical release, detonation or explosion<br>Impact: fatalities, extensive property damage, facility disabled for more than a month, major environmental impact, evacuation of adjoining populace |
| S2 | Cause: fire or major chemical release<br>Impact: nonfatal injuries, facility disabled for less than a month, shutdown of road or river traffic |
| S3 | Cause: chemical release<br>Impact: minor injuries and offsite impact |
| S4 | operational problem that does not cause injury or a chemical release with no off-site impact |

Thus, to define threat to a chemical facility, the design basis threat (DBT) is used that includes the type of adversary, the adversary's potential actions, his motivations and his capabilities. According to the U.S. classification scheme, there are three types of adversaries: insiders, outsiders and outsiders in collusion with insiders. Outsiders include terrorists, criminals, extremists, gangs or vandals. Insiders include hostile, psychotic or criminal employees forced into cooperating with criminals by blackmail or threats against them or their families.

In developing the design basis threat (DBT), information is collected from sources like local, state, federal law enforcement and intelligence agencies, including the company's employee data. For possible insider threats, the employee data that must be reviewed include the number of personnel and their positions at the facility, the number of direct employees in relation to the number of contractors, visitors and vendors, and problems that have occurred with direct or contract employees.

After considering all information about the spectrum of threats, threats are categorized in terms of the likelihood of attack. There are defined levels for each category (Table 3).

Table 3: Levels of the likelihood of an attack

| Level | Definition |
|---|---|
| 1 | threat exists, is capable, has intent or history, and has targeted the facility |
| 2 | threat exists, is capable, has intent or history but has not targeted the facility |
| 3 | threat exists and is capable, but has no intent or history and has not targeted the facility |
| 4 | threat exists, but is not capable of causing undesired event |

Site analysis is an essential component of the over-all protection and security system of the facility. In preparing this, the necessary background information includes site drawings, physical protection system features and Process control data.

The physical protection system of a facility has three features: detection, barrier and delay measures, and response to an emergency situation. Detection and the discovery of adversary action is preceded by a sensor (equipment or personnel) that initiates an alarm. The information is assessed and the alarm is determined whether valid or not. Delay is accomplished by fixed or active barriers (e.g.,doors, vaults and locks) or by sensor-activated barriers (e.g., dispensed liquid and foams). Security personnel can be considered an element of delay if they are in fixed and well-protected positions. Response consists of interruption and neutralization of adversary action to prevent accomplishment of his goal and subsequently defeat action.

### The European Response

In Europe, the European Commission developed through its Health Security Committee the Program of Cooperation on Preparedness and Response to Biological and Chemical Attacks[2].

The Directorate General Enterprise of the Commission mandated the EMEA and CPMP to produce a document on the use of medicinal products for the treatment and/or prophylaxis of intoxification by chemical agents. The EMEA/CPMP used a list of substances which was derived mainly from a list compiled by the U.S. Center for Disease Control and Prevention(CDC)[2].

Public health measures varied from one member state to another as such measures depend on availability of medicinal products, decontamination solutions, and the legal, practical and logistic considerations[2].

## ASSESSMENT OF THE PHILIPPINE SCENARIO

In the Philippines, most biological threats to public health and safety emanate chiefly from natural sources. Certainly, serious concerns raised by the avian flu virus, SARS, dengue and meningococcemia tend to overshadow terrorist threats.

On the other hand, the threat of chemical agents, whether deployed as weapons or released by accident, is even less appreciated, perhaps because almost no incidents of mass exposure have been reported in the media. A recent incident of food poisoning in the province of Bohol involving cassava was attributed to a pesticide but conclusive evidence of this has not been made public.

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Yet the threat of intentional short-term exposure to biological and chemical agents cannot be completely ignored. The Philippines, particularly Mindanao, has been used as transit area, staging area, training base or as target of terrorists from

Jemayaah Islamiyah that probably enjoy support from local extremist groups. Moreover, the vulnerability of the country is an open invitation to disaster. Food-borne diseases and poisons can easily be introduced through unregulated street food vendors. The water supply is also vulnerable not only because of relatively easy access to reservoirs but also because of the proliferation of bottled water vendors and the poor state of the distribution system. In addition, there is a wide variety of household and agricultural chemicals that can be obtained easily. Even explosives are in abundant supply, albeit in the underground market. The capability of the Philippine public health system to deal with large-scale exposures is also in question. Any large-scale biological or chemical event, regardless of source, is likely to test the country's force of health workers, treatment facilities and supply of pharmaceuticals (vaccines, antidotes).

To assess the Philippine scenario, the following criteria can be used:

1. Knowledge and perception of the threats
2. Fundamental criteria of readiness identified in the privately funded report[4]
    - workforce
    - laboratories
    - health tracking system
    - communications systems
3. Legislation and public policies
4. International commitments
5. Funding

To assess readiness in the Philippines using the first four criteria, representatives of the following offices were requested to answer a set of questions:

1. Bureau of International Health Cooperation
2. U.P. College of Science
3. U.P. Manila
4. National Bureau of Investigation
5. National Center for Health Facilities and Development
6. Family Planning Service of the Department of Health

7. NCDPC
8. Philpost Health Services Department
9. Philippine General Hospital

## Appreciation of Threats

In the questionnaire, threats were classified into terrorism, natural epidemics and accidents. Perception of the relative importance of the threats appears to be divided, and in the case of terrorism, even contradictory.

Asked to rank the type of threats according to level of importance for action to be undertaken by their agencies, representatives chose natural epidemics as the most important. Natural epidemics received 45% of the responses as most important threat while terrorism got only 36%. In the case of the latter, however, opinion was split. An equal number of respondents ranked terrorism as "most important" and "least important". Accidental release of biological agents was given a rank of "2".

**Table 4: Prioritization of Threats as Perceived by Concerned Agencies**

| | Rank* | | |
|---|---|---|---|
| Type of Threat | 1 | 2 | 3 |
| Terrorist use | 8 | 3 | 8 |
| Natural epidemics | 6 | 3 | 10 |
| Accidental release | 5 | 10 | 4 |

* "1" = least important;
"3" = most important

Among these respondents, 72% agreed with their agency's perception of threats.

## Perception Regarding Specific Biological and Chemical Agents

Respondents gave a variety of responses to the question of what specific biological agents are perceived as threats. A few responded in general terms such as "natural epidemics", "use of biological agents"and "infectious agents". A few others included such items as "food poisoning", "laboratory reference materials", "synthetic toxins" and "biological wastes". The majority listed specific agents. These are listed and classified loosely in Table 5. The classification has been adopted by this author solely for organizing the information.

**Table 5: Specific biological threats cited by respondents**

| Potential biological weapons | Vector-borne [a] and zoonotic [b] diseases | Common Infectious Diseases |
|---|---|---|
| Anthrax | Avian influenza | Pandemic Influenza |
| SARS | Mad cow disease | Tuberclosis |
| Botulism | Plague | Hepatitis B |
| Smallpox | Dengue | Pneumonia |
| Cholera | Typhoid fever | |
| Paralytic shellfish toxins | | |
| Salmonella | | |

a A vector is an organism that carries a certain disease.
b Zoonotic means "animal borne".

Among these specific biological threats, anthrax was perceived to be the most important. However, the number of respondents who recognized its importance was small compared to the total number of respondents. Out of 18 responses, only 5 ranked anthrax as "most important". The rest of the responses were spread almost evenly among the other agents. Remarkably, avian flu, now a clear global threat to health and the poultry industry, was perceived to be "least important". This is probably due to a sense of security afforded by the relative geographical isolation of the Philippines which has resulted in only isolated reports of incidents. This, however, has proven to be false in the light of Avian flu cases reported in Romania and Russia, interception of smuggled poultry and the arrival of migratory birds.

The wide variety of responses,ranging from environmental wastes to specific agents, appears to reflect the absence of any widely accepted scheme for identifying and classifying biological threats in the Philippines. Moreover, since the responses tend to give almost equal importance to known specific agents and failed to clearly identify the most important threats, there appears to be no scheme for prioritizing both potential threats and responses even in the agencies which the respondents represented.

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To the question of what specific chemical threats exist in the Philippines,the replies also varied from the most specific to the more general. If the plethora of responses were to be believed, any chemical qualifies as a threat. Among the general responses were "industrial chemicals", "household chemicals", "laboratory chemicals", "toxic wastes", "air pollutants", "petroleum-based fuels", "organic solvents", "chemical and nuclear weapons", "acids", "alkali" and "pesticides".

## Preparedness Against Threats

### *Initiatives for Identification and Prioritization of Agents*

Half of the respondents reported that they were not aware of any initiative to identify and prioritize chemical threats. The other half either had no valid response or indicated that they were not aware of such initiatives.

According to respondents who registered awareness, the initiatives include

1. Strict implementation of guidelines and penalties
2. Convening of the inter-agency group of the Department of

Foreign Affairs to disseminate information on the Chemical Weapons Convention

3. Creation of the chemical,biological, radiological and nuclear task force in the Department of Health(DOH)
4. Training programs on chemical emergencies
5. Advocacy
6. Seminars conducted by the National Disaster Coordinating Council (NDCC)and the DOH

Respondents are more aware of efforts to meet biological threats. Nearly 85% reported that they know of efforts to identify and prioritize biological threats. These include

- Meetings, workshops and a regional summit to discuss preparedness for avian and pandemic influenza.
- Discussions on the response to the SARS epidemic
- Discussions of NSC, airport and seaport authorities on the preparedness for deliberate use of biological agents
- DOH campaign against dengue, malaria, schistosomia
- Efforts of DOH, BFAR and UP Marine Science Institute to identify microalgal toxins
- Creation of chemical, biological, radiological and nuclear task force in the DOH
- Seminars conducted by the NDCC and DOH
- Advocacy activities in relation to anthrax, SARS and avian flu
- Dissemination of standard treatment protocols to health facilities and local government units
- Establishment of special health units in hospitals
- Networking of good referral systems
- Regular meetings of crisis management committee
- Continuous surveillance in hospitals and LGU's
- Setting up SARS quarantine and management facilities
- Bird flu reporting scheme
- Strict implementation of DENR guidelines and penalties

This assortment of initiatives do not appear to arise from a single plan or strategy and can be viewed as mostly independent, reactive efforts of various agencies. As a result, no clear identification of the most likely biological and chemical threats have been made apart from those that have already presented themselves as natural epidemics.

### *Capability for Rapid Identification of Agents*

The capability to identify chemical agents rests mostly in the Poison Control Unit of the Philippine General Hospital(PGH), the Forensic Laboratory of the NBI and the Crime Laboratory of the PNP. It is believed that some limited capability is also found in some hospitals but this remains to be ascertained.

For the identification of biological agents, the Research Institute for Tropical Medicine, the Philippine Animal Health Center (of the BAI-DA), tertiary hospitals and laboratories for marine microalgal toxins in BFAR and UPMSI can be tapped.

### *Treatment of Victims*

For the treatment of victims of chemical agents, the Poison Control Unit of the Philippine General Hospital(PGH) and tertiary hospitals are to be tapped.

Facilities capable of immediate treatment of victims of biological agents include the RITM,PGH,DOH,San Lazaro Hospital and tertiary hospitals.

### *Leadership and Organizational Preparedness*

As in other countries, threats posed by chemical and biological agents on public health fall within the domain of government. Indeed,the government was identified by most respondents as the sector that is expected to provide leadership in countering these threats. However, an NGO and one university were also mentioned as possible leaders. The lead agencies identified are listed in Table 6. However,there is still a need to identify the single agency that will coordinate the efforts of these agencies. Indeed, the role, function and responsibilities of these agencies need to be specified

in order to form a cohesive organization that can neutralize an emerging threat or respond swiftly to a large-scale disaster.

**Table 6 : L ead a gencies c ited by respondents**

| | |
|---|---|
| Government | Department of Health(DOH) |
| | Department of National Defense (DND) |
| | Department of Interior and Local Government (DILG) |
| | Department of Transportation and Communication |
| | National Disaster Coordinating Council |
| | Philippine Nuclear Research Institute |
| NGO | Haribon |
| Academe | University of the Philippines |

As far as some of the roles are concerned, the participation of some sectors seem to be expected. To identify biological and chemical threats, the government is considered the main actor, but community, NGO and academe were also identified.

Table 7 lists the various agencies and organizations that are thought to be mandated or can be mandated to identify and prioritize threats.

**Table 7: Agencies and organizations that can identify and priotize threats**

| | **Biological Threats** | **Chemical Threats** |
|---|---|---|
| Government | DENR, DOH, RITM, BFAR, DA | DENR, DILG-BFP, DOH, EMD, NDCC, CDCC, EMB(DENR), OSHA (DOLE), RITM, NSC/HEMS/NCDPC, PNP, BFP, DDB, ATO, PCG, AFP, PNRI |
| Academe | UP PGH, NDCP, UP MSI | UP College of Pharmacy, UP CoE-NEC, NDCP, UP PGH Poison Control Unit |
| Community | DILG, LGU | League of Cities |
| NGO | | SPIK |

### *Legislation*

Existing laws that touch on biological and chemical threats range from those that deal with environmental concerns to the local government. These are listed in Table 8.

**Table 8: Relevant legislation**

| | |
|---|---|
| RA 6969 | Toxic substances and hazardous and nuclear wastes control act of 1990 |
| RA 7160 | Local government code |
| PD 1586 | EIS System |
| PD 1566 | Overarching law on disaster management |
| PD 1185 | Fire code |

There are also various laws on the periodic monitoring and management of some bays for algal causative organisms and toxins, and on quarantine.

It is clear from this list that there is no legislation that deals specifically with chemical and biological threats. Such legislation may deal with the regulation of the acquisition, manufacture, transportation and storage of precursors, security measures in installations, and labelling of dangerous substances.

Most respondents reported that they are not aware of any existing policies or legislation concerning threats of biological and chemical agents. Nevertheless, 9 out of 12 respondents view that a new policy or legislation is needed to counter these threats.

## RECOMMENDATIONS

1. Educate the Public. It is very important to educate the public about biological and chemical threats. To quote a non-formal publication of the WHO[8], "an educated public is one that can reduce the burden to health care facilities in the event of an incident, and one that is less likely to succumb to panic."

2. Organize knowledge. There is a need to identify, classify and prioritize biological and chemical threats. The first two tasks are relatively easy since one can

rely on the list compiled by the U.S.CDC. It is really the task of determining the most likely agent to be used as a terrorist threat or to be involved in an accident or natural outbreak that is bigger and more urgent. To determine this likelihood, one can use such criteria as

- availability
- toxicity
- ease of manufacture, handling and delivery
- transportation
- usage

3. Enhance the public health system's preparedness and response capacity. A program for training personnel and creating or upgrading facilities for the rapid identification of biological and chemical agents. Support for research should also be considered, e.g.,

- bacterial studies
- toxin research
- viral studies
- diagnosis
- research on vaccines
- research on detectors

4. Develop a national database of sources. The location of storage, suppliers of chemical ingredients and virulent organisms should be documented for easy accounting of these materials as well as protecting these sites from infiltration or sabotage.

5. Pass preventive legislation. These may include regulation of materials that can be used in developing weapons as well as dual-use equipment or facility and imposition of anti-terrorist and safety measures in chemical facilities. The government must be tasked to monitor or investigate scientific activity which can be used for the dispersal of toxic materials.

It is clear from this list that there is no legislation that deals directly with chemical and biological threats. Such legislation may deal with the regulation of the acquisition, manufacture, transportation and storage of precursors, security measures in installations, and labelling of dangerous substances.

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