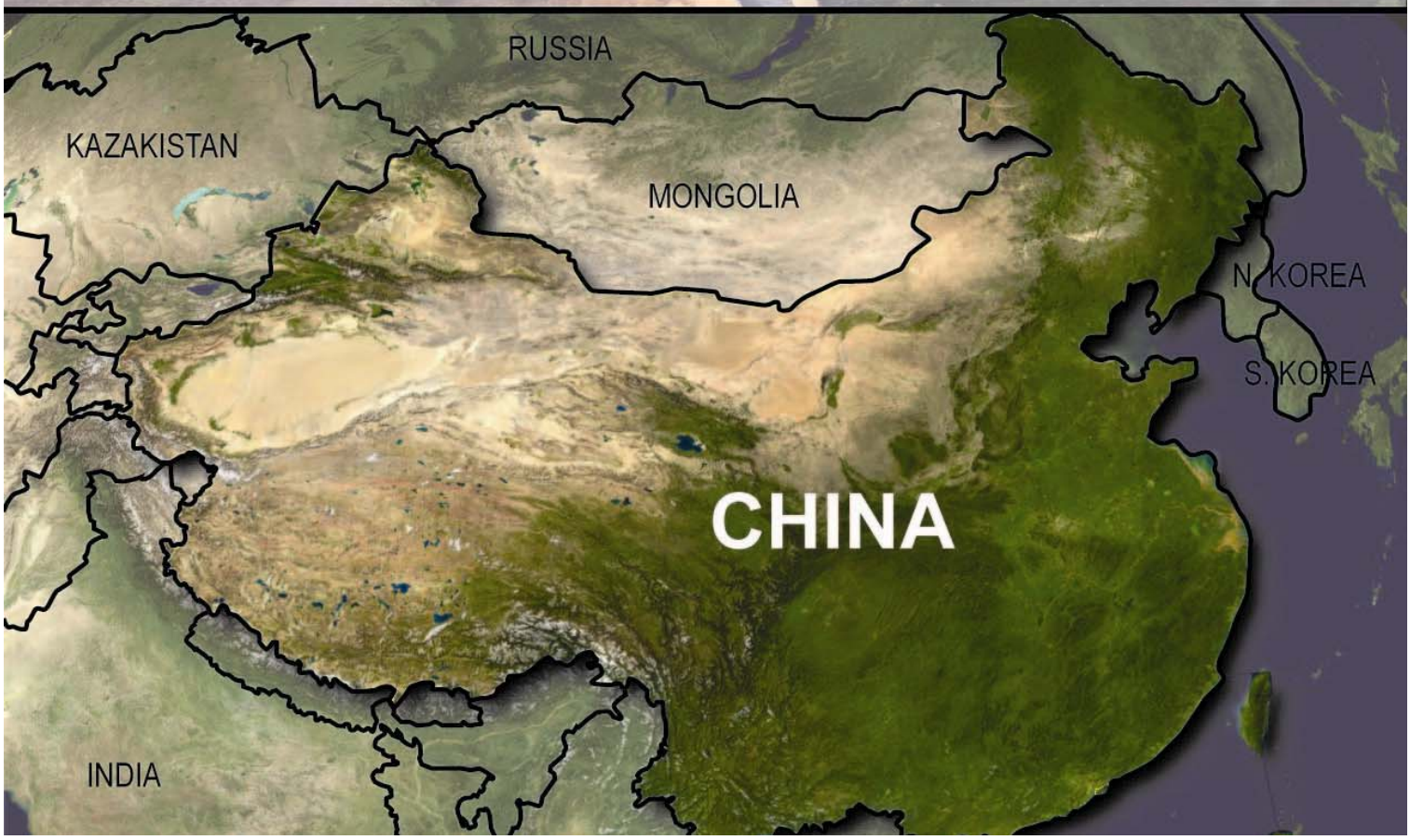
PANDEMIC INFLUENZA REVIEW PROGRAM
RETROSPECTIVE REVIEW
CHINA

APRIL 2011



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EXECUTIVE SUMMARY

The United States (U.S.) Pacific Command (PACOM) and the Hawaii National Guard (HING) have entered into an Inter-Service Support Agreement (ISSA) to execute two (2) USPACOM J07, Command Surgeon, Pandemic Influenza (PI) led activities in support of the U.S. Agency for International Development (USAID): A *Comprehensive Nation Review/Disparity Analysis* and a *PI Healthcare System Surge Demand and Intervention Workshop*. These USAID approved and resourced training and education activities support military-to-military engagement for a World Health Organization (WHO) PI Phase 6 event in six (6) USAID focus countries; a WHO PI Phase 6 event is defined as sustained human-to-human transmission in at least two (2) WHO regions with at least two (2) countries involved in one of the regions. The six (6) USAID focus countries for this project are Bangladesh, Cambodia, China, Indonesia, Nepal, and Vietnam. This report will focus specifically on China.

The People's Republic of China is one of the global leaders in vaccine research and production, and an active participant in international PI initiatives, but despite steps to improve influenza surveillance and ministerial coordination, major challenges remain to Chinese PI response preparedness. Substantial global concern has emerged in recent years regarding China's ability to effectively monitor, prevent, and contain infectious disease threats within its borders. Factors including potential Avian Influenza (AI) outbreaks in poultry, China's immense size and population, a largely underdeveloped health care infrastructure, and a sizable poultry industry all contribute to make China a global PI hotspot and an important area of focus for the potential emergence of human influenza pandemics that threaten the rest of the world.[1]

A PI Review Team from PACOM will use the results of this report as a starting point to complete an in-country review of China's military capabilities (People's Liberation Army) to prepare for and respond to this threat. The team will use an interactive Review Tool, standardized and scalable to the needs of China, to aid the team members in identifying capability disparities. Analysis of the information collected in this Review Report and through the use of the Review Tool will provide PACOM and USAID with the data needed to develop a three (3) to five (5) year strategic plan for future PI preparedness efforts in China.

The first component of the overall review includes this Retrospective Review in which the USPACOM project team reviewed existing data from prior PI efforts focused on China through four major research sources:

- Department of Defense (DoD);
- Non-Governmental Agencies (NGA);
- Other Government Agencies (OGA); and
- The Private Sector

[1] *China Ill-Prepared to Respond to a Severe Pandemic*, *(redacted)*, DIA, November 20, 2009, pg. 10

The results of this Retrospective Review will feed into the second component of the overall in-country review which involves the use of a PI Review Tool in China. The objectives of this Review Tool are as follows:

1. Establish a baseline of current national PI preparedness and response capabilities; and
2. Identify disparities in China's PI preparedness and response to assist USPACOM in identifying efforts to improve the country's military PI capabilities.

The USPACOM PI project team designed and tailored the PI Review Tool based on an analysis of existing PI assessment tools such as those developed by the WHO, European Union, USAID, Centers for Disease Control and Prevention (CDC), and the U.S. African Command (AFRICOM). The review focuses of the progress of China against the four key pillars of the *U.S. National Framework for 2009-H1N1 Influenza Preparedness and Response*:

1. **Surveillance.** Enhanced efforts to achieve timely and accurate situational awareness of evolving disease and the impact on critical sectors to inform policy and operational decisions;
2. **Mitigation Measures.** Interventions to slow the spread of illness and reduce the impact of infection and illness on individuals and communities;
3. **Vaccination.** Actions to secure safe and effective vaccines and to ready a national vaccination program; and
4. **Communications and Education.** A coordinated campaign to foster a convergence of action across all levels of government, the private sector, the entire healthcare sector, faith-based and community-based organizations, and individuals.

A general observation of this report is that while a number of PI-related activities were initiated in China in 2005, a comprehensive understanding of the progression of these activities, programmatic and operational activities, and the overall status of the current level of the country's PI preparedness measures, particularly as it pertains to its military is unknown. In addition, the integration or progress of influenza planning in the Special Administrative Regions of Hong Kong and Macau which possess different political systems than mainland China, is unknown.

The purpose of the Retrospective Review described in this report is to establish a baseline understanding of the PLA's PI capabilities and discrepancies by reviewing existing data of prior PACOM and other stakeholder activities, reports, and reviews specifically focused on China. The PLA is a critical component to the country's pandemic planning efforts. However, whether the PLA has developed adequate PI planning and preparedness is unknown because very little information is currently available via all-source networks. However, it is believed that China is likely to have plans in place for its military because the PLA has been an active participant in 2009-H1N1 influenza vaccine development and has demonstrated a large capacity to

respond to natural disasters.[2] In general, the USPACOM PI Review Team will need to verify baseline PI capabilities when it conducts its in-country interviews.

This report provides information on the following areas, specifically requested by USPACOM that will assist the Review Team in conducting its review efforts in China:

- An overview of the demographics of China and its military structure;
- A summary of China's progress against the four pillars of surveillance, mitigation measures, vaccination production, and communications outreach;
- Recent USAID/USPACOM-sponsored PI programs (Appendix C); and
- Feedback on recent PI events executed in, or including participants from, China (Appendix D).

[2] *China: Ill-Prepared to Respond to a Severe Influenza Pandemic*, pg. 9.

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BACKGROUND

The United States Pacific Command (USPACOM) and the Hawaii National Guard (HING) have entered into an Inter-Service Support Agreement (ISSA) to execute two (2) USPACOM J07, Command Surgeon, Pandemic Influenza (PI) led activities in support of the U.S. Agency for International Development (USAID). These USAID approved and resourced training and education activities support military-to-military engagement for a World Health Organization (WHO) PI Phase 6 event in six (6) USAID focus countries. The six (6) USAID focus countries for this project are Nepal, Cambodia, Indonesia, Bangladesh, China, and Vietnam. This report will focus specifically on China.

The purpose of this Retrospective Review described in this report is to establish a baseline understanding of China's military forces' PI capabilities and deficits by reviewing existing data of prior PACOM and other stakeholder activities, reports, and reviews specifically focused on China. A PI Review Team from USPACOM will use the results of this report as a starting point to complete an in-country review of China's military capabilities to prepare for and respond to this threat. The team will use an interactive Review Tool, standardized and scalable to the needs of China, to aid the team members in identifying capability disparities. Analysis of the information collected in this Review Report and through the use of the Review Tool will provide USPACOM and USAID with the data needed to develop a three (3) to five (5) year strategic plan for future PI preparedness efforts in China.

COUNTRY INFORMATION[3]

China is geographically located in Eastern Asia between North Korea and Vietnam, and borders the East China Sea, Korea Bay, the Yellow Sea, and the South China Sea. China commands a total area of roughly 9,600,000 sq. km, giving it authority over a region that is slightly smaller than United States of America. The terrain is mostly mountainous, with high plateaus and deserts in the west; and plains, deltas, and hills in the east. China has a population of 1.33 billion people, making it the most populous nation in the world. About 47% of China's population lives in an urban environment, and the rate of urbanization has been steadily climbing at 2.3% per year.

91.5% of the Chinese population consider themselves to be members of the Han ethnic group. The country is also home to other ethnic groups including the Zhuang, Manchu, Hui, Miao, Uighur, Tujia, Yi, Mongol, Tibetan, Buyi, Dong, Yao, and Korean ethnic groups (2000 census). The official language of China is Standard Chinese or Mandarin, but there are numerous dialects and minority languages. The country is officially atheist as of 2002, but religious groups that are present include Daoist (Taoist), Buddhist, Christian, and Muslim organizations.

China has a labor force of about 780,000,000 people. About 92% of the Chinese population over the age of 15 is able to read and write. This figure can be broken down

[3] Central Intelligence Agency, The World Factbook, China.

further to show that about 96% of the male population and about 88% of the female population are literate. 2.8% of the Chinese population lives below the poverty line, which is US $125 per year. In 2010, the Gross Domestic Product (GDP) per capita was estimated to be $7,400, which ranked 127th in the world. Most of the 780 million people in the Chinese workforce are employed in one of three primary sectors: agriculture (38%), industry (28%), or services (34%). China's primary exports include electrical and other machinery, including data processing equipment, apparel, textiles, iron, steel, optical equipment, and medical equipment. In 2010, China exported about US $1.5 trillion in goods and services, up from about US $1.2 trillion in 2009.

In 2006, it was reported that China spends roughly 4.3% of its GDP on military endeavors, ranking it 22nd in the list of countries that spend the highest percentage of their GDP on their military budget. The Chinese military, also known as the People's Liberation Army (PLA), is comprised of several branches, which include the Ground Forces, the Navy, the Air Force, the Second Artillery Corps, the People's Armed Police (PAP), and the PLA Reserve Force.

China maintains selective compulsory military service with a 24-month service obligation for males 18-22 years of age; no minimum age for voluntary service exists and all officers are volunteers. Female high school graduates that meet requirements for specific military jobs may enlist at 18-19 years of age.

The Chinese legal system is based on the civil law system and is modeled after Soviet and continental civil code legal principles. Judicial review of legislation is not clearly defined in the constitution.

Given the large territory that China covers, it is affected by most types of natural hazards. China experiences typhoons frequently along its southern and eastern coasts. Along with an average of five (5) typhoons per year, damaging floods, tsunamis, earthquakes, droughts, and land subsidence are also natural hazard threats.

Figure 1. Map of China

ASSUMPTIONS

China is a developing country with a huge territory and a large population. It has experienced several influenza epidemics in the last 100 years, and the 1918 Pandemic Influenza is thought to have originated in China. Despite the country's experience with PI, China is likely unprepared for a severe pandemic disease event. The Chinese Ministry of Health (MOH) developed a draft *Preparedness and Contingency Plan for Influenza Pandemic* in 2005, and that plan cites the following key assumptions:

- China's size will make it difficult to complete comprehensive disease surveillance and the length of borders will hamper bio-security efforts;
- The "health care service and public health system are still poor";
- The surveillance system can be improved upon;
- The drug and vaccine research and production capacity will not support China's population in a pandemic;
- If preparedness measures are not undertaken, "the preventive and control strategies will be ineffective and inefficient, which will result in a lot of illness and death in a short time"; and
- All of the above factors will "increase the terrors of society and people, devastate economic activities and social life, and even cause social upheaval."[4]

Limited stockpiles of antivirals raise the issue of drug allocation when a large-scale, high-impact pandemic occurs. The World Health Organization (WHO) recommends that countries stockpile antivirals for at least 20% of a country's population; in China this would mean antivirals for 240 million people. Any deficiency should be remedied by explicit rationing or a prioritization policy for the medicines and vaccines necessary. Such policies should be developed to avoid ethical and political conflicts that may arise.

The ongoing threat of PI with human-to-human transmission also calls for a revision/reposition of public educational campaigns that were shown to focus on animal to human transmission. The message would require adjustment from current emphasis on animal handling to respiratory hygiene and when to seek medical care.

The scarcity of healthcare resources, particularly in rural areas, has been shown to hamper the preparation for a pandemic as well as responses to other diseases. Scaling up health system capacity, such as health workforce and healthcare infrastructure, is necessary.[5]

[4] Ministry of Health, China. Preparedness and Contingency Plan for Influenza Pandemic. p.1.
[5] BioMed Central Public Health. Pandemic Influenza Preparedness and Health Systems challenges in Asia: Results from Rapid Analyses in Six Asian Countries. 2010.

REVIEW METHODOLOGY

The first component of the overall review includes this retrospective review in which the USPACOM project team analyzed existing China PI data focused on four major research sources:

- Department of Defense (DOD)
- Non-Governmental Agencies (NGA)
- Other Government Agencies (OGA)
- The Private Sector

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The USPACOM PI project team designed and tailored the PI Review Tool based on an analysis of existing PI assessment tools such as those developed by the WHO, European Union, United States Agency of International Development (USAID), Centers for Disease Control and Prevention, and the United States African Command (AFRICOM). The review focuses on the progress of China against the four key pillars of the *U.S. National Framework for 2009-H1N1 Influenza Preparedness and Response*:

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The PACOM PI project team developed and refined detailed questions within these four (4) pillars for use during discussions with Chinese government representatives and military officials to gather required information to assess capabilities. Each question includes specific indicators and instructions to guide Review Team members to enable a standardized review of capabilities on a Likert scale of 0 to 3 for each question. The tool also provides the ability for "no response" if a Review Team member was unable to elicit a response to a particular question.

Use of the Review Tool involves the following steps:

1. The Review Team will visit various hospitals, installations, and other applicable locations and capture their observations in a structured Excel-based review template.
2. The Review Team will upload a completed review template via the web; the contents of the file will be imported directly into the review tool.
3. The Review Tool will be a web-based "portal" that visualizes the results of the review and offers interactive features.

The goal for the tool, once populated, is to produce targeted reports of disparities and relative strengths and weaknesses in key areas, and to rapidly incorporate findings and recommendations into a separate disparity analysis report as depicted in the figure below.

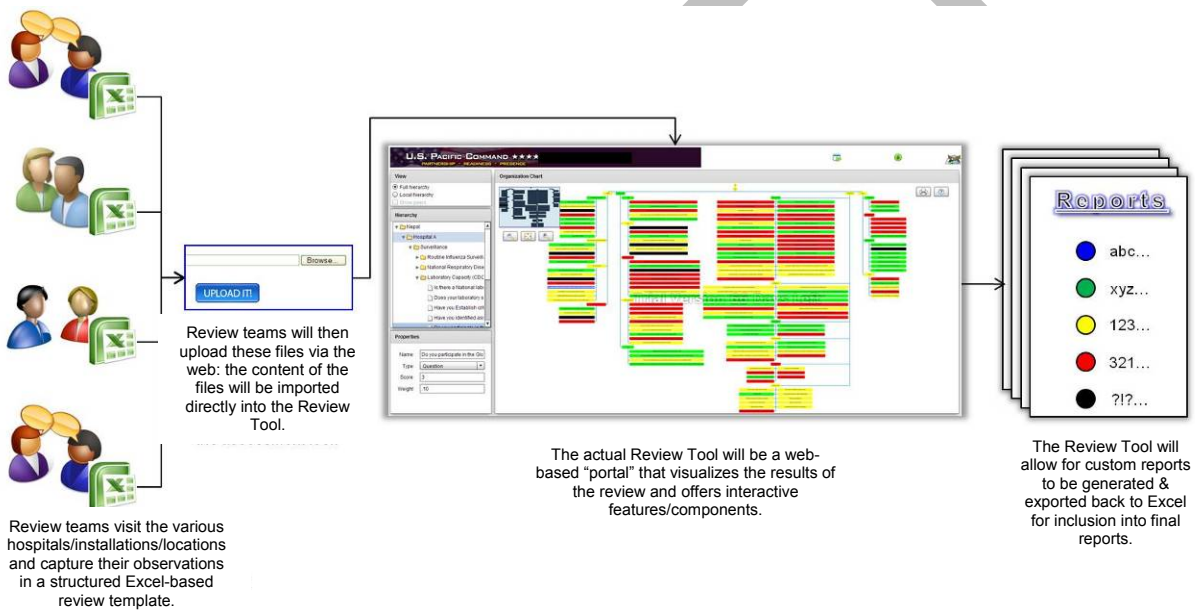

Figure 2. Review Tool Steps

REVIEW TEAM COMPOSITION

Medical professionals, PI Subject Matter Experts (SMEs), and disaster management and humanitarian assistance specialists whose documented expertise is pandemic preparedness within the WHO Phase 6 construct will conduct the review effort in China. The Review Team has been divided into two teams to assist in the ability to gather required information as described below.

Name	Role	Organization
Team A- Military Office Calls		
RADM Michael H. Mittelman	Team Lead	Command Surgeon, USPACOM
Maj Gen Darryll D.M. Wong	Team Lead	Adjutant General, State of Hawaii
Mr. Christopher Mann	PI/ID SME	USPACOM, J07
Mr. Brad Morrell	PI/ Emergency Management SME	SURVIAC Contractor support to USPACOM
Team B- Civilian Office Calls		
LTC Courtney Vares-Lum	Team Lead	HING (USPACOM Executive Agent)
Col John Cinco	PI/ID SME	Defense Institute for Medical Operations
Mr. Jon Shear	PI/Emergency Management SME	SURVIAC Contractor support to USPACOM
Ms. Allison Leslie	Ops/Coordination SME	SURVIAC Contractor support to USPACOM

REVIEW AGENDA *(DRAFT)*

Date	Office Calls / Event Details
Sunday	PACOM PI Team Members Arrive Final Review, Team Training/Prep

Day One Monday	Office call with Defense Cooperation Representatives Office call with Defense Attaché Office Office call with United States Agency for International Development, Health Office
Day Two Tuesday	**Team A** Visit Operations Centers/Military Medical Installations **Team B** Public/Private Hospitals/Agencies/Orgs
Day Three Wednesday	**Team A** Visit Operations Centers/Military Medical Installations **Team B** Public/Private Hospitals/Agencies/Orgs
Day Four Thursday	**Team A** Visit Operations Centers/Military Medical Installations **Team B** Public/Private Hospitals/Agencies/Orgs
Day Five Friday	White Space Opportunity to meet with additional key leaders and visit key medical sites
Saturday	PACOM PI Review Team Completes Work
Sunday	All personnel return to home station

SEASONAL INFLUENZA BACKGROUND (CHINA)

The Chinese Center for Disease Control and Prevention studies seasonal influenza patterns across both southern and northern China. In April of 2010, the organization produced this report:

> From the National Influenza Surveillance Network, a database of surveillance information from April 2006 to March 2009 was established. For influenza surveillance purposes, mainland China was divided into northern and southern parts, basically following the Qinling Mountain range in the west and the Huai River in the east. The prominent influenza peaks in the winter in the north and summer in the south were clear for adults and for children; the level of ILI was 3–5× for children. The influenza subtypes causing the 3 peaks in the north were preceded by a peak of the same subtypes in the south. During winter 2006–07, the influenza subtype was seasonal H1N1 and to a lesser extent H3N2. In winter 2007–08, the virus was B/Yamagata; and in 2008–09, it was again seasonal influenza A (H1N1), which was almost absent in the south during April–December 2007. Antigenic characteristics of the influenza virus from the north were similar to those from the south in the same epidemic episode. Furthermore, influenza A (H3N2) was in southern China throughout the year, whereas in northern China, this subtype only showed a clear peak in the first 2 winters of the study period. Subtype B/Victoria and B (unsubtyped) were both in northern and southern China in irregular and low numbers. Data from the 3 northern provincial areas with year-round surveillance confirmed that influenza cases during April–September were negligible.
>
> The influenza subtypes of seasonal influenza A (H1N1) and B/Yamagata that have caused the past 3 summer peaks in southern China were followed by an epidemic of the same subtypes in northern China during the subsequent winter. This finding may indicate that these peaks are regular epidemic phenomena for seasonal influenza in China. Another possible explanation is that other subtypes were cocirculating with the predominant subtype at the time of epidemics.
>
> The dual pattern of seasonal peaks for influenza is well-known for the Northern and Southern Hemispheres, but apparently it is also possible on one side of the equator. China is a large country with climatic differences between north and south. Although most of southern China is above the Tropic of Cancer, it is warmer and more humid than northern China, which may explain the different seasonal patterns within mainland China. Knowledge of the dual patterns of influenza in China is relevant for determining effective control measures, and knowledge of the underlying mechanisms of such patterns is relevant to understanding the epidemiology of influenza in general.[6]

[6] Shu Y-L, Fang L-Q, de Vlas SJ, Gao Y, Richardus JH, Cao W-C. Dual seasonal patterns for influenza, China [letter]. 2010.

REVIEW TOOL INPUT

The following section provides an overview of the pillars included within the review tool.

SURVEILLANCE

Surveillance of disease refers to the epidemiological practice of monitoring the spread of a disease in order to establish a pattern of progression and magnitude of impact (i.e., endemic versus pandemic).[7] A robust influenza surveillance network would include continuous detection and sampling of avian and mammal species that present Influenza-Like Illnesses coupled with rapid data collection, analysis, timely reporting, and disease tracking. Surveillance on an influenza virus allows a country to rapidly initiate preventative measures to stop the pandemic at its source if the virus spreads from the animal vector to humans, and to ramp up the frequency and type of preventive measures used if human-to-human transmission is documented. The ability to conduct disease surveillance, therefore, allows a country to potentially prevent millions of deaths, social disruption, and economic loss.

Surveillance Activities

Disease surveillance can be assessed and addressed through analysis of capabilities related to routine surveillance, national respiratory disease surveillance and reporting, epidemiology, and laboratory capacity.[8]

Routine surveillance addresses a country's ability to:

- Create and maintain sentinel sites and their geographic distribution to produce representative data for severe hospital respiratory infection;
- Analyze and distribute data to relevant parties in a timely fashion; and
- Use standard case definitions.

National Respiratory Disease Surveillance and Reporting addresses a country's ability to:

- Educate health care workers and the public;
- Monitor informal data sources (rumor surveillance);
- Cross-notify and work with both ministries of health and agriculture; and
- Recognize respiratory outbreaks of significance or clusters of severe disease reports.

Epidemiological Capabilities addresses a country's ability to:

- Staff and provide resources for timely monitoring and making recommendations on population health status, disparities, and acute incidents at the local level;

[7] Review tool for influenza preparedness in European countries. September 2006.
[8] USPACOM. *Survey Assessment Tool for Country PI Preparedness*. Version 9. 1 September 2009.

- Identify the number of practicing public health epidemiologists per million population, plus epidemiologist vacancies;
- Provide quality assurance and quality improvement of practicing epidemiologists; and
- Provide ongoing epidemiological training with dedicated resources.

Laboratory Capacity addresses a country's ability to:

- Maintain a national laboratory at Bio-Safety Level 3 (BSL-3) and above with the ability to isolate Avian Influenza (AI) in humans;
- Routinely return results of influenza testing to referring labs;
- Produce full antigenic and genetic characterization of influenza viruses; and
- Report and share results with WHO after laboratory confirmation of a potential public health emergency of international concern.

Overview of Global Surveillance Efforts

The WHO Influenza Surveillance Network serves as a global alert mechanism for the emergence of influenza viruses with pandemic potential. This enables WHO to recommend twice annually the content of the influenza vaccine for the subsequent influenza season.

The main components of the WHO Global Influenza Surveillance Network are National Influenza Centers (NIC), which sample patients with ILI and submit representative isolates to WHO Collaborating Centers (CC) for antigenic and genetic analyses. Annually, the NICs collect more than 175,000 patient samples and submit around 2,000 viruses to the WHO CCs for antigenic and genetic analyses. The National Influenza Center of the Chinese Center for Disease Control and Prevention was designated as a WHO Collaborating Center for Reference and Research on Influenza, making China the first developing country to house such an institution. Under the coordination of the WHO, the center in China joins four others - those in Australia, Japan, the United Kingdom and the United States - in monitoring, researching and responding to outbreaks of influenza, as well as making plans to combat pandemics.[9]

As demonstrated by the WHO Influenza Surveillance Network the efforts of surveillance networks should have sufficient coverage and laboratory capacity and epidemiological and virological data should be integrated. As part of national pandemic preparedness planning each country should prepare for enhanced surveillance to detect the emergence of a new disease, characterize the disease (epidemiology, clinical manifestations, severity), and monitor its evolution.

In affected countries during a transition to WHO Phases 5/6 (Pandemic), efforts switch from that of preparedness to response at the global level. With regards to situation monitoring and reviews, WHO actions include:

[9] *WHO Flu Center to be Set in China*, China Daily, March 15, 2011.

- Coordinating the review and monitoring of the disease characteristics and severity, and providing guidance accordingly;
- Monitoring the global spread of disease and possible changes in epidemiological, clinical, and virological aspects of infection, including antiviral drug resistance; and
- Supporting affected member states as much as possible in confirming the spread of human infections and assessing the epidemiological situation.[10]

Additionally, the WHO recommends the following national-level actions for member nations for pandemic disease surveillance:

- Undertake a comprehensive review of the earliest cases of Pandemic Influenza (PI);
- Document the evolving pandemic including geographical spread, trends, and impact;
- Document any changes in epidemiological and clinical features of the pandemic virus;
- Maintain adequate virological surveillance to detect antigenic and genetic changes, as well as changes in antiviral susceptibility and pathogenicity; and
- Modify national case definitions and update clinical and laboratory algorithms for diagnosis, as necessary.[11]

The WHO recommends the following national-level actions for member nations for monitoring and review of the impact of the pandemic:

- Monitor essential health-related resources such as medical supplies, antivirals, vaccines and other pharmaceuticals, health care worker availability, hospital occupancy/availability, use of alternative health facilities, laboratory material stocks, and mortuary capacity;
- Monitor and assess national impact using criteria such as workplace and school absenteeism, regions affected, groups most affected, and essential worker availability;
- Assess the uptake and impact of implemented mitigation measures; and
- Forecast economic impact of the pandemic, if possible.[12]

Standardized and coordinated international information sharing is crucial for crisis management at global and national levels. National authorities will need to know how the pandemic is evolving not only in their own country, but also in neighboring countries and continents. The continual flow and aggregation of information provided by individual countries will contribute to the development of a global picture that will:

[10] World Health Organization. *Phases 5-6 PANDEMIC*. 2009, www.who.int/csr/disease/influenza/extract_PIPGuidance09_phase5_6.pdf.
[11] *Ibid.*
[12] *Ibid.*

- Result in a rapid accumulation of critical clinical, epidemiological and virological data about the new disease;
- Allow health care providers and public health authorities to modify their strategies for case management, community mitigation, and health resource allocation;
- Disperse the workload among the first affected countries;
- Reduce the impact of inaccurate and unconfirmed rumors; and
- Enable the WHO to serve as a credible and stabilizing source of information and guidance.

Misinformation or lack of information at a global or country level will inevitably result in a delay of response, spread of damaging rumors, inadequate resource allocation, misdirected efforts, and ultimately, unnecessary loss of life.

Pandemic Surveillance in China

China's PI plan places the Ministry of Health (MOH) in charge of preparedness and response, and delegates surveillance responsibilities to China's Center for Disease Control (CDC). China has invested considerable resources into its surveillance and reporting protocols following the 2003 SARS outbreak and has modified its strategies following H5N1 and H1N1 outbreaks.[13] For example, initially, China focused on screening those entering the country and on monitoring patients with respiratory illness who had visited areas with confirmed H1N1 cases or had been in contact with diagnosed patients. Healthy people in close contact with H1N1 patients were quarantined. However, the containment strategy became inadequate as the virus continued to spread.[14] The emphasis on detection, laboratory confirmation and investigation of all cases, even mild ones, is resource-intensive, leaving little capacity to investigate severe cases and other exceptional events.

China's pandemic strategy focuses on an AI Control Strategy and Human PI Preparedness Strategy. China's surveillance objectives noted in the 2006 assessment of its pandemic preparedness included:

- Monitor influenza activity in mainland China;
- Monitor antigenic and genetic characteristics of influenza viruses and provide evidences for recommendation of representative circulating strains and vaccine strains in mainland China;
- Monitor the novel influenza with pandemic potential;
- Provide laboratory diagnosis capacity for special clinical needs; and
- Provide data for research.[15]

[13] *Assessment of the Country Framework for Avian Influenza Control and Human Pandemic Influenza Preparedness and Response*, January 17, 2006, pg. 33.
[14] *Response Strategy and Pandemic Surveillance*, Controller Center for Health Protection Hong Kong, July 24, 2010.
[15] *National Influenza Surveillance Network of China: beyond the influenza*, Chinese National Influenza Center National Institute for Viral Disease Control and Prevention, July 24, 2010, pg. 2.

China's pandemic surveillance protocol is predicated on three categories of influenza surveillance:

- Notification of influenza as a notifiable infectious disease (This consists of reporting and monitoring seasonal influenza, Highly Pathogenic Avian Influenza (HPAI), and H1N1)
- Sentinel hospital-based surveillance:
  - Influenza-like illness surveillance
  - Virological surveillance
- ILI outbreak surveillance:
  - Outbreak report
  - Virological surveillance[16]

As of 2005, the Chinese National Influenza Surveillance Network covered 31 provinces, autonomous regions and municipalities of mainland China, including 63 network laboratories and 197 national influenza surveillance sentinel hospitals. In March 2009, it was extended and 21 prefectural CDC laboratories joined in the network. In April 2009, following confirmation of H1N1 outbreaks, the Ministry of Health of China decided to greatly expand the Chinese National Influenza Surveillance Network. Since June 2009, an extensive surveillance network with 441 network laboratories and 556 national sentinel hospitals has been operating which not only covers all provinces, but also covers all prefectures and counties in mainland China.[17] This extension includes Since July 2009, China has switched to testing patients with ILI for H1N1 infection and monitoring local outbreaks and unusual disease clusters.[18] This aided in the country's ability to conduct human surveillance.

In one study performed by China in 2009, researchers studied 125 patients for whom an exact date of onset of PI was known. This provided Chinese researchers with an accurate estimate of the incubation period. The study illustrates the progress made in influenza surveillance since 2005, according to Nicole Lurie, MD, assistant secretary for preparedness and response for the Department of Health and Human Services.[19]

Other examples of the country's emphasis on pandemic surveillance includes the passage of legislation such as the *Law of the People's Republic of China on the Prevention and Control of Infectious Diseases* which classifies influenza into categories to help track and report diseases.[20]

Problems and Obstacles Identified by Chinese Officials

During 2009, China's geography inhibited the ability to monitor the H1N1 infection in the rural areas. Typically, China experiences an average of eight days between disease onset of H5N1 and hospitalization, largely because doctors in villages were unable to make the diagnosis. In addition, doctors in underdeveloped regions may be offering

[16] *Ibid*, pg. 4.
[17] *Overview of Influenza Surveillance in China*, CNIC Weekly Report, Oct 24, 2009 Version 1.0 http://www.cnic.org.cn/eng/show.php?contentid=176
[18] *China Boosts Pandemic Surveillance*, Nature, Volume 460, August 2009
[19] *Chinese Study Pins Down Pandemic Flu Incubation,* New England Journal of Medicine, December 9, 2009.
[20] *Overview of Influenza Surveillance in China,* Chinese National influenza Center, October 24, 2009. http://www.cnic.org.cn/eng/show.php?contentid=176

inadequate or dangerous treatments for symptoms related to H1N1 infection; many clinics and hospitals in China, especially in rural areas, use dexamethasone, a potent immunosuppressant, to treat acute fever.[21] Geographic issues cannot be eliminated, so this will continue to pose challenges for further outbreaks. The Review Team should determine whether progress has been made on the ability of local doctors to more rapidly diagnose the disease.

In addition, as part of its analysis of early warning and detection activities, China cited the need for improvements for both animal and human surveillance protocol that could be strengthened as part of its 2006 assessment of pandemic preparedness and response:

- **Animal Disease Surveillance:** China's AI plan is more comprehensive than the human pandemic plan, with more clearly defined procedures for surveillance, detection, and response. In regards to animal surveillance, China noted there was very limited veterinary capacity (training and facilities) below the provincial level. Recommendations for improvement in this area included:
  - Wild bird surveillance investment is needed;
  - Public awareness of early signs of disease and incentives (including compensation) to report;
  - Veterinary and wildlife field staff lack skills in differential diagnosis and decision-making techniques;
  - Disease reporting system and integration of laboratory data need to be assessed;
  - Surveillance of vaccinated birds is vital if the impact of vaccination campaigns is to be properly assessed. Further work is needed in this area; and
  - Timely sharing of outbreak information and exchange of virus isolates.[22]
- **Human Surveillance:** China assessed that considerable investment in surveillance and reporting occurred between 2003 and 2006. At that time, case definitions and guidelines for all diseases under surveillance had recently been revised and considerable investment has been made in training of local staff in early detection and reporting of notifiable diseases. Recommendations for improvement in that area included:
  - Raising public and clinician awareness of early signs of disease and address issues of stigma and incentives for early reporting;
  - Lack of non-hospital-based surveillance limits population coverage;
  - Reporting system is complex and may deter ability to detect clusters quickly;
  - Lack of capacity to perform serological investigations limits the potential to find mild or asymptomatic cases; and
  - Insufficient grass roots level surveillance and control.[23]

[21] *China Boosts Pandemic Surveillance*, Nature, Volume 460, August 2009.
[22] Assessment of the Country Framework for Avian Influenza Control and Human Pandemic Influenza Preparedness and Response, January 17, 2006, pg. 31

In regards to human surveillance, improvements have been documented in regards to the National Influenza Center, but progress against the other human surveillance actions is not known. The Review Team should inquire about the status of both human and animal surveillance recommendations from 2006.

External Review of China's Surveillance Efforts

The most recent external reports on China's pandemic surveillance efforts are predominantly from 2009, which was prior to the emphasis China began placing on human surveillance. Most of the reports indicate that China is ill-prepared to handle a pandemic. For example, detailed technical assessments of China's response from September 2006 undertaken by the World Bank, the United Nations System and other development partners in November and December 2005 noted that while significant progress has been made towards surveillance, a number of weaknesses remain in early warning and surveillance capacity, particularly at the grassroots level exist.[24]

In addition, as of 2009, a U.S. Government assessment found that geography, demographics, and fragmented government structure will continue to complicate China's PI surveillance, domestic disease reporting, and response. With the country's large urban-rural divide, the national government needs to find a way to conduct surveillance, education, preparedness, and response in hard-to-reach rural areas and among the floating population-- approximately 150 million people that migrate throughout the country for work. Local level compliance and enforcement presents a challenge because governments at the provincial level have a large degree of autonomy and have a tendency to interpret directives from the central government as they see fit. Regulation and oversight of government orders proves even more difficult at the county and city levels. The Defense Intelligence Agency (DIA) believes a combination of inadequate surveillance, poor postmortem examination, and a lack of transparency within the provincial and county governments.[25]

The Review Team should determine if more recent external assessments of China's surveillance efforts have been conducted since 2009 and whether the results are more positive in light of the advancements the country has made regarding human influenza surveillance and research.

[23] *Ibid*, pg. 36.
[24] *China*, The World Bank, September 2006, http://web.worldbank.org/WBSITE/EXTERNAL/COUNTRIES/EASTASIAPACIFICEXT/CHINAEXTN/0,,contentMDK:21063191~isCURL:Y~menuPK:318981~pagePK:1497618~piPK:217854~theSitePK:318950,00.html
[25] *China: Ill Prepared to Respond a Severe Influenza Pandemic*, Multiple Sources, November 20, 2009, pg. 1

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MITIGATION MEASURES

Mitigation measures, as they pertain to a pandemic, are those activities that help to stop, slow, or otherwise limit the spread of an outbreak; mitigate illness, suffering and death; and sustain infrastructure and mitigate impact to the economy and the functioning of society. Critical components of mitigation include planning and coordination, outbreak response, containment resources, community based interventions, infection control, and the response of the health sector. Each of these activities is essential to China's capability to slow the spread of illness and reduce the impact of infection and illness on individuals and communities.

Mitigation Activities

Planning and Coordination

Planning and coordination activities are key components of preparedness and directly impact a country's ability to respond during a pandemic event. The effectiveness of a pandemic response, and ultimately the impact of the pandemic event upon the country, depends upon how efficiently government officials and public health planners have planned and coordinated their preparedness actions.

Preparation for and response to a pandemic outbreak within China requires a coordinated response among national, provincial, and locals levels of government. Within those levels, mitigation and response activities should be coordinated among all agencies involved within the jurisdiction, as well as across jurisdictions and with private sector organizations. Influenza planning must also take into account the Special Administrative Regions of Hong Kong and Macau which possess different political systems than mainland China.

Pre-incident planning is an essential part of emergency preparedness. The fundamental logic that underlies the planning process is that these and the related decisions must be addressed before the incident occurs. China's overarching document on public emergency response, *The General Protocol for Response to National Public Emergencies,* establishes the single overarching framework for any public emergency to include pandemics. In 2005, the Ministry of Health (MOH) issued a *Preparedness and Contingency Plan for Influenza Pandemic of the Ministry of Health Draft* (hereafter, *PI Plan*). According to documentation, this special "Emergency Response Plan" of the MOH carries stipulations on a number of areas in the work of dealing with an influenza pandemic, including an organization and command system as well as responsibilities, preparations, emergency responses, and conclusion of supervision.[26] However, as of January 2006, there was no single integrated national plan for prevention and response to Avian Influenza (AI) and pandemic preparedness that covers both the animal and human aspects. There are, however, a number of separate strategies that deal with the animal sector, human health sector and pandemic preparedness.[27] For example, China drafted a *National Emergency Plan for Highly Pathogenic Avian Influenza* (HPAI) (*AI*

[26] *Ministry of Health Announces Emergency Response Plan Against Influenza Pandemic*, Open Source Center, September 28, 2005.
[27] *Assessment of the Country Framework for Avian Influenza Control and Human Pandemic Influenza Preparedness and Response*, January 17, 2006, pg. 12.

Plan), creating a command control headquarters for AI. The provisional version of the *PI Plan* was based on three phases – Preparedness Phase, Pandemic Phase, End of Pandemic Phase. According to third party documentation, the final version of the *PI Plan* focuses on preparedness, prevention, and early containment, including the need for PI response capacity-building, such as vaccine/antiviral stockpiles and surge capacity. The plan focuses less on response, though general procedures and thresholds exist for quarantine, treatment, and communication.[28] However, a copy of this full plan is not readily available – only a 15-page draft version is posted on public domains. Most of the information on China's *PI Plan* is garnered from the *Assessment of the Country Framework for Avian Influenza Control and Human Pandemic Influenza Preparedness and Response* (referred to as *Assessment* for the remainder of this section) published in January 2006.[29]

In addition, the Special Administrative Region of Hong Kong released an independent pandemic document entitled the *Framework for the Government's Preparedness Plan for Pandemic Influenza* in July 2007. This document is based on phases which are inconsistent with the 2005 provisional draft of mainland China's *PI Plan*. Hong Kong's framework uses Alert Response Level, Serious Response Level, and Emergency Response Level.[30] Whether the phases between these documents were reconciled is unknown.

The *Assessment* provides observations on the implementation of China's *PI Plan*. Based on its conclusions, there were significant areas for improvement along nine key areas: Strategic Planning; Institutional Arrangements and Coordination; Communications; Prevention; Early Warning and Detection; Outbreak Response and Containment; Pandemic Preparedness and Response; Areas for Research, International Collaboration and Possible Outward Assistance; and Building Towards Medium-Term Response. In particular, some of the more notable recommendations included the development of a more integrated, overarching, multi-sector national pandemic plan for AI and PI that covers all of the following-- prevention, detection, response/containment, research, communications and pandemic preparedness.[31]

There are non-specific references to subsequent pandemic plans, but versions have not been obtained by the researchers for this project. However, other Federal agencies, in particular, the Department of Defense (DoD), have been granted access. In a 2009 report, the DIA judged China's *PI Plan* to be far from complete indicating that the plan lacks vital details necessary to address response planning, vaccine and antiviral stockpiling, and medical surge capacity building.[32] Other organizations within China mirrored DIA's analysis by indicating that the country's preparedness plan should be further developed to be more operational and include additional information on

[28] *China: Ill-Prepared to Respond to a Severe Influenza Pandemic (redacted)*, DIA, November 20, 2009, pg. 1.
[29] *Assessment of the Country Framework for Avian Influenza Control and Human Pandemic Influenza Preparedness and Response*, January 17, 2006.
[30] *Framework of Government's Preparedness Plan for Influenza Pandemic,* Hong Kong Food and Health Bureau, July 2007, pg. 1-2.
[31] *Assessment*, pg. 53-56.
[32] *China: Ill-Prepared to Respond to a Severe Influenza Pandemic*, pg. 1.

vaccinations and immunization; antiviral stockpile; public health intervention; and medical care surge capacity.[33]

The People's Liberation Army (PLA) is a critical component to the country's pandemic planning efforts. However, whether the PLA has developed adequate PI planning and preparedness is unknown because very little information is currently available via all-source networks. However, it is believed that China is likely to have plans in place for its military because the PLA has been an active participant in 2009-H1N1 influenza vaccine development and has demonstrated a large capacity to respond to natural disasters.[34]

Coordination. Pandemic planning and response requires organizations and agencies in the public and private sectors to work together. During a pandemic, in which government officials will most certainly address difficult decisions on a daily basis, coordination of activities between officials at all levels of government and within the public and private sectors will be critical to an effective response. *The General Protocol for Response to National Public Emergencies* specifies that, at the national level, for any very severe national public emergency event, the commanding structure includes: (a) the State Council Routine Meeting Mechanism led by the Premier; (b) Sectoral Commanding Structure for Emergency Response; (c) Office for Emergency Response Management within the State Council; and (d) State Council Taskforce/Working Group. The *Draft Preparedness and Contingency Plan for Influenza Pandemic of the Ministry of Health* claims the MOH is responsible for leading preparedness activities to include:

- Leading and coordinating the preparedness and response activities with the administrative department of health, the medical organization and China's Center for Disease Control (CDC) at all levels nationwide;
- Setting up the effective mechanism and system of responsibilities and obligations;
- Drafting the annual work plan for pandemic;
- Strengthening the influenza surveillance system;
- Preparing for the health care service and public health intervention;
- Analyzing and evaluating influenza activity regularly and identifying the new influenza virus subtype timely by expert panel; and
- Regularly supervising the preparedness activities for the pandemic regularly.[35]

However, the *Assessment* of China's pandemic framework identifies various command and control structures for the different phases of a pandemic which was identified as an area for improvement. Specific recommendations in the *Assessment* included:

- Formulation of an overarching coordination mechanism that covers prevention, response and preparedness. There is also a need for a single body with

[33] *2009 Pandemic H1N1 Response in China*, Director, Office for Disease Control and Emergency Response Chinese Center for Disease Control and Prevention, July 24, 1010.
[34] *China: Ill-Prepared to Respond to a Severe Influenza Pandemic*, pg. 9.
[35] *Preparedness and Contingency Plan for Influenza Pandemic of the Ministry of Health, PR China (Draft version),* date unknown, pg. 5.

responsibilities for all actions related to control of the threat of AI and preparedness for a possible pandemic.

- The coordination mechanisms between the different lead groups should be further clarified and strengthened.
- Because of the existence of different commanding and control structures, clarification is also required with respect to which structure, namely the one for AI or the one for PI, will function and supersede the other when there are concomitant PI and AI outbreaks.[36]

The Ministry of National Defense (MOD) was not one of the ministries listed in the *Assessment* as having responsibilities. A regulation passed by the Chinese government in 2007 regarding emergency response to animal epidemics states the PLA should support AI efforts. The regulation does not, however, specify PLA activities or assign military branches specific roles in Avian or Pandemic Influenza (AI/PI) preparedness and response.[37] Whether subsequent Chinese PI plans include the Ministry of National Defense in its inter-ministerial coordination structures is unknown, however, recommendations from the *Assessment* advocated an integrated approach to AI/PI planning. The Review Team should determine whether 1) an integrated pandemic coordination and command structure exists; and 2) to what extent the military is currently engaged.

Exercises. Once plans and sufficient training are completed, the next step is to exercise the plan. Exercises provide an opportunity to evaluate the efficiency and effectiveness of the plan and to test the systems, protocols, facilities, and personnel involved in implementing the plan. Exercises are generally categorized by their scope and range from the discussion-based Tabletop Exercise (TTX) to the operations-based Full-Scale Exercise (FTX). Another method of testing plans and actions is through workshops. *The General Protocol for Response to National Public Emergencies* stresses the importance of a coordinated response, drills and exercises to test the appropriateness of the protocol and timely update of the protocol in order to respond to any changes in the actual situation. However, there are limited references to the concept of exercises in the *Assessment*, and no documentation or observations of any pandemic exercises that were conducted prior to the release of the document other than a recommendation to conduct cross-sector exercises.[38] There is little to no documentation of exercises conducted by China or the PLA for PI. The Review Team should inquire as to the types and frequency of pandemic exercises China has conducted and attempt to obtain after action reports to determine areas for improvement and whether subsequent exercises alleviated those concerns.

Resource Coordination. A pandemic in China will result in shortages of and competition for all types of goods and services. Pandemic resources must be carefully managed in order to obtain the greatest return. China has limited medical and human resources to support a pandemic outbreak. It is anticipated that the private sector and international nongovernmental organizations will play a large role in the provision of

[36] *Assessment of the Country Framework for Avian Influenza Control and Human Pandemic Influenza Preparedness and Response*, January 17, 2006, pg. 19.
[37] *China: Ill-Prepared to Respond to a Severe Influenza Pandemic (redacted)*.
[38] *Assessment*, pg. 44.

resources. However, there is no indication in available pandemic documentation as to which organization is responsible for the adjudication of critical resources if there are shortages or multiple requests.

Outbreak Response

An effective response to an outbreak of PI will initially rely on many groups (private industry, public health officials, emergency management personnel, veterinarians, government agencies) as the outbreak is recognized and efforts are made to respond to and contain the outbreak. To effectively respond to an outbreak, properly staffed, equipped, and trained response teams must act in a timely manner to control the spread of the disease to the greatest extent possible.

Human Resources. Response teams should be multidisciplinary and contain expertise in areas such as field epidemiology, clinical review, specimen collection, infection control, social mobilization, logistics, veterinary science, and environmental health sciences. According to the *Assessment*, in 2004, trained response teams for AI veterinary detection were established and appear to be relatively effective.[39] As of January 2006, China's CDC influenza epidemiological team had less than 20 people and limited capacity to support local investigation of possible outbreaks.[40] There were no references to other existing teams in the *Assessment*, but the document included a recommendation for the establishment of rapid response teams with sufficient support to investigate and contain human clusters.[41]

In regards to military teams, a 2006 article from the *Xinhua News Agency* reports the establishment of a PLA public health brigade. According to the article, China's Central Military Commission approved the establishment of the brigade to provide early warning and response to military public health emergencies and to be in charge of national epidemic prevention and disaster relief.[42]

Logistics Resources. To effectively respond to an outbreak sufficient logistics resources are needed. For example, response teams must be equipped with the necessary equipment and have available the necessary supplies to identify a pathogen, process a sample, transport a sample, and conduct epidemiological investigations.

While there is no documentation indicating the types of resources (personnel and assets) that the PLA may be able to provide to China in the event of a pandemic outbreak, statistics regarding other support to civilian authorities may be used as a comparison. For example, in response to the May 2008 Sichuan earthquake, 20,000 military and armed police arrived in Sichuan within 10 hours of the earthquake, and eventually 139,000 PLA and police troops were involved in the rescue and recovery efforts. This mission illustrates inter-service cooperation and coordination and demonstrates the PLA's ability to deploy thousands of troops quickly.[43] There can be some supposition that similar capabilities could be brought to bear during a pandemic.

[39] *Assessment*, pg. 40.
[40] *Ibid.,* pg. 41
[41] *Ibid.,* pg. 55.
[42] *China Ill-Prepared to Respond to a Pandemic*
[43] *Ibid.*, pg. 9.

Response Training and Exercises. Organizations and response teams must also conduct training and exercises on response activities. With the exception of the acknowledgement that there needs to be an establishment of a rapid response team, it is uncertain as to what extent training and exercises have been completed. Throughout the *Assessment*, there are references to the need for training in multiple functions, but no specific recommendations or metrics. The Review Team should determine China's training goals and whether it has achieved them.

Response Timeliness is key to effectively containing a pathogen and requires effective communication, timely and effective reporting procedures, and knowledge by primary care physicians of criteria and case definition for a possible human AI case. Having established triggers for activities aligned to the phases of the WHO will assist in determining acceptable timelines for critical response activities. One of the principles in China's *PI Plan* was prompt warning and effective response through strengthening the capacity of pandemic surveillance and alert and making the preparedness timely using the science and technology.[44] However, no additional details regarding metrics for judging timeliness or effective response were included, nor were any additional details or actions.

Containment Resources

Studies have suggested that response and containment measures taken within three (3) weeks of the appearance of a HPAI strain may prevent, or at least delay, progression to a pandemic. Local community responses, both operative and social, are crucial for the prevention and control of the influenza virus. While effective communications between all levels of government officials will aid in the activation of disease control procedures that will help prevent further spread of the disease, there are containment resources that must be available to support outbreak response efforts.

Antiviral chemoprophylaxis is an effective method that can be used to prevent influenza or reduce the severity of influenza illness. Four antiviral drugs, amantadine (Symmetrel®), rimantidine (Flumadine®), oseltamivir (Tamiflu®), and zanamivir (Relenza®), are recommended and commercially available for use in the treatment and prevention of influenza.

In September 2009, China became the first nation to begin mass-vaccinating high-priority groups with H1N1pdm vaccine with 102 million doses administered by June 30, 2010. 160 million doses of vaccine expected to be manufactured. [45] As of last year, China had contracts with 10 manufacturers.[46]

According to Chinese open press reporting from May 2009, the PLA's Academy of Military Medical Services began emergency 2009-H1N1 influenza research and successfully produced the antiviral drug, oseltamivir; a new antiviral drug and injection, Peramivir Trihydrate; and a rapid-detection test kit for the 2009-H1N1 influenza virus that would deliver sample test results in two hours. It is unknown whether the PLA

[44] *Preparedness and Contingency Plan for Influenza Pandemic of the Ministry of Health, PR China (Draft version),* date unknown, pg. 2

[45] 2009 Pandemic H1N1 Response in China, Director, Office for Disease Control and Emergency Response Chinese Center for Disease Control and Prevention, July 24, 1010.

[46] *Experiences of China in Developing 2009 A/H1N1 Flu Vaccines*, China's National Institute for the Control of Pharmaceutical and Biological Products, 2010. http://www.ifpi2010.com/speakers/WangJunzhi.pdf

continued with this research or agreed to use the antivirals being produced by China's private sector manufacturers.[47]

In the event of a severe influenza pandemic, the DIA reported that China will not have sufficient antivirals to meet recommended stockpile levels for 20 to 25 percent of its population, even with local production of oseltamivir and zanamivir. China also used traditional Chinese medicine as an alternative treatment for 2009-H1N1 influenza.[48]

Storage Facilities. Antiviral drugs can play an important role in the response to an influenza pandemic. A large quantity of the drugs should be stored in preparation for the occurrence of a pandemic. However, it is difficult to predict when a pandemic or the peak number of cases will occur, and how long the pandemic will last. Therefore it is difficult to predict the quantity of antiviral drugs that will be needed. The drugs, if stored correctly, are valid until their expiration date. Drugs stored beyond their shelf life may have reduced potency resulting in wastage of the unused product. Typical methods for the storage of antiviral medications as part of a pandemic preparedness program include the use of existing healthcare or pharmacy facilities, contracting with a wholesale drug distributor, or constructing specialized storage facilities. The *PI Plan* indicated that the MOH is responsible for estimating the category and quantity and submitting to the relevant departments of the government for the stockpile. However, there is no additional detail on expectation or locations for stockpiles. According to the *Assessment*, there was limited antiviral stockpile available and no policy for its use.[49] Chinese and Japanese news reports from early 2009 stated China's capability to manufacture and stockpile Panflu for use during an influenza pandemic, but, that information could not be corroborated at that time.[50] In September 2009, China's MOH reported the government has stockpiled enough Tamiflu to cover 10 million people, less than one percent of its population. Additionally, the Chinese government reported on 15 September that China had stockpiled 13 million doses of the domestically produced antiviral, oseltamiv. However, no details regarding storage locations or a strategy were revealed in relevant resources. The review team should seek a status on the progress on China's storage of vaccines.

Management and Distribution. Although China is increasing its antiviral production, in all likelihood, the demand for antivirals will exceed the supply it is able to sustain in-country. Due to shortages in supply, storage restrictions, and transportation requirements, an effective management and distribution plan must be developed to ensure the limited supply of antivirals is used as efficiently as possible. The 2006 *Assessment* recommended that additional work was required to understand antiviral and medication development and production issues.[51]

Biosecurity protocols and preventions used for control of a disease are applicable not only in healthcare facilities but also in agricultural facilities. Water birds are the natural reservoir for some influenza viruses and domestic poultry plays an important role as a

[47] *China Ill-Prepared to Respond to a Pandemic*, pg. 9.
[48] *Ibid.*, pg. 1.
[49] *Assessment* pg. 47.
[50] *China: Recent News Reports Provide No New Information on Pandemic Avian Influenza Vaccination Policy,* NCMI Medical Intelligence Note 033-09, DI-1802-144-09, 30 April 2009), pg. 1
[51] *Assessment*, pg. 47.

bridge between the virus in the wild and the virus in humans. An effective biosecurity program that encompasses both healthcare and agricultural considerations will play an important role in containment of the disease. The *PI Plan* does not reference the concept of bio-security. The ensuing *Assessment* from 2006, subsequently identifies ensuring bio-security for animal husbandry as one of the four principles of a major animal epidemic[52], but does not address the concept as part of human influenza preparedness.

Community-based Interventions. Due to its experience with SARS, China recognizes the value of community-based interventions as part of its prevention and control strategy aimed at reducing the risk of transmission of an influenza virus. In particular, it is prepared to institute non-pharmaceutical measures such as social distancing measures, restrictions of in-country and cross-border movement, closure of public meeting places, and isolation of affected areas where possible.[53] China has been successful with using social distancing measures. For example, in 2009, Hong Kong kindergartens and primary schools were closed when local transmission of pandemic (H1N1) was identified. Secondary schools closed for summer vacation shortly afterwards. By fitting a model of reporting and transmission to case data, it was estimated that transmission was reduced by approximately 25% when secondary schools closed.[54]

Infection Control

Although the characteristics of the next influenza virus strain remain unknown, the same strategies used to prevent and limit the spread of seasonal influenza will also apply to controlling infection with a novel influenza virus strain. These actions include vaccination, early detection and treatment with antiviral medications, and the use of infection control measures to prevent transmission during patient care.

Standards of Infection Control within Healthcare Facilities. China's hospitals will play a critical role in controlling the spread of the PI virus through adherence to sound infection control processes and policies. Specific infection control steps should include:

1) processes to detect persons entering the hospital who may have PI;
2) "source control" measures to limit dissemination of influenza virus from respiratory secretions;
3) procedures for the hospitalization of PI patients; and
4) procedures to maximize control of nosocomial (of or being a secondary disorder associated with being treated in a hospital but unrelated to the patient's primary condition) PI transmission.

According to the *Assessment*, health facility-based infection control remains an issue in China despite many improvements since SARS. As of 2006, pediatric services in particular appear to have inadequate infection control systems in place. Field missions conducted in 2005-2006 indicated that:

[52] *Assessment,* pg. 11.
[53] *Ibid.,* pg. 44.
[54] *School Closure and Mitigation of Pandemic, H1N1 (2009) Pandemic*, Emerging Infectious Diseases Vol. 16, No. 3, March 2010, pg. 1.

- Many hospitals do not have a triage system in place to ensure that potentially infectious respiratory patients are kept separate from other patients – this was found to be a particular problem in pediatric hospitals and when patients were admitted directly as inpatients;
- Adequate infection control measures are lacking in pediatric settings and in some intensive care areas;
- Lack of hand washing facilities and practices, reuse of needles and disposable equipment, lack of high filtration masks for use by staff performing high risk procedures and over use of disinfection/UV lights are consistent findings;
- Isolation facilities in some hospitals are inadequate and potential influenza A (H5N1) patients have been known to have been treated on wards with immuno-compromised patients indicating lack of understanding of infection control practices in some parts of China; and
- It is unclear whether Tamiflu and other antivirals are available for use by staff if exposed to high suspect or confirmed patients and to reduce viral shedding by patients.[55]

Recommendations in the area of infection control included:

- Health facility infection control particularly in pediatric settings and at point of contact;
- Availability of post exposure emergency use antivirals for health care workers; and
- High filtration masks for health care workers performing high risk procedures.[56]

Based on assessments following the 2009 H1N1 outbreak, a study conducted by the First Affiliated Hospital of China Medical University indicated that critical-care clinicians in China still reported poor knowledge of H1N1 influenza, even though most finished a relevant knowledge training program. They say that implementation of appropriate education program might improve compliance to infection control measures, and willingness to work in a pandemic.[57]

Health Sector Response

During a pandemic, the health care system must be prepared to care for persons with suspected or confirmed PI. The needs, requirements, and constraints of the health care system in China will differ in each of the WHO phases, especially with respect to the number of people infected. During the pre-pandemic and pandemic alert phase, few cases of influenza would likely be identified and could potentially be handled at designated health care facilities that have better trained personnel. During the pandemic phase, the health care system will likely be overwhelmed and it will be especially important to support the lowest levels of the health care system, since there are

[55] *Assessment*, pg.42.
[56] *Ibid.*, pg. 42-43
[57] *Despite Training, HCWs Report Poor Knowledge About H1N1* Influenza, Infection Control Today, January 26, 2011, http://www.infectioncontroltoday.com/news/2011/01/despite-training-hcws-report-poor-knowledge-about-h1n1-influenza.aspx

insufficient medical facilities, especially in-patient facilities to meet all of the potential requirements.

China's complex health care system overlaps authority among regions and tiers of government. Although the MOH has principal authority, public health ministries at provincial and city government levels tend to have actual control. The MOH in Beijing, under the authority of the State Council, runs China's largest health care network and is responsible for directing policy, implementing and coordinating health institutions, and supervising preventive services, medical education, and medical facilities. Lack of primary health care facilities countrywide exacerbates this problem, requiring the population to visit hospitals for even minor illnesses. Each level of district/county and higher local government has a health department that answers to the government at the same level and to the health department of the next higher level. Privatization of the health system has been a huge detriment to the civilian health sector, crippling local-level health facilities, where medical providers have placed economic advancement over health care provision.[58]

Even in nonemergency situations, there are insufficient health facilities and capacity in western provinces and many rural areas.[59] Although 80 percent of China's health care resources exist in urban areas, hospitals in major cities were overburdened with cases of 2009-H1N1 influenza. Furthermore, studies have shown that medical personnel in most hospitals in China are not adequately trained to respond to a pandemic.[60]

From 2000 to 2006, the WHO reported 22 hospital beds per 10,000 people in China. Surge models for influenza (e.g. FluSurge) typically assume that 15 percent to 35 percent of a population will be infected with influenza during a pandemic. This amounts to 200 to 400 million infected individuals in China, an overwhelming number in the face of a severe pandemic considering the current state and capacity of China's health care system. These factors and statistics led DIA to report that China's health care system capacity cannot handle a severe pandemic.[61]

Surge Capacity (Human Resources and Physical Facilities). The likelihood that requirements will exceed demand, for both staff and facilities, especially during the pandemic phase, is high. The Beijing Municipal Health Bureau reported on 28 October 2009 that the impact of 2009-H1N1 influenza was overburdening China's hospitals, particularly children's hospitals. Two studies examining hospital readiness found that China's hospitals are not sufficiently prepared for pandemics. A 2008 study, conducted by Peking Union Medical College and China's CDC on 400 hospitals in the provinces of Beijing, Shandong, Guangxi, and Hainan, found that 80 percent of the doctors knew public health emergency response procedures; however this study was not specific to PI knowledge. A 2007 survey of 152 hospitals in Beijing showed that although 93 percent of the hospitals had an emergency plan, none of their laboratories could isolate all eight common types of infectious pathogens; only 22 percent had medical treatment

[58] *Health Services Assessment - China*, September 30, 2005, DI-1813-CHN-05, pg. 2
[59] *2009 Pandemic H1N1 Response in China, Director, Office for Disease Control and Emergency Response Chinese Center for Disease Control and Prevention, July 24, 1010.*
[60] *China: Ill-Prepared to Respond to a Severe Influenza Pandemic*, pg. 1.
[61] *Ibid.*, pg. 7.

procedures for infectious diseases; and only 30 percent were trained in emergency preparedness for pandemics and infectious diseases.[62]

[62] *Ibid.*, pg. 7.

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VACCINATION

This section of the review includes vaccination policy, quality assurance, supply chain, and dispensing as critical capability areas. Vaccine selection, development, distribution and dispensing will play an important role in combating a pandemic. China has been aggressively producing and testing vaccines since the 2009 H1N1 outbreak. As of 2010, 120 million Chinese were vaccinated.[63] The challenges associated with vaccine selection, production, and distribution that China faces are described below.

- Vaccine selection is based on and tailored to the influenza virus strain causing the pandemic. The World Health Organization (WHO) will determine the strain to be used to produce pandemic vaccine based on global surveillance data. The significant genetic diversity of influenza viruses will limit the effectiveness of Pandemic Influenza (PI) vaccines currently under development; however, it is anticipated that pre-pandemic vaccines are likely to provide cross-protection, even if the vaccine is not an exact match to a future pandemic. The WHO will work with member states to make recommendations for the selection of the pandemic vaccine strain and recommend when to start pandemic vaccine production. China began development of vaccines for H1N1 in 2009 and has continued to develop vaccines based on that strain of virus. If subsequent outbreaks do not have commonalities, the vaccines may not be useful, however, China is attempting to circumvent this challenge by using diagnostic kits to reference reagents and quality criteria for pandemic influenza virus nucleic acid (i.e., identify the virus strain).[64]
- Upon selection of the Influenza strain, vaccine production will become the primary focus of the vaccination effort. Production is limited to only a handful of qualified vendors in order to assure quality control and the efficacy of the product. Production may take several months to complete, but will continue once distribution is initiated in an effort to get vaccine to all those affected. This cycle of production and delivery will continue as long as necessary to achieve vaccination goals set by the WHO and member nations.
- Timely access to new influenza isolates will be required for optimal production of a vaccine. As part of its vaccination development strategy, China's evaluation criteria of H1N1 detection kits include an objective of observing which strains can be detected using American, southern Chinese, and Chinese isolates.
- Shipping the vaccine is a major concern, and can be a single point of failure. The global supply chain effort poses a significant challenge as it includes multiple supply chain vendors and must include a cold storage plan during storage and shipment of the vaccine. As a component of distribution, contingency plans must be prepared to address the priority list of recipients of the vaccine for both seasonal and pandemic vaccines as the criteria may be different for each. There is currently no information on China's vaccine supply chain.

[63] *Experiences of China in Developing 2009 A/H1N1 Flu Vaccines*, China's National Institute for the Control of Pharmaceutical and Biological Products, 2010. http://www.ifpi2010.com/speakers/WangJunzhi.pdf
[64] *Ibid.*

The WHO has taken on several actions to address vaccine imperatives, to include:

- The development of principles to guide national recommendations for use of seasonal and pandemic vaccines;
- Support strain characterization and development and distribution of vaccine prototype strains for possible vaccine production;
- Review and update WHO recommendations for pandemic vaccine use;
- Provide technical support, capacity building and technology transfer for influenza vaccines and diagnostics to developing countries;
- Formulate mechanisms and guidelines to promote fair and equitable distribution of PI vaccines; and
- Manage an international stockpile of H5N1 vaccine for use in countries in need.

In addition, the WHO recommends the following national-level actions for member nations, which the Review Team should validate whether any of these have been accomplished in China:

- For countries not using seasonal influenza vaccine, document the disease burden and economic impact of seasonal influenza and develop a national vaccine, policy if indicated;
- For countries using seasonal influenza vaccine, work to increase seasonal influenza vaccine coverage levels of all high risk people;
- Establish goals and priorities for the use of PI vaccines;
- Develop a deployment plan to deliver PI vaccines to national distribution points within seven days from when the vaccine is available to the national government; and
- Consider the feasibility of using pneumococcal vaccines as part of the routine immunization program in accordance with WHO guidelines.

Vaccination History in China

China only began developing human PI vaccines within the last three year. Prior to that time, it was focused on poultry vaccines and claimed that it had more experience with the use of vaccination than any other country and further information on the effectiveness of this program could prove invaluable to the rest of the world. For example, since 2004, China mandated two vaccination campaigns to be conducted each year. As of December 2006, the Chief Veterinary Officer reported that an average of 80% of the Chinese poultry population had been inoculated, with almost 7 million poultry vaccinated against Avian Influenza (AI) in 2005.[65]

[65] *Assessment of the Country Framework for Avian Influenza Control and Human Pandemic Influenza Preparedness and Response*, pg. 25.

Prior to June 2009, China had only contracted with one company, Sinovac Biotech, for the development of a pre-pandemic vaccine (Panflu) for use in humans.[66] However, with the international outbreak of H1N1, it expanded and expedited contracts, conducted clinical trials, received China's State Food and Drug Administration approval and commenced vaccination of its population within a span of three months.[67] Last documented objectives for China's human pandemic vaccine capacity were documented in the 2006 assessment of the country's pandemic preparedness framework, when China had no vaccine program. Clearly, vaccines have been developed and administered in the past five years, but the current goals and objectives of the vaccine program are not published.

Vaccine Policy

The establishment, distribution, and collective understanding of effective national and supporting military vaccine policies provides the foundation for success in assuring the target population receives the vaccine. This process begins with an effective plan that is communicated and understood among all stakeholders. Plans must be briefed, trained, and exercised to assure maximum chance of success.

Policies should include the need to identify, track, manage, and report Vaccine Adverse Event Reactions (VAERs). Adverse events, although rare, must be documented and reported to assure high quality control health surveillance and to establish validation of supply chain standards. VAERs may indicate that an entire lot of vaccine may not be stable for use. Early and accurate reporting will prevent mass distribution. As of 2006, China did not have a policy for use of vaccines on humans. Its only stated policy was to vaccinate all domestic poultry with an initial focus on ducks and high-risk areas.[68] Subsequently, China established a human immunization strategy in January 2009 and has continued to amend the list based on new findings. Its list of prioritized groups is as follows:

1. Public servants in key positions;
2. Students and teachers;
3. Chronic disease patients;
4. Pregnant women (added in December 2009); and
5. Children age 6-35 months (added January 2010).[69]

It is uncertain how China's military factor into its vaccine prioritization strategy as there was no mention of the military in its framework. It is also unclear as whether China has developed broader vaccine policies.

[66] *China: Recent News Reports Provide No New Information on Pandemic Avian Influenza Vaccination Policy*, DIA/NCMI, April 30, 2009.
[67] *Experiences of China in Developing 2009 A/H1N1 Flu Vaccines*, China's National Institute for the Control of Pharmaceutical and Biological Products, 2010. http://www.ifpi2010.com/speakers/WangJunzhi.pdf
[68] *Assessment of the Country Framework for Avian Influenza Control and Human Pandemic Influenza Preparedness and Response*, China, January 17, 2006, pg. 25.
[69] *Immunization and AEFI Surveillance on Pandemic A(H1N1) influenza in China,* Dr. Liang Xiaofeng, July 2010, slide17.

Quality Assurance

Validation of vaccine efficacy is necessary to assure that the potency of the vaccine is sustained through the supply chain process until it is dispensed. Quality assurance and random laboratory testing of the vaccine may be an integral part of the national and military vaccination plan.

China's H1N1 vaccine has been deemed safe and effective and was highly recommended by the WHO representative in China.[70] In 2010, China implemented a Vaccine Immunization Information Management System to monitor the distribution of the A(H1N1) vaccine. As of July 2010, 102 million Chinese were inoculated, of whom 68% of their records were being tracked in the system. The vaccine surveillance system is designed to document effectiveness and any reactions to the vaccine. As a result of this study, it was determined that "safe and effective flu A H1N1 vaccines have been produced and vaccination activities well-conducted" in China. [71]

All of China's vaccine manufacturers are trained and guided by the National Institute for the Control of Pharmaceutical and Biological Products to ensure quality.[72] As of last year, China had contracts with 10 manufacturers.

Independent reviewers, to include the New England Journal of Medicine, assessed the safety of China's vaccine program and determined there was no pattern of adverse events that would be of concern was observed after the administration of influenza A (H1N1) vaccine, nor was there evidence of an increased risk of the Guillain–Barré syndrome.[73]

Management of the Supply Chain

Management of the supply chain begins with an understanding of the location and transport of stockpiles. Vaccines must be stored in climate controlled environments or at a minimum packaged in a climate controlled setting to assure vaccine efficacy in storage and transit.

Vaccines and associated Personal Protective Equipment (PPE) must be secure both in storage and in transit. Chains of custody and responsibility for this effort must be established and documented. Accountability for the quality storage and delivery of vaccines must be clearly established and enforced.

According to China's 2006 assessment of its pandemic efforts, there was limited antiviral stockpile available and no policy for its use. The document indicated that further work was required to understand antiviral and medication development and production issues.[74] The Review Team should seek a status on the progress on China's stockpile of vaccines and procedures for distributing them, both in mainland China and the administrative regions of Hong Kong and Macau.

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[70] *WHO: China's H1N1 Vaccine Safe, Effective*, China Daily, October 27, 2009.
[71] *Immunization and AEFI Surveillance on Pandemic A(H1N1) influenza in China,* slide19.
[72] *Experiences of China in Developing 2009 A/H1N1 Flu Vaccines*, China's National Institute for the Control of Pharmaceutical and Biological Products, 2010. http://www.ifpi2010.com/speakers/WangJunzhi.pdf
[73] *Safety of Influenza A (H1N1) Vaccine in Postmarketing Surveillance in China*, The New England Journal of Medicine, February 2, 2011.
[74] *Assessment of the Country Framework for Avian Influenza Control and Human Pandemic Influenza Preparedness and Response*, pg. 47.

A supply management and accounting system is necessary to know where vaccines are and how long they have been in storage or transit. This real-time, in-transit visibility within the supply chain requires an automated and perhaps web-based system to assure fidelity in knowing where vaccines are and the status of their condition. Assuring that in-transit cold chain temperatures are measured throughout the supply distribution system is similarly important.

Key to the delivery of vaccines is knowing the availability and status of PPE and associated delivery supplies such as syringes, gloves, masks, and antivirals. Absence of these items may at best make the vaccination process problematic or at worst impossible. In its 2006 assessment of its pandemic framework, China acknowledged that while outbreak guidelines stipulate PPE is to be used by people involved in culling operations, those engaging in interviews in an outbreak area and vaccinators, these practices were not always followed and that key equipment such as goggles and masks were not always available. Much of the PPE that is used in the field was designed for health care settings and further work (globally) is also needed to develop protective equipment that is more suited to field environments.[75] The Review Team should seek a status update on the procurement of PPE for vaccination distribution.

Dispensing

Proper dispensing of the vaccine begins with a plan. Typically a point of dispensing plan provides the necessary detail required to assure successful dispensing to the population.

Recommended Solutions

Seminars

Addressing the challenges to the Chinese military vaccine programs may entail the development and presentation of a series of seminars designed to enhance understanding and execution of the military's vaccination program. Seminars should be held in a didactic classroom environment, possibly followed by interactive Tabletop Exercises (TTXs).

Supply Chain (Store & Transport)

Establishing an efficient, effective and timely supply chain management program is essentials to a successful vaccination program. Special consideration needs to be paid to the importance of cold storage chains of custody and security in the transportation and delivery of vaccines. It is uncertain whether China has established a supply chain management program given that it did not have vaccines at the time of the issuance of its assessment of pandemic preparedness and response.

Dispensing

Point of Dispensing (POD). Determining PODs and procedures for dispensing of vaccines will be critical for a timely response. Whether China has a POD strategy has

[75] *Assessment of the Country Framework for Avian Influenza Control and Human Pandemic Influenza Preparedness and Response*, pg. 27.

not been validated. If procedures do exist, training and exercises should be designed to enhance understanding by key leaders of the dispensing process and more importantly, those military medical and administrative staff that will be conducting the dispensing activities.

Surge Staff Training. In the event of a full pandemic, intense staffing requirements for vaccine distribution and dispensing will entail an added staffing requirement to execute vaccine plans in a timely manner. Additional staff whether medical or administrative will require added training to assure program success. China has acknowledged that it needs to train its general hospital staff.

COMMUNICATIONS AND EDUCATION

In any crisis situation, regardless of the nature or cause of the emergency, strategies for risk communications and education must be a central component of plans and standard operating procedures of any government agency, civilian or military. For China's military, in the event of a Pandemic Influenza (PI) outbreak, effective communication is not merely desirable but essential to developing the military's response to and containment of a pandemic to include risk review, management, and the protection of service members, veterans, and their families.

China's Risk Communication Activities

Recognizing the vulnerability of China for a PI outbreak, the Government of the People's Republic of China, with support from other countries and NGOs, is developing its approach to education and communications planning and preparedness for a PI outbreak. With an immense population that is spread across a huge land mass and a health care system with recognized deficiencies, China presents the potential for a severe PI crisis if an active planning and preparedness effort is not executed.

As documented in available materials, China is still formulating and documenting its approach to PI. Several available documents help guide the overall PI planning and preparedness effort in China, with consideration of the factors that will lead to the success of the effort, including risk communication and education considerations.

In the *Preparedness and Contingency Plan for Influenza Pandemic of the Ministry of Health,* (hereafter, the *PI Plan*) the recommended response to the stages of a PI pandemic are presented.[76] Citing that the response activities should follow those prescribed in *The National Contingency Plan for Public Health Emergency Responses* and relevant guidelines and protocols, the *PI Plan* stresses prevention, and highlights education and risk communication activities as important in the increasingly severe stages of PI: Preparedness, Pandemic, and Ending.[77] As the lead organization, the Ministry of Health (MOH) is responsible for setting up effective communications. For Preparedness, key activities include the establishment of a reporting network to share the results of surveillance for cases and to coordinate information exchange among the relevant ministries of the State Council. The plan also addresses the need to train technical and medical staff at all levels and to plan and rehearse exercises that test health care interventions for emergency situations. As the stages of response intensify, the MOH in affected areas is expected to provide timely health education advising citizens to stay at home for isolation and wear masks when going out of the home. During pandemics, the full government is responsible to activate health and media resources to communicate by a variety of means to contain the PI event.

In January 2006, the MOH and international partners assessed China's framework for Avian Influenza (AI) control and human PI preparedness and response, and identified

[76] People's Republic of China, Ministry of Health, *Preparedness and Contingency Plan for Influenza Pandemic of the Ministry of Health, PR China,* undated.
[77] *Ibid*, p. 2

areas in which strategies were well formulated and those for which additional development was recommended. Communications activities were identified as needed bolstering in the short term.[78] Referencing the *National Protocol for Response to Public Health Emergencies* as the overarching strategy document for health emergencies and a provisional *PI Plan* developed by the Ministry of Health in 2005, the report cites the fact that at that time there was no single, integrated national plan for the prevention and response to PI and that strategies to address animal and human health in relationship to pandemic preparedness were addressed in separate plans. At that time, guidance for animal health lacked adequate provisions to make the public aware of concerns and recommended actions. The human health sector activities focused on preparedness for health practitioners, and also lacked a strong focus on public awareness.

The MOH and international partners' assessment of the Framework reported that communication within ministries is quick and efficient; however, communications across ministries could be better integrated. Prior to the assessment, the position of UN System coordinator on AI and PI had been established to improve communication and coordination of international assistance to China on AI and PI preparedness and response, trying to better integrate efforts with the international community. Recommendations for improvement included the need for an overarching communications strategy, development of prepared communication materials, professional communication mechanisms, and an enhanced public awareness and understanding to promote positive change in behavior. The assessment noted the lack of understanding of avian management and care by small farmers and poultry handlers, as well as an inadequate knowledge of human behaviors required to prevent outbreaks. As an example of communication challenges, it was noted that surveillance information was typically exchanged by animal and human health care workers in hard copy on an infrequent basis. Additional awareness training and education was prescribed, as well as training programs to support health care providers.

The July 2007 *Framework of Government's Preparedness Plan for Influenza Pandemic* by the Food and Health Bureau (Special Administrative Region of China) reflected the World Health Organization's (WHO) guidelines for pandemic planning and included communication activities tailored to three levels of response planning. Activities range from health education and informing medical professionals to, in conditions of human-to-human cases, daily updates by the government regarding the epidemic and response, and public education regarding personal protective equipment, the use of chemoprophylaxis, and vaccination programs.[79] This plan provided much greater detail regarding communication than a previously issued document from a Risk Communication Advisory Group (RCAG) that described the need for risk communications in PI preparedness at a general level.

Whereas China is actively pursuing PI planning and preparedness, plans for education and communication are not yet detailed or complete enough to guide a national

[78] Ministry of Health, *Assessment of the Country Framework for Avian Influenza Control and Human Pandemic Influenza Preparedness and Response,* 17 January 2006.
[79] *Ibid.*

response to a PI outbreak. Most planning and preparedness efforts have focused on the medical and veterinary aspects of PI preparedness, and have not yet fully addressed the need for educating and informing the massive Chinese population.

The role of China's military, the People's Liberation Army (PLA), in PI preparedness is not well documented in all-sources networks and, thus, is unclear. Due to the PLA's active response to natural disasters and engaged participation in 2009-H1N1 influenza vaccine development, there is a strong possibility that it has PI preparedness and response plans in place. Some mention in available documentation is made regarding the military's role in health emergencies, including a statement in a 2007 government regulation that directs that the PLA should support AI efforts, although specific roles for the military are not assigned. In addition, a 2006 *Xinhua News Agency* article describes the establishment of a PLA public health brigade that will provide early warning and response to military public health emergencies and be in charge of prevention of national epidemics and disaster relief. These references and the PLA's history of disaster response would suggest at least some level of formal planning for PI preparedness and response.[80]

When deciding the best course of action in the development and delivery of educational efforts and risk communications messages tailored to the Chinese military, the military's leadership should take into account the following key considerations:[81]

- **M**essages – what are the key messages that will alert, educate, motivate, support decision making, or compel protective behaviors and actions among military audiences?
- **M**edia – what are the traditional and social media channels that key military audiences access and monitor?
- **M**arkets – who of the military's response partners and/or stakeholder groups (e.g., service members, veterans and their families) may be potentially affected by an outbreak and be key audiences for communiqués?
- **M**essengers – how might military spokesperson(s) effectively communicate before, during, and after an outbreak?

Messages and Markets

Effective risk communications campaigns facilitate successful execution of a rapid, coordinated response. Successful campaigns systematically and consistently educate and inform people by providing facts versus fiction, thus eliminating hype, confusion, and fear.

Strategic messaging regarding a pandemic is designed to:

[80] *China: Ill-Prepared to Respond to a Severe Influenza Pandemic (Redacted),* 20 November 2009.
[81] The 4M approach to a crisis communications response is part of a systems-level model that Booz Allen's Center for Risk and Crisis Communications developed called the "Crisis Readiness-Response-Resilience Enterprise."

- Instill and maintain public confidence in the Government's animal health/public health system and its ability to respond to and manage an Avian Influenza (AI) pandemic outbreak;
- Maintain order, minimize public fear and facilitate public protection by providing accurate and complete information; and
- Prevent stigmatization and address rumors, inaccuracies and misperceptions.

The "participatory" nature of the messaging further emphasizes the need for increasing the military's ability to gain the needed facts to protect themselves, their families and animals from the dangers they are facing; making well informed choices from all the available information; and taking an active role in the overall response and recovery.

China's *PI Plan* cites the need for all levels of government to conduct information and education campaigns for the public through newspaper, television, radio, and print media. Leveraging principles and plans developed by international groups such as the WHO, the mass education campaigns provide basic guidance on infection avoidance, such as:

- Wash hands frequently
- Avoid travel to affected countries
- Avoid visiting affected farms or live poultry areas
- Monitor one's self and one's family for symptoms

Whereas the need for awareness campaigns is noted in various government documents, specific tactical plans for implementing PI awareness training are unavailable. Based on available descriptions of efforts and conclusions drawn by reviewers, risk communication and education programs are more likely to have reached densely populated urban areas than the vast difficult-to-reach rural populations.[82]

Due to close proximity of members of the military and common food sources, the development and delivery of messages regarding PI safety is important to maintain the wellbeing of the armed forces. Further, in the event of a pandemic, the PLA may be called upon to deploy to crowded areas in which other individuals are infected. Not only should military members be particularly alert to messages released through all media and channels, they can further serve as highly informed community members who know the importance of maintaining their own health and help educate family members, friends, and members of the public with whom they come in contact. Challenges to a nation-wide disaster relief effort include inadequate transportation and communication networks, especially in rural areas.[83] The potential for secondary effects on military preparedness from a widespread outbreak within the PLA underscore the need for communication and education efforts tailored to the military.

[82] *China: Ill-Prepared to Respond to a Severe Influenza Pandemic (Redacted),* 20 November 2009.
[83] *Health Services Assessment: China (Redacted),* DI-1813-CHN-05, 13 October 2005.

Media

The use of multiple media for PI education and training is prescribed in the various government plans directed at PI planning and preparedness. Television, radio, newspapers, and hard copy materials for distribution are typically referenced as addressing the need to provide information in a variety of formats. For advanced stages of a pandemic, hot lines and routine news releases are recommended. Classroom training, exercises, and participation in various symposia are becoming more prevalent, evidenced by reports of activities such as USAID's training in FY2008-2009 of nearly 400 people in animal health and/or behavior change communication related to HPAI,[84] and the International Forum on Pandemic Influenza 2010 held in Qingdao, China on 24-25 July 2010 and sponsored by the MOH, the WHO, the World Bank, the U.S. Center for Disease Control and Prevention (U.S. CDC), and *Vaccine* journal.[85]

Specific data regarding communication within the military, and its role in disseminating information and supporting community efforts is not readily available. It is anticipated that active duty military members, who should be accessible through standard chain-of-command interaction, and their families will pose fewer communication challenges than veterans and their families, who may have access to fewer communication channels. The level of individuals within the military and their presence in large urban or smaller urban units may impact both the amount and quality of information. Further investigation is needed to identify the best communication media to reach military, family members, and veterans.

Messengers

Multiple Ministries in China share responsibility for PI preparedness and response, with the MOH serving in a lead role. In the national command structure for Emergency Response at the level of the State Council, there are six task forces under the Chief Commander and Deputy Chief Commander, including a task force for Propaganda and Education.

Guidance for implementation of the PI response strategies contains repeated references to taking action at various levels within the government, with the expectation that communication and education activities will be handed across successively lower levels within government ministries. Identification of specific positions or individuals directly responsible for delivering messages is less specific in relevant documents for lower levels of the organization. Ministerial responsibilities for risk communications and education are cited, with the details of who will disseminate messages throughout the levels undefined. World-wide support organizations, such as USAID and WHO, often serve as direct and indirect messengers of educational materials targeted at informing medical professionals, poultry handlers, and the general public.

[84] USAID, *Avian Influenza and Infectious Disease Programs in China,* May 2010.
[85] IFPI 2010, International Forum on pandemic Influenza 2010, Qingdao, China, July 24-25, 2010, http://www.ifpi2010.com/index_en.asp

Preliminary Findings and Conclusions

China, with support from NGOs and other organizations, has undertaken efforts to ensure the development and implementation of a communications and education campaign to respond to the needs of the public and health care professionals before, during and after public health emergencies such as PI. Preventative training and structured responses during an outbreak provide critical aspects of PI preparedness and response. Participation in international symposia and educational programs delivered by the MOH and support organizations demonstrate China's increasing emphasis on planning and preparedness. Documentation regarding China's efforts reflects a greater focus on human health and veterinary practices (e.g., laboratory practices to avoid contamination, acquisition of adequate amounts of vaccine, culling activities) than on public awareness, education, and behavioral change for prevention. As China's PI efforts mature, the need to increase the focus on education and risk communication will be felt, including tackling the challenge of communicating across large rural areas.

The role of China's military in PI planning and response is important to prevention and national security. At a minimum, the military needs to actively employ the tenants and guidance of China's national plans to protect its forces and their families (i.e., key members of the target Market) in order to maintain preparedness to protect the nation. And, if they also will play a significant role in education and communication in preparation for and response to a PI outbreak, a clear articulation of the extent of their engagement, their specific roles, and established communication channels with other stakeholders will be critical to success.

Recognizing that communications are integral to any military's planning and response efforts, the assumption can be made that China's Armed Forces, like their government counterparts, have also undertaken efforts to ensure the development and implementation of a robust communications and education campaign before, during, and after public health emergencies such as PI. In the absence of documentation to describe the extent of those efforts, it is recommended that further information be gathered regarding the PLA's preparedness to assure that the required level of communication and education is provided to active duty military, retirees, and their families. The following questions should be answered:

1. What strategies and resources are currently in place (and have been tested) that will support an effective communications response?
2. What strategies and resources are still required for an effective communications response?
3. What obstacles (e.g., policy, resources, expertise, etc.) exist to communications readiness and how can they be overcome?
4. What are the most urgent and immediate actions to take to ensure communications readiness?

To best prepare the military so they can perform their vital role of protecting national security and assisting the government in managing a PI outbreak, the following issues should be addressed:

- Identification of the key stakeholders of the China Armed Forces, who rely on the military as the key source of information;
- Alignment of key stakeholder/audience groups to the communication channels that best reach them;
- Identification and prioritization of the communication needs of key stakeholder/audience groups;
- Identification of key messengers within the military to deliver messages and receive input from stakeholders in effective two-way communications;
- Appropriate military representation in groups responsible for PI preparedness and risk communication, to ensure that the needs of the military are represented in PI planning and execution;
- Establishment and documentation of communication contacts and channels to assure the rapid and accurate exchange of information in PI planning and events; and
- Clear definition and documentation of roles and responsibilities for the Chinese military as they relate to PI readiness and response.

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MILITARY ISSUES

The People's Liberation Army (PLA) is the world's largest military force, with approximately 3 million members, and has the world's largest (active) standing army, with approximately 2.285 million members.[86] The PLA is formally under the command of the Central Military Commission (CMC) of the Chinese Communist Party (CCP), which receives direction from the Central Committee of the CCP. It has 11 members, including a chairman and three vice chairmen and separate leadership positions for the Army, Navy, Air Force Artillery Corps and Army Forces in different parts of the country. The chairman of China's Central Military Commission is China's highest ranking officer, and has traditionally been the leader of the China.

The state military system upholds the principle of the CCP's absolute leadership over the armed forces, based on a joint system of party and state military leadership. Although the Central Committee of the Communist Party leads in all military affairs, the State President directs the state military forces and the development of the military forces managed by the State Council. In order to ensure the absolute leadership of the Communist Party over the armed forces, every level of party committee in the military forces implements the principles of democratic centralism. The divisions and higher levels establish political commissars and political organizations that ensure full compliance of directions. The CCP achieves overall control by melding the party organization with the military organization. The Ministry of National Defense, which operates under the State Council, does not exercise any authority over the PLA and is far less powerful than the CMC. The ministry assures continuing CCP control over the armed forces, and its primary role is that of a liaison office with foreign militaries.[87]

The political and military leadership have made a concerted effort to create a professional military force restricted to national defense and to the provision of assistance in domestic economic construction and emergency relief. Military service is compulsory, in theory, for all men who attain the age of 18; women may register for duty in the medical, veterinary, and other technical services at ages as young as 14. However, a draft in China has never been enforced due to large numbers of volunteers from China's huge population. Demobilized servicemen are carried in a ready reserve, which is reinforced by a standby reserve of veterans and by the militia.

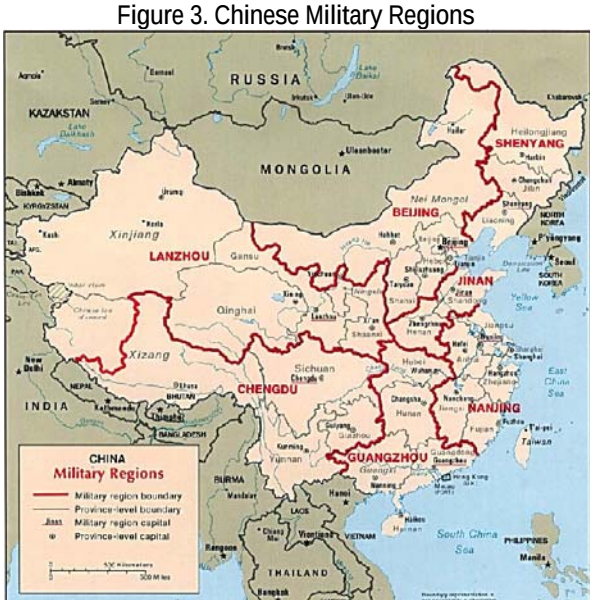
The PLA comprises five main service branches consisting of the PLA Ground Force, PLA Navy (PLAN), PLA Air Force (PLAAF), Second Artillery Corps (strategic nuclear or missile force), and the PLA Reserve Force.

[86] The International Institute for Strategic Studies. *The Military Balance 2011*. (London, 2011), p. 230.
[87] Office of the Secretary of Defense. Annual Report to Congress: Military Power of the People's Republic of China. 2009.

PLA Ground Force. Ground forces (~1.6M) are organized into eight service arms (branches) – infantry, armor, artillery, air defense, aviation, engineering, chemical defense, and communications – as well as other specialized units. Under the General Staff Headquarters are the seven military regions (See Figure 3):[88]

- Shenyang Military Region
- Beijing Military Region
- Lanzhou Military Region
- Jinan Military Region
- Nanjing Military Region
- Guangzhou Military Region
- Chengdu Military Region

Figure 3. Chinese Military Regions



PLA Navy. The PLA Navy, comprised of approximately 215,000 personnel, organizes and commands maritime operations conducted independently by its troops or in support of maritime operations. The PLA Navy is organized into five service arms: submarine, surface, naval aviation, coastal defense and marine corps (approximately 10,000 personnel), as well as other specialized units. There are three fleets: the Beihai Fleet (North Sea), Donghai Fleet (East Sea) and Nanhai Fleet (South Sea).[89]

PLA Air Force. The PLA Air Force, comprised of approximately 330,000 personnel, is organized into four service branches: aviation, surface-to-air missiles, air defense and airborne. Operations are conducted through seven region Air Forces: Shenyang, Beijing, Lanzhou, Jinan, Nanjing, Guangzhou and Chengdu.[90]

Second Artillery Corps (Strategic Missile Forces). The Second Artillery Forces, comprised of more than 100,000 personnel, organizes and commands its own troops to launch nuclear counterattacks with strategic missiles and to conduct operations with conventional missiles. It is comprised of missile and training bases, and relevant support troops.[91]

PLA Reserve Force. China's Militia, comprised of approximately 510,000 personnel, is a mass force engaged in daily production under the leadership of the Communist Party of China (CCP), forms part of the Chinese Armed Forces. Under the command of the military organs, it undertakes such jobs as war preparation services, security and defense operation tasks and assistance in maintaining social order and public security.

[88] The International Institute for Strategic Studies. *The Military Balance 2011*. (London, 2011), p. 230-231.
[89] *Ibid.* (London, 2011), p. 231-233.
[90] *Ibid.*. (London, 2011), p. 233-234.
[91] *Ibid.* (London, 2011), p. 230.

The **People's Armed Police (PAP)**, a Chinese paramilitary force under the dual leadership of the Central Military Commission and the Ministry of Public Security, is sometimes confused as a branch of the PLA (both the PLA and the PAP are under the lead of Central Military Commission). The People's Armed Police, comprised of approximately 660,000 personnel, is primarily responsible for law enforcement and internal security. In wartime, the PAP, as part of China's Armed Forces, would be used as light infantry, performing border defense and other support functions to assist the regular ground forces.

China maintains its Army is strictly for self-defense but build ups indicate it is preparing itself to handle regional conflicts such as disputes over resources or territory and increasing its ability to project itself far beyond its borders. In general, the PLA regular forces' main purpose is national defense and has rarely been used for internal security or police functions. Most such issues in the country however are handled by the paramilitary PAP. The instances in which the PLA has been used for non-military internal security duties have included several incidents during the Cultural Revolution in the 1960s, Tibet in 1989, and with the Tiananmen Protests of 1989. Many times, the PLA has been involved in flood relief operations, particularly in the Yellow River region.[92] As its military and economy get stronger and more power powerful, China is attempting to show that has a softer side, engaging in humanitarian missions abroad and contributing peacekeepers to different places. As of late 2009, there were 2,150 Chinese military and police personnel supporting the United Nations in 10 countries, including Sudan and Haiti. There are more than 800 in Sudan alone. [93]

National Military Issues[94]

Surveillance. Due to its forces dispersed across the multiple Commands, combined with peacekeeping missions in support of UN deployments, surveillance needs to be significantly strengthened. In the light of previous outbreaks of Influenza A (H5N1) originating in the country during the mid-part of the decade, military plans need to consider the impact of more intense and widespread outbreaks originating within the country. This scenario results in the need to anticipate and implement measures for early containment.

Mitigation.

- **Medical Operations.** Overall command and control of PLA medical operations is exercised through the health department of the General Logistics Department (GLD). The medical department, subordinate to the GLD, provides unified control over Ground, Navy, and Air Force medical affairs through subordinate

[92] Office of the Secretary of Defense. Annual Report to Congress: Military Power of the People's Republic of China. 2009.

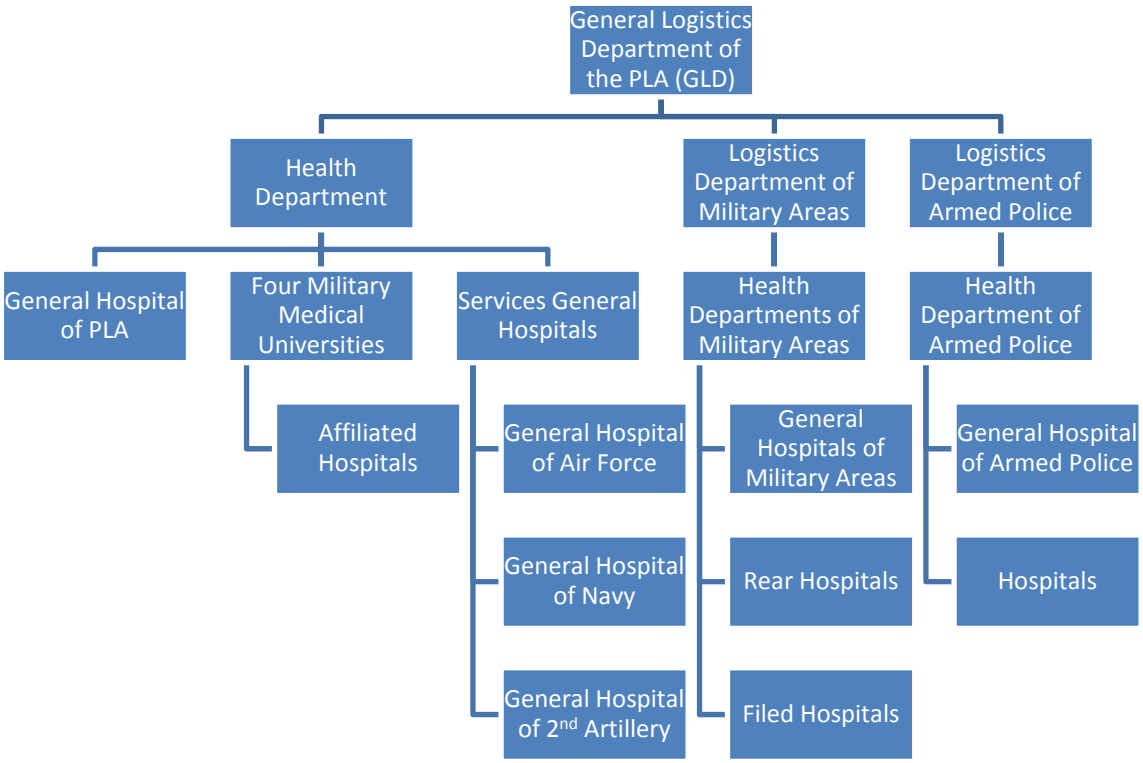
[93] http://factsanddetails.com/china.php?itemid=294&catid=8&subcatid=51

[94] (U) Health Services Assessment: China (REDACTED), DI-1813-CHN-05, 13 October 2005.

headquarters in each military region. See Figure 4 for Health Components of the GLD.[95]

In peacetime, military medical facilities provide peacetime medical support for China's armed forces. Additionally, nonmilitary facilities are designated as part of a large health care network to support the military during wartime. For humanitarian operations, China's medical teams generally do not interact with domestic medical systems or other foreign aid groups. Instead, China provides an entire imported system.

Figure 4. Health Components of the General Logistics Department



Quality of Medical Treatment Facilities. Compared to Western universities and in part due to funding limitations, China's top medical universities lag at least 10 years behind in laboratory and research equipment and facilities. The lack of quality impacts potential response capabilities.

Vaccination

- **Medical Logistics.** The PLA also has limited domestic pharmaceutical manufacturing capability, while importing advanced pharmaceuticals from Japan or the West. Supplies of comparable medicines, although less effective, generally

[95] (U) Health Services Assessment: China (REDACTED), DI-1813-CHN-05, 13 October 2005.

offset shortages. To meet the requirements of natural disasters, stockpiles of medical materiel are located within each province or military district, under each military region. These stockpiles, which are maintained by the provinces, enhance wartime medical supply levels.

- **Personal Protective Equipment (PPE).** Potential disparities in supplies, equipment and training – particularly as related to PPE (including vaccination) are likely challenges. This type of shortfall could have significant implications and impacts on localized troop formations, if not across the PLA depending on the extent of the disparity.

Communications

- **Preparedness and Response.** China, as many other countries in the region and across Southeast Asia, has developed a wide multi-sector approach, involving major stakeholders in their preparedness efforts. Thus, communications within the Armed Forces on potential threats and responses is critical.

Regional/Local Military Issues

Surveillance

Domestically, measures to track and monitor the health of military personnel, particularly given the environment of garrison living for most troops, are essential to sustaining the health of the force. The Review Team needs to focus on surveillance efforts beyond the capital into the regional/local level.

- **Infrastructure.** Hospital preparedness is critical to deal with a pandemic. Capacity building and improvement of hospitals and public health facilities in the country is essential; so is the need for augmenting the health infra- structure and training of health personnel to deal with emergencies and mass casualties. This becomes important for the PLA since there is a current anxiety that PI, like the 'Asian flu' could be the next big killer disease that impacts military forces, and hence requires the military to continue to upgrade and improve its medical capability and infrastructure as part of the overall county's public health system.

- **Exercises.** The extent to which regional and/or local plans for reaction to PI type events are tested by the military can impact effectiveness at the local level.

- **Quarantine Facilities and Procedures.** The mention of quarantine likely puts most attention on the *National Contingency Plan for Public Health Emergency Response* through the Ministry of Health (MOH), vice the MOD or the PLA. Whether China has made the plans at the regional or local level (or even national level) for the potential numbers that may require internment necessary to slow the spread of a pandemic is not clear.

Vaccination

- **Prevention and Containment.** There is a need for military capacity to periodically assess the availability and the need for replenishment of antivirals,

PPE, vaccines and antibiotics. The Review Team should validate procedures to implement antiviral chemoprophylaxis within the military (including those deployed on peacekeeping missions).

Communications

- **Education and Awareness.** The unique needs of the PLA, particularly its seven regions, and those forces deployed on UN missions should include materials, some of which could be leveraged from those developed elsewhere.

BEST PRACTICES AND LESSONS LEARNED

Lessons learned are the positive and negative knowledge and experience obtained from events and incidents that may provide added-value for others who are in similar situations.

- **Military Readiness.** Whether or not the People's Liberation Army (PLA) has developed adequate Pandemic Influenza (PI) planning and preparedness is unknown because very little information is currently available via all-source networks. However, China is likely to have plans in place for its military because the PLA has been an active participant in 2009-H1N1 influenza vaccine development and has demonstrated a large capacity to respond to natural disasters. For example, in 2006 the Central Military Commission (CMC) approved the establishment of a public health brigade to provide early warning and response to military public health emergencies and to be in charge of national epidemic prevention and disaster relief. Capability of the PLA to respond was demonstrated in response to the May 2008 Sichuan earthquake when 20,000 military and armed police arrived in Sichuan within 10 hours of the earthquake. Eventually 139,000 PLA and police troops were involved in the rescue and recovery efforts. Both missions illustrated inter-service cooperation and coordination. They also demonstrated the PLA's ability to deploy thousands of troops quickly.[96]

- **Military Medical Support for Civil Authorities.** The emergency response activities for medical support, including influenza epidemics, are carried out according to The *National Contingency Plan for Public Health Emergency Response* and relevant guidelines and protocols. The first major test of this type of civil-military cooperation and coordinated operations under the current regime occurred during the 2003 Severe Acute Respiratory Syndrome (SARS) crisis. During this period the military leadership was careful to obey and be seen to obey its civilian superiors, even if disagreements existed on how to handle the crisis, including the extent of information that military hospitals could disclose.[97]

- **Strengthening of Public Health System and Emergency Response Capacity.**[98] The experiences after SARS allowed China to respond to the H1N1 pandemic more effectively, particularly in the context of the incident command system and emergency management, and the supporting role of the military. The previous lessons learned and experiences, combined with better infrastructure and facilities, human resources, surveillance, epidemiological and lab capacity coupled with a preparedness plan that included antiviral and diagnosis tests underscored the need for further work in these areas. In the military context, the

[96] (U) China: Ill-Prepared to Respond to a Severe Influenza Pandemic (REDACTED), 20 November 2009.
[97] (U) Health Services Assessment: China (REDACTED), DI-1813-CHN-05, 13 October 2005.
[98] *Ibid.*

need for sustained medical care surge capacity, in part provided by the medical services, would be needed on a much broader scale in case of a larger epidemic.

RECOMMENDATIONS FOR FUTURE EFFORTS[99]

World Bank, FAO, and WHO Recommendations

Recommendations for future efforts in China were determined in a review conducted jointly by the Word Bank, the Food and Agriculture Organization (FAO), the World Health Organization (WHO), and the Government of China (GOC) in December 2005. These efforts are focused on specific objective areas and are denoted by the headings for each section. (Note: These recommendations need to be validated by the Review Team as no confirmation of completion is provided in the report).

Strategic Planning

Recommend that the GOC:

- Develop a more integrated, overarching, multi-sector national pandemic plan for Avian Influenza (AI) and Pandemic Influenza (PI) that covers all of the following--prevention, detection, response/containment, research, communications and pandemic preparedness; and
- Undertake a scientific review of the current epidemiological situation in animals in China so that strategic objectives and plans can be designed to best fit the current situation.

Institutional Arrangements and Coordination

Recommend that the GOC:

- Develop an overarching coordination and command mechanism for AI and PI that encompasses both the animal and health sectors (as well as the many other sectors) and can operate in both the inter- and pandemic periods with minimal disruption; and
- Develop management, monitoring and evaluation tools for across and within all sectors involved in avian and pandemic influenza activities.

Communications

Recommend that the GOC:

- Conduct studies to develop appropriate risk reduction communication strategies for the public during pre- and pandemic period; and
- Review professional and operational communication mechanisms and develop strategies for improvement, particularly in horizontal communications.

Prevention

Recommend that the GOC:

- Develop a medium- to long-term strategic plan for prevention/risk reduction of animal to animal transmission of AI and as relevant other major animal epidemic diseases;

[99] *Assessment of the Country Framework for Avian Influenza Control and Human Pandemic Influenza Preparedness and Response*, January 17, 2006, p. 53-56.

- Develop a medium- to long-term strategic plan for prevention/risk reduction of animal to human transmission of AI and as relevant other major animal epidemic diseases;
- Undertake comprehensive assessment of the impact of animal vaccination campaigns on animal disease, circulation of viruses in animals, sensitivity of surveillance systems (animal and human), and human disease;
- Undertake review of biosafety in agriculture sector and quality inspection sectors, and develop a strategy for strengthening biosafety from sample collection to disposal; and
- Strengthen biosafety in the field, inspection facilities and lower level health care settings.

Early Warning and Detection

Recommend that the GOC:

- Strengthen current research and surveillance into the role that wild migratory birds play in the transmission and evolution of AI;
- Strengthen public awareness of disease in animals and undertake assessment of possible barriers to reporting by the public, including compensation;
- Develop and deliver training program on surveillance for veterinarians and wildlife workers at lower levels;
- Develop comprehensive reporting system for animal disease that allows the integration of clinical, virological and epidemiological data;
- Strengthen sample collection skills at the local level and reduce financial and logistical barriers to sample collection, transportation and testing;
- Strengthening provincial laboratory skills and infrastructure;
- Strengthen public, clinician and Customs staff awareness of early signs of disease through Information, Education, and Communication (IEC) and professional education focused on grass roots level;
- Undertake rapid assessment of community-based surveillance pilot projects and scale up/develop more pilots as appropriate;
- Review and simplify/integrate the current reporting systems;
- Improve capacity to perform serological investigations;
- Strengthen training and decision making for lower level health care and public health workers in collecting clinical samples;
- Develop central fund to pay for sample collection, transportation and testing and strengthen logistical support for rapid transportation of clinical samples;
- Develop capacity for all provincial laboratories to perform Polymerase Chain Reaction (PCR) and develop a small number of sub-national laboratories to assist with surge capacity;
- Develop national quality assurance program and actively engage in and support regional quality assurance; and
- Develop a system for regular and timely data and virus exchange between the animal and human health sectors.

Outbreak Response and Containment

Recommend that the GOC:

- Develop joint (animal-human) investigative protocols for all outbreaks;
- Develop and deliver joint training on field investigation focused at the grassroots level; and
- Develop rapid response teams for investigation and containment of human clusters.

Pandemic Preparedness and Response

Recommend that the GOC:

- Perform regular exercises to ensure skills remain high;
- Assess current capacity and quality of human influenza vaccine in China and develop scale up plans;
- Increase capacity to monitor quality of vaccine post production;
- Strengthen the current post marketing surveillance to ensure that adverse events could be detected quickly during mass use of pandemic vaccine and efficacy could be monitored;
- Modeling possible impact of a pandemic, assessment current capacity and development of strategic plans to strengthen preparedness in health sector;
- Develop strategy and appropriate stockpiles of drugs, diagnostics and medical equipment; and
- Undertake assessment of antiviral and other key medical drugs/equipment in China and develop scale up plans if appropriate.

Areas for Research, International Collaboration, and Possible Outward Assistance

Recommend that the GOC:

- Develop comprehensive research strategy;
- Strengthen regional and international collaboration and information and virus sharing; and
- Consider developing plan for outward assistance.

Building Towards a Medium-Term Response

Recommend that the GOC:

- Develop strategy to reform over medium-term farming and market practices with focus on integrated rural development and technical support at lowest levels;
- Develop plans for centrally funded veterinary service at all levels for major epidemic disease; and
- As part of health financing and rural health reforms, develop an essential centrally public health care package for diseases with epidemic potential.

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CONCLUSION

Over the past two years, the People's Republic of China has become one of the global leaders in vaccine research and production, and an active participant in international Pandemic Influenza (PI) initiatives, but despite steps to improve influenza surveillance and ministerial coordination, major challenges remain to Chinese PI response and preparedness. Factors including potential Avian Influenza (AI) outbreaks in poultry, China's immense size and population, a largely underdeveloped health care infrastructure, and a sizable poultry industry all contribute to make China a global PI hotspot and an important area of focus for the potential emergence of human influenza pandemics that threaten the rest of the world.[100]

U.S. Pacific Command (USPACOM) has proactively engaged with China in an attempt to assess the programmatic and operational capabilities and discrepancies of the People's Liberation Army (PLA) pandemic preparation and response actions, both internally and as part of a larger integrated national response. However, limited documentation over the past five years regarding China's overarching and military pandemic preparedness progress does not offer a solid understanding of the country's existing national and military PI capabilities and shortfalls.

With the exception of vaccines and surveillance, the analysis did not yield a robust baseline of all facets of China's PI activities due to a lack of open source information on critical areas such as a current plan, intra-government coordination measures, capability building, and the role of the PLA in pandemic efforts. The information provided in this review report should serve not only to guide the Review Team in validating the information gathered from previous USPACOM-led data gathering efforts and publically-released documentation from China, but in identifying those areas where the team will have to conduct significant information gathering.

[100] *China: Ill Prepared to Respond a Severe Influenza Pandemic*, Multiple Sources, November 20, 2009,pg. 10

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APPENDIX A WHO PANDEMIC PHASES

The WHO Pandemic Phases[101] were developed in 1999 and revised in 2005. The phases are applicable to the entire world and provide a global framework to aid countries in pandemic preparedness and response planning. In this revision, WHO has retained the use of a six-phased approach for easy incorporation of new recommendations and approaches into existing national preparedness and response plans. The grouping and description of pandemic phases have been revised to make them easier to understand, more precise, and based upon observable phenomena. Phases 1-3 correlate with preparedness, including capacity development and response planning activities, while Phases 4-6 clearly signal the need for response and mitigation efforts. Furthermore, periods after the first pandemic wave are elaborated to facilitate post pandemic recovery activities.

In nature, influenza viruses circulate continuously among animals, especially birds. Even though such viruses might theoretically develop into pandemic viruses, in **Phase 1** no viruses circulating among animals have been reported to cause infections in humans. In **Phase 2**, an animal influenza virus circulating among domesticated or wild animals is known to have caused infection in humans, and is therefore considered a potential pandemic threat.

In **Phase 3**, an animal or human-animal influenza reassortant virus has caused sporadic cases or small clusters of disease in people, but has not resulted in human-to-human transmission sufficient to sustain community-level outbreaks. Limited human-to-human transmission may occur under some circumstances, for example, when there is close contact between an infected person and an unprotected caregiver. However, limited transmission under such restricted circumstances does not indicate that the virus has gained the level of transmissibility among humans necessary to cause a pandemic.

Phase 4 is characterized by verified human-to-human transmission of an animal or human-animal influenza reassortant virus able to cause "community-level outbreaks." The ability to cause sustained disease outbreaks in a community marks a significant upwards shift in the risk for a pandemic. Any country that suspects or has verified such an event should urgently consult with WHO so that the situation can be jointly assessed and a decision made by the affected country if implementation of a rapid pandemic containment operation is warranted. Phase 4 indicates a significant increase in risk of a pandemic but does not necessarily mean that a pandemic is a foregone conclusion.

Phase 5 is characterized by human-to-human spread of the virus into at least two countries in one WHO region. While most countries will not be affected at this stage, the declaration of Phase 5 is a strong signal that a pandemic is imminent and that the time to finalize the organization, communication, and implementation of the planned mitigation measures is short.

[101] World Health Organization. Global Influenza Programme. *Pandemic Influenza Preparedness and Response.* http://www.who.int/csr/disease/influenza/PIPGuidance09.pdf

Phase 6, the pandemic phase, is characterized by community level outbreaks in at least one other country in a different WHO region in addition to the criteria defined in Phase 5. Designation of this phase will indicate that a global pandemic is under way.

During the **post-peak period**, pandemic disease levels in most countries with adequate surveillance will have dropped below peak observed levels. The post-peak period signifies that pandemic activity appears to be decreasing; however, it is uncertain if additional waves will occur and countries will need to be prepared for a second wave. Previous pandemics have been characterized by waves of activity spread over months. Once the level of disease activity drops, a critical communications task will be to balance this information with the possibility of another wave. Pandemic waves can be separated by months and an immediate "at-ease" signal may be premature.

In the **post-pandemic period**, influenza disease activity will have returned to levels normally seen for seasonal influenza. It is expected that the pandemic virus will behave as a seasonal influenza A virus. At this stage, it is important to maintain surveillance and update pandemic preparedness and response plans accordingly. An intensive phase of recovery and evaluation may be required. This phased approach is intended to help countries and other stakeholders to anticipate when certain situations will require decisions and decide at which point main actions should be implemented. As in the 2005 guidance, each of the phases applies worldwide once announced. However, individual countries will be affected at different times. In addition to the globally announced pandemic phase, countries may want to make further national distinctions based upon their specific situations.

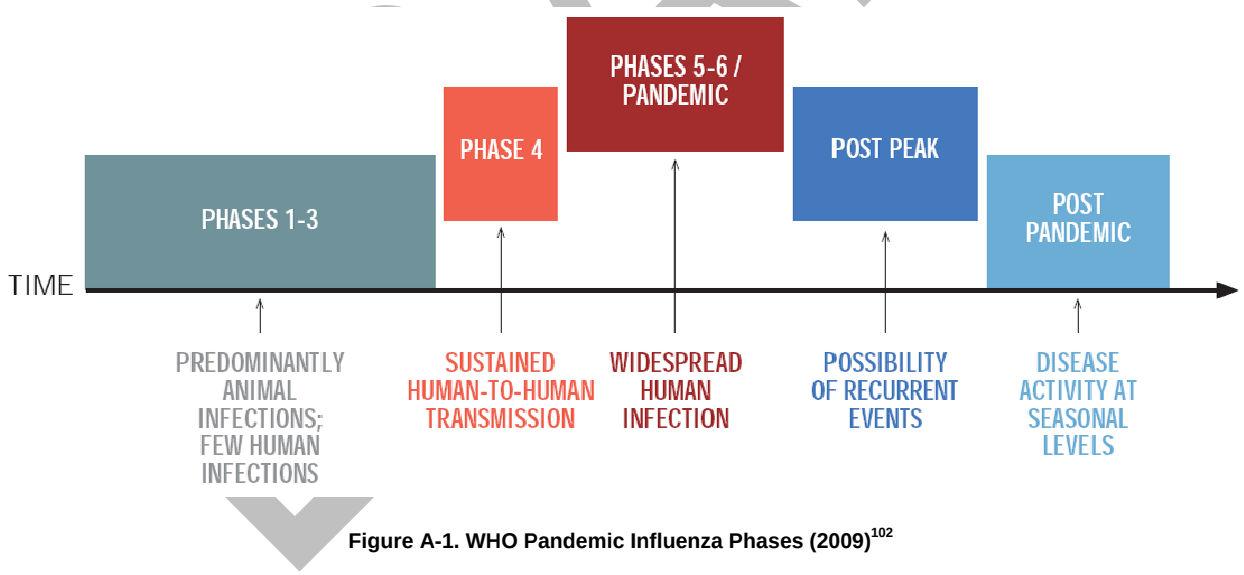

Figure A-1. WHO Pandemic Influenza Phases (2009)[102]

[102] World Health Organization. Global Influenza Programme. *Pandemic Influenza Preparedness and Response.* http://www.who.int/csr/disease/influenza/PIPGuidance09.pdf

APPENDIX B REVIEW LIMITATIONS/CONSTRAINTS

As of writing, engagements with the People's Liberation Army (PLA) have been postponed, impacting the completeness of the report. In addition, the bulk of the After Action Reports (AARs) provided to U.S. Pacific Command (USPACOM) by organizations conducting efforts in support of China lacked substance or useable information for the Review Team, since almost every organization used their own format to provide their trip/summary report. The data collected was not standardized, and many key elements of information were missing from these reports. For example, some reports included little more than a list of participants, or a summary of conference activities. None of the reports analyzed included quantitative or qualitative data directly from participants as to the effectiveness of the previous efforts, or recommendations for future efforts.

Recommend that future USPACOM sponsored Pandemic Influenza (PI) efforts should provide more detailed and standardized reporting requirements. In addition, these reports should be captured in a searchable database with the ability to produce country specific reports.

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APPENDIX C RECENT USAID/PACOM SPONSORED PI EFFORTS

Recent U.S. Agency for International Development and U.S. Pacific Command (USAID/PACOM) sponsored Pandemic Influenza (PI) events dated July 2007 to the present are listed below which were either conducted in China, or which reportedly included participants from China.

Exercise Name	Date	Focus	# of Participants
(13 AF) Asia-Pac Mil Nursing Exchange	August 2010	Defense and Military Contacts	N/A
Asia-Pacific Military Medicine Conf.	May 2010	Defense and Military Contacts	N/A
WHO Military Annex Devel Wkshp-HI (M)	February 2010	Humanitarian Assistance	N/A
Hong Kong Orientation Visit	November 2009	Defense and Military Contacts	N/A
Transnational Security Co-op 09-2	August 2009	Combined/Multinational Education	N/A
Asia Pacific Military Nursing Exchange	August 2009	Defense and Military Contacts	3
PI WHO Containment Project Workshop	June 2009	Combined/Multinational Education	N/A
PI Sr Leaders Regional Symposium	August 2008	Combined/Multinational Education	3
PRC Pandemic Influenza SMEE	April 2008	Defense and Military Contacts	N/A
AI/PI Breakout at APMMC	April 2008	Defense and Military Contacts	N/A
PI Workshop 07-1 CivMil Coordn	July 2007	Combined/Multinational Education	N/A

NOTE: The events below will be conducted in the Asia-Pacific in 2011

Exercise Name	Date	Focus	# of Participants
Lab Capacity Development - Malaysia	March 2011	N/A	N/A
Senior Planners Workshop	May 2011	N/A	N/A
PI Recovery Plan Symposium - Nepal	June 2011	N/A	N/A
APM Nurse Conference - Thailand	July 2011	N/A	N/A
SLS-Indonesia	August 2011	N/A	N/A
APMMC - Location: TBD	Spring 2011	N/A	N/A
National Planning Workshop - China	TBD 2011	N/A	N/A
Mil-to-Mil PI Program Review	TBD 2011	N/A	N/A
PI Healthcare System Surge Demands and Interventions Workshop Series	Jul 2011 TBD	N/A	N/A
Multilateral National PI Planning Workshop Series	Sep 11 TBD	N/A	N/A

APPENDIX D FEEDBACK ON RECENT EFFORTS

The project team reviewed all available After Action Reports (AARs) regarding the workshops and training sessions highlighted in Appendix C. While the reports contained information concerning workshop logistics, very few provided specific qualitative or quantitative feedback from participants. Feedback from participants is helpful in that it will allow future efforts to be tailored.

Based on the available after action reports, the following challenges as a result of cultural, economic and environmental conditions should be considered for the design and coordination of future workshops in, or involving participants from, China:

- Set up all major appointments in advance;
- Ensure that all itineraries are complete and verified;
- Break out groups during large events are helpful planning tools;
- Special attention should be paid to protocols;
- Ensure that facilitators read assigned material in advanced; and
- Ensure that presenters provide briefs in advance.

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APPENDIX E POTENTIAL DATA SOURCES

PILLAR	POTENTIAL SOURCE
Military	• 301 Military Hospital • 302 Military Hospital • Army Association for Infectious Diseases

PILLAR	POTENTIAL SOURCE
Civilian	• Beijing Chao-Yang Hospital • Beijing Municipal Bureau of Health • Beijing Chao-Yang Hospital • Ministry of Health • Office of Health Emergency, Ministry of Health • Chinese Academy of Medical Science • Chinese Medical Association • Chinese Preventive Medical Association • Chinese National Influenza Center, Chinese Center for Disease Control and Prevention • Food and Agriculture Organization of the United Nations • Food and Health Bureau • The World Bank • United Nations • US Centers for Disease Control and Prevention

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APPENDIX F COUNTRY POINTS OF CONTACT

NAME	TITLE	ORG	PHONE (MOBILE)	E-MAIL
TBD	**TBD**	**TBD**	**TBD**	**TBD**

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APPENDIX G ACRONYMS AND ABBREVIATIONS

A

ADB	Asian Development Bank
AED	Academy of Educational Development
AFNS	Armed Forces Nursing Services
AFMIC	Armed Forces Medical Intelligence Center
AFRICOM	African Command
AFRIMS	Armed Forces Research Institute of Medical Sciences
AGID	Agar Gel Immuno Diffusion
AGPT	Agar Gel Precipitation Test
AH	Animal Health
AHPO	Animal Health Provincial Office
AHRD	Animal Health Research Division
AHI	Avian and Human Influenza
AHW	Auxiliary Health Worker
AI	Avian Influenza
AIN	Avian Influenza Network
AMC	Army Medical Corps
AMES	Acute Meningo-Encephalitis Surveillance
ANM	Assistant Nurse Mid-Wife
ARD	Acute Respiratory Disease
ARI	Acute Respiratory Infection

B

BAPS	Bird Flu Awareness in Primary Schools
BCC	Behavioural Communication Change
BMC	BioMed Central
BRIMOB	Police Mobile Brigade
BSL	Bio-Safety Level

C

CAS	Country Assistance Strategy
CBAIC	Community Based Avian Influenza Control Programme
CBO	Community Based Organization
CC	Collaborating Center
CC	Communication Committee
CCP	Chinese Communist Party
CDC	Centers for Disease Control
CDO	Chief District Officer
CDRC	Central Disaster Relief Committee
CEU	Central Epidemiological Unit
CFIA	Canadian Food Inspection Agency

CI/KR	Critical Infrastructure/ Key Resource
CIP	Critical Infrastructure Protection
CIP G	Critical Infrastructure Protection Group
CMC	Central Military Commission
COOP	Continuity of Operations Plan
CSR	Communicable Disease Surveillance and Response
CVL	Central Veterinary Laboratory

D

D/PHO	District Public Health Office
DAIT	District Avian Influenza Technical
DCDC	Department of Communicable Disease Control (Ministry of Health)
DCP	Disease Control Program
DDC	District Development Committee
DE&T	Directorate of Extension and Training
DFAIT	Department Of Foreign Affairs and International Trade
DFID	Department for International Development
DGHS	Director General of Health Services
DGMS	Director General of Medical Services
DH	District Hospital
DHS	Department of Homeland Security (U.S.)
DIA	Defense Intelligence Agency (U.S.)
DIMO	Defense Institute for Medical Operations
DLSO	District Livestock Services Office
DMCC	District Multisectoral Coordination Committee
DNA	Deoxyribonucleic Acid
DOD	Department of Defense (U.S.)
DOS	Department of State (U.S.)
DOT	Department of Transportation (U.S.)
DRRT	District Rapid Response Team
DSA	Daily Stipend and Allowances

E

ECDC	European Centre for Disease Prevention and Control
EDCD	Epidemiology and Disease Control Division
EDP	External Development Partners
EIA	Environment Impact Assessment
ELISA	Enzyme Linkage Immuno-Sorbent Assay
EMP	Environmental Management Plan
EOC	Emergency Operations Center
EPA	Environment Protection Act
EPI	Expanded Program on Immunization
EPR	Environment Protection Rules
EU	European Union
EWARS	Early Warning Reporting System

F

FAO	Food and Agriculture Organization
FCHV	Female Community Health Volunteer
FHP	Force Health Protection
FM	Frequency Modulation
FMD	Foot and Mouth Disease

G

GDP	Gross Domestic Product
GIS	Geographical Information System
GLD	General Logistics Department
GPAI	Global Program for Avian Influenza and Human Pandemic Preparedness and Response
GPS	Global Positioning Satellite

H

H5N1	Influenza A Virus
HAI	Human Avian Influenza
HCW	Health Care Worker
HH	Human Health
HHS	Department of Health and Human Services (U.S.)
HO	Head Office
HP	Health Post
HPAI	Highly Pathogenic Avian Influenza
HPI	Human Pandemic Influenza
HPNAI	Highly Pathogenic Notifiable Avian Influenza
HRD	Human Resource Development
HSPD	Homeland Security Presidential Directive (U.S.)
HW	Health Worker

I

I/V	Intravenous
IC	Incident Commander
ICS	Incident Command System
ICU	Intensive Care Unit
IDA	International Development
IDP	Internally Displaced Person
IDS	Institutional Disease Surveillance
IEC	Information, Education and Communication
IEDCR	Institute of Epidemiology, Disease Control and Research
IEE	Initial Environmental Examination
IFA	Immuno-Fluorescence Assay
IFRC	International Federation of Red Cross and Red Crescent Societies
IHR	International Health Regulations

ILI	Influenza-Like Illness
ILO	International Labour Organization
INGO	International Non-Governmental Organization
IPD	Immunization Preventable Diseases
IT	Information Technology
IVPI	Intravenous Pathogenicity Index

J

JTC	Joint Technical Committee

L

LDO	Local Development Officer
LPAI	Low Pathogenic Avian Influenza
LSDSC	Livestock Services Development Service Centres
LSDSSC	Livestock Services Development Service Sub Centres

M

MENWAR	Civil Service Police Unit
mL	Milliliter
mln.	Million
MoA	Ministry of Agriculture
MOD	Ministry of Defense
MoEF	Ministry of Environment and Forest
MOH	Ministry of Health

N

NAC	National Advisory Committee
NAI	Notifiable Avian Influenza
NARC	National Agriculture Research Labs
NCB	National Competitive Bidding
NCC	National Coordination Cell
NCHP	National Centre for Health Promotion (Ministry of Health)
NDRCCC	National Disaster Relief Central Coordination Committee
NGO	Non-Governmental Organization
NHEICC	National Health Education, Information and Communication Center
NIC	National Influenza Center
NIPPRP	National Influenza Pandemic Preparedness and Response Plan
NMTF	National Multi-Sectoral Task Force
NPHL	National Public Health Laboratory
NPI	Non-Pharmacologic Intervention
NRRT	National Rapid Response Team
NTC	National Technical Committee

O

OFFLU	OFFLU is the OIE-FAO global network of expertise on animal influenzas
OGA	Other Governmental Organization
OIE	World Organization for Animal Health
OPS	Operations

P

PACOM	Pacific Command
PAP	People's Armed Police
PCDS	Priority Communicable Disease Surveillance
PCR	Polymerase Chain Reaction
PDR	Participatory Disease Response
PDSR	Participatory Disease Surveillance and Response
PHAC	Public Health Agency of Canada
PHC	Primary Health Center
PI	Pandemic Influenza
PI	Pharmacologic Intervention
PI	Pasteur Institute
PIP	Project Implementation Plan
PIPP	Pandemic Influenza Preparedness Plan
PIVDP	Pandemic Influenza Vaccine Deployment Plan
PLA	The People's Liberation Army
PLAAF	The People's Liberation Airforce
PLAN	The People's Liberation Navy
POD	Point of Dispensing
PPE	Personal Protective Equipment
PPM	Parts Per Million

Q

QA	Quality Assurance
QC	Quality Control
QTN	Quarantine

R

R&D	Research and Development
RAIT	Regional Avian Influenza Technical
RCAG	Risk Communication Advisory Group
RD	Regional Director/Directorate
RDOLS	Regional Directorate of Livestock Services
RDT	Rapid Diagnostic Test
RHD	Regional Health Directorate
RNA	Ribonucleic Acid
RPM	Rotations Per Minute
RRT	Rapid Response Team
RT-PCR	Reverse Transcriptase Polymerase Chain Reaction

S

SAR	Special Administrative Region (Hong Kong)
SARS	Severe Acute Respiratory Syndrome
SHP	Sub-Health Post
SME	Subject Matter Expert
SOP	Standard Operating Procedure
SPP	Security and Prosperity Partnership of North America
SST	Surveillance Supervision Team

T

TAD	Trans-border Animal Disease
TADA	Travel and Daily Allowances
TADL	Trans-border Animal Disease Laboratory
TBA	Trained Birth Attendant
TEU	Technical Execution Unit
TIV	Tri-Valent Influenza Vaccine
TOT	Training of Trainer
TSCAI	Technical Subcommittee on Avian Influenza
TTX	Tabletop Exercise

U

UMCC	Upazila Multisectoral Coordination Committee
UN	United Nations
UNDP	United Nations Development Program
UNHCR	United Nations High Commission for Refugees
UNICEF	United Nations Children's Emergency Fund
UNOCHA	United Nations Office for the Coordination of Human Affairs
UNRC	United Nations Resident Coordinator
UPS	Uninterrupted Power Supply
URRT	Upazila Rapid Response Team
USAID	United States Agency for International Development
USD	U.S. Dollars
USDA	United States Department of Agriculture
USG	United States Government
USPACOM	United States Pacific Command

V

VAC	Volt Alternate Current
VAER	Vaccine Adverse Event Reaction
VAHW	Village Animal Health Worker
VBT	Village Based Training
VDC	Village Development Committee
VHW	Village Health Worker

W

WCS	Wildlife Conservation Society
WFP	World Food Program
WHO Euro	World Health Organization Regional Office for Europe
WHO	World Health Organization
WTO	World Trade Organization

OTHER

µl	Microlitre

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APPENDIX H REFERENCE LIST

DEPARTMENT OF DEFENSE (DOD)

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APPENDIX I PROJECT TEAM POINTS OF CONTACT

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