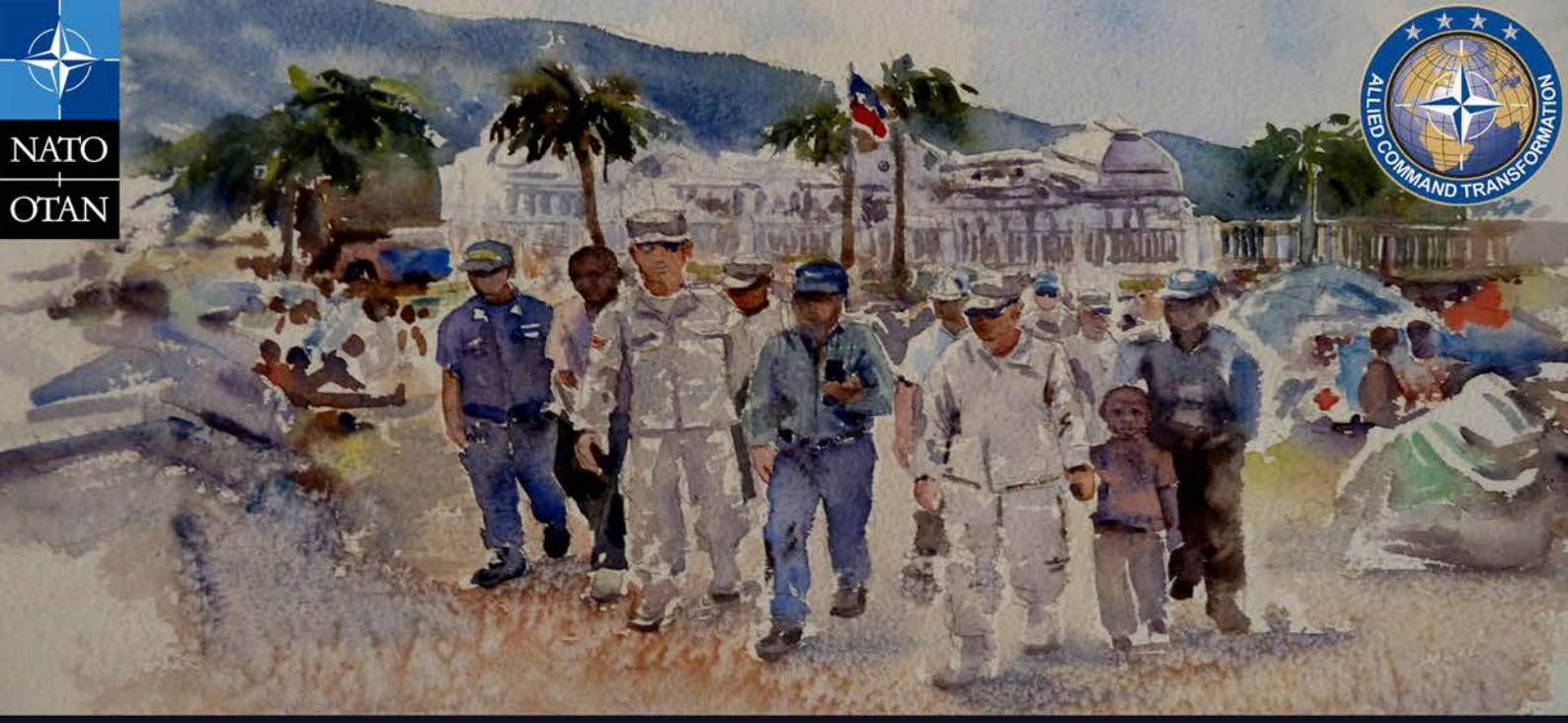

# THE HAITI CASE STUDY

*Working Paper of* the collaborative NATO-Harvard project:

## TOWARDS A COMPREHENSIVE RESPONSE TO HEALTH SYSTEM STRENGTHENING IN CRISIS-AFFECTED FRAGILE STATES


HARVARD MEDICAL SCHOOL
DEPARTMENT OF GLOBAL HEALTH AND SOCIAL MEDICINE

NATO JOINT ANALYSIS AND LESSONS LEARNED CENTRE

HARVARD MEDICAL SCHOOL
DEPARTMENT OF GLOBAL HEALTH
AND SOCIAL MEDICINE

NATO JOINT ANALYSIS AND
LESSONS LEARNED CENTRE

# THE HAITI CASE STUDY

*Working Paper of* the collaborative NATO-Harvard project:

*Towards a Comprehensive Response to*
*Health System Strengthening*
*in Crisis-affected Fragile States*

*This project was conducted jointly by researchers from Harvard Mecical School – Department of Global Health and Social Medicine and analysts from NATO's Joint Analysis and Lessons Learned Centre under the sponsorship of NATO's Allied Command Transformation. Additional funding for this case study was provided by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH.*

27 June 2012

## FOREWORD

A joint study team from NATO's Joint Analysis and Lessons Learned Centre, Harvard Medical School, and Harvard Humanitarian Initiative is engaged in an ongoing study project to infer elements of a strategic framework for health system strengthening in crisis-affected fragile states. The joint study team has adopted a multi-case study approach, and it is with great pleasure that we release this working paper documenting the findings from the subject of the first case study: Haiti after the January 2010 earthquake.

The paper addresses four key themes: the impact of the earthquake and the subsequent cholera epidemic on Haiti's health system; security community participation in health system recovery and reconstruction; coordination mechanisms that facilitated or directed the security community's involvement; and the information generating and sharing mechanisms that allowed the security community to best participate in health system strengthening. Investigations into these four themes were focussed through the use of the three narratives given in the Annexes to this paper.

The outcome of this first case study is a number of key takeaways and food for thought which will inform the research being undertaken by the joint project team as it carries out the subsequent case studies.

We trust that this working paper is informative and we look forward to releasing the papers on the future case studies and the final report detailing the overall project findings and recommendations.

Peter Sonneby
Brigadier General Danish Air Force
Commander,
Joint Analysis and Lessons Learned Centre

Vanessa Bradford Kerry, MD MSc
Director of Global Public Policy and
Social Change,
Department of Global Health and Social
Medicine, Harvard Medical School

# Acknowledgements


## Project Team

Dr. Vanessa Bradford Kerry
Harvard Medical School,
Department of Global Health and Social Medicine

Dr. Margaret Bourdeaux
Division of Global Health Equity Brigham and Women's Hospital

Mr. John Crowley
Harvard Humanitarian Initiative

Cdr. Dr. Christian Haggenmiller
German Navy, NATO – JALLC

Cdr. Luigi Ceppodomo
Italian Navy, NATO – JALLC

LtCdr Andre Thouvenel
French Navy, NATO – JALLC

Capt. Brad Holt, US Navy
NATO – Allied Command Transformation

## Customer Representative

NATO HQ Supreme Allied Commander Transformation
Capability Development Joint Deployment and Sustainment, Medical Branch
Col. Toby Rowland, British Army and Col. Dr. Valerie Denux, French Military Health Service

## Advisory Board

H.E. Ambassador Michel Rentenaar, NATO – Civilian Advisor to the Supreme Allied Commander Europe

Rear Adm. Bruce Doll, US Navy, NATO – Medical Advisor to the Supreme Allied Commander Transformation

Brig. Gen. Peter Sonneby, Royal Danish Air Force, NATO – Commander JALLC

Col. Karlheinz Nickel, German Air Force, NATO – JALLC

Prof. Michael Reich, Harvard School of Public Health – Taro Takemi Professor of International Health Policy

Dr. Jennifer Leaning, Harvard School of Public Health – Director, FXB Center for Health and Human Rights

Dr. Michael Vanrooyen, Director – Harvard Humanitarian Initiative

Dr. Frederick Burkle, Senior Fellow – Harvard Humanitarian Initiative

Dr. Stewart Patrick, Council on Foreign Relations – Senior Fellow and Director of the International Institutions and Global Governance Program

Dr. Stephen Morrison, Center for Strategic and International Studies – Director of the Center on Global Health Policy

# Executive Summary

An effective comprehensive response to health system strengthening in crisis-affected fragile states demands coherent action by all participating actors. A particularly complex challenge in this regard is coordinating the desired outcomes and the required actions of the humanitarian & development and security communities.

A joint team from NATO's Joint Analysis and Lessons Learned Centre and Harvard Medical School is engaged in a study with the overarching aim to infer elements of a strategic framework for health system strengthening in crisis-affected fragile states focusing on optimal use of all global contributions. The approach adopted by the team to meet this aim relies predominantly on case study research.

This report documents the results from investigation of the first case study: Haiti. Haiti met all three criteria established for case study selection: it is a fragile state whose health system was threatened by a major earthquake followed by a major cholera outbreak; there was a global crisis response directed towards health system strengthening; and a multinational military force with a peace-keeping/peace-building or stabilization mandate was present.

Four key themes are developed: the impact of the earthquake and the subsequent cholera epidemic on Haiti's health system; security community participation in health system recovery and reconstruction; coordination mechanisms that facilitated or directed the security community's involvement; and the information generating and sharing mechanisms that allowed the security community to best participate in health system strengthening. Investigations into these four themes were focussed through the use of the three narratives given in the Annexes to this paper.

## Findings

The Haitian government lost significant assets—personnel, infrastructure, communications, records and administrative systems—at a time when their citizens were in the greatest peril and counting on them the most. Additionally, the aid community, including the UN peacekeeping mission MINUSTAH, UN agencies, and aid organizations were also severely affected by the earthquake and were unable to offer robust support of the Haitian state.

Nations responded principally by deploying military assets including logistics, security escorts, rubble clearance, engineering services, and tertiary care, all of which contributed significantly to the overall effort of the international community in responding to the earthquake; the US was the largest bilateral responder.

A coordination architecture for the whole response existed at the strategic level (High Level Coordination Committee), the operational level (Coordination Support Committee), and at the tactical level (UN sector-based cluster system). The key military tactical level coordination mechanism was the Joint Operations and Tasking Center, formed by UN Office for the Coordination of Humanitarian Affairs, MINUSTAH and other key partners, to orchestrate the use of military assets for relief purposes. The US military created the Humanitarian Assistance Coordination Centre to interface with the Coordination Support Committee and the Joint Operations and Tasking Centre.

Coordination among donor nations, the government of Haiti, UN agencies, militaries and relief agencies was a complex web. Personal relationships and friendships among leaders of response entities were instrumental in facilitating coordination mechanisms.

During both the earthquake and the cholera responses, there were difficulties and missed opportunities in processing and sharing important situation awareness information among all actors, despite considerable efforts to do so. However, new ways and means of collecting, processing and visualizing data—for example, social media, cell phone tracking data, Geographic Information Systems, etc.—show significant potential to improve shared situation awareness.

All of the above lead to the overarching finding from this case study: coordination mechanisms and institutional arrangements necessary to undertake a disaster response of this size and magnitude remain underdeveloped and inefficient.

## Takeaways

As this report represents the first in a series of case studies, no specific recommendations are made. But three takeaways have been identified for consideration by global crisis responders to develop future frameworks for strengthening state health systems:

- In an overwhelming, chaotic, disaster situation the security community might be an appropriate contributor to strengthen some elements of the health system: securing the supply chain; contributing to the health service delivery in providing surge secondary and tertiary care to assist health organizations regain their pre-crisis levels of functioning; supporting local and international leadership by providing security to health stakeholders.
- Coordination among the key actors from the humanitarian and security community in the health sector is essential and requires long-term relationship to ensure that: there is mutual understanding among the security and humanitarian communities such that coordination mechanisms are in place prior to crisis responses; interoperability exists between the different coordination mechanisms; threats to health systems are detected and responded to quickly; Host Nation governance over the responders is clarified and supported by all means.
- An efficient and pragmatic way for coordination among the humanitarian and security communities is to create, and for all actors to contribute to, a commonly shared health information picture which is essential for timely service delivery and early detection of health threats. New technologies have the potential to enhance a holistic picture to disaster response.

## Ideas to take Forward

Additionally, three key ideas will help shape the investigations to be carried out in subsequent case studies:

- Weaknesses in other systems (e.g. security) may affect the health system and efforts to address these weaknesses will be considered alongside health system specific activities.
- The most prominent challenge that hampers a coherent and effective response by the security, humanitarian and the development communities is insufficient coordination mechanisms at national/international political level to include the whole spectrum of governmental stakeholders in achieving a common goal. Military initiatives to develop venues on how to contribute to a comprehensive approach are not currently being fully supported by civilian actors either from the security or humanitarian and development communities. Consequently, other ways will be explored that members of all involved communities could be better engaged in common policy, plans, and standing mechanisms for interaction.
- Ways and concepts that can better relate crisis response to longer term recovery and health system strengthening will be investigated.

# CONTENTS

# 1
# INTRODUCTION

1. This report is the first in a series of case studies being undertaken by a joint study team from NATO's Joint Analysis and Lessons Learned Centre, Harvard Medical School, Harvard School of Public Health and the Harvard Humanitarian Initiative that will contribute to an overarching project, due to report in 2013. The overall aim of the overarching project is to infer elements of a strategic framework for health system strengthening in crisis-affected fragile states focusing on optimal use of all global contributions. The intended audience for the project's products is policy and decision-makers in the security and humanitarian & development communities interested in moving towards a comprehensive response to health system strengthening in crisis-affected fragile states.

2. The scope of the overarching project is to examine the relationship between health system strengthening in crisis-affected fragile states and the activities of the security community, particularly through the employment of their military assets in those states. Many of the challenges to health system strengthening come from the need to align the actions of an increasing number of various interested parties, both in preparing for future crises and when responding to an individual crisis. A particularly complex challenge in these respects is coordinating the desired outcomes and the required actions of the humanitarian & development and security communities. Therefore, within this scope, the focus will be on the interface between the security community and the humanitarian & development community: *What challenges were apparent and what options exist to overcome those challenges?*

3. Haiti was chosen for a case study because it was seen to meet the three criteria the team established for cases that would yield the insight needed to meet the overall goal of the project. First, Haiti is a fragile state whose health system was threatened by a series of human security crises—a major earthquake followed by a major cholera outbreak. Second, there was a global crisis response directed towards health system strengthening. Third, a multinational military force with a peace-keeping/peace-building or stabilization mandate was present.

4. A great deal of literature has been produced examining the Haiti earthquake and the international response to it, much of which has served as source material for this case study. It is not the intention of this report to duplicate that literature or to serve as a historical record of events in Haiti since the January 2010 earthquake. For that reason, this case study's findings will be based on a carefully selected set of narratives that the team believes best illustrate the lessons from Haiti that we think will be most useful in addressing the overarching project's overall aim. The narratives used to reach the case findings are presented as Annexes to this report. The report's principal findings and conclusions are presented in the chapters that follow here in the main body. Findings from this case will be used to guide the research focus in subsequent cases as we investigate their validity in other settings.

## METHODOLOGY

5. The research was carried out over five months as an exploratory case study. The project proposal was submitted to the Harvard Medical School and Haiti Ministry of Health for ethics review and approved in Fall 2011. The interdisciplinary five member study team from Harvard and NATO progressed through four phases of data collection and iterative analysis: background research, background interviews, field-based data collection, and data analysis & report writing. The joint civilian-military study team allowed unparalleled access to both the military and civilian actors and perspectives.

6. The fundamental unit of analysis in this project is the health system in the fragile state, in this case the Haitian health system. The team used the Health System "Building Block" Framework from the WHO as a guide for considering how the security community may have impacted aspects of Haiti's health system. The WHO describes health systems as consisting of six elements or building blocks: service delivery, health workforce, information, medical products, vaccines & technologies, financing and leadership/ governance. In the model, these building blocks contribute to improved health of the population, improved responsiveness to the population's health needs, increased social and financial risk protection and improved efficiency.[1]

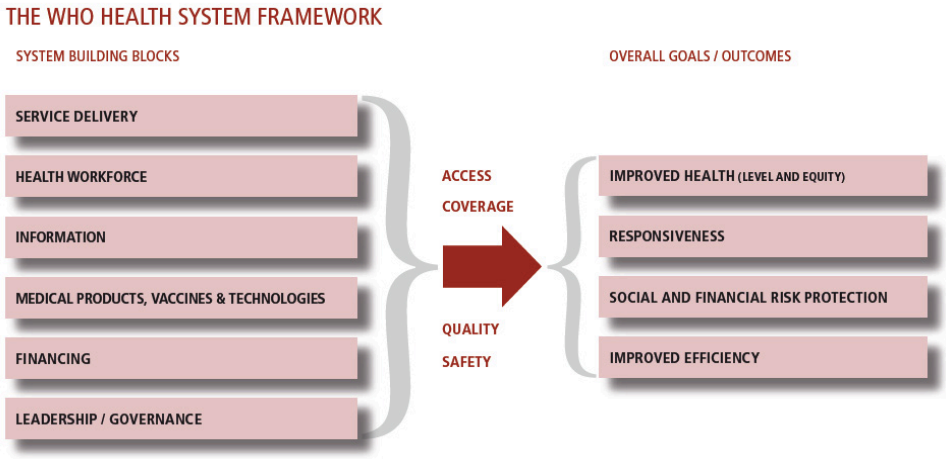


Figure 1: The WHO Health System Framework

7. Four questions for this case were also formulated to guide the research within the context of the chosen health system framework and with the final project aim in mind. These four questions were:

- How did the disasters (January 2010 earthquake and subsequent cholera epidemic) impact Haiti's health system?
- How did the security community participate in health system recovery and reconstruction when responding to the disasters?
- What were the coordination mechanisms, both formal and informal, that facilitated or directed the security community's involvement?
- What were the information generating and sharing mechanisms that allowed the security community to best participate in health system strengthening?

## Phase one: Background Research

8. The study team conducted a comprehensive review of scholarly articles, written interviews, after action reviews, lectures, websites, relevant NATO and US doctrine, and newspaper and magazine reports about the international response to the Haiti earthquake, with a particular focus on where military assets made direct contributions in health sector response and reconstruction, and how these assets coordinated with other responders during participation. This phase took place from September 2011 to November 2011.

## Phase two: Background Interviews

9. The study team held discussions with key personnel who the study team knew to be knowledgeable about Haiti's health sector, governance, history, and with events after the earthquake. Based on information from these background interviews, the study team generated a data collection plan that included specific questions and an initial list of stakeholders to be contacted to participate in formal semi-structured interviews. In order to encourage participants to share their candid views and protect them from political or social

liability, we agreed all comments would be “not for attribution”, nor would we disclose the identity of the participants or the specific organization they worked for. This phase took place from October 2011 to November 2011.

### Phase three: Field-Based Data Collection

10. The study team travelled to Haiti for a total of 23 days and conducted interviews with those on the initial stakeholder list as well as subsequent stakeholders identified during these initial interviews. During field data collection the team also attended meetings, visited public and private clinics and health organizations, and held informal round table discussions with personnel from a variety of organizations. In total, the joint team conducted 40 interviews with officials known to have been involved in the earthquake response and subsequent reconstruction effort, including key representatives from:

- the Haitian public health and civilian protection sectors
- non-governmental agencies
- the private sector
- bilateral donor agencies
- UN agencies
- the UN Stabilization Mission to Haiti (MINUSTAH)
- the most prominent military response organizations
- foreign diplomatic representation

11. The interviews were semi-structured. Each interview was tailored to the specific background of the participant and the aspects of health system strengthening they were involved in. Each interview included a discussion of: the participants role and involvement in Haiti’s earthquake response and health system protection or recovery; their understanding of the major challenges faced in addressing the Haitians’ health needs; their perspective on the security community’s impact on health system protection and recovery, the information and coordination mechanisms they used to interact with the global response and/or security community, and their perceptions of what went well and what could have been improved in terms of recovering and strengthening Haiti’s health system in the aftermath of the earthquake and cholera outbreak. As with the background interviews, all field interviews were conducted on a non-attributable basis.

12. Interview notes were compiled into interview transcripts which were then reviewed by the study team with the salient issues and recurrent themes extracted. This phase concluded in January 2012.

### Phase four: Data Analysis and Report Writing

13. The data collected in the previous phases was reviewed and further investigated through additional targeted research, including additional interviews, which refined and deepened the team’s understanding of the salient findings. With this deeper understanding the team identified the key themes and issues and selected the major stories to develop into narratives that would best illustrate these themes. Narratives were built around instances of when the security community impacted one or more aspects of Haiti’s health system, the coordination and information sharing mechanisms relevant to the instance, and the success and challenges implicit in the example that illustrate how all global actors can work together to best support health system strengthening in future crises.

14. A draft report was written and circulated for comments and feedback to informal advisors familiar with health system strengthening issues, military policy, and civilian military interactions, before being presented to the Advisory Board on 18 March 2012. Based on the

feedback from the Advisory Board and other commentators, the final draft of the case study report was prepared. Final review and editing of this report took place in May 2012.

### Limitations

15. A five-month exploratory case study possesses inherent limitations. However, the time elapsed since the event will have shaped participants' recollection of events and influenced their judgments of what events were important and which stakeholders they now consider influential.

16. Additionally, the time-limited nature of the study prevented the research from continuing until all possible leads had been followed and forced the team to focus their research on the most accessible parts of the story. We confronted constant trade-offs between exploring specific issues in depth and capturing the breadth of issues relevant to the security community's involvement in the health sector. These trade-offs and decisions were discussed among the study team systematically and at length both during the fieldwork and during the production of this report. We attempted to strike a balance, with the issues presented in this report representing the most salient and notable ones relevant to developing elements of a strategic framework for health system strengthening in crisis affected fragile states.

17. Given these limitations, the findings put forth in this study should be viewed as preliminary—ones the team will continue to explore in detail over the coming 18 months and beyond.

# 2
# THE HAITI CONTEXT

18. Haiti, an impoverished country with episodic political instability, faced two major disasters within one year: the earthquake and a cholera epidemic. The disasters differed in nature but both posed a significant challenge to Haiti's health system and a threat to the state's legitimacy. The earthquake destroyed not only much of the country's governance and infrastructure but it also caused damage to the facilities and human resources of the existing foreign humanitarian organizations and specifically to the leadership of the UN stabilization mission to Haiti MINUSTAH.

19. On Tuesday 12th January 2010 at 16:53 local time, a magnitude 7.0Mw earthquake hit Haiti. The epicentre was located approximately 25km west of Port-au-Prince, Haiti's capital. The Haitian government estimates more than 220,000 people were killed in the earthquake and 300,000 people seriously injured.[2] The affected population in Haiti was around 3 million, nearly a third of the total population of around 10 million.[3]

20. Ten months later Haiti was plagued by what is now the largest cholera epidemic in the world, which, as of March 2012, has killed upwards of 7,000 civilians and infected 500,000.[4] In the initial phases of the epidemic, fatality rates were estimated to be as high as 9%—before falling to 1-3% five months later; it should be noted that a well-managed outbreak is currently defined as a fatality rate less than 1%.[5] This epidemic has proved to be the biggest shock to the health sector and cholera, a disease previously unknown to Haiti, is now likely to become endemic.[6]

21. Understanding why the earthquake and the subsequent cholera epidemic wrought such devastation requires a sense of Haiti's historical sources of fragility and vulnerability. This chapter aims to provide a brief overview of Haiti's history, the nature of Haiti's health system, and the level of involvement of foreign actors in Haiti prior to the earthquake. It will look at conditions in Haiti prior to the earthquake, justifying our designating it a fragile state and giving an idea of both the level of involvement of foreign actors and the state of its health system.

## HAITI—A BRIEF HISTORY

22. Haiti achieved its independence in 1804, defeating the French to become the first independent former slave republic in the Americas[7]. The new nation, however, immediately faced diplomatic and economic embargoes imposed by the United States and Europe, which recapitulated the extractive qualities of colonialism from which the country had just escaped[8]. Over the subsequent decades, debt to France, a US military occupation from 1915 to 1934, dictators, coups and conflicts created instability, which hampered Haiti's ability to develop economically, politically and socially.

23. Haiti has been politically volatile for decades, which has made stable economic and development policy difficult to enact. It has had few democratic transfers of power since its independence. Shaking free of a prolonged and stifling dictatorship, Haiti elected Jean-Bertrand Aristide to power in 1990. His first term was abruptly interrupted after 7 months by a military coup. Reinstated in 1994 by US intervention, he passed power to Prime Minister Rene Préval after the 1995 election only to be re-elected to President in 2001[9]. Aristide was again ousted in a coup in 2004 that has been controversial as some believe it was backed by the Haitian elite and the US government; this has been adamantly denied by many US policy makers[10]. To promote stability, MINSUTAH, a UN stabilization mission, started in 2004; it was intended to help support the transitional government, address political and criminal violence, assist in disarmament and demobilization of armed factions and enforce the rule of

law[11]. In 2006, Rene Préval again was elected president and remained so until 2011. President Préval is the first Haitian president to be democratically elected to a second term.

24. Though elected more than once, President Aristide's rule was marred with political challenge which has created barriers for Haiti's foreign investment and development. Concern over corruption and Aristide's leftist policies led the donor community, and the US in particular, to refuse money to his government and funnel it instead to largely foreign based NGOs[12].

25. This lack of stable, credible governance and finance, as well as a lack of trust between Haitian leadership and powers beyond its borders, led to the government's inability to perform basic functions, like issuing birth and death certificates and land deeds, regulating industry and providing and enforcing building codes, much less providing health and education services[13]. In addition, environmental vulnerabilities went unaddressed, most notably deforestation for the purposes of charcoal production, which is Haitians main source of fuel. Only an estimated 2% of Haiti's forests remain and this has led to a fragile environment with landslides and devastating floods wracking Haiti's hurricane vulnerable and erosion prone coastline[14]. In 2001, Haiti remained the least water secure nation in the world[15]. Haiti is a fragile state indeed and one frequently affected by and vulnerable to crisis.

## A Crisis-Affected Fragile State

26. In July 2010, Active Learning Network for Accountability and Performance in Humanitarian Action (ALNAP), in partnership with the UN Evaluation Group, published a Haiti Context Analysis report whose purpose was to "*provide a useful contextual background for operational reflection [and to] serve as a sound and shared foundation for evaluative efforts going forward*"[16]. The project team found that this report provides a solid summary for understanding the historical, political, and social context of Haiti as a fragile state prior to the earthquake.

27. The ALNAP report summarizes Haiti's political and social context as follows:

> *"Haiti has endured political instability, chronic challenges in governance and the highest levels of poverty in the Western Hemisphere. According to several indexes measuring states' fragility, Haiti performs particularly poorly ranking twelfth out of 177 countries in the Failed States Index and 129th of 141 countries according to the Index of State Weakness in the Developing World…"*
>
> *"The rapid urbanisation has a negative impact on the local environment and the country's natural resources. In 2007 45.6 per cent of the population lived in urban centres that have more than doubled in size since 1982. As a result vulnerable populations live in high-density and often appalling living conditions in slums, triggering public health and other problems."*

28. In light of this political and social context, the ALNAP report concludes that "*the country is highly vulnerable to disasters such as floods, landslides, storms, hurricanes, tsunamis and earthquakes. Between 2001 and March 2007, disasters resulted in 18,441 deaths, 4,708 injuries and 132,000 homeless; some 6.4 million people were affected and damage was estimated at USD4.6 billion*".

## The Health System

29. Prior to the earthquake, Haiti's population suffered from some of the worst health outcomes in the Western Hemisphere, worsening with eruptions of political strife, divestment of aid to the public sector, embargoes and coups.[17] Comparing Haitian health outcomes to those of the Dominican Republic, its only neighbour, is particularly illustrative of Haiti's plight. Life expectancy in Haiti is 63 years compared to 72 in the Dominican Republic. 76 children per 1,000 live births will die before their fifth birthday in Haiti, compared with 24 in the

Dominican Republic. The measles vaccination rate is only 58% in Haiti, compared with 95% in the Dominican Republic.[18] Indeed, while Haiti has made tenuous progress in achieving development goals over the past decade, Haiti's health outcomes are more similar to those of Sub-Saharan African nations than those of its regional neighbours.[19]

30. The government entity responsible for public health and the health system is the Ministry of Public Health and Population (MSPP) of which the Ministry of Health (MOH) is a subdivision. MOH leadership is represented at the federal, departmental (regional) and community level.[20]

31. The national budget for health garners only an estimated 4% of the national budget[21]—below regional average—or USD65 per head per year according to ALNAP. Frequent disruptions of health system financing have provoked strikes by employees of the public system and stripped health officials of the ability to oversee or enforce regulation of the sector. Payment for health services is based largely on user fees, where patients pay for their own care out of pocket. It has been postulated that user fees in a country where more than 70% of people live on less than two dollars a day, have been found to significantly reduce use of health care services.[22] Only about 1,500 public service employees receive social insurance which covers health care costs at public facilities. Private insurance is a rarity. Many with the means to travel seek medical care in the US, Canada and other Latin American countries, thus funding foreign rather than local health systems.[23]

32. Human resources in health are severely limited with fewer than 6.5 doctors per 10,000 Haitians (WHO recommends 25 per 10,000) and many of Haiti's health workers migrate to other countries after training.[24] Of note, one strength of Haiti's health workforce has been community health workers who are credited with playing a major role in containing Haiti's HIV epidemic in the 1990s.[2526]

33. Because of the limited capability and financing of Haiti's public health sector, international organizations (IO), foreign government agencies and NGOs funded by foreign donors have played a central role in the delivery of health services in Haiti under the coordination of WHO. Bilateral aid also plays a prominent role in Haiti's health sector. For example, Cuban doctors rotate through Haiti's public hospitals as a standard component of their training.[27] Haiti's health supply system is entirely operated by external actors—in the 1990s Pan American Health Organization (PAHO) started a pharmaceutical and medical equipment supply system, called the Programme de Médicaments Essentiels (PROMESS). The PROMESS warehouse in Port-au-Prince supplied all public facilities as well as many health care NGOs.[28]

34. NGOs play perhaps the most prominent role in Haiti's health system. Health NGOs have ranged from large, multinational groups to small faith-based organizations with personal or cultural ties to Haiti. Some estimates put the number of NGOs in country prior to the earthquake as high as 10,000, and they provided an estimated 75% of health services to the Haitian people.[29] Their relative strength in comparison to the Haitian government and their long standing presence in the country has earned Haiti the informal designation of the "Republic of NGOs."[30]

35. Perhaps the most significant dynamic in Haiti's health sector is the leadership's limited influence over the planning and activities of the numerous foreign actors, including NGOs, in the health sector. While most health NGOs work with the tacit support of government officials, some officials interviewed during the course of this project noted that their ability to confront or challenge NGOs not complying with national health plans or agreements is severely limited because NGOs enjoy the support of both the communities they serve and their foreign donors.[31]

## CONTRIBUTIONS OF GLOBAL ACTORS

36. Since Haiti is a crisis-affected fragile state, it should come as no surprise that there is a great deal of involvement by foreign actors in the country, interacting with most of the country's systems, including the health system. These actors run the gamut from International aid agencies to the various UN humanitarian agencies (through the "cluster system), the World Bank, and bilateral governmental aid donors such as the US Agency for International Development (USAID). In addition to the governmental and international bodies active in Haiti, it is estimated that—as described in the next section of Haiti's health system—over ten thousand NGOs were operating in Haiti prior to the earthquake[32]. And, of particular relevance to this report, Haiti has hosted a UN stabilization mission since 2004 called MINUSTAH (from the French version of the mission's official name: *Mission des Nations Unies pour la stabilisation en Haïti*).

37. To understand the extent of the role played in Haiti by global actors, it is instructive to again refer to the context provided by the ALNAP report. Official development assistance funding for 2008 totalled nearly one billion US dollars, nearly 13% of GDP, of which approximately one fifth was humanitarian assistance. According to the OECD[33], the largest donors were the United States, Canada, the Inter-American Bank and the European Commission. Additionally, the international community spent 575 million US dollars on stabilization and peacekeeping in 2008[34].

38. The role of the UN in Haiti is particularly noteworthy. MINUSTAH, which replaced an earlier UN force in 2004 following the coup against Jean-Paul Aristide, has the mandate to ensure a secure and stable environment, and in 2009 was further tasked with supporting the Haitian political process. MINUSTAH's authorized strength when the earthquake struck was 6940 military personnel and 2211 police. MINUSTAH has played an important role in reducing gang violence in Haiti's slums[35] and, thanks to the combined efforts of the Haitian authorities, the United Nations, and the international community, violence had largely been removed from politics, public security mostly restored, and crime reduced[36]. In 2009 the UN also appointed a special envoy to Haiti, the former U.S. president Bill Clinton, whose role is to "Work with the Haitian Government and people as they implement their vision for recovery and beyond in an effort to maximize job creation and sustainability". The Special Envoy plays an important role in seeking pledges for official development assistance. Besides the special envoy and MINUSTAH, multiple other UN agencies and bodies were represented in Haiti prior to January 2010.

39. All of these global actors ostensibly work in support of the government of Haiti, but, as stated in by the International Crisis Group in a 2009 report on the state of Haiti's environmental protection, coordination among them prior to 2010 has not been optimal:

> *In the absence of effective state policies, foreign assistance has sought to fill the void, but a clear strategic and comprehensive policy approach does not exist. Funding fluctuates in accordance with political circumstances, donor strategies vary, and the government has little influence over the use of funds. Project visibility, not good results, is often the priority.*[37]

40. During the several natural disasters which affected Haiti during the first decade of the new millennium, the international community present in Haiti made efforts to coordinate its response and work with Haitian authorities to reduce risk from natural disasters; in 2008, in anticipation of the hurricane season, a UN cluster system was rolled out. The ALNAP report cites the positive impact on coordination of these efforts but notes that other observers continued to see a "striking disconnect" between the international community and Haiti. In particular it notes that "*A study of NGOs operating in Haiti observed that while larger international NGOs' efforts to coordinate amongst themselves have proved successful, smaller, grassroots organisations face constraints in time, money or modes of communication to access and coordinate with other like-minded organisations*".

### Summary: The Haitian Health System's Status Quo

- Haitians largely pay for health care out of pocket and suffer from the worst poverty and health outcomes in the Western Hemisphere.
- IOs, foreign government agencies and, in particular, NGOs funded by foreign donors have played a central role in the delivery of health services in Haiti because of the limited capability and financing of Haiti's public health sector.
- Haiti loses a substantial portion of its Haitian-trained physicians and nurses through emigration to other countries.
- The public health system has an internationally managed medical supply chain.
- Haitian leadership has limited regulatory authority over the activities of the numerous foreign actors, including NGOs, in the health sector.

# 3
# HAITI AFTER THE EARTHQUAKE AND BEYOND

41. While the earthquake was itself an unparalleled humanitarian disaster, its catastrophic implications for almost all leading organizations in Haiti transformed it into to a state-threatening mega-disaster. The institutions—the government, the UN, the aid agencies and the NGOs—that would ordinarily manage a crisis were themselves incapacitated by it.

42. The Government of Haiti (GoH) lost people, infrastructure, assets and administrative information. The presidential palace, the legislative building and 28 of 29 ministry buildings collapsed.[38] Among the destroyed capabilities were some critical to disaster response including the National Disaster Risk Management System (NDRMS) and the Emergency Operations Centre of the Direction de la Protection Civile (DPC), although the latter immediately regrouped and became operational within hours, despite their lack of communications and office space.[39]

43. The earthquake also compromised the mandated international security force, the UN stabilization mission, MINUSTAH. Among MINUSTAH's 171 fatalities from the earthquake were MINUSTAH's Head of Mission and Special Representative of the Secretary General Hédi Annabi, his deputy Luiz Carlos da Costa, the Acting Police Commissioner Douglas Coates. It destroyed MINUSTAH's headquarters and many office buildings. In the early days of the response, MINUSTAH focused on rescuing its staff and recovering its operational resources[40].

44. Many UN bodies, NGOs, bilateral government agencies and IOs, which the fragile state of Haiti had previously relied upon to help the state function, found themselves in a similar position to the Haitian government and MINUSTAH. For example, according to UN Office for the Coordination of Humanitarian Affairs' (OCHA) After Action Review, the "centre of gravity" for the UN response shifted to the Department of Peacekeeping offices in New York, which was able to stand up faster but was much farther from the centre of activity and need.[41] As one participant stated, *"We were in no position to help anyone—we couldn't even help ourselves!"*[42]

45. The devastation wrought by the earthquake on the already fragile state of Haiti, as summarized by principal system in the following table, compounded the impact of the cholera epidemic that was to strike ten months later.

Table 1: Disaster Assessment according to US DOD Center of Excellence for Disaster Management and Humanitarian Assistance.[43]

| HAITI (affected areas) - Systems | Pre-earthquake | Post-earthquake |
|---|---|---|
| Infrastructure | 289 km roads functional | 69 km roads, 4 bridges damaged |
| Port Systems | Two docks at Port-au-Prince | 0 docks functional |
| Airfields | 1 major airport | No control tower, damaged terminal |
| Public Health | 49 hospitals | 19 hospitals functional |
| Education | | 1,300 educational institutions collapsed |
| Gov. Administration | 15 govt ministries | 2 govt ministries functional |
| Judiciary | | 49 justice-related buildings damaged |
| Public Security | | ½ police missing, widespread looting |
| Financial System | | Banking services disrupted for 13 days |
| Industry & Business | Economic growth 3.6% | -8.5% |
| Food Production Systems | 40% of households w/ food insecurity | 52% |
| Energy | | Disrupted 2-3 weeks |
| Wat/San | 70% water coverage - | 0-60 % coverage |
| Telecommunications | 40 per 100 persons (mobile) | 0 (radio only) |

46. The following sections discuss the disasters' effects in Haiti and the security community's involvement in the international response in terms of the case questions we posed in the methodology.

## The Disasters' Impact on Haiti's Health System

### How did the disasters (January 2010 earthquake and subsequent cholera epidemic) impact Haiti's health system?

47. The earthquake unmasked health leadership's lack of assets and authority. It destroyed the MoH building and left health leaders without transport, offices, computers, telephones, staff, information and ways to get information. This made taking charge of the response impossible. It also destroyed financial databases, payroll documents and the administrative data they contained.

48. The earthquake caused significant structural and functional damage to 30 out of 49 hospitals in the affected regions, including l'Hôpital de L'Université d'Etat d'Haïti (HUEH)—Port-au-Prince's General Hospital, the 700-bed main referral and teaching facility in the country. Much of the damage occurred in secondary and tertiary care centres, while 90% of primary health clinics were left structurally intact.[44] Of the three secondary level medical treatment facilities in Port-au-Prince, the emergency facility of Martissant only was operational after the earthquake[45], while the Argentine MINUSTAH field hospital was one of the few medical facilities still operating in the capital.[46]

49. The earthquake and the response disrupted the health workforce as well. Mortality of health workers was relatively low (61 individuals out of 5,879 as surveyed by the Ministry of Health). However, the significant exception was nurses and physicians in training—the earthquake killed the entire second year class and teaching staff of the nation's largest nursing school, and damaged three out of four medical schools. Displacement, dispersion, and social disruption due to loss of family members and homelessness inhibited health professionals from adequately staffing medical centres in some instances.[47] While many

Haitians continued working in the public sector, a significant loss of staff did occur in the public sector through the hiring of staff by foreign response organizations, a practice referred to as “poaching” which, combined with emigration of Haitian doctors and nurses, continues to contribute to a shortage of indigenous health professionals.

50. Communication systems which might ordinarily enable the healthcare system to coordinate patient triage and transfers were also not functional: landlines were inoperable (for weeks, ultimately); all three principal cell phone networks were down or overloaded; internet connections, which would rely on both electricity and a functioning infrastructure, were inoperable (except for satellite dish-served users who had residual power).[48]

51. The PROMESS warehouse fortunately had been restocked in the months before the earthquake and it sustained little structural damage. However, the roads and communications to the warehouse were disrupted or damaged. Also, the warehouse was unprepared to deal with the massive influx of medical aid supplies channelled through it during the earthquake response.

52. With respect to health system financing, while care was provided without charge for the first few months after the earthquake, little reform of the health payment arrangements has taken place since then. The World Bank assumed the role of fiscal agent for the Haitian government and temporarily took over payroll functions for federal employees.[49] However, sustained donor funding for direct budget support has been difficult to maintain. Several unique arrangements to fund the salaries of public sector health employees materialized including one scheme whereby the American Red Cross temporarily paid the salaries of Haitian public health sector employees. This process was fraught with administrative and bureaucratic difficulties. [50]

53. The subsequent cholera epidemic did not in itself massively degrade the health system, but it showed that the health system strengthening following the earthquake had not reached a stage where the health system could cope with a threat of such magnitude.

54. In order to summarize the changes the disasters' caused to the state of the Haitian national health system, we used the WHO Health System Building Blocks Framework as depicted in the following table.

Table 2: Summary of impacts to Haitian national health system

| WHO Framework Component | Before | After |
|---|---|---|
| Service Delivery (Infrastructure) | Perhaps the most significant dynamic in Haiti’s health sector—one typical in fragile states—was the leadership’s limited influence over the planning and activities of the health sector relative to numerous foreign actors, including NGOs that provide about 35% of the health services in the country. | 60% of the hospitals were severely damaged or destroyed, including the only national teaching and reference (tertiary) hospital. The international responders brought a wide spectrum of care: primary (most of the providers), secondary and very little tertiary care. This surge of care capability was limited to the disaster response. There is progress in restoring and developing health service delivery but basic health needs remain unfulfilled. |

| WHO Framework Component | Before | After |
|---|---|---|
| Health Workforce (Human Resources) | Human resources in the health sector are severely limited with fewer than 0.25 doctors per 1000 Haitians and more than 80% of its health workers migrating to other countries within two years after training. | Haiti's health workforce remains underdeveloped with many public care centers underfunded and understaffed. |
| Information (Systems) | Basic communication system was used among healthcare providers mainly through landlines and cell phones. Internet bandwidth was poor. Responders to earthquake had almost no relevant health information that could contribute to a more effective response. | The earth quake affected landlines for weeks. Local cell phones were mostly not destroyed but overwhelmed by the amount of users that caused shortage in capacity. Foreign cell phone providers temporarily supported the capacity. Many had to rely on Internet via satellite. Governmental organizations and NGOs voluntarily contributed to one of the best health pictures in the region, however, this was mostly on individual sites (patchwork) instead of to a common comprehensive one. |
| Medical Products, Vaccines & Technologies (Supplies) | Since 1990s Haiti had a pharmaceutical and medical equipment supply system called PROMESS. The PROMESS warehouse in Port-au-Prince supplied all public facilities as well as many health care NGOs. The PROMESS warehouse fortunately had been restocked in the months before the earthquake and it sustained little structural damage | The main issue after the earthquake was the disruption of the logistics and access to the supplies which was mainly recovered. The large dependency of the Haitian health system on foreign supplies hasn't changed and faces new challenges as donors and NGOs are withdrawing after the initial surge of the disaster response |
| Financing | Less than 4% of national funding invested in improving the abysmal health status of the population. Health financing relies largely on user fees, a system known to serve as a prohibitive barrier to access for the impoverished. In Haiti, where more than 80% of its 10 million in population lives in extreme poverty, few are able to access the minimal care available. | Haiti's health system remains chronically underfinanced. For example, just one NGO has more financial power than the Haitian government (USD80M versus USD120M annual budget). The Consolidated Appeals Process (CAP) from 2011 only financed 55% of Haiti's request and the CAP for 2012 has received only 9% in the first five months of the year. |
| Leadership (/Governance) | The national leadership is generally regarded as weak had to face the specific challenges in Haiti. There were three sectors with separate and independent leaderships:<br>a) the Haitian government and its public health sector<br>b) the UN mandated agencies and<br>c) the "Republic of NGOs" . | The earthquake had an impact on all actors and leadership chains in Haiti. The MOH building itself collapsed, killing more than 200 staff. MINUSTAH lost their leadership and main offices. The response required leadership that had to be created during the actors pouring into the country. The amount of actors and their diversity led to many independent structures of leadership. |

## Security Community and the Health System

### How did the security community participate in health system recovery and reconstruction when responding to the disasters?

55. The Haitian government declared the emergency within several hours after the earthquake and President René Préval immediately reached out to the international community to request relief assistance. Nations responded, in large part by deploying military assets. Nations turned to their militaries to provide response assets for a variety of reasons including their ability to deploy immediately and in large numbers, their engineering and logistics capabilities, and their trauma care resources. The Inter-Agency Standing Committee (IASC) Report gives an overview of international military contributions offered by single and ad-hoc groups of nations:

> *Twenty-six countries, including Argentina, Canada, France, Russia, the United Kingdom, and the US, provided significant military assets in support of the earthquake response, including field hospitals, troops, military aircraft, hospital ships, cargo ships, port handling equipment, and helicopters.*[51]

56. The United States was the largest bilateral responder to Haiti's earthquake given its proximity and numerous historical and political ties to Haiti. More than a dozen US government agencies participated in the response, which was led by the US government's development office, the USAID. The US Department of Defense under Operation UNIFIED RESPONSE provided the overwhelming bulk of the United States' relief contribution, deploying 22,000 personnel, 17 ships—including a hospital ship and several large amphibious ships equipped with tertiary care hospitals—and more than 100 aircraft to the response effort. These forces were formed into Joint Task Force (JTF) Haiti under the command of US Southern Command's Deputy Commander, Lt General Ken Keen, who happened to be present in Haiti at the time of the Earthquake on an official visit to the country.

57. Most of the military assets deployed were under national or multinational civilian leadership and control and were mandated to provide immediate relief. In so doing military forces participated in a wide range of activities: search and rescue, running the airport, reopening the port, clearing rubble, distributing aid, directly providing medical treatment, participating in housing reconstruction plans, and providing security. [52] The US forces were instructed to "save lives" and "mitigate human suffering" by the Joint Task Force Haiti commander; the three priorities in this effort were to provide critical medical aid, distribute food and water, and support search and rescue efforts[53].

58. Besides providing relief, it was also assumed that security, both for one's own responders and for Haiti in general, would be a major concern in the disaster response since security organizations themselves were severely impacted by the earthquake.[54] The Haitian police headquarters and 54 Police stations were destroyed in the capital and about 6000 prisoners escaped from unattended or damaged prisons.[55] MINUSTAH itself had been badly affected by the earthquake.

59. Given the uncertain security situation, Nations had different approaches regarding the security requirements of their troops: some deployed combat ready security forces wearing body armour; others arrived in fatigues with only light side arms; and still others adopted a low military profile with focus on the medical and humanitarian relief[56]. The various postures were reported to have had an impact on the public perception of their role, with some worried that the influx of heavily armed troops denoted a military agenda. For example, one Haitian official said, "they must have thought we were the worst people in the world to come so heavily armed."

60. One of the first priorities of the JTF Haiti commander was to coordinate with the MINUSTAH Commander on the provision of security, for which MINUSTAH, despite its

losses, assumed the lead role, allowing JTF Haiti and other military responders to concentrate on saving lives. On 19 January, the UN Security Council broadened MINUSTAH's mandate to *"to support the immediate recovery, reconstruction and stability efforts".* Forces were increased from 6,940 to 8,940 in the six weeks subsequent to the crisis, incorporating 19 contributing nations' military contingents.[57]

61. Most participants agreed that in general the military assets contributed significantly to the overall effort of the international community in responding to the earthquake. There was much less agreement on their value during the cholera outbreak. Some contributions after the earthquake, such as the opening of the airport and thereby enabling all responders to access the disaster zone, were so essential that, arguably, the relief effort could not have succeeded without them. The study team determined that the security community were involved in supporting the disabled health system in the following areas:

- Support to the impacted leadership (Contributing to security)
- Recovery of aid and medical supply chains (Opening air-sea port, clearing roads, Contribution to transportation)
- Provision and protection of health service delivery (Providing secondary & tertiary care as last resort, Contributing to security)

62. They also showed potential to help in the following areas:

- Support to help service delivery organizations regain capacity (Contributing to security)
- Monitoring and aggressively responding to epidemics (Contributing to health picture, Contributing to security)

63. These contributions had an impact on many of the WHO Health System Building Blocks as shown in the following figure:

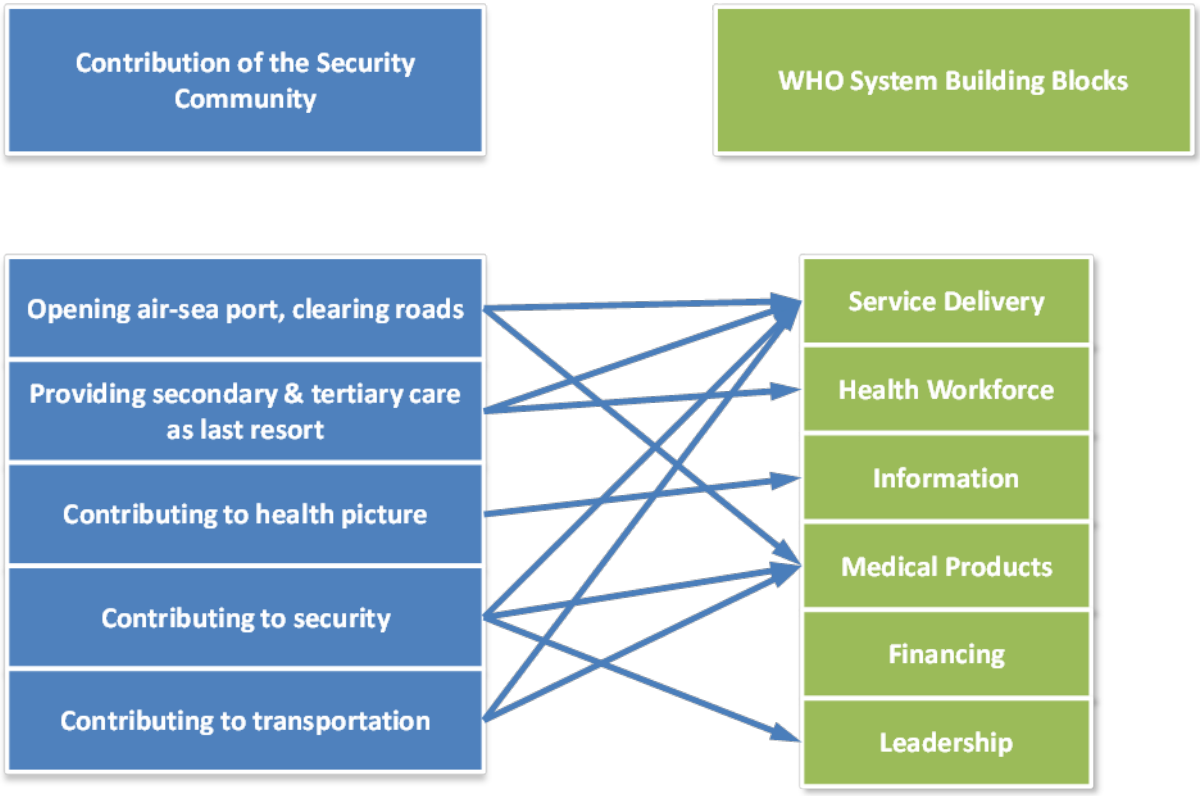


Figure 2: Contributions of security community linked to WHO Health System Building Blocks

## Coordination Mechanisms for the Security Community

### What were coordination mechanisms, both formal and informal, that facilitated or directed the security community's involvement?

64. Because the scope and scale of the disaster was so large, no single multinational organization or nation could respond adequately alone. Rather, the response inspired some nations to marshal new *whole of government* responses, and most organizations on the ground in Haiti had to create new coordination mechanisms to align the plethora of stakeholders and responders across the global response community. Having to create these new coordination structures likely impaired the efficiency of the response—a factor that may have driven up mortality as patients succumbed to earthquake-derived injuries.[58]

65. It proved to be an enormously complex undertaking to create the coordination mechanisms to direct relief, recovery and reconstruction efforts among the Haitian government, MINUSTAH and associated UN agencies, bilateral responders like the US, Canada and France, and other donor governments, military forces and relief agencies. Creating these coordination mechanisms was driven by changing needs on the ground, changing groups of stakeholders over time, and the learning curves of stakeholders with respect to how best to work within their own organization and with one another. Personal relationships and necessity drove much of this process, especially in the early phase.

66. Each stakeholder, including the Haitian government, needed to organize itself internally such that it could interface with this core coordination structure. As one participant described, *"I had to laugh at all the various flow charts that flew across my desk in the early days [after the earthquake]. They were all trying to backtrack and trace the relationships and processes that were already happening."*[59]

67. Early on, the Haitian government stood up the Council of Ministers, which met daily at a small police station next to the destroyed airport to plan the response strategy. On 15 January, they created six sector based working groups to interface with the international response community. However missing staff, lack of assets including communications and information gathering tools, lack of experience in managing a disaster of this scope, as well as the sheer size of the disaster and the subsequent response, all contributed to hindering the government's effectiveness.

68. The Haitian government and MINUSTAH, with the support of the US government and other responding nations, forged an improved coordination structure that rolled out on 22 January, ten days after the earthquake.[60] At the strategic level, the High Level Coordination Committee (HLCC) oversaw the response and reconstruction. It was chaired by the Haitian Prime Minister and included the acting Special Representative of the Secretary-General (MINUSTAH Mission Head) and key Ambassadors to Haiti.[61]

69. The Coordination Support Committee (CSC) sat underneath the HLCC and was the operational lead. It brought together senior Haitian leadership, the Deputy Special Representatives of the Secretary-General (second in command in MINUSTAH), lead agency representatives, donors, major foreign militaries and UN agency leads to tackle key response and recovery planning issues such as large scale food distributions, rubble removal and neighbourhood reconstruction. Part of the CSC was the Project Management Coordination Cell (PMCC) that oversaw the implementation of these initiatives. Of note, the US military Army Corps of Engineers lent advising support to the reconstruction effort via the CSC and also participated in major relief initiatives launched by the CSC including a massive food distribution in the eight weeks after the earthquake[62].

70. The UN entity responsible for organizing and coordinating disaster response is UN OCHA. Despite the organizational challenges the earthquake caused for UN OCHA—members of its small in-country team were injured or left homeless by the quake and its office collapsed—it activated the cluster system. The cluster system is a sector-based

approach to disaster response whereby international groups and agencies align efforts and share information with others responding in the same sector. A lead agency, usually a UN affiliated agency or a prominent NGO, is appointed to lead each sector's cluster meetings; in Haiti, the health cluster system was led by PAHO. In the aftermath of the disaster, inter-cluster coordination meetings with all sector-based cluster leads took place to try to harmonize efforts across the clusters[63]; these meetings were initially chaired by the Haitian government for a limited period and subsequently by OCHA.

71. UN OCHA's Disaster Assessment and Coordination (UNDAC) team also responded quickly, but coordination and leadership were reported to be challenging at the early stages.

72. Other coordination groups were also formed. A Humanitarian Donors Committee stood up that coordinated and harmonized donor's initiatives in Haiti—the first of its kind. Later, on 5 May, the Interim Haitian Reconstruction Commission was formed to oversee and help harmonize reconstruction projects with Haiti's Action Plan for National Recovery and Development Plan.[64]

73. The JTF Haiti commander created a Humanitarian Assistance Coordination Center (HACC) to interface with the clusters, the CSC, and other responders.[65] The key military tactical level coordination mechanism was the Joint Operations and Tasking Centre (JOTC), formed by OCHA, MINUSTAH and other key partners, to organize and prioritize humanitarian requests for military assets. The JOTC provided the principal link through which the HACC, and therefore JTF Haiti, interfaced with other actors and military, police and mission support assistance. The JOTC provided a mechanism by which non-military agencies and organizations could request military or police assistance for relief activities through a formal process that was reviewed by civilian response planners. Opening on 26 January, JOTC became a focal point for tactical level civil-military coordination. [66]

74. One of the most interesting and effective coordination mechanisms, but one more serendipitous than planned, was the personal relationships that existed between the key players on the ground. The JTF Haiti commander and the Brazilian commander of MINUSTAH had a long-standing friendship going back over 20 years which has frequently been cited as major contributor to the good coordination experience between the two forces. Lt. General Keen and many of his staff also had personal relationships with many Haitian officials as a result of US SOUTHCOM's frequent theatre security cooperation activities in the country. Less serendipitous was that many Haitian officials also knew foreign military personnel through prior regional disaster drills, small peacetime engagement projects, or even, in some cases, because their own family members were members of the foreign militaries, particularly in the US and Canadian forces. These factors fostered a sense of mutual trust, as did military leadership that proactively engaged and planned their operations with Haitian leadership.[67]

75. The UN cluster system suffered from being overrun by hundreds of participating organizations. Some issues were encountered in achieving good coordination. OCHA, the coordinating agency for the UN struggled to keep pace with the dynamic response with its small staff, but it produced regular updates about the response to the relief community. The cluster approach was up and running by day three but was quickly overrun by the large number of response organizations wishing to participate. The health cluster, for example, hosted 45 response organizations in the first week, and 390 by the third.[68]

> *"Some came to coordination meetings seeking information on how to find hotel accommodation, still others wanting to find out how to apply for a vehicle registration, and the more professional organisations wanting OCHA to provide an assessment of needs, or how to coordinate with the military forces. OCHA staff being new to the country themselves[28], it was unrealistic to expect OCHA to meet the interests of such diverse participants. In the first two weeks, some coordination and cluster meetings had over 80-150 (on one occasion the shelter cluster had 212 participants), all packed in a tent, all shouting to be heard. Needless to say, cluster meetings therefore worked on the principle*

*of lowest common denominator, and at their best, only served as platforms for information exchange in the early phase."*[69]

76. Some Haitian officials viewed the cluster system mechanism with scepticism because they perceived it as a way to create a parallel authority to the six sector-based government run working groups created the day after the earthquake. "Why have a government if you have clusters funded and led by foreign agencies and beholden only to their donors?" noted one participant.[70] The fact that some cluster meetings were conducted in English rather than French further alienated Haitian government officials. Eventually agreement was reached that a Haitian official would chair each cluster meeting and the lead agency would play a supporting role.[71]

77. Another challenge was negotiating how multiple military organizations—MINUSTAH and particularly the US military—would interface at the strategic and operational level. Developing lines of authority and carving out scopes of work between bilateral military response forces and the peacekeeping mission was an issue in the first days after the earthquake, but was resolved relatively quickly. A detailed review of the colossal US response effort documented many of the struggles inherent in establishing internal lines of authority and pushing massive amounts of resources through fragmented, weak, or understaffed institutional structures. As one interviewee in the review commented, getting resources delivered from the US to Haiti was like *"pushing a bowling ball through a hose"*.[72] Another example involved the US military, which worked hard to comply with the plans of civilian policy makers, but struggled to obtain guidance for every effort. *"The US military had 10,000 responders in the field, [USAID] had 34. The military was simply able to outrun everyone else,"* remarked one US official.[73]

## Information Generating and Sharing Mechanisms

### What were information generating and sharing mechanisms that allowed the security community to best participate in health system strengthening?

78. Disaster responders lacked information regarding need assessment and where and how to respond. Much of the first response was based on assumptions and estimation which led to a concentration of aid provision focused on the capital, Port-au-Prince, and information which could guide the response in rural areas was not available.

79. For their part, security forces were able to collect relevant information quickly for the overall need assessments but it seemed that data sharing between the security and humanitarian community was inhibited by lack of both formal exchange mechanisms and an understanding of how specific information could be of value to others.

80. New communication technologies suggest opportunities for improved situational awareness and some of these were present in the earthquake response. In particular, satellite imagery from drones and satellites, and mapping earthquake-affected areas using cell phones were successful techniques in generating detailed maps in Haiti. Other tools such as social media networks, crowd sourcing for need assessments and mapping cell phone data to capture migration tendencies of displaced people were experimented with during the response, with mixed success. Information from such tools would have been useful to plan location, size and capability of field hospitals that need to be mounted, and food/water/aid distributed.

81. Clusters were traditionally the place where stakeholders shared information and received an overview of the situation but as transportation was a big issue only nearby organizations could afford to attend and the effort was balanced with the value of information provided.

82. The Haiti cholera outbreak showed how important it is for militaries to be tuned into epidemiologic data and health system functioning as a whole. The need for better situation

awareness (near real-time) requires a holistic approach between those providing data (individual persons, NGOs, IOs, military, etc.) and those hosting the data (share point, cloud). In order to support the development of a common operational picture, nations, multinational organizations (UN, NATO, EU, etc.) and NGOs should agree on technical standards and minimum requirements to facilitate acceptance of using one site and avoid duplication and incapability issues.

83. To respond to this missing information sharing platform there have been some initiatives to provide a common health picture such as *Healthmap* or *One Response*. There are efforts underway by the security community to provide a comprehensive interactive information sharing point, with the aim to facilitate humanitarian and security responders to share complementary capabilities and to better use limited resources. This "*Medical Assistance and Collaboration Tool*" was recently tested between security and humanitarian community members and could be support future responses to disaster or humanitarian crisis. Ideally, those efforts should be combined with inter-agency coordination mechanisms between UN and non-UN (military), specifically the IASC Need Assessment Task Force and Real Time Evaluation.

84. Of note, several experiments in using social media to track population movements, communicate with crisis affected populations and detect diseases with epidemic potential were trialed in Haiti, some with promising outcomes, as will be discussed further in the narratives.[74] More traditional media platforms such as websites were also established but were only modestly successful. Websites included the UN's *OneResponse*, *Relief Web* and US Department of Defense's *All Partners Access Network* but all were underutilized because of technical difficulties (lack of bandwidth and electricity) as well as a glut of posted information of questionable operational value. The US State Department set up Wehave/weneed.org to try to manage an unwieldy number of donations which also met limited success.[75]

85. Geographic Information System (GIS) technologies, social media and cell phone data can improve the speed of disease surveillance. The dynamics in the technical field are of particular interest for civilian and military epidemiologist. Cell phone tracking data showed that it can allow an accurate disaster response planning at strategic level. Currently, there are no formal and legal procedures release those data to crisis and disaster responders. Additionally, all those new features come with concerns if those data of individuals and populations are used for their benefit only. Our next case studies will address those concerns in more detail.

### Summary: Global Response to Haiti's Disasters

- Coordination mechanisms and institutional arrangements necessary to undertake a disaster response of this size and magnitude remain underdeveloped and inefficient.
- The Haitian government lost significant assets—personnel, infrastructure, communications, records and administrative systems—at a time when their citizens were in the greatest peril and counting on them the most.
- The aid community, including the UN peacekeeping mission MINUSTAH, UN agencies, and aid organizations were also severely affected by the earthquake and were unable to offer robust support of the Haitian state.
- Nations responded principally by deploying military assets including logistics, security escorts, rubble clearance, engineering services, and tertiary care, all of which contributed significantly to the overall effort of the international community in responding to the earthquake; the US was the largest bilateral responder.
- The coordination architecture of the whole response included the HLCC at the strategic level, the CSC at the operational level, and the UN sector-based cluster system, initially chaired by the Haitian government for a limited period and subsequently by OCHA, at the tactical level.

- Coordination among donor nations, the government of Haiti, UN agencies, militaries and relief agencies was a complex web. Personal relationships and friendships among leaders of response entities were instrumental in facilitating coordination mechanisms.
- The key military tactical level coordination mechanism was the JOTC, formed by OCHA, MINUSTAH and other key partners, to orchestrate the use of military assets for relief purposes.
- The US military created the HACC to interface with the CSC and the JOTC.
- During both the earthquake and the cholera responses, there were difficulties and missed opportunities in processing and sharing important situation awareness information among all actors, despite considerable efforts to do so.
- New ways and means of collecting, processing and visualizing data show significant potential to improve shared situation awareness.

# 4
# IDEAS TO TAKE FORWARD

## KEY TAKEAWAYS

86. Experience suggests that issues in coordinating global actors in a humanitarian disaster response are a recurring theme. Much has been achieved to improve an effective and coherent effort by international community: landmarks include the UN clusters system on the humanitarian side and the integrated mission approach with joint civil-military tasking centres on the security side. However, further improvement is needed by all involved actors through a process of continuous learning to achieve a more efficient and effective holistic response to crises; particularly in times of financial austerity.

87. A review of the responses to the health threats in this case study has identified three main takeaways worthy of consideration by global crisis responders to develop future frameworks for strengthening state health systems:

a. In an overwhelming, chaotic, disaster situation the security community might be an appropriate contributor to strengthen some elements of the health system:

- By securing the supply chain;
- By contributing to the health service delivery in providing surge secondary and tertiary care to assist health organizations regaining their pre-crisis levels of functioning;
- By supporting local and international leadership by providing security to health stakeholders.

b. Coordination among the key actors from the humanitarian and security community in the health sector is essential and requires long-term relationship to ensure:

- Mutual understanding among the security and humanitarian communities such that coordination mechanisms are in place prior to crisis responses;
- Interoperability of the different coordination mechanisms;
- During crises, threats to health systems are detected and responded to quickly, to ensure health resources are delivered and administered as efficiently and effectively as possible, and patients receive appropriate care that is coordinated and standardized across care providing organizations;
- That Host Nation governance over the responders is clarified and supported by all means.

c. An efficient and pragmatic way for coordination among the humanitarian and security communities is to create, and for all actors to contribute to, a commonly shared health information picture which is essential for timely service delivery and early detection of health threats. New technologies proved to support a holistic picture to disaster response:

- Crowd sourcing, cell phone tracking data, satellite imagery, and social media contributed to mapping the disaster zone, understanding health system functioning, detecting health threats, and tracking the spread of cholera. These techniques and data sources have the potential to improve the effectiveness and efficiency of crisis response and management;
- Information sharing tools to facilitate mutual interaction are currently developed by the security community but should be co-developed and designed in partnership with the humanitarian community.

## Food for Thought

88. The following two sections provide some food for thought regarding the security community elements that need to be put into place to provide a future framework to strengthen state health systems.

### A holistic approach – health system strengthening as part of an all systems approach

89. The health system is just one of many systems that allow a state to function, and these systems are all inter-related and inter-dependent. Direct engagement in one will have effects in others and, in some cases, pairs and constellations of systems cannot function unless each individual system is functioning at some minimum level. For instance, in Haiti, the health system, which was weak before the earthquake, needed medical supply chains to be re-established and a secure environment around medical treatment facilities as well as support for local leaders to re-assert their authority over national medical facilities. Chronic public health issues such as poor water security proved that silent threats can erupt that have an unexpected impact on the national and regional health system.

90. The cholera outbreak in Haiti highlighted that a health system threat can spill over into threats to other systems, in this case the security and stability systems. If the military mandate is one of stabilization, the risk of instability posed by threats to the health system means that such threats must be accounted for in the stabilization force's contingency planning. Haiti's cholera outbreak further suggests that foreign military disaster responders should be aware of both the effect they can have on all functional systems in a state and of the impact disruptions to those systems can have on the force's ability to carry out a security and stability mandate.

91. The point that we will take forward in subsequent case studies is that in studying health system strengthening, we will also have to look at how weaknesses in other systems may affect the health system and how efforts to address these weaknesses need to be considered alongside health system specific activities.

### Military as part of the humanitarian disaster response

92. In Haiti, the overall impression is that, in general, military assets contributed significantly to the overall effort of the international community in responding to the disaster. Some contributions, such as the opening of the airport, were absolutely essential and enabled responders to access the disaster zone; other contributions were seen as welcome additions to the overall effort. The provision of direct health care by military forces is contentious for numerous reasons, but it is recognized that the deployment and direct engagement of tens of thousands of foreign military personnel contributed to the saving of hundreds, if not thousands, of lives.

93. The use of military forces as humanitarian responders remains controversial. In Haiti, the sheer number of troops and what could be perceived as an intimidating appearance concerned beneficiaries and potential co-actors as to these troops motives and mandates. However, in the early phase of disaster relief assistance, the willingness of foreign troops to work consultatively with Haitian health officials and civilian relief workers alleviated these concerns in some instances.

94. An idea that has started to be formed by the project team during the conduct of this case study is that the term civil-military cooperation/interaction may not be appropriate terminology. By adopting a wider term that includes the security community as a whole (military, police, diplomacy, funding) instead of an isolated military player, a change in mindset may be realized such that coordination among the security and humanitarian community might be improved. For example, in the military responses to the Haiti disaster, it should be remembered that national military assets were always under the civilian control; this appears not to have been a widely recognized among the civilian actors.

95. The most prominent challenge that hampers a coherent and effective response by the security, humanitarian and the development communities is insufficient coordination mechanisms at national/international political level to include the whole spectrum of governmental stakeholders (uniformed or not) in achieving a common goal. Military initiatives to develop venues on how to contribute to a comprehensive approach are not currently being fully supported by civilian actors either from the security or humanitarian and development communities, which leaves the military alone in crafting a concept for civil-military interaction in crisis affected fragile states.

96. The point that we will take forward in subsequent case studies is to look for ways that members of the security, humanitarian & development community are incorporated or could be better incorporated into policy, plans and standing mechanisms for interaction.

### Health System Recovery – short- versus long-term approach

97. The activities of the security community responding to the earthquake and the cholera outbreak were not designed to strengthen the health system as those activities were ad hoc efforts to fill the gaps left by an overwhelmed humanitarian and development community. When considering the amount of human and financial effort invested in Haiti after the two shocks to the health system, the discussion remains on how global actors should balance their contribution by providing emergency aid (curing the symptoms) or how to support long-term and sustainable infrastructural developments (addressing the cause).

98. The concept of "early recovery" after disaster has evolved over the past ten years. Conventionally, recovery and delivery of humanitarian assistance has been conceived of as distinct sets of activities that take place during different time periods. However, a new paradigm has emerged which recognizes the link between population survival strategies, which largely rely on attempts to access pre-disaster resources and systems, and aid distribution and reconstruction.[76] The IASC evaluation of the Haiti response summaries this new paradigm:

> *"In a sudden-onset disaster…early recovery often starts the day after…Early recovery activities are critical to the wider strategizing on the overall objectives of the humanitarian response. In Haiti, for example, what happens, and where, in terms of job creation, provision of school and development of services will have significant impact on decisions relating to resettlement and longer term support."* [77]

99. By most accounts, initiating early recovery activities within the first 24 hours after an emergency has yet to find significant expression in the field. Most reviews of the Haiti response note this is an underappreciated notion of early recovery and its link to relief and reconstruction on the part of the response community generally[78]. Protection and recovery of the health system seems to have been missing from the mandates of most early response organizations. This was true of military responders in Haiti whose mandates tended to be only relevant to providing direct relief.

100. In situations like Haiti when hundreds of actors are independently providing various types of direct and indirect care, it still remains unclear how this effort leads into long-lasting support that results in a sustainable indigenous health care system.

101. The point that we will take forward in subsequent case studies will be to look for ways and concepts that can better relate crisis response to longer term recovery and health system strengthening.

# ENDNOTES

[1] WHO; Every Body's Business: Strengthening Health Systems to Improve Health Outcomes: WHO's Framework For Action

[2] De Ville de Goyet

[3] Haiti Earthquake Facts and Figures. Relief Web. http://reliefweb.int/node/380897, Last checked 05 May 2012.

[4] Sontag. In Haiti, Global Failures on a Cholera Epidemic

[5] Republic of Haiti MSSP Bulletin No 25

[6] WHO website, Prevention and Control of Cholera Outbreaks: WHO Policy and Recommendations. http://www.who.int/cholera/technical/prevention/control/en/index3.html, Last checked May 10, 2012.

[7] Paul Farmer. Haiti After the Earthquake. (Public Affairs, 2011) 124-125.

[8] Mark Danner. "To Heal Haiti, Look to History, Not Nature". *New York Times*. 21 Jan. 2010

[9] Farmer. Haiti After the Earthquake, 134

[10] Handling Haiti. Rep Maxine Waters, Roger Noriega, Senator Norm Colman, Senator Christopher Dodd. Interview by Gwen Ifill. PBS Newshour. Aired 10 March 2004. http://www.pbs.org/newshour/bb/latin_america/jan-june04/haiti_03-10.html. Last checked May 10, 2012.

[11] MINUSTAH website. http://www.un.org/en/peacekeeping/missions/minustah/background.shtml. Last checked May 2, 2012.

[12] Guha-Sapir G, Kirsh T, Dooling S, Sirois A. Independent Review of the US Government Response to the Haiti Earthquake. USAID. 28 March 2011. 18.

[13] Mission by the United Natins High Commissioner for Refugees. Human Rights' Compilation Report..http://www.unhcr.org/refworld/pdfid/4d8869932.pdf. Last checked May 11, 2012.

[14] Farmer. Haiti After the Earthquake, 138-145.

[15] Dan Dewitt. "US Had a Role in Haiti's Dirty Water" Tampa Bay Times. 7 November 2010. http://www.tampabay.com/news/health/medicine/article1132441.ece. Last checked May 12, 2012.

[16] Rencoret et al; Haiti Earthquake Response: Context Analysis

[17] PAHO; Health Situation in the Americas – Basic Indicators

[18] De Ville de Goyet

[19] WHO website, Core Health Indicators http://apps.who.int/whosis/database/core/core_select_process.cfm. Last accessed 02 May 2012

[20] PAHO Country Profiles – Haiti. http://www.paho.org/english/dd/ais/be_v24n1-haiti.htm. Last accessed 01 June 2012

[21] PAHO Country Profiles – Haiti. http://www.paho.org/english/dd/ais/be_v24n1-haiti.htm. Last accessed 01 June 2012; see also Prims, A. et al.; Haiti Maternal and Child Health and Family Planning Portfolio Review and Assessment at pg. 20, citing World Bank estimates placing the number at 2.9%.

[22] PAHO Country Profiles – Haiti. http://www.paho.org/english/dd/ais/be_v24n1-haiti.htm. Last accessed 01 June 2012

[23] Based on the Partners in Health website – Site Background Haiti http://www.pih.org/pages/haiti-background. Last accessed 12 May 2012 and a Project Team Interview, Haitian government official, 2011

[24] Interim Haiti Recovery Commission; Health Sector Background and call for Proposals

[25] The HIV epidemic, which many estimated was on track to reach prevalence rates of 30% was brought under control, in part by successful community health worker programs and public-private partnerships. The HIV prevalence rate is now <3%, lower than in Washington D.C., a notable public health achievement.

[26] Sources for this paragraph include: MSNBC Website – From Haiti a surprise: Good news about AIDS http://www.msnbc.msn.com/id/31755066/ns/health-aids/t/haiti-surprise-good-news-about-aids/#.T1gx7ZghalI, last accessed 01 June 2012; USAID Haiti; HIV/AIDS Profile Haiti; Bicego; UNICEF website, At a glance: Haiti. http://www.unicef.org/infobycountry/haiti.html, Last accessed 01June 2012; and the Trading Economics website http://www.tradingeconomics.com/haiti/mortality-rate-infant-per-1-000-live-births-wb-data.html, Last accessed 01 June 2012

[27] Miroff

[28] Project Team Interview, Haitian Health Official, December 2011

[29] De Ville de Goyet, pg 4

[30] See Kristoff, and Morton

[31] PAHO Country Profiles – Haiti. http://www.paho.org/english/dd/ais/be_v24n1-haiti.htm. Last accessed 01 June 2012; and Prins pg 14

[32] Madeline Kristoff. “Haiti: Republic of NGOs?” US Institute of Peace. http://www.usip.org/files/resources/PB%2023%20Haiti%20a%20Republic%20of%20NGOs.pdf. Last checked May 18, 2012

[33] OECD website, Official development assistance to Haiti, 2002 – 2008, http://www.oecd.org/document/10/0,3746,en_21571361_44315115_44454474_1_1_1_1,00.html last accessed 28 May 2012

[34] Office of Special Envoy for Haiti, “Has Aid Changed? Channelling assistance to Haiti before and after the earthquake”, June 2011, page 7, http://www.haitispecialenvoy.org/report-center/, last accessed 18 June 2011.

[35] Rencoret; Haiti Earthquake Response: Context Analysis

[36] UN MINUSTAH Background page, http://www.un.org/en/peacekeeping/missions/minustah/background.shtml last accessed 31 May 2012

[37] International Crisis Group, pg 5

[38] FEMA

[39] Bhattacharjee

[40] De Ville de Goyet

[41] Bhattacharjee

[42] Project Team Interview, UN worker, December 2011.

[43] Slide courtesy of the US DOD Center of Excellence for Disaster Management and Humanitarian Assistance

[44] De Ville de Goyet

[45] Médecins Sans Frontières; Haiti one year after – A Review of Médecins Sans Frontières' Humanitarian Aid Operations

[46] au.news.com website http://www.news.com.au/breaking-news/only-one-hospital-open-in-haitis-quake-hit-capital/story-e6frfku0-1225819044634, last accessed 01 June 2012

[47] De Ville de Goyet

[48] Project Team interview with private communication company, November 2011

[49] Guha-Sapir

[50] Katz

[51] IASC, pg 10

[52] Bhattacharjee

[53] Keen P.K., et al; Disaster Response Joint Task Force-Haiti Observations

[54] Project Team Interview, Diplomat, December 2011

[55] Margesson, pg 6

[56] Homepage of the French amphibious assault ship SIROCO http://tcd.siroco.free.fr/actualites2010haiti2.htm last accessed 01 June 2012

[57] MINUSTAH website http://www.un.org/en/peacekeeping/missions/minustah/ , last accessed 01 June 2012

[58] De Ville de Goyet, pg 21 fig 3.1

[59] Project Team Interview, US government official, December 2011

[60] Guha-Sapir, pg 72.

[61] Guha-Sapir, pg 72

[62] Guha-Sapir, pg 73

[63] Bhattacharjee

[64] Interim Haiti Recovery Commission; Health Sector Background and call for Proposals

[65] Guha-Sapir, Pg 21.

[66] MINUSTAH Integrated Joint Operations and Tasking Centre After Action Review

[67] Keen P.K. Lieutenant General and Major General Floriano Peixoto Vieira Neto; Relationships Matter – Humanitarian Assistance and Disaster Relief in Haiti

[68] De Ville de Goyet

[69] Bhattacharjee, pg 27

[70] Project Team Interview, Haitian government official, December 2011

[71] Project Team Interview, Haitian government official, December 2011

[72] Guha-Sapir, pg 59

[73] Project Team Interview, US government official, December 2011.

[74] De Ville de Goyet

[75] Guha-Sapir, pg 22

[76] OCHA “Evaluation of OCHA response to the Haiti earthquake”, Final Report, January 2011

[77] Ibid.

[78] Bhattacharjee, pg 53.

# THE NARRATIVES

# Annex A
# NARRATIVE: RE-ESTABLISHING SUPPLY CHAINS

## CHALLENGE TO THE HEALTH SYSTEM

1. Medical supply chains for Haiti's public health system were tenuous prior to the earthquake. Then the earthquake destroyed ports of entry, transit routes, and medical distribution points. Foreign militaries, UN agencies and the Haitian government were all involved in re-establishing supply chains—and supply routes generally—so that thousands of responders and the millions of tons of supplies could come into the country. Re-establishing supply chains was a task instrumental both to the humanitarian relief effort and to the early recovery of the health system.

## RESPONSES TO THE CHALLENGE

2. The following narrative discusses the three tasks that stood out in Haiti as being both fundamental to the immediate and long-term re-establishment of medical supply chains and of particular interest to this study because military assets were involved:

a. Reopening the airport

b. Organizing and distributing medical supplies

c. Mapping and clearing blocked supply routes

### Reopening the Airport

3. By request from Haiti's Prime Minister, the US disaster response agency, the Office of Foreign Disaster Assistance (OFDA) took control of Toussaint Louverture International Airport in Port-au-Prince—the major air port of entry to the country. OFDA, in turn, requested the US military to assist with the effort. Pre-earthquake, the airport handled around a dozen flights per day, up to a maximum of thirty.

4. Thirty hours after the earthquake, special tactics squadrons of the USAF arrived to reopen the airstrip. Within one hour of the team's arrival, they were able to secure and clear enough of the airstrip to begin landing and launching a few aircraft.[79] The team quickly discovered the operation would be far more complicated than expected. The control tower was badly damaged and unusable, and the main airport terminal had sustained heavy damage. Empty aircraft that were supposed to have flown out the day of the earthquake sat abandoned, occupying apron space. And clearing the airfield was only half the problem: with limited apron space, any planes that managed to land would need to be unloaded quickly and take off again to make room for the next flight. The teams had little to work with—they could find only one working forklift to unload aircraft and had limited manpower for the manual labour.

5. The team did manage to clear the airstrip and fashioned an air traffic control system using hand held radios, with a card table set up next to the airport runway serving as the "air control tower".[80] But by day two the small team was overrun by requests to land and little capacity to get planes unpacked and off the airstrip. *"The first full day on Thursday [36 hours after the earthquake] was an extremely jam-packed, difficult day. At one time we had 42 aircraft on deck, 17 in holding and I want to say 97 en route between here and Miami Dade airport,"* a USAF chief master sergeant reported to news radio.[81] Concerned about this dangerous congestion, the US FAA halted flights to the airport in the morning of 15 January, essentially closing the only effective port of entry into the country.[82]

6. On the evening of 15 January, a 115-person team operating under US Transportation Command (TRANSCOM) arrived to help support the airport team.[83] The TRANSCOM units worked with the special tactics squadron to bring in five C-17 cargo planes of communication and airstrip management equipment to relieve the congestion and restart flights. Within 72 hours, the combined airport teams were able to increase the volume of flights handled by the airport from 30 per day prior to the earthquake, up to 140 flights per day—setting the all-time record for a single-strip operation in US military history. No accidents occurred and this pace was maintained for three months.[84]

7. This technical achievement allowed flights to enter the country; the next challenge was how to prioritize them. Personnel from response organizations including militaries brought in to provide security, supplies to support them, tents, medicines, water, in-kind donations, equipment, diplomats, movie stars, and thousands of expatriates to be evacuated all needed to be flown in and/or out. Every country and organization wanted to prioritize the aid it was sending and in the absence of an internationally agreed upon method for prioritization, those involved in air traffic control were left to figure it out for themselves. Adding to their challenge was that, in many cases, flights had no manifest, making it impossible to know how they should be prioritized compared to flights that had sent TRANSCOM its cargo manifests. In other cases, according to an interview conducted during the fieldwork for this case, flights misrepresented their cargo to gain priority entry.

8. Although the US government and military partnered with the Haitian government, and later with MINUSTAH, on flight prioritization, some global response actors disagreed with the airport team's decisions. The prioritization by the US military of "military" supplies in the initial three days of the response quickly created the impression that the US was, as some exasperated officials expressed it, *"occupying Haiti"*—even though the supplies were often for relief.[85] As flights started arriving with political leaders, US soldiers and their equipment, and celebrities, Médecins Sans Frontières, which had a flight of critical supplies diverted from the airport to Miami, delivered one of the more public criticisms of the US military: *"What is unacceptable to us is the priorities,"* the group's spokesperson stated to the media.[86]

9. The participants in this study involved with airstrip landing choices described having to take prioritization decisions based on little data and having to accommodate the conflicting agendas of multiple stakeholders. For example, in the case of the Médecins Sans Frontières (MSF) plane, interviewed decision makers reported that the plane—which was low on fuel and thus had to either land or divert to another airport—could not land because there was literally nowhere to put the plane at the time they were slotted to arrive because several aircraft had failed to take off.[87]

10. Problems prioritizing flights constituted significant distractions for Haitian health system leadership as well. "I would often have to interrupt planning meetings to go and welcome various dignitaries on the tarmac, or negotiate political disagreements," one participant remarked.[88] Another noted that having to justify why they had allowed the US military to control the airport took up significant amounts of time and energy.[89]

11. After several weeks the US State Department and US SOUTHCOM, with UNDAC and World Food Programme (WFP) input evolved a flight slot allocation system where requests for landing slots were processed by a call in system at US SOUTHCOM. Each requester received a landing slot time. If the time was inappropriate the requester could then plan another way to get goods into the country. In terms of balancing competing needs, a system of thirds was organized such that a third of the flights were for NGOs, a third for diplomats and a third for military supplies.[90] While this system was more transparent, it was not "needs based" or driven by priorities noted on the ground. For their part, the Haitian officials attempting to provide guidance to the US military about which planes to land based on what supplies were needed in the field were almost totally in the dark.

## Organizing and distributing medical supplies

> *"We were holding on—trying to get injured patients who survived the supplies and the specialty care they needed. Those that we could connect survived. Those who didn't died."*
>
> *—Haitian Health Official*

12. The glut of supplies that arrived in Haiti following the earthquake backed up quickly at the airport. Despite the completely unknown need—or lack of "demand signal"—suppliers from all over the world were depositing diverse supplies onto the tarmac at the airport and eventually at the seaport when it opened two weeks later. These supplies arrived in a variety of packaging formats, many of which were not on pallets making loading and unloading them by hand a necessity.[91] Furthermore, much of the supply inventory—when it existed—was on paper, not in electronic format. Inventory that was in electronic format, was recorded in desktop software and could not be shared over a network. The combination of disorganized supplies and disjointed and incomplete inventories, with the velocity and volume of aid, caused the backups and made it extremely challenging to ensure supplies arrived at their intended recipient. One interviewee noted it took about three weeks to get supplies out of the airport.[92]

13. Timing of aid delivery was also complicated. Response organizations frequently sent their supplies a week in advance of arrival of their teams. The aid was often mislabelled as "unclaimed" and put to other use, only to be filed as missing shortly after.[93] The arrival of medical supplies posed a particularly complex challenge, not least because many of these supplies require special handling or storage, or must be transported together to be effective. Haitian officials described feeling lucky if they even knew if anything relevant to medicine was on an incoming flight. The inability to track, sort, or assign aid often led to supplies being piled up on the tarmac or other areas of the airfield for extended periods. One participant involved in managing medical supplies delivered to the airport noted difficulties they had maintaining the cold chain to preserve blood and vaccines. He reported a case when a shipment of yellow fever vaccine had been left on the tarmac and ruined.[94] As one US military worker described to a reporter,

> *"Nongovernmental agencies pick up their goods at the airport yard, and this was a problem. In one case, someone donated a plane to airlift supplies to the effort, and several organizations placed goods aboard it without tracking numbers, or even labels. Separating these out and ensuring they go to who they belong to can cause problems. In other cases, they don't have the right trucks to load with a forklift, so we have to break down the palettes and load [the vehicles] by hand. This takes time."*[95]

14. A Haitian official in charge of the health response stationed personnel at the airport to record and enter incoming supplies in the desktop based humanitarian supply management system (SUMA). SUMA, developed by PAHO, has been taken up across Latin America as an essential supply tracking tool during national emergencies and is run by national leadership, rather than UN agencies and NGOs. However, SUMA is not a web based tool and thus uploaded information on one computer must be physically transferred to another. Nonetheless it is an advance over prior tracking efforts. In Haiti, however, only 60% of the supplies coming through the airport were captured even in a general way by SUMA because of lack of reporting.

15. For medicine and pharmaceuticals, a significant percentage of supplies passed through the existing PAHO program called PROMESS, which had started in Haiti in 1992. PROMESS was designed as the coordination node of 13 warehouses to distribute low-cost medicines and supplies to the public health system and some private, not-profit health centres. Its main centre is a warehouse approximately 8km from the airport.[96] While functioning before the earthquake, the earthquake clogged key roads leading to the warehouse with debris. Communications with the 40-plus health facilities that participated in the PROMESS

programme were not functional. As a result, it was nearly impossible for logisticians to estimate demand for supplies from the overburdened facilities.[97]

16. In the first three weeks of the response supplies were shuttled the several kilometres to PROMESS, sorted, inventoried, stored and entered into SUMA. [98] From PROMESS, aid would then need to be loaded onto trucks and distributed to health facilities throughout Haiti, a process hindered by the tons of rubble blocking most of the major exits from the city. Furthermore, like the airport, the warehouse inventory was also largely unmarked and lacked inventory sheets or manifests to detail what was inside, adding to the chaos of aid distribution.[99]

17. Recognizing the disarray, PAHO enlisted the aid of the US military to put the warehouse into better order at the end of January. Five US Army Logistics teams were dispatched to sort and inventory supplies.[100] These teams worked with USAID and its contractor, Management Sciences for Health, to put the inventory into a supply chain management system, for easier tracking of the inventory. They also explored methods of packaging into standardized kits that could be sent to health facilities.[101] The US military also provided 24/7 security for a month and removed rubble around the routes into warehouse, making it easier to get trucks in and out of the facility. The manpower resources available to JTF Haiti made it possible to surge the capacity that proved essential to getting aid flowing through the PROMESS supply chain.[102]

### Mapping and clearing blocked supply routes

18. A third immediate challenge was to assess the status of transport infrastructure so damaged sections could be restored as quickly as possible. For those trying to solve this problem, there was one key issue: a lack of baseline maps. In most crises, global responders are able to find such maps through the affected nation's geographical and demographic departments. In Haiti, the earthquake had destroyed administrative buildings, killing Haiti's civil servants and burying the country's baseline maps.[103]

19. US Intelligence, Surveillance, and Reconnaissance (ISR) assets—including satellites, unmanned aerial vehicles (UAV), and reconnaissance aircraft—collected the first imagery of the disaster. A Global Hawk UAV snapped the first pictures of critical infrastructure within two days of the earthquake. The Haiti earthquake response marked the first time that a UAV had supported a humanitarian operation. The US also flew P-3 Orion aircraft to gather visual information and released both the still photos and videos from the sorties to the humanitarian community.[104] All imagery was collated and made available via the San Diego State University Visualization Center's Haiti web site. The process however took at minimum several days—too much time to be of most use to search and rescue and initial response efforts.[105]

20. Several sources were most agile at making critical and potentially sensitive data available. The US National Geospatial-Intelligence Agency (NGA) released imagery under the International Space Charter, a consortium of space agencies and UN agencies that agree to release imagery to other signatories or host nations who are sponsored by a signatory. NGA also prepared a standard atlas of Haiti that was sent to Haiti and made available to the urban search and rescue teams.[106] Several commercial providers—including Digital Globe and GeoEye—also were quick and generous with information, releasing sub 1-metre imagery to the general public by 14 January 2010.[107] The World Bank released under public domain 15cm imagery collected by aircraft for most of the country in early February. One could claim that Haiti was the best-imaged disaster of all time.

21. However good the imagery of Haiti was, it proved far more difficult to turn those imagery sources into usable maps that could track the status of roads, show the locations of health facilities, and become the base maps for common operational pictures. Adding important data to digital maps is time intensive and requires trained cartographers to trace

over satellite imagery and add metadata to each tracing (such as road name, road direction (one-way or two-way), road type (dirt, gravel, asphalt, or concrete), etc.

22. Creative solutions evolved in Haiti. *OpenStreetMap* (OSM) is a free and open map of the world, a sort of cartographical version of Wikipedia with tools specific to map building and with about 150,000 members. When the Haiti earthquake occurred, 640 cartographers and mapping technologists used the already available imagery of the country to trace roads and map hospitals and other critical infrastructure. The cartographers and technologists made 1.2 million edits to the map of Haiti in about two and a half weeks, effectively performing about one man-year of work.[108] The base map created by OSM was the best available in the early response, leading *MapAction*, the NGO designated by OCHA to perform emergency mapping services for the UN, to use OSM as their core data set.[109] The US military also turned—for the first time—to crowdsourcing for mapping. NGA followed *MapAction* and the military began using data generated by an online community data for operational use.[110]

23. The mapping of Haiti using open data formats was a huge success. Because OSM used web services to distribute data, it allowed for widespread diffusion of mapping data and rapid exchange of derived works. OSM essentially became a collaborative wiki where anyone could add data in an ongoing basis and know that the current data was immediately available to everyone. The system also enabled a web services model. This allowed GIS professionals to overlay their systems on an OSM map that was being dynamically updated (once per minute) as they created their analyses using the OSM data as a base layer. The maps generated through this process served as the baseline maps for the entire response and the Haitian government.[111]

## DISCUSSION

24. Medical supply chains in Haiti were devastated and foreign military forces played an essential role in re-establishing them. Key tasks which civilian actors requested help from the military to perform were reopening the airport, organizing and distributing medical supplies and mapping in order to organize clearing of blocked supply routes.

25. Medical supply chains are an essential aspect of health systems and quickly re-establishing them—rather than creating a duplicate system—is critical to both timely crisis response and health system recovery and strengthening.

26. Establishment of efficient effective supply chains may have also bolstered Haitian health system leadership by potentially enhancing its legitimacy.

27. Military assets were able to contribute to reestablishment of medical supply chains because of their experience with port opening, logistics, rubble removal, and mapping. Their technical expertise was reflected in the remarkable achievement of opening the airport and safely quadrupling its capacity.

28. The biggest challenges that arose sprung from lack of interoperability among all actors. In this case, interoperability challenges were manifested in:

- Lack of widely accepted, transparent and need driven mechanisms to prioritize incoming supplies;
- Lack of common standards, or failure to comply with existing standards, regarding labelling and packaging relief materials;
- Lack of staffing and transport capabilities among key civilian lead agencies;
- Lack of mechanisms for those controlling supply chains to sense demand signals from the field.

29. As Lt. General Keen noted, “we worked through challenges, but our logistical system is designed and focused primarily on internal support of our own forces, rather than external

support for humanitarian assistance and disaster relief operations. A more thorough look into capabilities required for his type of operation is necessary."[112]

30. There were also some remarkable successes with respect to collaborative information processing; including sharing imagery data and using new web technologies and crowd sourcing to produce high quality maps for all to use.

31. The advances in mapping technology discussed in this narrative suggest that it may be possible to develop tools to amplify in near real-time the demand signals from the field regarding medical supply needs.

[79] Keen P.K., et al; Disaster Response Joint Task Force-Haiti Observations

[80] Fraser

[81] National Public Radio podcast from 18 January 2010: Search and Rescue Operations Continues in Haiti, http://www.npr.org/templates/story/story.php?storyId=122701542

[82] Laing

[83] Spiegel

[84] Keen P.K., et al; Disaster Response Joint Task Force-Haiti Observations, pg 85

[85] Laing

[86] Carvajal

[87] Project Team Interview, US government official, January 2011

[88] Project Team Interview, Haitian official, December 2011

[89] Project Team Interview, Haitian official, December 2011

[90] Fraser

[91] Project Team Interview, Military personnel, December 2011

[92] Project Team Interview, Haitian official, December 2011

[93] Project Team Interview, Military personnel January 2011

[94] Project Team Interview, Military personnel January 2011

[95] Garamone; Joint Task Force Organizes Haitian Airport; American Foreign Press Service

[96] De Ville de Goyet

[97] Project Team Interview, Military personnel, January 2011

[98] Project Team Interview, Military Personnel, January 2011

[99] WHO; Earthquake in Haiti One Year Later – Report on the Health Situation

[100] SCMS/Supply Chain Management System

[101] Management Sciences for Health website: MSH Helps Rebuild Haiti's Pharmaceutical Stores, http://www.msh.org/news-bureau/msh-helps-rebuild-promess-haiti.cfm, last accessed 31 May 2012

[102] WHO; Earthquake in Haiti One Year Later – Report on the Health Situation

[103] Kolbe

[104] Fraser

[105] Jacobs

[106] Fraser

[107] UN Foundation; Disaster Relief 2.0, pg 26

[108] UN Foundation; Disaster Relief 2.0, pg 26

[109] Pomfret

[110] Project Team Interviews, Military personnel and UN worker, December 2011

[111] UN Foundation; Disaster Relief 2.0, pg 41

[112] Keen P.K., et al; Disaster Response Joint Task Force-Haiti Observations, pg 85

# Annex B
# NARRATIVE: MILITARY CONTRIBUTION TO SECONDARY AND TERTIARY CARE FACILITIES

## CHALLENGE TO THE HEALTH SYSTEM

1. A major blow to health system was the destruction of secondary and tertiary care facilities (i.e. hospitals) including the HUEH, also known as "General Hospital", the main medical facility of the capital. Before the disaster, General Hospital had a capacity of 700 beds and provided almost all the tertiary care services in Port-au-Prince (including podiatry, gynaecology, dermatology, and internal medicine referrals). The hospital was also the base of the principal medical university in Haiti. Immediately after the earthquake, its capacity was down to 450 beds, it had no electricity, water or telecommunications and out of fear of aftershocks, patients had been transferred outdoors, into the grounds. Although it was the biggest hospital affected, it was not the only one. Within the geographic areas hardest hit by the earthquake, 30 of 49 hospitals were destroyed or severely damaged.[113]

2. The earthquake also devastated the capabilities of the Haiti's hospitals in peripheral ways. The leadership, communications, workforce and security necessary to make that infrastructure function were degraded. The following summarizes the situation:

a. Leadership: The Haitian government lost key leadership at the Ministry of Health level and key leadership staff at Haitian hospitals leaving these facilities without oversight at least in the initial days following the earthquake.

b. Communications: Telecommunication systems which might ordinarily enable the healthcare system to coordinate patient triage and transfers between medical treatment facilities were not functional.

c. Workforce: In the immediate aftermath of the earthquake, the availability of medical and staff personnel in Medical treatment facilities was very poor. The health system lost capability at the clinical, direct service provision level either through death or through displacement/dispersion of medical professionals.

d. Security: Some care providers and NGOs feared kidnapping, especially for health aid workers. A massive influx of patients overwhelmed the general hospital, provoking anxiety amid the patients and surrounding population; security concerns increased when the walls enclosing the General Hospital fell down and the usual (unarmed Haitian) resident guards were unable to maintain crowd control[114].

3. Simultaneously, the earthquake caused a major additional burden on the devastated facilities. PAHO officials estimated that over 300,000 people suffered serious injuries in the immediate aftermath of the earthquake.[115] The healthcare facilities that were still operational received an overwhelming influx of patients. Within 30 minutes of the first shock waves, patients started streaming into the General Hospital. By the next morning, 1500 patients had inundated the facility that only had 450-bed capacity remaining. Within hours of the earthquake, MSF's Martissant emergency facility's 50-bed capacity was overwhelmed by 400 patients.[116]

4. The combination of degraded medical treatment facility capability and the massive influx of patients meant that after the earthquake Haiti's medical treatment facilities were unable to meet the demands they faced. The consequence of this lack of capacity is evident in the size of the second step on this PAHO graph:

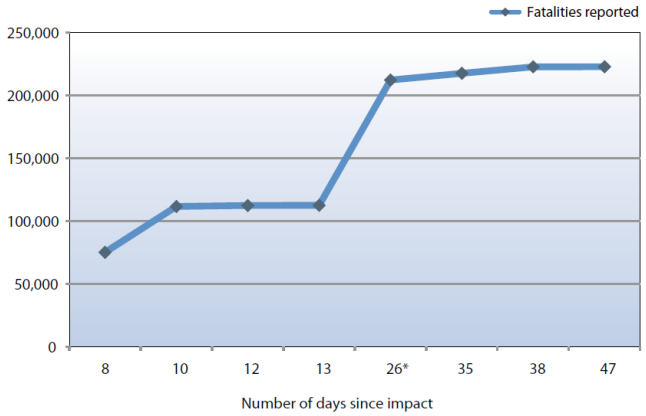


Figure 3: Graph of Fatalities reported versus days since incident

5. The first step occurred immediately, during the actual earthquake (i.e. those caught in collapsing building who were crushed instantly); the second step occurred later[117] when open wounds became infected, untreated compound fractures became gangrenous, tetanus set in, untreated crush injuries caused renal failure, etc. These delayed fatalities, caused by earthquake-related injuries but leading to death several weeks after the disaster, were the result of delayed access to health-care facilities.

6. Lack of secondary and tertiary care capacity made patient triage and the setting of priorities for care the most important drivers in handling patients. Delays in care could lead to worse patient conditions and thus tougher medical challenges than would have been present with timely intervention, especially in those portions of the population suffering from anaemia (caused by malaria), from drug resistant tuberculosis, or from malnutrition whose underlying poor health status exacerbated their earthquake-related injuries.

7. Immediately following the earthquake, many people with relatively minor (i.e. non-life threatening) injuries overwhelmed secondary care infrastructures, preventing their specialized capabilities from being used appropriately, while primary care facilities were overwhelmed by patients with injuries too complex to be handled. In some instances, primary care facilities' only option was to treat patients urgently despite scarcity of tools and medical staff expertise[118]. Other patients were lucky enough to be transferred to a suitable facility, but arranging these transfers was a distraction for medical staff, which lost precious time for addressing acute care needs.

8. A longer-term challenge came from financial arrangements for externally provided health care: would Haitians have to pay directly for the care they received or would it be provided to them free of charge? Before the earthquake, most services offered by MSPP required user payment.[119] As a result, many Haitians had difficulties accessing public health since most of them live on two dollars or less per day. After the earthquake, a wide range of NGOs and other international actors, with total funds which far exceeded the MSPP budget[120], were able to offer many free medical services. This "shift of power" from state to externally provided health services undermined the national health system.

9. Responders needed to incorporate the system of temporary medical treatment facilities established by numerous civilian and military actors into an effective care network with existing medical treatment facilities. This was needed to both meet the immediate medical needs of the population and promote reconstruction and development of Haiti's medical care network to meet local needs long-term.

# RESPONSES TO THE CHALLENGE

## Overview

10. Hundreds of health worker volunteers from all over the world arrived to help at Haitian medical treatment facilities or set up extra facilities to augment the overwhelmed Haitian system. Military units responded both to provide security at existing Medical treatment facilities, such as the support provided by 22 Marine Expeditionary Unit and the 82nd Airborne Brigade Combat Team (BCT), and with their own deployable medical treatment facilities.

11. Several of the temporary medical treatment facilities established to augment local capacity were military medical treatment facilities including field hospitals from the Canadian Army and Israeli Defence Forces (IDF) and military hospital ships from Mexico, the United States, Colombia, France, Spain and Italy.

12. The 22 Marine Expeditionary Unit and the 82nd Airborne BCT, the IDF field hospital and the hospital ship USNS COMFORT are the focus of this narrative which will consider the challenges these highly capable early military responders faced. Together the stories of these different contributions illustrate the potential as well as the challenges of deploying military forces to protect and provide medical treatment facilities in the immediate aftermath of a natural disaster and offer insights regarding how direct aid may impact the indigenous health system generally.

## Providing security at existing Medical treatment facilities

### The 22 Marine Expeditionary Unit and the 82nd Airborne BCT

13. Military forces were asked provide security at existing Medical treatment facilities. One example of this occurred at the General Hospital. The hospital director, preoccupied with patient care and service delivery, but mindful of the increase in tension in relationships with both the population and NGOs, asked a representative from Partners in Health to liaise with the military to provide security. A major security concern came from the intimidating number of people desperately seeking access to treatment facilities in order to get treated themselves or to try to save their injured relatives. Also, there were concerns existing frictions between resident medical staff and NGO personnel might get worse.[121] As, one hospital manager reported:

> *"The main reason we called for the military was I was threatened by the NGOs. They wanted to take over and have control. We needed to have authority re-established because it was a public hospital. Groups came and tried to paste their signs on the outside of the hospital…I was worried if we didn't improve security many staff people would leave when they heard about the kidnapping"*

14. The marines and soldiers of the 22 Marine Expeditionary Unit and 82nd Airborne BCT arrived six days after the earthquake[122] and helped secure access to the hospital entrance and organize food distribution to patients. They also restored the electricity inside the building through a power generator, and broke some locked doors so as to gain access to additional stored equipment. US troops remained to support the hospital for about two months.[123]

## Direct care in military-provided medical treatment facilities

### IDF Field Hospital

15. The IDF field hospital was the first military medical treatment facility to arrive and also the first to leave on completion of its 10-day mission, arriving on 14 January 2010 when two Israeli planes with 230 people (109 for search & rescue and support and 121 medical personnel) landed in Port-au-Prince and established a functioning field hospital a short

distance from the airport within eight hours of landing. The IDF field hospital proceeded to operate at full capacity (72 beds), including four ICUs, and during its 10 day mission was able to treat more than 1100 patients, who together received more than 240 surgical interventions[124].

16. When the IDF landed there was no central authority able to coordinate the medical response overall, nor to direct the IDF as to how they could best integrate into the overall effort. An early priority was to establish an ethical but efficient process for determining treatment priorities for incoming patients, sometimes including the ultimate question as to which lives could be saved and which not. The IDF made its prioritization decisions by balancing the medical urgency of the case, resource availability, and the likely effectiveness of care. It should be noted that this decision making process did not solve the problem entirely, and patient prioritization remained an issue for the entire mission.[125]

17. IDF's patient tracking problem was partially mitigated through the adoption of "Electronic Medical Records" (EMR), whereby the IDF developed a database with all known information on each patient (date of birth, signs and symptoms, known history, photographs of relevant features where available, status of medications and treatment, etc.). Each patient was provided a bar-coded bracelet to link them thereafter to their EMR, and to help maintain proper patient identification and tracking.

18. In order to free up resources for other patients, and in an effort to reduce long-term dependence on their service, the IDF medical staff adopted a policy of "early discharge", providing patients the advice and supplies they would need to tend to their wounds (antibiotics, medicines, etc.), and discharging them from the IDF hospital as quickly as their medical condition would allow. This early discharge strategy was not ideal, because many patients were homeless and had nowhere safe to go. Very young patients often had no adult guardian to look after them. There were very few post-trauma treatment and rehabilitation facilities to pick up care for these most vulnerable of patients. In the end, the IDF had to rely on UN agencies and other relief organizations to support the patients they were discharging. Ultimately, when it came time for the IDF to redeploy, the USNS COMFORT was the main facility engaged in IDF post-discharge planning and was able relieve the field hospital of its seriously injured patients.

### Hospital ship USNS COMFORT

19. The USNS COMFORT was one of the first military hospital ships to arrive and was by far the most technically sophisticated, with a capacity of 1,000 beds, up to 12 operating rooms, and an ability to provide a wide range of care, including complex surgeries. Upon the arrival of COMFORT off Port-au-Prince on 20 January[126], she became the main tertiary level facility for Haiti.[127] During her seven week mission to Haiti, USNS COMFORT saw over 8,600 patients and performed over 1,000 surgeries.[128]

20. USNS COMFORT had already visited Haiti several times. US SOUTHCOM had sent the ship on short term "medical missions" to Haiti in the preceding years, the most recent in April 2009. Previous missions were principally focused on collaboration with the Haitian Ministry of Health in terms of health care delivery and training for medical students

21. In advance of the arrival of USNS COMFORT as part of JTF Haiti, US forces from SOUTHCOM assessed what healthcare facilities existed, and what their capacity and needs were. Due to the lack of a clear on-the-ground picture and in order to gain quick situation awareness, US SOUTHCOM also used other assets, such as P-3 Orion aircraft using Full Motion Video (FMV) feeds and new sensors (Airborne Laser Imaging Research Test Bed-ALIRT) to provide infrastructure damage assessment.[129]

22. COMFORT was anchored in the Port-au-Prince harbour because the port was also severely affected by the disaster including major damage to the larger northern pier[130] that would have otherwise accommodated her. The immediate problem was deciding which

patients to select to transport for care on-board, and how to transport them since, not being pierside, patients had to come by either boat or helicopter.

23. The process of patient referral was initially "overwhelming and chaotic". One senior COMFORT staff member put it: *"It felt impossible to address so much need in such an ad hoc way. I'm sure someone could figure out a better way, but all we could do was keeping going."* Existing personal relationships and prior knowledge of trusted organizations and formal brokering from MSPP were the only links the COMFORT had to work with in the beginning. Eventually, the patient referral process became more organized, as coordinators on board learned "which organizations to trust and which were not reliable" and shore-based partners gained familiarity with the COMFORT's referral procedures. As word spread, the list of referring organizations grew and, given the large volume of requests, the next challenge was figuring out which cases the hospital ship could handle, how many to transfer, and how/where helicopter or land transport arrangements would be handled.

24. Patient referral was coordinated by a civilian physician on board COMFORT and a civilian "shore based" coordinator. Their main means of communication was initially by text message using a free plan from AT&T (a provision by AT&T as part of its support for the disaster response). The coordinating individual aboard COMFORT fortuitously had email and phone numbers for key contacts already. Each day, the assigned "shore based" coordinator reassessed which services were available, and input the assessment into an informal database which became the mechanism both for matching needs and resources and for tracking patients.

25. Patient transfers involved the use the 36 US helicopters which were the only means of transport for patients from the countryside to a tertiary care facility.[131] At least initially, most of the civilian partners ashore were not familiar with requesting helicopter medical evacuations, and had to learn how to accurately obtain and report the necessary information.[132]

26. As COMFORT's facilities filled with patients, post-treatment rehabilitation and discharge became a priority and Haiti had little post-operative services capacity. One COMFORT staffer noted, *"Even on the way steaming toward Port-au-Prince harbour, the civilian staff knew we were going to have trouble discharging patients. They were going to have injuries that required long-term rehabilitation and couldn't be turned around quickly. The planners didn't necessarily think about this and had to scramble about, seven days into the mission as our beds filled up but couldn't be emptied."* Several attempts to create a rehabilitation space on board COMFORT were unsuccessful. Ultimately, the resolution was to push patients back out to their referring organizations.

27. Some patients with severe injuries, needing specialized care, were transferred to different or distant places. Many were transferred to Miami Florida and from there to other hospitals in the US.[133] In the US, visa and other homeland security hurdles could be negotiated only by US National care providers personally intervening and vouching for the commitment to properly repatriate patients after treatment.[134]

28. The initial mandate of the USNS COMFORT was to treat adult orthopaedic cases, though this mission scope was interpreted with increasingly flexibility as it became apparent that the need was much more extensive.[135] As the interpretation of the mandate expanded to include care for children, family contact became an issue. The medical staff quickly realized that when child patients were admitted without their family, handling communication with the child's family became an additional administrative burden. Thereafter, a family escort was allowed to travel with child patients.

29. Figuring out when and how to withdraw COMFORT and her valuable service delivery was the final challenge, with several factors to consider. One view was that COMFORT should leave after just a few days; another view was that an abrupt departure could create a negative political image; a third view was that the COMFORT should stay until the health sector was able to resume care approaching its pre-earthquake levels[136]. Ultimately the decision to withdraw

the USNS COMFORT was based largely on resource considerations. Thus, once earthquake-related injuries levelled off and the non-earthquake related injured and ill began seeking care from COMFORT[137], the ship began a tacit program of "weaning," whereby fewer and fewer patients were accepted, even though COMFORT had additional capacity. COMFORT left on 09 March 2010[138], 49 days after she treated her first patients.

## DISCUSSION

30. Existing health facilities—already struggling to meet the needs of the population—were devastated by the earthquake, especially at the secondary and tertiary care levels. Hospitals, where they survived, were rapidly overwhelmed by patients. Military security and military medical treatment facilities were used to temporarily strengthen the health system and clearly provided net benefit to the Haitian population and in the immediate aftermath of the disaster.

31. There were however some challenges faced by those providing security at existing medical treatment facilities and those working at military hospitals. It is worth noting that both military health facility providers considered in this narrative, although operating very different facilities and from different nations under different mandates, faced similar challenges. Many of these challenges were also faced by NGOs operating treatment facilities. The following sections sum up the challenges faced.

### Military security provision at indigenous health facilities

32. Initially, security did not appear to be a major concern on the ground: Haiti was not involved in armed conflict at the time of the earthquake. The immediate-post-shock stage affected everybody universally, an idea corroborated, for instance, by statistical data with respect to gunshot wound interventions in MSF facilities; there were about the half as many in the first month following the earthquake than in the following months.[139] As a consequence, there was no evidence of civil unrest outbreak and no particular report of violence against health facilities.[140] Due to the lack of coordination and the absence of police forces during the first days, a military presence was helpful to secure the healthcare facilities and allow service providers the opportunity to triage casualties, until transition to local police or private security could be arranged.

### Building situation awareness and coordinating

33. The early responders from the international community had to set up their facilities without coordination or standardization. At the outset, newly-arrived responding healthcare providers simply did not know what Haitian (or pre-existing non-Haitian) healthcare facility capabilities existed—they did not have comprehensive knowledge of what prior capabilities had existed to begin with and they did not know the current status of those capabilities. An assessment of the status of existing capabilities is required for any provider seeking to integrate with existing efforts. US military providers seemed to have among the best situation awareness in this respect following extensive pre-deployment surveys. Some private sector care providers sent personnel with handheld (e.g. Blackberry, Palm Pilot, etc.) communication devices to get data and develop a database of needs and capabilities. It seems that little information sharing took place in the early days and at least one observer felt this ad hoc effort to create a common operating picture ultimately took too long to set up. "*By the time it could be up and running, need was over*", one US Government representative said.

34. One surprising but undeniable feature of the effort to coordinate and standardize efforts and build situation awareness was the role of personal knowledge and informal contacts among key players. Military contributions benefitted significantly from the *ad hoc* capability provided by informal contacts. It seems likely there will be a lack of coordination and standardization to cope with at the start of any crisis response and informal contact networks are a pragmatic solution to overcome this challenge and should be encouraged.

### Developing fair, effective patient triage and referral systems

35. In the initial chaotic situation, a large influx of patients reached the few medical facilities still available. There was no readily-accessible overarching database to help catalogue the massive pool of patients, in order to effectively triage on a systemic scale; while various software and communications tools exist, none was in place for such coordination. MSF described the situation well: *"There was no let-up in the work and thus no time for reflection and planning; only responding".*[141]

36. Triage involves health care professionals who carefully assess the patient and then refer them for the services and the care they require. After the earthquake, this function was compromised due the overwhelming numbers of patients, the severity of many of the emergency cases, and the lack of adequate triage resources—e.g. physician or nursing personnel, space to exam patients efficiently, medical records to assess history and status.

37. Almost all the facilities used different triage parameters, in accordance with their own capabilities. For example, MSF could not carry out systematic triage due to the sheer numbers of patients. It ended up giving priority to patients, not necessarily with the greatest need, but who had the highest chance of survival.[142] The IDF field hospital created a procedure on the basis of casualties' urgency and care's cost/effectiveness ratio.

38. Different referral systems were built from scratch, in the middle of an emergency, with limited communications, records storage or access, and poor formal relationship with any care organizations in Haiti. Informal personal contacts and trusted relationships with organizations were the backbone of the referral system used.

### Patient transport by helicopter

39. Helicopters were essential to transfer patients from rural regions. Military helicopters were instrumental in this respect. However arranging patient transfers by military helicopter challenged staff in humanitarian organizations to learn how to work with military helicopter request procedures.

### Keeping track of patients and relatives passing through their care

40. Before the earthquake, Haitian authorities lacked a mechanism for patient registration and had a very poor patient database. The earthquake caused the loss of key information that had been available (birth registrations, personal records, prior medical history, etc.). A study by Operational Medicine Institute reported the main issue faced in Haiti was the lack of a patient identification and tracking system, especially with respect to orphans and unaccompanied minors.[143] Many patients were unable to maintain contact with their families (due to communication system shutdown), causing additional anxiety among the Haitian population, and resulting in an administrative burden to medical staff who had to respond to many information requests from patients' relatives.

### Discharging patients with on-going medical needs

41. The decision of how to discharge patients represented the final challenge to providing responsible care. Field hospitals are equipped to provide immediate care, while the facilities for follow-up or post-operative care are not available or overburdened. Immediate care facilities somehow need to plug into an outpatient network that can provide long-term post-operative care. The lack of outpatient facilities in Haiti was noted as a problem by both the International Federation of the Red Cross (IFRC) Rapid Deployment Emergency Hospital – Emergency Response Unit (RDEH ERU) and University of Miami Global Institute/Project Medishare (UMGI/PM) field hospital. However, they each offered different solutions:

a. RDEH ERU set up an outpatient clinic with expatriate paramedics, providing post-operative care, but suggested that, *"future deployments require better staffing for post-operative nursing care"*[144].

b. The UMGI/PM field hospital proposed that in future deployments field hospitals should have ability to provide outpatient care facilities.[145]

### Deciding when to withdraw services

42. When and how to end military medical treatment provision is a critical decision. There is no commonly agreed method for how to arrive at the decision. The definition of a fixed period of deployment was undoubtedly considered during the planning phase (i.e. endurance, provision, refuelling issues, etc). But due to the numerous factors, most of them unpredictable or situation-related (disaster damages, local capabilities, culture, etc), it is difficult to stick to such a decision. This issue is deeply related to the issue of planning for long-term recovery and development during the response phase. Whenever the assets leave, it is important to have an "exit strategy" that can hand over patients to long-term care.

### Impact on the Health System

43. Military hospitals contributed effectively to strengthening the Haitian health system, especially during the critical and acute phase of the disaster response, especially in terms of flexibility and rapidity of engagement. However, many Medical treatment facilities in the affected zones are far from being completely restored both in terms of capacity and capabilities and still, less than 40% of Haitians have access to health care[146]. The immediate relief provided by the temporary medical facilities appears to have contributed little to enduring increase in the capacity of Haitian health facilities.

44. Haitian health leadership was undoubtedly strengthened by military security provision at Medical treatment facilities. The security provided by militaries, such as at the General Hospital, helped local representatives to maintain appropriate control of the situation and allowed them to work properly. The greater access to care made possible by externally provided medical treatment facilities (including IDF and USNS COMFORT) was appreciated by MSPP representatives.

45. There were major problems with medical information gathering and sharing that were solved only with ad hoc solutions, which appear to have departed with the organizations that developed them. Most of the information sources available were under-employed and poorly shared. Linkages were created on the fly, based on personal relationships. "Mutual trust and acquaintances" played a primary role in the information flow. It is not clear how much of the information gathered and the systems for storing and sharing developed during the earthquake response are now being used in Haiti's health system.

46. The military medical staff augmented the local health workforce. The care they provided was undoubtedly helpful in the aftermath of the disaster. However, two months after the earthquake, when many military staff had left, local medical staff who should have been returning to work at public facilities had not. Migration of staff from public to private facilities was attributed to recruitment by NGOs offering a better salary.[147]

### Health and Security

47. There is a risk that failure by the state to meet heightened expectations for free healthcare could undermine the population's confidence in the state. The mandates of militaries in a disaster response/humanitarian assistance operation are short- to medium-term and limited. Although they relieve the burden on the host nation by providing capabilities and support, they do not contribute to the host nation budget. When health services are provided free of charge by external actors, they raise an expectation in the population of ongoing free healthcare. When external providers leave, the host-nation is unlikely to be able to continue to provide free healthcare.

[113]De Ville de Goyet, pg 29.

[114] A similar situation was also experienced by MSF when delays in relief material distribution provoked anxiety and desperation from the population outside the capital. In this case, MSF decided to minimize the security issues through "a quick and large scale distribution" (reference: MSF "*Haiti one year after*", 10 January 2011, page 20).

[115] De Ville de Goyet, pg 20

[116] Médecins Sans Frontières; Haiti one year after – A Review of Médecins Sans Frontières' Humanitarian Aid Operations, pg 7–8

[117] De Ville de Goyet, pg 21

[118] Médecins Sans Frontières; Haiti one year after – A Review of Médecins Sans Frontières' Humanitarian Aid Operations, pg 9–11.

[119] WHO website: Global Heath Expenditure Database (Haiti country profile), http://apps.who.int/nha/database/DataExplorerRegime.aspx, 31 May 2012

[120] MSF alone spent about 124 million dollars for the relief effort by December 2010, far exceeding MSPP's 86 million dollar budget. "*Haiti one year after*", 10th January 2011, pages 31-32).

[121] De Ville de Goyet, pg 63–64

[122] The commander was an American-Haitian colonel.

[123] USA Today website: U.S. troops pack to leave Haiti"*;* 07 March 2010 http://www.usatoday.com/news/world/2010-03-07-american-troops-haiti_N.htm), last accessed 01 June 2012

[124] Merin

[125] Merin

[126] Garamone, USNS COMFORT Arrives in Port-au-Prince

[127] De Ville de Goyet, pg 62.

[128] Daniel

[129] Joint Center for Operational Analysis

[130] CNN World website: Haiti pier opens, road laid into Port-au-Prince, http://articles.cnn.com/2010-01-21/world/haiti.earthquake_1_pier-haiti-tons-of-humanitarian-aid?_s=PM:WORLD, last accessed 01 June 2012

[131] Comfort's helicopters were also used for the distribution of basic supplies to outlying clinics.

[132] A "medical evacuation" (MEDEVAC) requires at the minumum getting accurate GPS coordinates of shore-based facilities transferring patients; sometimes the COMFORT coordinator provided a shore-based partner a rendezvous point, but the helicopter was unable to embark patients at the appointed time and place (distance, time limitation, prioritization of the flights, etc). Conversely, COMFORT-based coordinators had to figure out where helicopters could safely land, matching a lot of medical requests and the limited resources on board (number of assets, weather limitation, endurance, etc).

[133] Dewan

[134] De Ville de Goyet, pg 78

[135] Daniel

[136] Strobel

[137] The project team was able to view a graph from USS BATAAN showing patients accepted on board by type of injuring per day (earthquake or non earthquake-related)that was used a decision aid and it was reported that a similar graphic aid was adopted by USNS COMFORT.

[138] US Department of Health and Human services information page about USNS COMFORT, http://www.hhs.gov/haiti/usns_comfort.html, last accessed 01 June 2012

[139] De Ville de Goyet, pg 133

[140] UN Security Council; Report of the Secretary-General on the United Nations Stabilization Mission in Haiti; 22 February 2010

[141] Médecins Sans Frontières; Haiti one year after – A Review of Médecins Sans Frontières' Humanitarian Aid Operations, pg 9-10

[142] De Ville de Goyet, pg 67 and Médecins Sans Frontières; Haiti one year after – A Review of Médecins Sans Frontières' Humanitarian Aid Operations, pg 9)

[143] Operational Medical Institute website: The Haiti information technology Rescue Project: Electronic Medical Record and Patient Tracking Assessment, http://www.opmedinstitute.org/haiti/, last accessed 30 May 2012

[144] IFRC established a field hospital in Port-au-Prince on 16 January that hosted 70 to 80 patients per day and performed about 300 surgical operations (See Elsharkawi, page 11).

[145] Center for Diseases Control website ,MMWR weekly report of 07 January 201, http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5951a1.htm, last accessed 03 June 2012

[146] UN General Assembly, Report of the Secretary-General on Sixty-sixth session

[147] De Ville de Goyet, pages 38–40.

# Annex C
# NARRATIVE:
# CHOLERA – THE SECOND SHOCK

## CHALLENGE TO THE HEALTH SYSTEM

1. Ten months after the devastation wreaked by the earthquake, a second dreadful threat to the population materialized: cholera. In Haiti, as of January 2012, over 500,000 people have become infected and more than 7,000 have died from cholera.[148] The sudden lethal outbreak was incomprehensible to the Haitian population. One blogger described the reaction in her neighbourhood to the epidemic: *"terrified residents saw stricken young neighbors die within hours of developing symptoms. The speed and violence of the illness convinced residents the water must have been deliberately poisoned with a chemical, not a germ or bacteria because they had drunk the same dirty water their whole lives and had never fallen ill before."*[149]

2. There was great concern over waterborne diseases in the aftermath of the earthquake. The population had limited access to safe water because of underlying poor levels of sanitation compounded by the destruction of water system infrastructure during the earthquake. In March 2010, the Center for Disease Control (CDC) estimated the chance of an outbreak of waterborne diseases as high, although it determined that an outbreak of cholera was unlikely because cholera was historically not endemic to Haiti.[150] Nonetheless, ten months after the earthquake, in late October 2010, Haiti saw its first officially reported cholera case and the epidemic soon spread to all Haitian Departments. [151]

3. The cholera epidemic broke out first along Artibonite River. The proximity of one UN peacekeeper compound to the Artibonite River and the identification of an Asian string of cholera indicated that a UN battalion from Asia could have brought the bacteria into the country.[152] After the association of cholera fatalities with the UN mission, anger, frustration and unrest among the Haitian population broke out very quickly.[153] A deputy mayor told the New York Times of his anger towards MINUSTAH and that he had even considered killing Nepalese UN soldiers. He added that, *"If they hadn't left, we would have burned it* [the Nepalese UN Camp] *down."*[154]

4. Elections held at the end of November 2010 contributed to an increase in violence on the streets[155] and in the weeks following the first cases of cholera, protests and riots erupted in the affected areas and soon spread across the whole country[156]. Outbreaks of violence requiring MINUSTAH intervention were not only directed at MINUSTAH but also, as a result of fear among the population, directed at cholera treatment facilities provided by NGOs. For example, terrified residents violently protested the opening of a 400-bed cholera clinic nearby for fear that the clinic would bring more cholera into the region. MINUSTAH had to respond to these protests and the clinic was not opened.[157] Another NGO clinic required protection because people's frustration with the slow cholera response turned into violent riots.[158]

5. The increased violence and instability made it more difficult to circulate response resources which in turn hampered the fight against the epidemic.[159] Besides the increase in instability, the cholera outbreak also impacted food security. According to a FAO report, many farmers feared that the water irrigating the rice fields could have been infected.[160] The security ramifications of the epidemic led Haitian health authorities to declare the epidemic *"a national security problem"*.[161]

6. The impact on the health system has been immense. Cholera patients have overrun clinics and hospitals, with many hospitals seeing hundreds of patients per day.[162] The consumption of health supplies, provider time, and money necessary to treat these patients has distracted and continues to distract from efforts to strengthen Haiti's health system. Fear

and fatalities affected the ability of medical facilities to treat patients. Clinics lacked the sanitation facilities to handle waste from cholera patients and other patients avoided clinics where cholera patients were being treated for fear of contracting the disease themselves. The bodies of deceased cholera patients lay in field hospitals uncollected by their families and undertakers.

7. The environmental contamination impact has also been extensive. Cholera bacteria are feared to have contaminated the water table in considerable depth.[163] One year after the outbreak, the UN deputy special envoy to Haiti, Dr Paul Farmer declared that cholera is likely to become endemic in Haiti. He also attributes the spread of the disease to what he describes as Haiti's status as the "most water insecure" country in the world. In the view of Doctors Without Borders (MSF-Haiti) the epidemic was not yet under control after a year.[164] It is expected that the each rainy season will bring new waves of cholera.

8. The long-term wide-ranging effects of the epidemic on Haiti are still emerging. For example, Human Rights Watch mentioned in their last world report that both the earthquake and cholera epidemic hindered Haiti from addressing many of the chronic human rights problems exacerbated by the quake, including violence against women and girls, inhumane prison conditions, and impunity for past human rights abuses.[165]

## Responses to the Challenge

9. The security community did or could have contributed to the response to cholera in the following tasks:

a. Providing epidemic surveillance and public information

b. Ensuring access to safe water

c. Distributing medical supplies and mortuary services.

10. The following sections explain what actually happened with respect to these tasks in Haiti, highlighting key challenges faced.

### Providing Epidemic Surveillance and Public Information

#### Epidemic Surveillance

11. Prior to the cholera outbreak, Haiti did not have a comprehensive epidemic surveillance system. After the earthquake Haiti's MSPP requested help from the CDC to strengthen its national epidemic surveillance system and its workforce. The need to monitor disease trends, detect outbreaks, and characterize the affected population to target relief efforts led to the creation of Haiti's National Sentinel Site Surveillance (NSSS) system. MSPP, the PAHO, CDC, together with other national and international agencies launched the NSSS System. [166]

12. The first cases of cholera were detected quickly by the MSPP and confirmed by the national lab within 24 hours. As early as November 2010, an early warning system was put in place by the MSPP, with PAHO/WHO's support. This system enabled the real-time collection of data on localized epidemics, available resources and response needs. Additionally, the system supports Direction Nationale de l'Eau Potable et de l'Assainissement (DINEPA) water quality monitoring programme in health institutions located in the Port-au-Prince.[167]

13. The MSPP and CDC continued to monitor the dynamics of the cholera epidemic and collaborated with other partners to identify the primary source of cholera.[168] Several organizations and clusters (Carte Sanitaire, PAHO, International Organization for Migration (IOM), Health-, Logistic (LOG)-, Water Sanitation and Hygiene- clusters) are hosting data and information that are meant to provide situation awareness related to cholera. However, MSF reported in May 2012, after seeing an unexpected quadrupling in the numbers of newly

infected patients, that the surveillance system, which is supposed to monitor the situation, and provide a forecast to raise the alarm, is still dysfunctional.[169]

### Public Information

14. The population was kept informed through traditional means including broadcasting updates and cholera awareness throughout MINUSTAH FM in conjunction with other radio stations.[170] Also, recognizing the fastest way to contain the epidemic was to treat and educate the limited number of patients in rural areas before the disease spread across the country, Haiti's public health community drew up a plan to quickly fan medical teams out across the countryside. However, some participants in this study reported that the MSPP lacked the staff to implement the plan and few NGOs wanted to travel outside of Port-au-Prince where, they felt, media attention and funding was scarce.[171]

15. New forms of public information were also used in Haiti for the first time such as Digicel's initiative to inform the population via Short Message Service (SMS). One interesting project tracked cell phone movements across the country. Digicel used this cell phone tracking to inform cell phone customers if they entered a cholera-contaminated area and simultaneously to provide the customer advice on how to protect themselves from cholera. Interestingly, one of the directors of the project noted, *"often before we could send the message, the phone was on the move out of the area. Its owner was already running away from cholera."*

## Ensuring Access to Safe Water

16. With respect to water security, Haiti appears near the bottom of the ranking of nations; indeed in 2002, Haiti ranked last out of 147 countries for water security[172]. The Joint Monitoring Programme (JMP) from the WHO and UNICEF published[173] recently that in 2010 whereas almost 85% of the urban population have access to "improved" water, in the rural areas access to piped or improved water sources is still limited to 51%. The JMP also included statistics showing that in rural areas almost 50% of human waste is "open defecation" and nationwide the trend of unimproved sanitation—which means that human excreta are not separated hygienically from human contact—has worsened in the last 10 years.

17. Without sanitation services or even simple pit latrines, cholera easily spreads across waterways. One NGO worker told of testing the well water from a nearby deep well in the central plateau and found the number of chloroforms to be *"too numerous to count"* suggesting that the water table itself has now become infected.

### Clean water in internally displaced persons (IDP) camps

18. Fear prompted migration away from cholera-affected villages and towns into the already crowded capital city where purified water was being provided in the short-term in the IDP camps. The outbreak had relatively few cases in the IDP camps. The mean reason for this lower incident rate compared to the rural areas is that IDP camps were mostly provided with clean and chlorinated potable water by Haitian and international actors. To give an example, peacekeepers built a water tank in largest IDP site in the country.[174] Latrines were also serviced in camps.[175]

### Clean water in the population

19. Lack of municipal water supplies and sewage treatment centres in Haiti make "point of source" water purification one of the only ways to provide the population with clean water. Many humanitarian organizations provide potable water to the population, MINUSTAH contributed to this effort by distributing nearly 15 million gallons of drinking water and 16,000 purification tablets and MINUSTAH's Community Violence Reduction section has distributed more than 6000 water filtration units. The coordinated distribution of water purification kits was a big challenge.

### Medical Supply Distribution and Managing Mortuary Services

#### Medical supply chains

20. Interviewees highlighted an aching need for logistics support to manage the epidemic, including for vaccine distribution. In the cholera epidemic there were massive breakdowns in the supply chains providing rehydration medications. There is a contrast between the single organization military-led efforts to address supply logistics for the earthquake relief and the system-wide efforts—including all actors—to strengthen medical supply delivery for the outbreak.

#### Mortuary services

21. Disposal of cadavers requires honouring cultural practices related to dying and death, disinfecting cadavers, and identifying burial sites that are acceptable to the community all of which must be integrated into the broader waste management system to avoid contaminating the waterbed. During a health cluster meeting, MSF reported "congestions" of dead bodies contaminated with cholera in their clinics. This problem was also seen in other clinics and had an impact on their functionality and capacity to receive and treat cholera cases.

22. As many funeral parlours refused cadavers from patients who died of cholera[176] the population, local authorities, NGOs and the health sector may welcome support with cadaver disposal from other actors. Handling dead bodies is very sensitive and some from NGOs would appreciate help with it, but it was mentioned that this activity could easily be stigmatized and maybe some would even claim that the military would try to hide evidence (bodies) of military action.

## DISCUSSION

23. Over 7000 were killed and 500,000 sickened by cholera in Haiti, compared with 399 deaths and 23,000 infections in the adjacent Dominican Republic[177]. Thus, the problem cholera posed for Haiti was not so much the bacteria itself but the ground it found. The latest Health Bulletin[178] only now shows a significant drop in the number of new daily cases from more than 1000 in June 2011 to 77 in March 2012.

24. In March 2011, five months after the first identified cholera case, The Lancet published a study suggesting immediate measures such as the provision of clean water, vaccination and expanded access to antibiotics that might avert thousands of deaths.[179] Responders were criticised in a New York Times article[180] that noted a belief that, *"the bar for success was set too low and more lives could have been saved."* The same article listed some specific criticisms including: weak disease surveillance and case-tracking, inadequate water distribution and latrine building, and a reluctance to use antibiotics and cholera vaccine. Their article suggests that: *"cholera could have been stymied, even eradicated, last winter during the dry season after the first wave. Instead, it flared with the rains even as aid groups shuttered or reduced operations. And now, after another winter without an aggressive prevention and eradication effort, the health authorities fear a reprise."*

25. The view that more could be done is further supported by Dr. Piarroux, who believes that Haiti has a chance of eradicating cholera completely within a few months by taking appropriate actions in the areas where cholera is still a source of infection and by using quicker and more effective epidemiological surveillance.[181]

### Link to Security

26. While MINUSTAH and other foreign military forces were perceived as "friendly" during the earthquake response, the perception of MINUSTAH and its mission were at stake when the cholera broke out and the health system was not strong enough to protect the population. Violence directed both at MINUSTAH and NGOs was witnessed throughout the country.

27. That said, it is difficult to conclude that cholera alone generated social unrest and violence. The increased violence seen on the street must be considered in conjunction with an election campaign that per se triggered some party supporters to go out on the street with many events ending violently.[182] The US Institute of Peace mentioned in a report that "political tensions in the run-up to elections, armed groups, criminal enterprises and vulnerable youth could once again be mobilized by political forces to fuel violence or disrupt the political process".[183]

### Leadership and Coordination

28. The humanitarian response to the cholera outbreak was led by the Ministry of Public Health and Populations with technical support from PAHO/WHO.[184] The MSPP collaborated with partners, including CDC, in providing guidelines for drug treatment, training health workers on cholera treatment, improving water and sanitation and public messaging. However, over one year after the outbreak, humanitarian actors still recommended the creation of a national multi-sector coordination structure to bolster the government's capacities to tackle the cholera epidemic.[185] After a new sharp peak of cholera cases in April 2011, MSF noted in a press release: *"It is concerning that the health authorities are not better prepared and that they cling to reassuring messages that bear no resemblance to reality. There are many meetings going on between the government, the United Nations and their humanitarian partners, but there are few concrete solutions."*[186]

29. The security community could assist by providing civilian experts to support the local authorities to manage an epidemic response and be more involved during the planning of a response. Despite the availability of crucial engineering, logistic and human resources in the UN-mandated stabilization force, MINUSTAH was left out of the initial response.[187] Lack of mandate (legitimacy) for involvement in major health threat responses meant that MINUSTAH resources were called on too little and too late.

### Preventing Introduction

30. International responders must take measures to prevent the introduction of non-endemic infectious disease in a highly vulnerable region. The independent expert panel tasked by the UN to identify the source of the epidemic suggested that United Nations personnel and emergency responders traveling from cholera endemic areas should either receive a prophylactic dose of appropriate antibiotics before departure or be screened to confirm absence of asymptomatic carriage of *Vibrio cholerae*[188]. But which organization would be responsible to implement such measures is not clear. Larger organizations would have standards and procedures for their personnel but smaller NGOs or individuals coming from high risk areas facing logistic and financial constraints might not automatically comply with the request for pre-screening if host nation authorities are not controlling it at the point of entry.

### Identifying and Tracking an outbreak

31. There are many opportunities to improve epidemic warning and surveillance in fragile states. The threat of an outbreak and its impact on the population, particularly with respect to stability, would seem to justify the use of military assets to contribute to a first rate epidemic surveillance system. Thus, it should be possible to leverage the Joint Mission Analysis Center (JMAC) of the in-country UN mission. MINUSTAH's JMAC maintains a robust database of intelligence on security and crime; adding and sharing epidemic data would help epidemiologists with their struggle to collect basic data about the cholera epidemic. In Haiti the military may have done more to collect critical epidemic data and contribute to an overall health threat assessment if they had been asked to by civilian authorities. The impact of health threats on security might warrant new indicators for inclusion in security risk assessments.

32. New technology offers an opportunity to complement traditional epidemic tracking. A study team from the Karolinska Institutet found a way to monitor an infectious disease outbreak in real time by analysing the population's movement using cell phone tracking.[189] There is a trend towards widespread access to mobile phones, even in countries with poor sanitary and health conditions.[190] In Haiti, Digicel estimates that among the 10 million inhabitants over 5 million cell phones are in use. However, there are legal issues relating to the release of confidential cell phone tracking data. One of the first steps that an organization needs to take to access such data is to contact the phone regulator. Flowminder an organization set up by the authors of the Karolinska Institutet study, got approval from Groupe Spéciale Mobile Association (GSMA)[191] to be a single source, trusted and a known entity for carriers to send this type of information.

33. Also, web based analysis of social media news such as Twitter feeds proved, in hindsight, to be useful in tracking the cholera epidemic faster than traditional sources. This new approach for epidemic surveillance could help responders in an important window of opportunity to react very quickly to implement aggressive measures to stop the outbreak from spreading. A study published in Nature[192] describes how data collected through social media sites accurately tracked the Haiti's cholera outbreak faster and more cost effectively than traditional surveillance methods. By measuring the volume of informal news media generated during the first 100 days of the outbreak and looking at the number of "cholera" posts on Twitter using an automated surveillance platform called “HealthMap”, researchers found that as the official number of cases increased and decreased, so did the volume of informal media reports about cholera. This observed correlation means such reports could be used to get earlier estimates of a disease outbreak and help plan a response sooner. Other advantages include finer temporal and spatial resolution, and the study says informal media could be used to study other disease outbreaks around the world.

### Preventing Spread

34. From an international responder’s perspective, there are several measures that need to be taken to prevent the spread of a waterborne infectious disease, the first of which is to stop any imported disease from leaving international compounds. The expert panel suggested United Nations installations worldwide should treat faecal waste using on-site systems that inactivate pathogens before disposal. These systems should be operated and maintained by trained, qualified United Nations staff or by local providers with adequate United Nations oversight.[193]

35. Once a waterborne infectious disease has reached the waterways, the main way to stop its spread is to ensure good sanitation and access to safe drinking water. In the short-term, IDP camps in Haiti were notable for their low levels of reported cholera due to the access to purified water and waste treatment they provided to the population. But, as recently mentioned by the UN Humanitarian Coordinator in Haiti, those camps which had benefited from chlorinated water provided by relief organizations might face issues as some of the services cease because of shortage of funding.[194] It was noted that, if servicing of latrines in IDP camps were stopped for any reason (e.g. due to lack of funding), poor sanitation conditions among the camps could lead to rapid increase of the disease transmission.[195] Medical treatment facilities are a further concern where waste and bodies of infected people must be dealt with appropriately. Participants of the health cluster discussed whether the military could be helpful in supporting the local authorities and funeral services in transporting contaminated bodies to the burial place.

36. Another short-term measure is "point of source" purification which while certainly an important part of the epidemic response in Haiti, was less effective than it could have been because of the challenges inherent in coordinating the distribution of kits and training end-users in their proper use.

37. In general, the UNEP strongly suggests investing in basic access to a safe water sources and sanitation would have the largest impact on health, in particular averting

diarrhoea cases. These investments would also have a beneficial long-term effect on a population's productivity and stability.[196] Obviously these investments would best come from the development community, but in states where there is a proven link between state stability and water security, nations could provide funding and resources channelled through an international stabilization force under its security mandate—if funding and resources are not forthcoming through the appropriate development channels.

38. In Haiti, the development community is not able to fully support water security development and the cholera epidemic has shown that water insecurity in this country impacted stability. In 2008 the Inter-American Development Bank estimated building municipal water treatment plants in Haiti would cost 750 million dollars.[197] However, because of scarce resources and funds available in the country, a large-scale water project appears unlikely in the near future—the consolidated appeal process for Haiti in 2011 received only 55% of the requested amount. On the other hand, MINUSTAH with its engineering capacity, has assets that could provide clean water pumps and contribute to sewage cleaning, draining of water and garbage removal. It is not up to the military to decide when and where safe water projects need to be performed. In the case of Haiti, requests from local authorities and foreign civilian organizations for MINUSTAH support should go to the JOTC.

39. Finally, the other key tool in fighting the spread of cholera, and reducing causalities is direct health interventions in the form of prevention of infection through vaccination and rapid treatment with rehydration medicines. Such medical supplies require organized supply chains that can ensure they reach the affected areas. MINUSTAH helped with some medical supply distribution.

### Observations for Health System Strengthening

40. Both the impact of and the solutions to the cholera outbreak extend much further than the boundaries of the health system as defined by the WHO. Whenever there are significant threats to the personal and environmental security of the population, any gains in health security can be quickly eroded. Improvements in the health system alone would not be sufficient to protect a population from future outbreaks of a waterborne infectious disease.

41. What is needed within the health system, using the WHO building blocks as a framework, may include:

a. Service Delivery: Ensure medical treatment facilities are able to maintain sanitary conditions and mortuary services can dispose of cadavers quickly and appropriately so that medical treatment facilities can function at full capacity. Ensure security is maintained at existing facilities and so that additional facilities can be built as necessary.

b. Health Workforce: Ensure medical workers are trained to recognize, treat and report cholera cases.

c. Information: Ensure a functional epidemic surveillance system is in place that makes use of new technology and security community information as well as traditional surveillance methods to provide early warning of a possible epidemic. Use mobile phone tracking and messaging to keep the public informed to complement traditional public information broadcasts.

d. Medical Products, Vaccines & Technologies: Coordinate all available logistics mechanisms to ensure medical supply chains are able to meet sudden increased needs.

e. Financing: Channel international funding to enable provision of epidemic treatment and vaccines at no cost to the population.

f. Leadership/Governance: Strengthen the ability of local health authorities to manage the epidemic response with experts from the international community.

### Health and Security

42. Environmental security, in this case, water security proved to be the main factor contributing to the enormous toll that cholera has had in Haiti. Building infrastructure to provide clean water and sanitation is one of the most pragmatic options to prevent new outbreaks and to fight cholera in the long term and thereby contribute to overall security; this kind of contribution should not be overlooked by the security community.

43. Retrospectively, it also seems that the cholera outbreak and its impact on personal security, for which MINUSTAH was responsible, were underestimated or not sufficiently well assessed. The cholera triggered unrest and violence. There is the belief that swift and proactive actions could have reduced its impact in this respect. Early warning signals may have been identified if security assessments had included public health indicators but this would have had to have been predicated on a broader interpretation of the stabilization mandate.

### Opportunities for a more Comprehensive Approach

44. The overarching need is for a productive and open discourse about integrating resources directed toward immediate disaster relief and stabilization, and basic service resources. There is no doubt that a large scale outbreak of infectious disease calls for employment of all available resources to protect the population, including military assets if they are available. Experience during the cholera response points to a number of areas in which the security community, particularly through employment of its military assets could have been used more effectively as part of a comprehensive approach:

a. Military assets present in a nation and familiar with logistics supply chain challenges could be directed towards resolving the relatively straightforward issues likely to arise in the supply chain for resources to address an epidemic.

b. The UN military missions possess engineering assets capable of the provision of water and sewage infrastructure construction. MINUSTAH with its engineering capacity has assets that are greatly needed to address waterborne infectious disease outbreak. It provided clean water pumps and contributed to sewage cleaning, draining of water and garbage removal.

c. Recognizing the link between epidemic outbreak and increased instability, military and police forces need to ensure public health indicators are included in their comprehensive surveillance as part of their own situation awareness; shared with other epidemic surveillance initiatives, both the chance of early warning of an impending epidemic and the ability to deal with an on-going epidemic would be increased.

d. Military and police forces could support disposal of cadavers when no other organization is able or willing to do so.

### Opportunities for better use of New Information Technologies

45. The case of cholera in Haiti has proven that new information technology can positively augment existing methods for epidemic surveillance and public information, even in very poverty stricken societies. Benefits in Haiti were seen using cell phone tracking and messaging to ensure people in cholera-affected areas had the latest information and guidelines about how to avoid catching the disease. Although it was not used in real-time in Haiti, social media monitoring and analysis has been shown to work both to track an emerging epidemic and predict its immediate spread. The use of social media information in this respect could gain vital life-saving hours to plan and mobilize a response.

### Critical implications of the cholera epidemic

46. A cholera outbreak in Haiti was not considered likely because it was not endemic to the island of Hispaniola where Haiti is located. However, given the vulnerability of the health

sector and the high number of foreigners coming from all over the world, maybe it was just a matter of time before cholera arrived in Haiti with devastating effect. As UN Special Envoy Clinton said “what really caused the cholera outbreak was the country's lack of proper sanitation”[198]

47. Local leadership and humanitarian responders faced serious difficulties:

a. First to prevent the epidemic;

b. Second to take drastic measures in order to minimize the impact of the epidemic; and

c. Third to include and mobilize all means including military assets as part of a comprehensive response plan.

48. In addition, the impact of a disease such as this recent outbreak on the society seemed not to have been considered in the overall security and stabilization assessments:

a. The specific threats to the population’s health in water-insecure areas require significant investments in prevention of waterborne diseases.

b. Measures must be robust and appropriate to the expected threat and its consequences.

c. The response plan should include military assets that are vital and available at short notice.

d. Stabilization missions should incorporate health indicators in their overall threat assessments.

49. Although mortality due to cholera has decreased and stabilized since the onset of the epidemic, Haiti continues to see new cases of cholera every day, with a sharp increase during the rainy season. The negative impact of the outbreak on both stability and development of Haiti means that prevention of such devastating outbreaks should be a key element for all contributors to stabilization and development.

[148] ReliefWeb website, Cholera cases and Response: http://reliefweb.int/sites/reliefweb.int/files/resources/UpdateCholeraCasVusMars2012_28052012.pdf

[149] Wagner

[150] CDC website: Acute Watery Diarrhea and Cholera: Haiti Pre-decision Brief for Public Health Action http://www.bt.cdc.gov/disasters/earthquakes/haiti/waterydiarrhea_pre-decision_brief.asp, last accessed 03 June 2012

[151] Ivers

[152] Piarroux

[153] Doyle

[154] Sontag, In Haiti, Global Failures on a Cholera Epidemic

[155] Sontag, Election Violence Flares in Haiti

[156] Schlein

[157] Katz, Jonathan M.; Cholera Fears Spark Anti-Clinic Protest in Haiti

[158] Zuckerman

[159] HaitiLibre website http://www.haitilibre.com/en/news-1905-haiti-epidemic-cholera-and-political-crisis-the-situation-in-haiti.html last accessed 03 June 2012

[160] UN FAO media centre website: Cholera fall-out likely to cause crop losses in Haiti, December 2010; http://www.fao.org/news/story/en/item/49044/icode/ last accessed 03 June 2012

[161] UN International Organization for Migration website, http://www.iom.int/jahia/Jahia/media/press-briefing-notes/pbnAM/cache/offonce?entryId=28645 , last accessed 03 June 2012

[162] DirectRelief International website, http://www.directrelief.org/EmergencyResponse/2010/HaitiCholera.aspx last accessed 0June 2012

[163] Project Team Interview, NGO worker, December 2011

[164] Haiti Libre, Haiti-Health: Cholera already one year, October 2011, http://www.haitilibre.com/en/news-4053-haiti-health-cholera-already-one-year.html last accessed 03 June 2012

[165] Human Rights Watch; Human Rights Watch World Report 2012: Haiti

[166] CDC website http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5930a1.htm last accessed 03 June 2012

[167] UN, Report of the UN in Haiti

[168] Tappero

[169] MSF website http://www.doctorswithoutborders.org/press/release.cfm?id=5990&cat=press-release last accessed 03 June 2012

[170] UN Security Council; Report of the Secretary-General on the United Nations Stabilization Mission in Haiti; 25 August 2011

[171] Farmer, Meeting Cholera's Challenge to Haiti and the World: A Joint Statement on Cholera Prevention and Care

[172] Farmer, Meeting Cholera's Challenge to Haiti and the World: A Joint Statement on Cholera Prevention and Care

[173] World Health Organization; Estimates for the use of Improved Drinking-Water Sources

[174] MINUSTAH Cholera Response Fact Sheet, March 2012, http://minustah.org/pdfs/fiche_information/CholeraResponse_EN.pdf last accessed 03 June 2012

[175] Farmer, Meeting Cholera's Challenge to Haiti and the World: A Joint Statement on Cholera Prevention and Care

[176] Farmer, Meeting Cholera's Challenge to Haiti and the World: A Joint Statement on Cholera Prevention and Care

[177] PAHO Epidemiological Alert: Cholera: http://new.paho.org/hq/index.php?option=com_content&task=view&id=6744&Itemid=2291 last accessed 03 June 2012

[178] UN OCHA; Humanitarian Bulletin Haiti

[179] Andrews

[180] Sontag, In Haiti, Global Failures on a Cholera Epidemic

[181] Chery

[182] Sontag Election Violence Flares in Haiti

[183] Berg

[184] Cholera Inter-Sector Response Strategy for Haiti Nov. 2010 – Dec. 2011;

[185] UN OCHA; Humanitarian Bulletin Haiti

[186] MSF website http://www.doctorswithoutborders.org/press/release.cfm?id=5990&cat=press-release last accessed 03 June 2012

[187] Project Team interview with MINUSTAH leadership, November 2012

[188] Cravioto

[189] Bengtsson

[190] A resent census from India suggests that more people there have a mobile phone than a household toilet. http://sanitationupdates.wordpress.com/2012/03/16/india-census-more-people-have-a-mobile-phone-than-a-household-toilet/ last accessed

[191] GSMA represents the interests of mobile operators worldwide and unites nearly 800 of the world's mobile operators. See http://www.gsma.com/aboutus/

[192] Hirschfeld

[193] Cravioto

[194] Fisher

[195] Farmer, Meeting Cholera's Challenge to Haiti and the World: A Joint Statement on Cholera Prevention and Care

[196] Corcoran

[197] According to an AFP article, various international institutions estimate that to improve Haiti's supply of drinking water at least USD746 million to USD1.1 billion will be necessary. http://medicalxpress.com/news/2012-01-haiti-cholera-death-toll-nears.html

[198] Trenton

# Annex D
## BIBLIOGRAPHY


Abbott, Elizabeth; Haiti A Shattered Nation; Overlook Press; 2011

Andrews, Jason R.,M.D.; Basu, Sanjay, M.D.; Transmission dynamics and control of cholera in Haiti: an epidemic model; *The Lancet*; Volume 377, Issue 9773, Pages 1248–1255, 09 April 2011; http://www.thelancet.com/journals/lancet/article/PIIS0140-6736(11)60273-0/abstract; Last accessed 30 May 2012

Bengtsson, Linus and Xin Lu, Anna Thorson, Richard Garfield, Johan von Schreeb; Improved Response to Disasters and Outbreaks by Tracking Population Movements with Mobile Phone Network Data: A Post-Earthquake Geospatial Study in Haiti; Public Library of Science; 30 August 2011; http://www.plosmedicine.org/article/info%3Adoi%2F10.1371%2Fjournal.pmed.1001083; Last accessed 30 May 2012

Berg, Louis-Alexandre; Crime, Politics and Violence in Post- Earthquake Haiti; United States Institute of Peace; 28 September 2010; http://www.usip.org/files/resources/PB%2058%20-%20Crime%20Politics%20and%20Violence%20in%20Post-Earthquake%20Haiti.pdf;

Bhattacharjee A and Lossio R.; Evaluation of OCHA Response to the Haiti Earthquake; UN OCHA; January 2011; http://ochanet.unocha.org/p/Documents/Evaluation%20of%20OCHA%20Response%20to%20the%20Haiti%20Earthquake.pdf; Last accessed 3 March 2012

Bicego, George et al.; Trends, Age Patterns and Differentials in Childhood Mortality in Haiti (1960–1987); Population Studies-a Journal of Demography ; Vol. 45, Iss. 2/pg. 235-52; 1991; http://www.tandfonline.com/toc/rpst20/45/2; Last accessed 30 May 2012

Bloon, Alsan M. and DE; Canning D.; The Effect of Population Health on Foreign Direct Investment Inflows to Low- and Middle-Income Countries.; *World Development*; Volume 34, Issue 4,Pages 613-630; 2006

Bourdeaux, M. E., et al; Involvement of the US Department of Defense in Civilian Assistance, Part I: A Quantitative Description of the Projects Funded by the Overseas Humanitarian, Disaster, and Civic Aid Program; *Disaster Medicine And Public Health Preparedness*; Volume 4/pg. 66-73; 2010

Carroll, Rory and Daniel Nasaw; US Accused of Annexing Airport as squabbling hinders aid effort in Haiti; The Guardian; ; 17 January 2010; http://www.guardian.co.uk/world/2010/jan/17/us-accused-aid-effort-haiti; Last accessed 15 March 2012

Carvajal, Doreen; French Groups Criticize Handling of Relief Flights; *New York Times*; 22 January 2010; http://www.nytimes.com/2010/01/23/world/europe/23iht-doctors.html; Last accessed 15 March 2012

Chery, Dady; Piarroux: Haiti Epidemic Could Be Gone in Months, Vaccination Target St Marc Has No Cholera; Haiti Chery Dancing with Gods Blog; 20 April 2012; http://www.dadychery.org/2012/04/20/haiti-epidemi-could-be-gone-in-months/; Last accessed 30 May 2012

CIA; Haiti country profile; CIA World Factbook; https://www.cia.gov/library/publications/the-world-factbook/geos/ha.html; Last accessed 30 May 2012

Clinton, Hillary; Speech on the tarmac to the Haitian people; http://www.youtube.com/watch?v=zRvX0pG9Hn4.; Last accessed 3 March 2012

Corcoran, Emily and Christian Nellemann, Elaine Baker, Robert Bos, David Osborn, Heidi Savelli; Sick Water? The central role of waste management in sustainable development; UNEP; 2010; http://www.unep.org/pdf/SickWater_screen.pdf; Last accessed 30 May 2012

Cravioto, Alejandro Dr. et al.; Final Report of the Independent Panel of Experts on the Cholera Outbreak in Haiti; UN; Undated; http://www.un.org/News/dh/infocus/haiti/UN-cholera-report-final.pdf ; Last accessed 30 May 2012

Daniel, Lisa; SOUTHCOM completes Haiti disaster response; American Forces Press Service; 01 June 2010; http://www.defense.gov/news/newsarticle.aspx?id=59423; Last accessed 30 May 2012

Danner, Mark; To Heal Haiti, Look to History, Not Nature; *New York Times*; ; 21 January 2010; http://www.nytimes.com/2010/01/22/opinion/22danner.html?pagewanted=all; Last accessed 29 May 2012

De Ville de Goyet C., Sarmiento J P, Grunewald F.; Health response to the earthquake in Haiti – Lessons to be learned to the next massive sudden-onset disaster; Pan American Health Organization, 2011, ISBN: 978-927513252-4

Dewan, Shaila and Liz Robbins; U.S. Seeks Options for Airlifting Haitian Patients ; *The New York Times*; 30 January 2010; http://www.nytimes.com/2010/01/31/world/americas/31airlift.html?pagewanted=2&ref=haiti; Last accessed 30 May 2012

Dewitt, Dan; US Had a Role in Haiti's Dirty Water; Tampa Bay Times; 07 November 2010; http://www.tampabay.com/news/health/medicine/article1132441.ece; Last accessed 30 May 2012

Doyle, Mark; BBC News ; Haiti's cholera row with UN rumbles on; BBC News; 14 December 2011; http://www.bbc.co.uk/news/world-latin-america-16180250; Last accessed 30 May 2012

Dubois, Laurent; Haiti: The Aftershocks of History; Metropolitan Books; 2012

Elsharkawi, Hossam et al.; Mobile field hospitals in the Haiti earthquake response: a Red Cross model; *Humanitarian Exchange*; Nr. 48,page 11 ; October 2010; http://www.odihpn.org/humanitarian-exchange-magazine/issue-48/mobile-field-hospitals-in-the-haiti-earthquake-response-a-red-cross-model; Last accessed 30 May 2012

Farmer, Paul, et al.; Meeting Cholera's Challenge to Haiti and the World: A Joint Statement on Cholera Prevention and Care; Public Library of Science Neglected Tropical Diseases; Volume 5, no. 5; 2011; http://www.plosntds.org/article/info%3Adoi%2F10.1371%2Fjournal.pntd.0001145; Last accessed 30 May 2012

Farmer, Paul, Furin J; and Katz J. Global Health Equity; *The Lancet*; Volume 363; 2004

Farmer, Paul; Haiti After the Earthquake; Public Affairs Book; 2011

FEMA; Haiti Earthquake Response: Quick Look Report; 03 June 2010; http://publicintelligence.net/ufouo-fema-haiti-earthquake-response-report/; Last accessed 30 May 2012

Fisher, Nigel; Address to the Press on Progress in Haiti; UN in Haiti; http://www.onu-haiti.org/nigel-fisher-deputy-special-representative-of-the-secretary-general-humanitarian-coordinator-and-resident-coordinator-addresses-the-un-perss-court-in-new-york/; Last accessed 30 May 2012

Fraser, Douglas and Hertzelle, Wendell; Haiti Relief: an International Effort Enabled through Air, Space, and Cyberspace; *Air and Space Power Journal*; Winter (2010): 5-12; Winter 2010

Garamone, Jim; Joint Task Force Organizes Haitian Airport; American Foreign Press Service; 28 January 2010; http://www.defense.gov/news/newsarticle.aspx?id=57776; Last accessed 15 March 2012

Garamone, Jim; USNS COMFORT Arrives in Port-au-Prince; American Forces Press Service; http://www.defense.gov/news/newsarticle.aspx?id=57631; Last accessed 30 May 2012

Gilley, Bruce; The Determinants of State Legitimacy: Results for 72 Countries; *International Political Science Review / Revue internationale de science politique;* Sage Publications, Ltd.; Vol. 27, No. 1, 47-71; January 2006; http://www.jstor.org/stable/20445036

Global Health Watch; Global Health Watch 2; Zed Books, New York and London; 2010; ISBN: 9781848130357

Gottret P and Schieber G; A practitioner's Guide. Health Financing Revisited; World Bank; 2006; http://siteresources.worldbank.org/INTHSD/Resources/topics/Health-Financing/HFRFull.pdf; Last accessed 01 March 2012

Groupe U.R.D.; Eastern Chad: Focus on sanitation in a long-term humanitarian crisis context; http://www.urd.org/Humanitarian-crises-and; Last accessed 30 May 2012

Grünewald, François and Andrea Binder; Inter-Agency Real-Time Evaluation in Haiti: 3 Months after the Earthquake; Group Public Policy Institute; 31 August 2010; ; http://www.alnap.org/pool/files/haiti-ia-rte-1-final-report-en.pdf; Last accessed 15 March 2012

Guha-Sapir G, Kirsh T, Dooling S, Sirois A.; Independent Review of the US Government Response to the Haiti Earthquake.; USAID; 28 March 2011

Health Roots Student Organization; MINUSTAH: Keeping the peace or conspiring against it? A review of the human rights record of the United Nations Stabilization Mission in Haiti 010-2011; HealthRoots is an officially recognized student organization at the Harvard School of Public Health.; http://www.normangirvan.info/wp-content/uploads/2011/10/minustah-white-paper-harvard-group.pdf; Last accessed 30 May 2012

Hirschfeld, Daniela; Twitter data accurately tracked Haiti cholera outbreak; SciDev.Net; 10 January 2012; http://www.nature.com/news/twitter-data-accurately-tracked-haiti-cholera-outbreak-1.9770; Last accessed 30 May 2012

Hopmeier, M. J., et al.; Reflections on the Initial Multinational Response to the Earthquake in Haiti; *Population Health Management*; Vol. 13, No. 3, pg. 105-13; June 2010

"Human Rights Liaison Unit; Human Rights' Compilation Report - Universal Periodic Review: HAITI; Mission by the United Nations High Commissioner for Refugees; March 2011; http://www.unhcr.org/refworld/pdfid/4d8869932.pdf; Last accessed 11 May 2012

Human Rights Watch; Human Rights Watch World Report 2012: Haiti; January 2012; http://www.hrw.org/world-report-2012/haiti; Last accessed 30 May 2012

IASC; Response to the Humanitarian Crisis in Haiti; Interagency Standing Committee 6 month report; 10; 2010

Interim Haiti Recovery Commission; Health Sector Background and call for Proposals; IHRC-Government of Haiti;
2011; http://en.cirh.ht/files/pdf/call_for_proposals/cirh_rfp2011_health_7-5_en.pdf; Last accessed 02 May 2012

International Crisis Group; Policy Briefing Haiti: Saving the Environment, Preventing Instability and Conflict; 28 April 2009; http://www.crisisgroup.org/en/regions/latin-america-caribbean/haiti/b020-haiti-saving-the-environment-preventing-instability-and-conflict.aspx; Last accessed 30 May 2012

Ivers, Louise C. and David A. Walton; The "First" Case of Cholera in Haiti: Lessons for Global Health; The American Journal of Tropical Medicine and Hygiene; October 2011; http://www.ajtmh.org/content/86/1/36.abstract; Last accessed 30 May 2012

Jacobs, Gina; Viz Lab Helps on the Ground in Haiti; San Diego State University; 26 January 2010; http://newscenter.sdsu.edu/sdsu_newscenter/news.aspx?s=71854; Last accessed 30 May 2012

Jones, Seth G., et al; Securing Health: Lessons from Nation-Building Missions; RAND Corporation; 2006; ISBN: 0-8330-3729-3; http://www.rand.org/pubs/monographs/MG321; Last accessed 15 March 2012

Katz, Jonathan M.; Haitian Hospital's woes show challenges of recovery; Associated Press; ; 07 October 2010; http://www.msnbc.msn.com/id/38185239/ns/world_news-haiti/t/haiti-hospitals-woes-show-challenge-recovery/#.T7ahTJghall; Last accessed 12 May 2012

Katz, Jonathan M.; Cholera Fears Spark Anti-Clinic Protest in Haiti; *The Jakarta Post*; 27 October 2010; http://www.thejakartapost.com/news/2010/10/27/cholera-fears-spark-anticlinic-protest-haiti.html; Last accessed 15 March 2012

Keen P.K., et al; Disaster Response Joint Task Force-Haiti Observations; *Military Review*; November–December
2010; http://usacac.army.mil/CAC2/MilitaryReview/Archives/English/MilitaryReview_20101231_art015.pdf; Last accessed 30 May 2012

Keen P.K. Lieutenant General and Major General Floriano Peixoto Vieira Neto; Relationships Matter – Humanitarian Assistance and Disaster Relief in Haiti; *Military Review*; May–June 2010; http://usacac.army.mil/CAC2/MilitaryReview/Archives/English/MilitaryReview_20100630_art004.pdf; Last accessed 12 May 2012

Kelly, Annie; Is Haiti's Health System Any Better? ; Merlin health sector review;
2010; http://haiti.cridlac.org/XML/eng/doc18402/doc18402-contenido.pdf; Last accessed 15 March 2012

Klarreich, Kathie; Haiti's Working Better; *Miami Herald*; 08 December 2009

Kolbe, Athena and Robert Muggah; Surveying Haiti's post-quake needs: a quantitative approach; *Humanitarian Practice Network*; Issue 48; October 2010

Kristoff, Madeline; Haiti: Republic of NGOs?; US Institute of Peace – Peacebrief; 26 April 2010; http://www.usip.org/files/resources/PB%2023%20Haiti%20a%20Republic%20of%20NGOs.pdf; Last accessed 18 May 2012

Laing, Aislinn and Tom Leonard; US Accused of Occupying Haiti as Troops Flood in; *Daily Telegraph*; 18 January 2010; http://www.commondreams.org/headline/2010/01/18-10; Last accessed 02 May 2012

Lockheart, Clare and Ashraf Ghani; Fixing Failed States. A Framework for Rebuilding a Fractured World; Oxford University Press; 2008; ISBN: 0195342690

Madico, Guillermo et al.; Active Surveillance for Vibrio cholera O1 and Vibriophages in Sewage Water as a Potential Tool to Predict Cholera Outbreaks; *Journal of Clinical Microbiology*; p. 2968–2972 ; December 1996; http://www.ncbi.nlm.nih.gov/pmc/articles/PMC229443/pdf/342968.pdf

Margesson, Rhoda; Haiti Earthquake: Crisis and Response; Congressional Research Service; 19 February 2010

Médecins Sans Frontières; Haiti one year after – A Review of Médecins Sans Frontières' Humanitarian Aid Operations; 10 January 2011; http://www.doctorswithoutborders.org/publications/reports/2011/Haiti-one-year-report.pdf; Last accessed 30 May 2012

Merin, Ofer, M.D. and Nachman Ash, M.D. et al.; The Israeli Field Hospital in Haiti – Ethical Dilemma in Early Disaster Response; The New England Journal of Medicine; 18 March 2010; http://www.nejm.org/doi/full/10.1056/NEJMp1001693; Last accessed 30 May 2012

Ministry of Public Health, Islamic Republic of Afghanistan; Proposal of the Health Facility Development for NATO; May 2008

MINUSTAH; MINUSTAH Integrated Joint Operations and Tasking Centre. After Action Review.; Unpublished document provide to Project Team during data collection; Undated

Miroff, N.; Cuban doctors in Haiti, and their promoters in Havana; *Global Post*; 30 March, 2010; http://www.globalpost.com/dispatch/cuba/100208/doctors-haiti; Last accessed 07 March 2012

Morton, Alice; Haiti: NGO Sector Study; World Bank; 19 March 1997; http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2006/12/01/000310607_20061201113122/Rendered/PDF/380160vol02.pdf; Last accessed 18 May 2012

Nangia R; World Bank Response to Influenza A (H1N1); World Bank; 2009; http://siteresources.worldbank.org/JAPANINJAPANESEEXT/Resources/515497-1181632169443/3871544-1234144459893/5813719-1248418348949/090713_event06_01.pdf; Last accessed 1 March 2012

NATO; Civil Military Medical Interface Doctrine; October 2011; AJMedP-06

PAHO; Health Situation in the Americas – Basic Indicators; 2009; *http://new.paho.org/hq/dmdocuments/2009/BI_ENG_2009.pdf*; Last accessed 12 May 2012

Pape, J. W., W. D. Johnson, and D. W. Fitzgerald; The Earthquake in Haiti – Dispatch from Port-Au-Prince; *New England Journal of Medicine*; Vol. 362, no. 7 pg. 575-77; 2010; http://www.nejm.org/doi/full/10.1056/NEJMp1001015; Last accessed 30 May 2012

Parker, Suzi; Bill Clintons Lasting Legacy May be Haiti's Earthquake Recovery Effort; Huffington Post; 12 January 2011; http://www.politicsdaily.com/2011/01/12/bill-clintons-lasting-legacy-may-be-haitis-earthquake-recovery/; Last accessed 2 May 2012

Phares, Jerome; and Valery Daudier; Money for Cleaning Toilets in Haiti Down the Drain? – Part 1; *IPS/The Nouvelliste*; 07 March 2012; http://ipsnews.net/news.asp?idnews=106976; Last accessed 30 May 2012

Piarroux R, Barrais R et al.; Understanding the cholera epidemic, Haiti; Emerging Infectious Diseases; Volume 17, Number 7; July 2011

Pomfret, Kevin; Location: Its time has come; *Space News*; 15 February 2010

Prescott E.; The Politics of Disease: Governance and Emerging Infections; *Global Health Governance*; Volume 1, Issue 1, pg.1-8; Spring 2007

"Prins, Agma et al.; Country Profiles Haiti – Haiti Maternal and Child Health and Family Planning Portfolio Review and Assessment; USAID; 2008; http://pdf.usaid.gov/pdf_docs/PDACP887.pdf; last accessed 01 June 2012

Reich M.R. et al.; Global Action on Health Systems: A Proposal for the Toyako G8 Summit; The Lancet; Vol 371, pages 865-869; 2008; ; ;

Rencoret, Nicole et al.; Haiti Earthquake Response: Context Analysis; Active Learning Network for Accountability and Performance in Humanitarian Action, UNEG, UN Evaluation Group; Latin America and Caribbean Briefing N°20; Port-au-Prince/Brussels, 28 April 2009; July 2010

Rep Maxine Waters, Roger Noriega, Senator Norm Colman, Senator Christopher Dodd. Interview by Gwen Ifill; Handling Haiti; PBS Newshour; Aired 10 March 2004; http://www.pbs.org/newshour/bb/latin_america/jan-june04/haiti_03-10.html; Last accessed 10 May 2012

Republic of Haiti; MSSP Bulletin – Rapport du 25 decembre 2011 sur l'évolution du cholera en Haiti; Ministére de la Santé Publique et de la Population; 25 December 2011; ; http://www.mspp.gouv.ht/site/index.php?option=com_content&view=article&id=117&Itemid=1

Roberts M. et al.; Getting Health Reform Right; Oxford University Press; 2008

Robles, Frances and Jacqueline Charles; Leadership in Crisis, Relief Comes Slowly; *Miami Herald*; 13 January 2010; *http://www.haitiauvirtual.net/page/14/?p=blkbgphe*; Last accessed 02 May 2012

Rotberg, Robert; Failed States, Collapsed States, Weak States: Causes and Indicators; Woodrow Wilson International Center for Scholars; 07 July 2011; http://wilsoncenter.net/sites/default/files/Failed%20States,%20Collapsed%20States,%20Weak%20States-%20Causes%20and%20Indicators.pdf; Last accessed 01 March 2012

Schlein, Lisa; Un Says Violence Jeopardizing Cholera Assistance in Haiti; Voice of America; 19 November 2010; http://www.voanews.com/english/news/americas/UN-Says-Violence-Jeopardizing-Cholera-Assistance-in-Haiti-109227209.html; Last accessed 15 March 2012

SCMS/Supply Chain Management System; In Haiti Helping PROMESS regain its footing; scms.pfscm.org/scms/docs/papers/Haiti_success_story_PROMESS.pdf; Last accessed 01 June 2012

Senessie C, Gage G, von Elm E; Delays in Childhood Immunization in a conflict area: a study from Sierra Leone during civil war; Conflict and Health; 09 December 2007; http://www.conflictandhealth.com/content/1/1/14; accessed 2 March 2012

Sontag, Deborah; In Haiti, Global Failures on a Cholera Epidemic; *The New York Times*; ; 31 March 2012; http://www.nytimes.com/2012/04/01/world/americas/haitis-cholera-outraced-the-experts-and-tainted-the-un.html?_r=1&pagewanted=all; Last accessed 30 May 2012

Sontag, Deborah; Election Violence Flares in Haiti; *The New York Times*; 08 December 2010; http://www.nytimes.com/2010/12/09/world/americas/09haiti.html; Last accessed 30 May 2012

Spiegel, Peter, and Yochi Dreazen; U.S. Air Force Reopens Haitian Airport.; *The Wall Street Journal*; 15 January 2010; http://online.wsj.com/article/SB10001424052748703657604575004913901168380.html; Last Accessed 01 June 2012

Stavridis, James G. Admiral, USN; Partnership for the Americas: Western Hemisphere Strategy and U.S. Southern Command; Ch. 5 People First, Human Rights Always; National Defense University; 2010

Stedman, Stephen John; International Actors and Internal Conflicts; Project on World Security; Rockefeller Brothers Fund; 1999

Stock, Jon; AMC Total Force provides hope to Haiti; USAF; Air Mobility Command Public Affaris; 18 February 2010; http://www.af.mil/news/story.asp?id=123191086; Last accessed 03 March 2012

Strobel, Warren P; Will US troops leave Haiti too soon?; McClatchy.com; 22 January 2010; http://www.mcclatchydc.com/2010/01/22/82877/will-us-troops-leave-haiti-too.html; Last accessed 15 March 2012

Tappero, J. W., and R. V. Tauxe; Lessons Learned During Public Health Response to Cholera Epidemic in Haiti and the Dominican Republic; *Emerging Infectious Diseases*; Vol. 17, no. 11, pg. 2087-93; 2011; http://wwwnc.cdc.gov/eid/article/17/11/pdfs/11-0827.pdf

Toole, MJ; and RJ Waldman; The Public Health Aspects of Complex Emergencies and Refugee Situations; *Annual Review of Public Health*; Vol. 18/ pg. 283 -312; May 1997

Trenton, Daniel; Clinton urges officials to stem cholera in Haiti; *The Guardian*; 08 March 2012; http://www.guardian.co.uk/world/feedarticle/10132721; Last accessed 30 May 2012

UK Department for Overseas Development; Building Stability Overseas Strategy; http://www.dfid.gov.uk/Documents/publications1/Building-stability-overseas-strategy.pdf; Last accessed 01 June 2012

UN; Report of the UN in Haiti; 2011; http://onu-haiti.org/launch-of-the-un-annual-report-in-haiti-2011; Last accessed 01 June 2012

UN Development Programme; UNDP Humanitarian Development Report 1994; New York and Oxford: Oxford University Press; 1994; hdr.undp.org/en/media/hdr_1994_en_contents.pdf

UN Foundation; Disaster Relief 2.0 – The future of information sharing in humanitarian emergencies; In Partnership with UN OCHA, the Harvard Humanitarian Initiative and the Vodafone Foundation; http://www.globalproblems-globalsolutions-files.org/gpgs_files/pdf/2011/DisasterResponse.pdf

UN General Assembly; Report of the Secretary-General on Sixty-sixth session- 2nd September 2011, item 70 (a) of provisional agenda; 02 September 2011; http://reliefweb.int/sites/reliefweb.int/files/resources/RSG_A-66-332_EN.pdf

UN in Haiti and U.S. Department of State; Statement of Principles on Field Coordination between the United Nations in Haiti and the United States Government in the Haitian earthquake response effort; 17 January 2010; http://usun.state.gov/documents/organization/135902.pdf; Last accessed 3 March 2012

UN OCHA; Guidelines on the Use of Foreign Military and Civil Defence Assets in Disaster Relief ('Oslo Guidelines'); 2007; http://reliefweb.int/sites/reliefweb.int/files/resources/8706B7B69BD77E00C1257233004F0570-OCHA-Nov2006.pdf; Last accessed 01 June 2012

UN OCHA; Humanitarian Bulletin Haiti; Issue 16; 02 April 2012; http://reliefweb.int/sites/reliefweb.int/files/resources/OCHA_Haiti_Humanitarian_Bulletin_16.EN_.pdf

UN OCHA, Cholera Inter-Sector Response Strategy for Haiti, November 2010 – December 2011, Reliefweb, http://reliefweb.int/node/374535

UN Security Council; MINUSTAH United Nations Stabilization Mission in Haiti Security Resolution; 2004; S/RES/1542; http://www.un.org/en/peacekeeping/missions/minustah/background.shtml; Last accessed 3 March 2012

UN Security Council; Report of the Secretary-General on the United Nations Stabilization Mission in Haiti; 22 February 2010; http://www.un.org/en/peacekeeping/missions/minustah/reports.shtml; Last accessed 01 June 2012

UN Security Council; Report of the Secretary-General on the United Nations Stabilization Mission in Haiti; 25 August 2011; S/2011/540; http://minustah.org/pdfs/rapportsSG/RSG2011-540_EN.pdf; Last accessed 01 June 2012

UN Security Council; Security Council Report October 2011 Haiti; October 2011; http://www.securitycouncilreport.org/site/c.glKWLeMTIsG/b.7751813/k.8D10/October_2011brHaiti.htm; Last accessed 30 May 2012

US Joint Center for Operational Analysis; Haiti Case Study; Joint Center for Operational Analysis Journal; Volume XII/Issue 2, pages 2 – 32; Summer 2010

US Joint Chiefs of Staff; Joint Pub 3-29 Foreign Humanitarian Assistance; 17 March 2009

US Joint Chiefs of Staff; Joint Pub 3-08, Inter-organizational Coordination During Joint Operations; 24 June 2011

USAID Haiti; HIV/AIDS Profile Haiti; November 2010; http://www.usaid.gov/our_work/global_health/aids/Countries/lac/haiti.pdf; Last accessed 15 March 2012

Wagner, Laura; How Rumors Rule in Cholera-Torn Haiti; *Truthout*; ; 04 December 2010; ; http://archive.truthout.org/how-rumors-rule-cholera-torn-haiti65656; Last accessed 15 March 2012

World Health Organization; Cardiovascular Diseases: Fact sheet N°317; 2011; http://www.who.int/mediacentre/factsheets/fs317/en/index.html; Last accessed 15 February 2011

World Health Organization; Earthquake in Haiti One Year Later – WHO Report on the health situation; January 2011; http://www.who.int/hac/crises/hti/haiti_paho_jan2011_eng.pdf; Last accessed 12 May 2012

World Health Organization; Estimates for the use of Improved Drinking-Water Sources; WHO/UNICEF Joint Monitoring Programme for Water Supply and Sanitation; Updated March 2012; http://www.wssinfo.org/fileadmin/user_upload/resources/HTI_wat.pdf

World Health Organization; Commission for Macroeconomics and Health, Macroeconomics and Health: Investing in Health for Economic Development; 2002; www.cid.harvard.edu/cidcmh/CMHReport.pdf

World Health Organization; Everybody's Business – Strengthening Health Systems to Improve Health Outcomes. WHO's framework for action; 2007; ISBN: 978 92 4 159607 7; http://www.who.int/healthsystems/strategy/everybodys_business.pdf ; Last accessed 01 March 2012

Zuckerman, Jocelyn C.; International Medical Corps Helps Haiti in Its Long Haul; Fastcompany.com; 19 October 2011; http://www.fastcompany.com/magazine/160/international-medical-corps-haiti; Last accessed 15 March 2012

# Annex E
## GLOSSARY OF ACRONYMS

| | |
|---|---|
| ALNAP | Active Learning Network for Accountability and Performance in Humanitarian Action |
| BCT | Brigade Combat Team |
| CAP | Consolidated Appeals Process |
| CDC | Center for Disease Control |
| CSC | Coordination Support Committee |
| EMR | Electronic Medical Records |
| GIS | Geographic Information System |
| HACC | Humanitarian Assistance Coordination Center |
| HLCC | High Level Coordination Committee |
| HUEH | l'Hôpital de L'Université d'Etat d'Haïti |
| IASC | Inter-Agency Standing Committee |
| IDF | Israeli Defense Forces |
| IDP | Internally Displaced Persons |
| IO | International Organization |
| JALLC | Joint Analysis and Lessons Learned Centre |
| JMAC | Joint Mission Analysis Center |
| JMP | Joint Monitoring Programme |
| JOTC | Joint Operations and Tasking Centre |
| JTF | Joint Task Force |
| MINUSTAH | Mission des Nations Unies pour la stabilisation en Haïti |
| MOH | Ministry of Health |
| MSF | Médecins Sans Frontières |
| MSPP | Ministère de la Santé Publique et de la Population (Ministry of Public Health and Population) |
| NGA | National Geospatial-Intelligence Agency |
| NSSS | National Sentinel Site Surveillance |
| OCHA | Office for the Coordination of Humanitarian Affairs |
| OFDA | Office of Foreign Disaster Assistance |
| OSM | OpenStreetMap |
| PAHO | Pan American Health Organization |
| PROMESS | Programme de Médicaments Essentiels |
| RDEH ERU | Rapid Deployment Emergency Hospital – Emergency Response Unit |
| SUMA | Humanitarian Supply Management System |
| TRANSCOM | Transportation Command |
| UAV | Unmanned Aerial Vehicle |
| UMGI/PM | University of Miami Global Institute/Project Medishare |
| UNDAC | UN Disaster Assessment and Coordination |
| USAID | US Agency for International Development |
| USNS | United States Naval Ship |