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摘要

這個計畫的目的是透過與其他全球衛生安全綱領(Global Health Security Agenda, GHSA)會員國使用相同的工具與方法，執行國際衛生條例(International Health Regulation, IHR)核心能力的聯合外部評核(Joint External Evaluation, JEE)，評估台灣達成 GHSA 設定目標的進度並且展示成果。

這個方法包括受評國家的自我評核以及國際專家的外部評核。自我評核及外部評核皆使用世界衛生組織(World Health Organization, WHO)開發的聯合外部評核工具(JEE Tool)，其中涵括了 19 項核心能力、48 項評估指標。6個外部專家包括5位來自美國學術研究及政策組織－匹茲堡大學衛生安全中心(UPMC Center for Health Security)及 1 位美國疾病控制與預防中心前資深官員。外部評核工作共計造訪台灣 2 次、停留 14 個工作天。此外這個計畫也特別關注了台灣結核病防治與 IHR 核心能力的交集。

此外，UPMC 在美國華府舉辦了為期一天的「Assessing Countries' Global Health Security Capabilities」國際研討會、協助執行台灣疾病管制署 3 位訪問學者的參訪計畫，以及預計於 2017 年 3 月在「Health Security」國際期刊發表 GHSA 及台灣聯合外部評核專刊。

聯合評核報告展現了台灣在公共衛生的堅強實力。台灣在大部分 IHR 目標中皆表現出色，包括在許多評核指標拿到滿分 5 分(代表「可持續的能力」)，例如入境港埠及疾病監測，並在其他多項指標拿到 4 分(代表「已被證明的能力」)，包括國家政策發展及抗微生物管理。其他較為低分的項目，

也大多僅是因為沒有達到少部分的要求。

台灣在大部分的受評領域展現相當程度的能力，但確實也面臨了一些挑戰，大概可以歸納為以下三點：

- 因為台灣並不是WHO的正式會員國，無法參加某些支持建置IHR核心能力的國際計畫。
- 如同許多國家一樣，跨部會及跨部門間的合作仍然有待加強，方可完全達成某些IHR核心能力的要求。
- 人力及預算的限制侷限了某些活動，使得部分IHR設定的目標無法被完全達成。

這個計畫證實一個符合所有 GHSA 設定目標的聯合外部評核，可以成功地在非屬 WHO 或 GHSA 的程序中完成。聯合外部評核的過程對於受評國家來說具有實質的價值，包括它有助於找出差異、設定優先順序、證明經費需求及建立跨部門關係。我們的結論是，所有國家都應該進行外部評核，並依據評核結果展開行動，定期進行複評以評估進展程度。

關鍵字：聯合外部評核(joint external evaluation)、全球衛生安全綱領(global health security agenda)、國際衛生條例(international health regulations)

Abstract

The purpose of the project was to assess the progress of Taiwan toward the goals of Global Health Security Agenda (GHSA) and to showcase the findings by conducting a Joint External Evaluation (JEE) of Taiwan's International Health Regulation (IHR) capabilities using the same tool and methodology being used by GHSA member countries.

The methodology involved a self-assessment by the host country and then an external review by international subject matter experts. Both used a JEE tool developed by the World Health Organization (WHO) that covered 48 indicators across 19 capabilities. The 6 external experts were from the UPMC Center for Health Security (Center), an American academic research and policy organization, along with a former senior official of the US Centers for Disease Control and Prevention. The external evaluation involved 2 visits to Taiwan that totaled 14 working days. Special attention was paid to the intersection of the IHR capabilities and Taiwan's efforts to control tuberculosis.

In addition, the Center convened a day-long international symposium on "Assessing Countries' Global Health Security Capabilities" in Washington, DC, hosted 3 visiting scholars from the Taiwan Center for Disease Control and arranged for the journal *Health Security* to devote a special issue in March 2017 to the topic of global health security and the JEE of Taiwan.

The JEE report demonstrates Taiwan's robust strengths in public health. Taiwan is doing an excellent job in meeting most of the IHR goals. On a 5-point scoring system, there is "Sustainable Capacity" (Level 5) for many of the indicators,

including points of entry and disease surveillance, and “Demonstrated Capacity” (Level 4) for many others, such as the development of national policy and antimicrobial stewardship. For the few indictors in which a lower capacity is evident, it is often only a small part of a criterion that is missing.

While Taiwan demonstrates considerable capacity in most of the assessed areas, it does face some challenges that fall into 3 overarching themes:

- Because Taiwan is not a full member state in the WHO, it cannot participate in some international programs that support IHR capabilities.
- Like many countries, interagency and cross-sectoral collaboration in Taiwan is not optimal for fully achieving some IHR capabilities.
- Personnel and budgetary constraints limit some activities needed to fully achieve some IHR goals.

This project demonstrates that a JEE that meets all of the GHSA goals can be successfully accomplished outside the official WHO and GHSA process. The JEE process has true value to the host country in that it helps to identify gaps, set priorities, document funding needs and build cross-sectoral relationships. We conclude that all countries should conduct external evaluations, act on the findings of the JEE, and conduct periodic re-evaluations to gauge progress.

Key words: joint external evaluation, global health security agenda, international health regulations

前言 **Preface**

這個計畫的目的是為了評估台灣對於 GHSA 三主軸－預防、偵測及應變等目標的達成情形並展示結果。The purpose of the project is to assess the progress of Republic of China (Taiwan) toward the “Protect, Detect, and Respond” goals of Global Health Security Agenda (GHSA) and to showcase the findings.

GHSA 是美國聯合許多國家、國際組織與公民社會，共同加速朝向讓世界免除傳染病威脅的具體行動[1]。GHSA 意在倡導全球衛生安全為國際首要任務，並且促進各國全面達成 WHO 訂定的 IHR 2005[2]、OIE 訂定的 PVS[3]以及其他與全球衛生安全相關的工作框架。GHSA 尋求透過闡釋明確工作細節的 11 項行動方案，進而加速達成特定的目標。在 GHSA 架構下，所有政府相關部門，包括衛生、農業、國防、法務、國發及外交皆應共同參與行動。The Global Health Security Agenda is an effort initiated by the US and involving a number of other countries as well as international organizations, and civil society to accelerate progress toward a world safe and secure from infectious disease threats.[1] The GHSA intends to promote global health security as an international priority and to stimulate progress toward full implementation of the World Health Organization (WHO) International Health Regulations 2005 (IHR)[2], the World Organization for Animal Health (OIE) Performance of Veterinary Services (PVS) pathway[3], and other relevant global health security frameworks. GHSA seeks to accomplish this goal through 11 “Action Packages,” which elucidate specific actions that should be taken to accelerate progress toward specific objectives. Under the GHSA, all relevant sectors within a government including health, agriculture, defense, law enforcement,

development, and foreign affairs, are called upon to be involved.

GHSA 包含了九個以下首要目標：GHSA includes nine priority objectives, organized as follows:

預防 Prevent

1. 抑制抗藥性微生物及新興人畜共通傳染病的傳播，並強化改善食品安全的框架 Inhibit the spread of antimicrobial drug resistant (AMR) organisms and emerging zoonotic diseases, and strengthen frameworks to improve food safety.
2. 支持國家生物安全體系 Bolster national biosafety and biosecurity systems.
3. 減小傳染性疾病爆發的嚴重度與發生數 Lessen the severity and number of infectious disease outbreaks.

偵測 Detect

4. 建立與強化全球及時生物偵測網絡 Establish and strengthen global networks for real-time biosurveillance.
5. 在傳染病緊急事件發生期間，促進快速且透明的通報及加強檢體與試劑的分享 Improve rapid and transparent reporting to the WHO, OIE, and FAO during infectious disease emergencies and strengthen sample and reagent sharing.
6. 發展創新檢驗試劑及強化實驗室體系 Develop new diagnostics and strengthen laboratory systems.
7. 訓練與佈署包含疾病探測與實驗專才的監測人力 Educate and deploy a surveillance workforce comprised of disease detectives and laboratory scientists.

應變 Respond

8. 發展因應生物突發事件的全球緊急應變中心網絡 Develop a global network of Emergency Operations Centers for biological incident response.
9. 增強傳染病緊急事件發生期間的全球對抗手段的可近性 Increase global access to countermeasures during infectious disease emergencies.

作為 GHSA 行動的一部分，所有參與國皆被鼓勵完成獨立評核並報告進展。五個國家(喬治亞、祕魯、葡萄牙、烏干達、烏克蘭及英國)自願接受國際團隊的先導性評核計畫，使用的是美國 CDC 開發的評核工具，並加入 WHO 及其他國家的意見。這些評核報告已經公布在網路上[4]。As part of the GHSA, all participating countries are encouraged to conduct independent assessments and report on their GHSA progress. Five counties (Georgia, Peru, Portugal, Uganda, Ukraine and United Kingdom) volunteered to be assessed by international teams as part of a pilot project using an assessment tool developed by US CDC with input from the WHO and other countries. The reports of these evaluations are available online.[4]

從 2016 年開始，前開五個國家使用的 GHSA 評核工具已經被全新的 JEE 評核工具所取代。[5]這個工具是在國家層級下及跨相關部會，用來評估一個國家的 IHR 及 GHSA 相關衛生安全量能。這個工具擁有 19 項評核議題，是根據以下 3 個核心元素制定：Starting in 2016 the GHSA tool that had been used in the first 5 pilot assessments had been replaced by a new tool, the Joint External Evaluation (JEE) tool.[5] The tool is a data gathering instrument designed to evaluate a country's IHR and GHSA-relevant capacities for health security at

a national level, across all relevant sectors. The tool has 19 technical areas arranged according to 3 core elements:

- 防止疫情爆發或是其他公共衛生緊急事件發生的可能性 Preventing the likelihood of outbreaks and other public health emergencies defined by the IHR.
- 早期偵測威脅 Detecting these threats early.
- 透過跨部門、國家及國際合作與溝通，進行快速及有效的應變 Responding rapidly and effectively, using multi-sectoral, national, and international coordination and communication.

這個總計 92 頁的工具是為了評估一個國家在 19 項評核議題的基礎量能及找出差距所在。評估過程需要回答 48 項評核指標所包含的數百個問題。評核結果有助於擬定改善計畫及設定優先順序。The intent of the 92-page tool is to assess a country's baseline capacity related to the 19 technical areas and identify gaps. This is accomplished by answering hundreds of technical questions that address 48 indicators. The findings can then be used to guide plans for improvement and aid in priority setting.

在台灣開始進行外部評核之前，有 2 個國家(衣索比亞及坦尚尼亞)發布了 JEE 評核報告。在台灣進行評核的過程中，有 5 個國家(孟加拉、賴比瑞亞、莫三比克、巴基斯坦及美國)[4]發布了 JEE 評核報告。所以台灣是第 8 個完成 JEE 評核並公布結果的國家。Prior to the start of the Taiwan external evaluation, 2 countries (Ethiopia and Tanzania) had published JEE reports. Over the course of the Taiwan JEE, 5 more countries had published JEE reports (Bangladesh, Liberia, Mozambique, Pakistan, and USA).[4] Taiwan was the 8th country to report

the results of its JEE.

雖然台灣無法以官方身分正式參加 GHSA 評估程序，但它致力於提升衛生安全相關量能，並支持 GHSA 的內涵。以此身份，它選擇與外部團隊合作，使用與 GHSA 相同的工具，進行嚴密的外部評核。此外，台灣希望賦予評核更多意義，而且不要像其他國家一樣倉促進行。就像其他已經發布評核報告的國家一樣，台灣希望可以讓評核結果完全透明並公諸於世。Although Taiwan is not officially participating in the GHSA assessment process, it is committed to its own health security and endorses the principles contained in the GHSA. As such, it elected to contract with an external party to conduct a rigorous assessment of Taiwan using the same tool as that being used by the GHSA. Furthermore, Taiwan wished to make the assessment more meaningful and less rushed than many the other country assessments that had been conducted to date. Like the countries that have published their GHSA assessments, Taiwan wishes to be fully transparent and make the results of its assessment public.

在過去十年間，台灣已在結核病防治向前邁進了一大步。從 2005 年迄今，結核病發生率已經下降了將近 30%。伴隨著台灣採行論質計酬的創新支付模式，改善了臨床治療成效，使得防治努力獲得國際讚譽。因此，這個計畫也特別探討了台灣消除結核病的進展及 GHSA 目標之間的關係。In the last decade, Taiwan has made considerable strides in controlling the spread of TB. Since 2005, TB incidence has been reduced by almost 70%. This progress, coupled with Taiwan’s adoption of novel strategies such as Pay-for-Performance models to improve treatment outcomes, has garnered international praise for its commitment to TB control. Therefore, as part of the GHSA assessment,

particular attention will be paid to how Taiwan's progress towards TB elimination aligns with GHSA goals.

方法 Methods

我們透過以下方式，達成這個計畫所設定的目標：To achieve the goal of this project the following objectives were proposed:

- 使用最新發布的 GHSA 評估工具，評估台灣對於傳染病預防及控制的量能 Assess Taiwan's capability for infectious disease prevention and control using the latest available GHSA assessment tool;
- 特別關注台灣消除結核病的進展 Focus particular attention on Taiwan's progress in tuberculosis (TB) elimination;
- 在美國華府舉辦為期一日的國際研討會 Convene a one-day long international symposium on Taiwan and the GHSA in the Washington, DC area;
- 將前開研討會的論文發表及其他邀稿，彙編專刊至具有同儕審查機制的期刊 Compile the papers from the symposium, along with other invited papers related to the GHSA, into a special issue of a respected peer–reviewed journal;
- 與台灣 CDC 共同發布 GHSA 評核報告 Prepare a final report containing the findings of the independent GHSA assessment of Taiwan and make it public in collaboration with the Taiwan Center for Disease Control (Taiwan CDC).

目前的 JEE 過程包含了兩個階段：先是受評國家使用 JEE 工具進行自我評核，然後由各個主題的國際專家進行外部評核。The current JEE process consists of two stages: an initial self-assessment conducted by the country itself using the JEE tool and then an in-country evaluation conducted by an external evaluation team of subject matter experts informed by the initial self-assessment.

在自我評核的階段，相關政府部門的代表及其他利害關係人使用 JEE 工具完成自我評核報告。評核過程特別著重跨部門參與及防疫一體。In the self-assessment phase, representatives of relevant government agencies and other stakeholders in the country complete a self-evaluation report using the JEE tool. There is an emphasis on involving multiple government sectors and a “one-health” approach.

當自我評核完成後，台灣與外部評核團隊分享自評結果。經過數日的實地訪查，外部評核單位針對自評結果提出疑問並釐清答案，並由台灣提供必要的佐證文件。實地訪查增加了外部評核團隊對於台灣量能的實質瞭解。外部評核團隊與台灣官方密切合作，針對每一個評核指標給予真實的分數、找出強項及典範實務、尚待加強的領域及挑戰，並針對每一個評核議題找出 3~5 個優先行動方案。Once the self-evaluation is complete, the host country shares it with the External Assessment Team (EAT) of experts from other countries. Over the course of a multi-day site visit, the host country presents their country’s self-assessment to the EAT who ask follow-up questions to clarify some answers and provides needed documentation. Field trips may be used to enhance the external team’s understanding of the host country’s

capacities. The EAT works in a fully collaborative manner with host country officials to assign scores for each indicator, as well as identifying strengths and best practices, areas that need strengthening, challenges, and three to five key priority actions for each technical area.

JEE 工具相較於先前的工具，更大程度地依賴第一步的自我評核。此外，這個評核工具篇幅很長並且在某些地方很難理解。因為這樣的差異，我們必須思考如何能夠適切地完成評核工作。因此對於第一次造訪，需要改用與原先設定不同的方式，例如對於評核項目逐條檢視。因此，我們將原先第一次造訪的人力與時間配置，從 2 人 2 日改成 3 人 4 日(人員包括艾瑞克透納醫師、珍妮佛納佐博士及馬修舒利亞碩士)。議程包括一開始由郭旭崧署長主持的全體會議，與會者包括了跨部門的自評團隊，隨後是外部評核團隊分別與 19 個自評團隊就 JEE 評核內容進行逐條檢視，並確認沒有因為語言隔閡造成誤解，以及雙方對於問題的解讀是一樣的。第一次造訪的議程詳見附錄一。The JEE tool depends much more on internal self-assessment as a first step than the previous tool. Furthermore, the tool is very long and difficult to understand in places. Because of these differences we had to consider how we could best carry out the assessment. This required a different approach to the first visit than originally envisioned including a detailed line-by-line review of the assessment tool. Therefore, we changed our plans for the first trip from a visit of 2 people for 2 days to a team of 3 (Eric Toner, MD; Jennifer Nuzzo, DrPH, and Matthew Shearer, MPH) for 4 days. This visit included an introductory plenary session chaired by the Director General of the Taiwan CDC, Hsu-Sung (Steve) Kuo, with many of the multisector participants in the self-assessment teams. Over the course of the remaining days the EAT met individually with each of the 19 self-assessment teams and reviewed the JEE

tool line-by-line to ensure that there were no confusion due to language and that the EAT and self-assessment teams interpreted the questions similarly. The agenda for this initial visit can be found in Appendix I.

標準的 JEE 評核議程包括 5 天的行程。然而，我們認為這樣的時間太短，不足以讓我們深入完成必要的工作。因此我們安排了 10 個工作天的行程，其中包括 1 天造訪疾病管制署中區管制中心、食品藥物管理署中部辦公室、台中市衛生局所及部立台中醫院的傳染病部門。此外，亦造訪位於台北市的萬芳醫院，並由郭旭崧署長主持閉幕全體大會。第二次造訪的議程詳見附錄二。The standard GHSA agenda for the JEE assessment visit lasts 5 days. However, we judged this time period to be too short to accomplish the necessary tasks thoroughly. Therefore we scheduled our visit to last 10 working days. This included a full-day remote site visit to the city of Taichung where we visited District Health Center of the Mid–Western Region Bureau, the infectious disease unit of Taichung Hospital, the CDC Central Regional Office and regional public health laboratory, and Taiwan FDA Central Regional Office. The assessment visit also included a visit to a local Taipei hospital, Wan Fang Hospital, and a final concluding plenary session chaired by Dr. Kuo. The agenda for this second visit can be found in Appendix II.

外部評核團隊包括 6 位專家，分別是艾瑞克透納醫師(Eric Toner, MD)、珍妮佛納佐博士(Jennifer Nuzzo, DrPH)、阿妮塔西賽羅法學博士(Anita Cicero, JD)、克里斯托波迪碩士(Crystal Boddie, MPH)及馬修舒利亞碩士(Matthew Shearer, MPH)，以及內布拉斯加大學公共衛生學院院長、美國 CDC 公共衛生整備及應變部門前官員阿里可汗醫師(Ali Khan, MD, MPH)。在 8 天的評核過程中，外部評核團隊與 19 個自評團隊 80 個成員深入會談。每一個主

題的會談持續大約 90 分鐘，議程包括自評團隊展現自評結果、佐證文件、優先行動及預擬分數。外部評核團隊會接著提出相關問題並且討論強項、差距及分數。在結論會議中，外部評核團隊對於 48 個評估指標提出初步發現及試評分數。郭旭崧署長及自評團隊有機會對於每個發現補充評論。The EAT consisted of 6 external evaluators: Eric Toner, MD; Jennifer Nuzzo, DrPH; Anita Cicero, JD; Crystal Boddie, MPH; Matthew Shearer, MPH—all from the UPMC Center for Health Security (Center) — and Ali Khan, MD, MPH, Dean of the College of Public Health of the University of Nebraska and former Director of the US CDC office of Public health Preparedness and Response. Over the course of 8 days, the EAT conducted individual meetings with 19 self-assessment teams consisting of over 80 individuals. These meetings lasted on average 90 minutes during which the self-assessment teams presented the self-evaluation, documentation, priorities for action, and possible scores. The EAT then asked probing and clarifying questions and discussed strengths and gaps and scoring. At the final concluding session, the EAT provided preliminary findings and tentative scores for each of the 48 indicators. Dr. Kuo and the self-assessment teams had the opportunity to comment on each of the findings.

在 2016 年 10 月 19 日，匹茲堡大學衛生安全中心在美國華府舉辦了為期一天的「Assessing Countries' Global Health Security Capabilities」國際研討會。On October 19, 2016, The UPMC Center for Health Security convened a day-long international symposium on Assessing Countries' Global Health Security Capabilities at the W Hotel in Washington, DC.

匹茲堡大學衛生安全中心也執行了疾病管制署的三個訪問學者計畫，1人停留2週，2人停留3個月。The UPMC Center for Health Security hosted 3 visiting

scholars from the Taiwan CDC. One was in residence for 2 weeks, the other 2 were in residence for 3 months.

此外，並將於2017年3月在「Health Security」國際期刊發表全球衛生安全及台灣聯合外部評核專刊，預期將至少包含八篇專文。Arrangements were made for the journal *Health Security* to devote a special issue in March 2017 to the topic of global health security and the JEE of Taiwan. It is anticipated that at least 8 articles will be included in the issue.

結果 Results

台灣的 JEE 報告已經公布於網路上(如附錄六)。對於每一個評核議題，都包含了評核目標、能力等級、強項以及尚待加強的領域，並且有佐證文件清單及分數。評分是使用五點量尺，1 分=尚無能力、2 分=有限的能力、3 分=已發展的能力、4 分=已被證明的能力、5 分=可持續的能力，並進一步使用顏色編碼，1 分為紅色、2 分及 3 分為黃色、4 分及 5 分為綠色。台灣獲得的分數摘要如表一。The full report of the Taiwan JEE is available online and attached (Appendix VI). For each of the 19 capabilities there are sections on Targets, Level of Capabilities, Strengths, and Areas that Need to be Strengthen, along with a list of documentary evidence and a score. Scores are determined on a 5 point scale: 1=no capacity, 2=limited capacity, 3=developed capacity, 4=demonstrated capacity, and 5=sustainable capacity. The sores are further colored coded with 1 being red, 2 and 3 yellow, and 4 and 5 being green. A summary of Taiwan's scores are provided in Table 1.

如同JEE報告所呈現的，台灣在公共衛生的堅強實力是顯而易見的。台灣在大部分IHR目標中皆表現出色，包括在許多評核指標拿到滿分5分(代表「可持續的能力」) ，例如入境港埠及疾病監測，並在其他多項指標拿到4分(代表「已被證明的能力」)，包括國家政策發展及抗微生物管理。其他較為低分的項目，也大多僅是因為沒有達到少部分的要求。As is evident from the scores and in the full report, Taiwan's robust strengths in public health were obvious. Taiwan is doing an excellent job in meeting most of the IHR goals. There is clear, "Sustainable Capacity" (Level 5) for many of the indicators, including points of entry and disease surveillance, and "Demonstrated Capacity" (Level 4) for many others, such as the development of national policy and antimicrobial stewardship. For some indictors in which a lower capacity is evident, it is often only a small part of a criterion that is missing.

JEE評估的IHR核心能力與結核病防治所需能力有許多重複之處。持續支持結核病防治計畫可以幫助台灣維持現有或超前的IHR核心能力。此外，還有許多領域是台灣可以透過現有或進階的結核病防治行動予以強化，包括：及時監測、人力資源、流病訓練計畫、公衛與安全當局的聯結、風險溝通、社區參與以及謠言管理等。報告詳如附錄五。There are important overlaps between the IHR capacities measured in the JEE and those capabilities need to control TB. Continued support for existing TB programs will help Taiwan maintain its existing, advanced IHR capacities in a number of areas. Additionally, there are several areas where Taiwan has the opportunity to strengthen its current IHR capacities through current or enhanced TB control activities. Important areas of overlap include: real-time surveillance, human resources, epidemiology training programs, linkage between public health and

security authorities, risk communication, community engagement, and rumor management. Details can be found in Appendix V.

台灣的訪問學者包括高慧芸、楊季融及陳毓翎，在本中心獲得了寶貴的經驗。高小姐及楊先生得以在此準備研討會發表及專刊專文。除此之外，他們也前往約翰霍普金斯大學、馬里蘭大學生物隔離病房、MRIGlobal 研究機構、BioFire Defense 公司、合成生物研討會、馬里蘭州立公共衛生實驗室、馬里蘭大學疫苗發展中心、在紐約舉辦的 GHSA 會議以及美國 CDC，並前往埃默里大學參加國家伊波拉訓練及教育中心舉辦的訓練課程。The Taiwan visiting scholars, Hui-Yun Kao, JiRong Yang and Yu-Ling Chen, have had a valuable experience at the Center. Ms. Kao and Mr. Yang were able to work on their presentations for the Symposium and their manuscripts for the Journal. In addition they had valuable visits to the Johns Hopkins and University of Maryland Biocontainment Units, MRIGlobal and BioFire Defense, a symposium on synthetic biology, the Maryland State public health laboratory, the University of Maryland Center for vaccine Development, a GHSA meeting in New York City, the US CDC, and attended a training course at Emory University conducted by the National Ebola Training and Education Center.

國際研討會是非常成功的。大約50人參加了整天的議程。除了來自台灣CDC的講者外，台北醫學大學公共衛生學院郭乃文院長講述了該大學在全球衛生安全扮演的角色。議程也邀請了許多GHSA的領導人及美國JEE自評團隊的專家。研討會議程詳見附錄三、參加人員名單詳見附錄五。許多與會者都贊許研討會讓人收穫良多。The Symposium was considered a great success. Approximately 50 people were present during most of the day-long meeting. In addition to the speakers from the Taiwan CDC, Dean Nai-Wen Kuo from Taipei

Medical University spoke on the role of universities in global health security. The agenda also included many of the leaders of the GHSA and the US JEE self –assessment team. The agenda and attendee list can be found in Appendices III and IV respectively. A number of attendees commented on how informative the presentations were.

討論Discussion

台灣在大部分的評核議題展現相當程度的量能，但它也確實面臨了一些挑戰，大概可以歸納為以下三點：While Taiwan demonstrates considerable capacity in most of the assessed areas, it does face some challenges. These fall into 3 overarching themes that emerged during the evaluation:

- 因為台灣獨特的國際政治情勢，無法成為WHO的正式會員國，因此無法參加某些支持建置IHR核心能力的國際計畫。Because of its unique international political status, Taiwan is not a full member state in the WHO and, therefore, cannot participate in some international programs that support IHR capabilities.
- 如同許多國家一樣，跨部會及跨部門間的合作仍然有待加強。例如，人類與動物疾病管制及食品管理部門需要更緊密的合作，不論是在中央或是地方層級，方可強化食品安全及疫情調查相關量能。Like many countries, interagency and cross-sectoral collaboration in Taiwan is not optimal for fully achieving some IHR capabilities. For example, closer collaboration between the human public health, animal health, and food inspection sectors at both the local and national levels would enhance food safety and improve outbreak investigation capabilities in Taiwan.
- 人力及預算的限制侷限了某些活動，使得部分 IHR 設定的目標無法被

完全達成。有限的預算似乎也阻礙了台灣的國際參與程度，使得台灣無法進行雙邊或多邊合作以及與其他國家分享寶貴經驗。Personnel and budgetary constraints and cutbacks limit some activities needed to fully achieve some IHR goals. Limited budgets also seem to hinder Taiwan's ability to be more engaged internationally. This inhibits Taiwan's ability to learn from bilateral or multilateral engagement and to share its considerable expertise with other countries.

關於 JEE 評核過程，我們發現第一次引導性質的造訪是非常重要的。部分 JEE 問題的用詞是意味不明的，特別是對於非屬英文母語者來說。因此，事先共同檢視問題的意涵是重要的。建立信任也是第一次造訪的另一個功能。部分受評國家參與者會有防禦心態或是對於分享資訊有所保留是很自然的，因為可能因此展現弱點。雖然評核過程頗具侵入性，但 JEE 的目的是具建設性的。透過展現友善及團隊參與的態度，外部評核專家可以展現他們是值得信賴的，並且引導不是那麼開放分享的參與者。In terms of the JEE process, we found that the initial visit was very important. The wording of some of the JEE questions is ambiguous especially for users who are not native English speakers. Therefore, jointly reviewing the meaning of the questions in advance is important. Building trust is another important function of the initial visit. It is natural that some participants from the host country would feel defensive or would be reticent to share information that might reveal areas of relative weakness. Although the assessment process can be intrusive, the purpose of the JEE is intended to be entirely constructive. Through a friendly and collegial attitude the external evaluators can demonstrate that they are trustworthy and draw out participants who would otherwise be reluctant to be open.

對於自評國家來說，一個高度投入的領導者對於成功的評核是至關重要的。自我評核是一個艱鉅的過程，過程中必須詳盡回答數百個問題，且這些問題是跨部門的。為數眾多的政府文件必須被搜尋、彙編及翻譯。這次台灣的評核共有超過 80 個參與者投入了非凡的努力及工時。若不是一個高度主動的高層領導者要求這樣的投入，自我評核將無法如此順利。A highly committed host country champion/leader is essential to a successful evaluation. The self-evaluation is an arduous process involving detailed answers to hundreds of technical questions across multiple government agencies. Many government documents must be searched, referenced and translated. More than 80 individuals we involved in the Taiwan self-assessment which no doubt required extraordinary effort and many hundreds of hours of work time. Without a highly placed and motivated leader capable of commanding such effort, the self-evaluation would be less than optimal.

領導者也必須對自我評核的評分提供清楚的指引。一方面，高分是令人驕傲的，但另一方面，它也會有礙未來的預算投入。相反的，低分可以協助當局取得資源，但卻也可能使領導者招致大眾、媒體或民選官員的批評。總結來說，嚴格遵守評分系統似乎是最好的方式，惟仍須注意受評國因未能達成指標中某些細節要求，使得其評分被低估的主觀限制。在這樣嚴格的評分系統下，以下的認知是重要的，不完美的分數不盡然代表受評國家表現不佳，只是部分要求沒有被達到。同樣的，完美的分數也不盡然代表著完美的公共衛生量能。仍有許多量能是這個工具沒有考慮到的。The leader must also provide clear guidance on the approach to the self-assessment scoring. On the one hand, a high score is naturally a source of pride, on the other hand, it could undermine ongoing funding. Conversely, a lower score could be used to

substantiate a budget request for more funding but could also invite criticism from the public, press or elected officials. In the end, strictly adhering to the scoring criteria seems to be the best approach. Although this approach might tend to produce a lower score in some indicators if some minor scoring criteria is missing, it limits subjectively. With this strict scoring approach, it is important to recognize that a less than perfect score does not necessarily mean that the host country is doing a poor job, just that certain specific criteria have not been met. Likewise, it is equally important to recognize that a perfect score on the tool does not necessarily equate to perfection in public health capabilities. There are many capabilities that the tool does not address.

儘管仍有尚待努力的部分以及評分系統的限制,JEE 評核過程對於受評國家來說是非常有價值的，因為它促進了跨部門及跨部會的合作，找出差距，讓受評國家得以深入思考優先順序。Despite the effort needed and the limitations of the scoring system, the JEE process is valuable to the host country because it promotes interagency and cross sectoral collaboration, uncovers gaps, and thus allows the host country to honestly reflect on priorities.

在國際研討會上，來自美國、孟加拉、巴基斯坦及衣索比亞的發表顯示，台灣的 JEE 評核經驗與其他國家類似，特別是關於 JEE 評核過程的價值展現。Presentations by at the international symposium on the JEEs of the US, Bangladesh, Pakistan and Ethiopia indicate that there were many area of commonality between the Taiwan JEE experience and those of other countries especially regarding the value of the JEE process.

結論 Conclusion

這個計畫證實一個符合所有 GHSA 設定目標的聯合外部評核，可以成功地在非屬 WHO 或 GHSA 的程序中完成。聯合外部評核的過程對於受評國家來說具有實質的價值，包括它有助於找出差距、設定優先順序、證明經費需求及建立跨部門關係。我們的結論是，所有國家都應該進行外部評核，並依據評核結果展開行動，定期進行複評以評估進展程度。This project demonstrates that a JEE that meets the GHSA goals can be successfully accomplished outside the official WHO/GHSA process. The JEE process has true value to the host country in that it helps to identify gaps, set priorities, document funding needs and build cross-sectoral relationships. We conclude that all countries should conduct external evaluations, act on the findings of the JEE, and should conduct periodic re-evaluations to gauge progress.

建議 Suggestions

<u>對台灣的建議 Recommendations for Taiwan:</u>

- 我們建議台灣可以將評核報告找出的行動項目納入接下來的策略計畫。此外，每 3~5 年重複 JEE 評核以評估進展程度。We recommend that Taiwan incorporate the action items identified in the report into a strategic plan for implementation in the near future. Furthermore, we recommend that Taiwan repeat the JEE process in 3-5 years to gauge progress.

- 我們建議嚴重威脅台灣維持公共衛生成就的預算及人力限制可以被重新考量。We suggest that current budget and personnel constraints threatened the remarkable achievements of Taiwan’s public health programs and should therefore be reconsidered.

對 JEE 評核過程的建議 Recommendations for the JEE Process:

- 引導性質的造訪應該納為常規。An initial introductory visit to the host country by the EAT should be routine.
- 應該鼓勵實際走訪偏遠的公共衛生部門。Site visits to outlying public health departments should be encouraged.
- 評核性質的造訪應該加長時程。The evaluation visit should be lengthened.

對 JEE 評核工具的建議 Recommendations for the JEE Tool:

- 應該重新檢視這個工具中以美國為中心的用語及概念，以確保文化中立以及非美裔與母語非屬英文者能夠理解其中意涵，相關用語包括動態聆聽、全體社會及強弱危機分析等。The tool should be reviewed for US-centric language and concepts to ensure cultural neutrality and clarity to non-Americans and non-native English speakers. Examples of such language include “dynamic listening”, “whole of society”, “SWOT”
- 不同指標間的問題數量及深入程度應該相同且去除重複。例如，「食品安全」包含 1 個指標 8 個問題，然而，「風險溝通」卻包含了 5 個指標 58 個問題。The number of questions and level of detail should be equalized across the indicators and redundancies eliminated. For example, “Food Safety” has 1 indictor with 8 technical questions; in contrast, “Risk Communications” has 5 indicators with 58 questions

- 應該納入醫療照護整備量能相關指標(例如醫院突增需求量能)。Indicators related specifically to healthcare preparedness capabilities such as hospital surge capacity should added.

重要研究成果 Key findings

1. 台灣在大部分的 JEE 評核議題展現了堅強的實力。Taiwan has robust capabilities in most of the 19 areas assessed in the JEE.
2. 台灣面臨以下數個挑戰：Taiwan faces several overarching challenges, including:
    a. 國際政治情勢限制了部分國際合作。its international political situation which limits some aspects of international collaboration,
    b. 跨部門及跨部會的合作遭遇阻力。some resistance to cross-sectoral and interagency collaboration, and
    c. 預算限制威脅了公共衛生計畫的進展及延續。budgetary constraints that threaten further progress and sustainability of public health programs.
3. 儘管在大部分的受評項目取得高分，仍有待改進之處。Despite its high scores in most of the assessed capabilities, there are areas in which Taiwan could further improve its public health.
4. 儘管不能完全參與某些國際公共衛生組織，台灣展現了對於 GHSA 行動的支持及公共衛生實務的貢獻。Taiwan has demonstrated its support of the mission of the GHSA and that it has much to offer in terms of public health best practices despite its inability to fully join some international public health organizations.

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圖、表 Figures and Tables

Table 1 Summary of Scores

Element	Indicator	Score
National Legislation, Policy, and Financing	P.1.1 Legislation, laws, regulations, administrative requirements, policies, or other government instruments in place are sufficient for implementation of IHR	4
	P.1.2 The state can demonstrate that it has adjusted and aligned its domestic legislation, policies and administrative arrangements to enable compliance with the IHR (2005)	4
IHR Coordination, Communication, and Advocacy	P.2.1 A functional mechanism is established for the coordination and integration of relevant sectors in the implementation of IHR	4
Antimicrobial Resistance	P.3.1 Antimicrobial resistance (AMR) detection	5
	P.3.2 Surveillance of infections caused by AMR pathogens	5
	P.3.3 Healthcare associated infection (HCAI) prevention and control programs	4
	P.3.4 Antimicrobial stewardship activities	4
Zoonotic Disease	P.4.1 Surveillance systems in place for priority zoonotic diseases/pathogens	5
	P.4.2 Veterinary or animal health workforce	5
	P.4.3 Mechanisms for responding to infectious zoonoses and potential zoonoses are established and functional	5
Food Safety	P.5.1 Mechanisms are established and functioning for detecting and responding to foodborne disease and food contamination	3
Biosafety and Biosecurity	P.6.1 Whole-of-government biosafety and biosecurity system is in place for human, animal, and agriculture facilities	3
	P.6.2 Biosafety and biosecurity training and practices	3
Immunization	P.7.1 Vaccine coverage (measles) as part of national program	5
	P.7.2 National vaccine access and delivery	5
National Laboratory System	D.1.1 Laboratory testing for detection of priority diseases	5
	D.1.2 Specimen referral and transport system	5
	D.1.3 Effective modern point of care and laboratory based diagnostics	5
	D.1.4 Laboratory quality system	5
Real-Time Surveillance	D.2.1 Indicator and event based surveillance systems	4
	D.2.2 Interoperable, interconnected, electronic real-time reporting system	4
	D.2.3 Analysis of surveillance data	5
	D.2.4 Syndromic surveillance systems	4
Reporting	D.3.1 System for efficient reporting to WHO, FAO, and OIE	5
	D.3.2 Reporting network and protocols in country	5
Workforce Development	D.4.1 Human resources are available to implement IHR core capacity requirements	4

Element	Indicator	Score
	D.4.2 Applied epidemiology training program in place such as FETP	4
	D.4.3 Workforce strategy	5
Preparedness	R.1.1 Multi-hazard national public health emergency preparedness and response plan is developed and implemented	5
	R.1.2 Priority public health risks and resources are mapped and utilized	5
Emergency Response Operations	R.2.1 Capacity to activate emergency operations	5
	R.2.2 Emergency Operations Center operating procedures and plans	5
	R.2.3 Emergency operations program	5
	R.2.4 Case management procedures are implemented for IHR-relevant hazards	5
Linking Public Health and Security Authorities	R.3.1 Public health and security authorities (e.g., law enforcement, border control, customs) are linked during a suspect or confirmed biological event	4
Medical Countermeasures and Personnel Deployment	R.4.1 System is in place for sending and receiving medical countermeasures during a public health emergency	4
	R.4.2 System is in place for sending and receiving health personnel during a public health emergency	3
Risk Communication	R.5.1 Risk communication systems (plans, mechanisms, etc.)	4
	R.5.2 Internal and partner communication and coordination	4
	R.5.3 Public communication	5
	R.5.4 Communication engagement with affected communities	4
	R.5.5 Dynamic listening and rumor management	4
Other IHR Related Hazards and Points of Entry (PoEs)	PoE.1 Routine capacities are established at PoE	5
	PoE.2 Effective Public Health Response at Points of Entry	5
Chemical Events	CE.1 Mechanisms are established and functioning for detecting and responding to chemical events or emergencies	3
	CE.2 Enabling environment is in place for management of chemical Events	5
Radiation Emergencies	RE.1 Mechanisms are established and functioning for detecting and responding to radiological and nuclear emergencies	3
	RE.2 Enabling environment is in place for management of Radiation Emergencies	5

附錄一 Appendix 1

Agenda of the UPMC Experts' Visit in Taiwan March 29 – April 1, 2016

March 29, 2016, Meeting at 7F, Taiwan CDC

Time	Subject
09:00-09:10	Welcome remarks (Dr. Steve Kuo)
09:10-09:30	Briefings by Taiwan CDC on Taiwan's experience in responding to the Ebola threats
09:30-09:50	Briefings by Taiwan CDC on Taiwan's experience in responding to the Zika threats
09:50-10:00	Break
10:00-10:30	Introduction to UPMC and its work (Dr. Eric Toner) ▪ CDC project on Ebola (Dr. Eric Toner) ▪ Multilateral Dialogues (Mr. Matthew Shearer)
10:30-12:00	Briefing on the Global Health Security Agenda (GHSA) and UPMC's work in support of GHSA (Dr. Jennifer Nuzzo)
12:00-13:30	Lunch
13:30-14:30	Briefing on other US policy initiatives that support GHSA (Dr. Jennifer Nuzzo) ▪ US TB Action Plan ▪ White House DR-TB Action Plan
14:30-15:00	Break
15:00-16:30	Briefing by UPMC on proposed work plan for completing Taiwan's GHSA Assessment (Dr. Eric Toner/Dr. Jennifer Nuzzo) *During this briefing, UPMC will provide an overview of the process by which countries' GHSA assessments have been conducted and findings from the assessments conducted to-date. UPMC will provide an overview of each of the sectors contained in the current GHSA assessment tool, known as the WHO International Health Regulations (IHR) Joint External Evaluation (JEE) assessment tool.*
16:30-17:00	Discussion UPMC and Taiwan CDC to identify a process and work plan to complete Taiwan's self- and external assessment Taiwan's GHSA assessment. *UPMC will lead a discussion with Taiwan CDC of the steps that will be required to conduct the self- and external- GHSA assessments.*
18:30-	Welcome dinner

March 30, 2016, Discussion with Taiwan CDC of GHSA assessment areas at 7F, Taiwan CDC

UPMC and Taiwan CDC will discuss each of the technical and qualitative questions contained in the following sections of the WHO IHR JEE tool:

Time	Subject	Division
09:00-09:30	National Legislation, Policy and Financing (e.g., legislation, regulations, policies or other government instruments in place are sufficient for implementation of IHR)	Planning and Coordination
09:30-10:00	IHR Coordination, Communication and Advocacy (e.g., functional mechanism for the coordination and integration of relevant sectors in the implementation of IHR)	Epidemic Intelligence Center
10:00-10:30	Real-Time Surveillance (Indicator- and event-based surveillance systems; syndromic surveillance; inter-operable, interconnected, electronic real-time system for reporting, including WHO, FAO, OIE)	
10:30-11:00	Break	
11:00-11:30	Workforce Development (human resources to implement IHR core capacity requirements; applied epidemiology training such as FETP; workforce strategy)	Office of Preventive Medicine
11:30-12:00	Visiting program at UPMC	
12:00-13:30	Lunch	
13:30-14:00	Risk Communication	Public Relation Office, Office of Preventive Medicine
14:00-14:30	Immunization (vaccine coverage, vaccine access and delivery)	Acute Infectious Diseases
14:30-15:00	Zoonotic Disease (surveillance, veterinary/animal health workforce, programs/plans for responding to zoonoses)	

The goal of these discussions will be to provide clarity regarding the technical and qualitative questions included in each of the above sections that Taiwan will have to be answered in the self- and external assessments. These questions should provide information to help determine which external partners may need to be included in the assessment process.

March 31, 2016, Discussion with Taiwan CDC of GHSA assessment areas at 7F, Taiwan CDC

UPMC and Taiwan CDC will discuss each of the technical and qualitative questions contained in the following sections of the JEE tool:

Time	Subject	Division
09:00-09:30	Emergency Response Operations	Emergency Operation Center
09:00-10:00	National Laboratory System (detection of priority diseases, specimen referral and transport; point-of care and laboratory-based diagnostics; laboratory quality system)	Center for Diagnostics and Vaccine Development
10:00-10:30	Break	
10:30-11:00	Antimicrobial Resistance (detection, surveillance, healthcare-associated infection prevention and control programs, antibiotic stewardship)	Infection Control and Biosafety
11:00-11:30	Biosafety and Biosecurity (safety/security of human, animal, and agriculture facilities)	
11:30-12:00	Point of Entries (PoEs)	Quarantine
12:00-13:30	Lunch	
13:30-14:30	Medical Countermeasures and Personnel Deployment (systems for sending/receiving medical countermeasures and health personnel during a public health emergency)	Preparedness and Emerging Infectious Diseases
14:30-15:00	Preparedness (Multi-hazard National Public Health Emergency Preparedness and Response Plan; priority public health risks and resources are mapped and utilized)	
15:00-15:30	Linking Public Health and Security Authorities (e.g. Law Enforcement, Border Control, Customs) are linked during a suspect or confirmed biological event	

The goal of this discussion will be to provide clarity regarding the technical and qualitative questions included in each of the above sections. These questions should also provide information to help determine which external partners may need to be included in the assessment process.

April 1, 2016, Discussion with Taiwan CDC and Other Relevant Agencies of GHSA assessment areas at 7F, Taiwan CDC

UPMC and Taiwan CDC will discuss each of the technical and qualitative questions contained in the following sections of the JEE tool:

Time	Subject	Division
10:00-11:00	Tuberculosis	Chronic Infectious Diseases
11:00-12:00	Food Safety (detecting and responding to foodborne disease and food contamination)	Taiwan Food and Drug Administration
12:00-14:00	Lunch	
14:00-15:00	**UPMC and Taiwan CDC will also discuss next steps, jointly plan for work to be completed before UPMC's next visit, and develop a proposed agenda for UPMC's next visit.**	

附錄二 Appendix II
Agenda of the
UPMC Experts' Visit in Taiwan
June 21 – July 1, 2016

June.27.2016

June 21, 2016, Meeting at 1F, Taiwan CDC
UPMC Experts: Jennifer Nuzzo, Eric Toner, Crystal Boddie, Matthew Shearer

Time	Subject	TCDC Division
09:30-10:00	Briefing on the self-assessment progress report	(Yu-Chen, Yu-Ling)
10:00-12:00	(17) Points of Entry (PoE)	Quarantine
12:00-13:15	Lunch Break	
13:15-15:15	(1) National Legislation, Policy and Financing	Planning and Coordination
15:15-15:30	Coffee Break	
15:30-17:30	(16) Risk Communication	Public Relation Office, Office of Preventive Medicine

June 22, 2016, Meeting at 1F, Taiwan CDC
UPMC Experts: Jennifer Nuzzo, Eric Toner, Crystal Boddie, Matthew Shearer

Time	Subject	TCDC Division
9:30-11:30	(2) IHR Coordination, Communication and Advocacy	Epidemic Intelligence Center
11:30-13:00	Lunch Break	
13:00-15:00	(9) Real Time Surveillance	Epidemic Intelligence Center
15:00-15:15	Coffee Break	
15:15-17:15	(10) Reporting	Epidemic Intelligence Center

June 23, 2016, Meeting at 1F, Taiwan CDC
UPMC Experts: Jennifer Nuzzo, Eric Toner, Crystal Boddie, Matthew Shearer

Time	Subject	TCDC Division
9:30-11:30	(8) National Laboratory System	Center for Diagnostics
11:30-13:00	Lunch Break	
13:00-15:00	(6) Biosafety and Biosecurity	Infection Control and Biosafety
15:00-15:15	Coffee Break	

15:15-17:15	(3) Antimicrobial Resistance (AMR)	Infection Control and Biosafety

June 24, 2016, Meeting at 1F, Taiwan CDC

UPMC Experts: Eric Toner, Crystal Boddie, Matthew Shearer

Time	Subject	Department/Agency
9:30-11:30	(5) Food Safety	TCDC, TFDA
11:30-13:00	Lunch Break	
13:00-15:00	(18) Chemical Events	TCDC, EPA
15:00-15:15	Coffee Break	
15:15-17:15	(19) Radiation Emergencies	TCDC, AEC

June 27, 2016, Meeting at 7F & 1F, Taiwan CDC

UPMC Experts: Anita Cicero, Eric Toner, Crystal Boddie, Matthew Shearer

Time	Subject	TCDC Division
9:30-11:30	(11) Workforce Development	Office of Preventive Medicine
11:30-12:00	Health security professional training program	Office of Preventive Medicine
12:00-13:30	Lunch Break	
13:30-15:30	(4) Zoonotic Disease	Acute Infectious Diseases

June 28, 2016, Site Visit - Health Department of Taichung City Government

UPMC Experts: Anita Cicero, Eric Toner, Crystal Boddie, Matthew Shearer

Time	Subject	Department
08:24-09:13	High Speed Rail (Train ID: 0115) Taipei to Taichung	
9:13-9:50	To District Health Center of Mid-Western Region	Central Regional Center of TCDC
9:50- 10:00	Meet the Director General of Taichung Health Bureau	Director General YUAN-NIAN HSU
10:00-10:30	visit the District Health Center: 1. Management and Working Flow of Infectious Disease case 2. Vaccine cold chain	District Health Center of Mid-Western Region
10:30-11:20	To Taichung Hospital (5 minus walk) Briefing of the hospital	Taichung Hospital

11:20-12:00	Visit Taichung Hospital: 1. Emerging Infectious Disease Patient flow 2. Travel clinics	Taichung Hospital
12:00-12:30	Exchange Opinion	Taichung Hospital
12:30-14:00	Lunch	
14:00-15:00	Visit Taiwan CDC Central Regional Office and Taiwan FDA central regional office	TCDC Central Regional Office
15:00-16:30	Visit Chinese Tea Culture Center	
16:30-17:00	To Taichung High Speed Rail Station	

June 29, 2016, Meeting at 1F, Taiwan CDC

U.S. Expert: Ali Khan,
UPMC Experts: Anita Cicero, Eric Toner, Crystal Boddie, Matthew Shearer

Time	Subject	TCDC Division
9:10	Pick up from hotel lobby	Yuchen
9:10-10:30	Meet with Health Minister Lin	Yuchen
10:30-12:15	(12) Preparedness	Preparedness and Emerging Infectious Diseases
12:15-13:00	Lunch Break	
13:00-15:00	(13) Emergency Response Operations	Emergency Operation Center
15:00-15:15	Coffee Break	
15:15-16:30	(14) Linking Public Health and Security Authorities	Preparedness and Emerging Infectious Diseases
17:30-18:00	Pick up from TCDC Lobby	
18:00-	Dinner	

June 30, 2016, Meeting at 1F, Taiwan CDC

UPMC Experts: Eric Toner, Crystal Boddie, Matthew Shearer

Time	Subject	TCDC Division
8:30-9:45	(7) Immunization	Acute Infectious Diseases
10:00-12:00	(15) Medical Countermeasures and Personnel Deployment	Preparedness and Emerging Infectious Diseases
12:00-13:00	Lunch Break (UPMC and Taiwan CDC will discuss plans for the October symposium)	Yuchen, Yuling

13:30-14:00	Pick up from TCDC Lobby
14:00-	Visit Wan Fang Hospital

July 1, 2016, Meeting at 7F, Taiwan CDC

U.S. Expert: Ali Khan,

UPMC Experts: Anita Cicero, Eric Toner, Crystal Boddie, Matthew Shearer

Time	Subject
9:30-9:40	Remarks (Steve Kuo and Anita Cicero)
9:40-10:10	Briefing by UPMC on the IHR-JEE Assessment for National Health Security Capacities and Key Findings From the Assessment Undergone in the U.S and other Countries.
10:10-12:00	Presentations by Ali S. Khan, MD
12:00-13:30	Lunch Break
13:30-16:00	Summary of Key Findings for Each Assessment Area (held by UPMC)
16:00-16:20	General Discussion (held by UPMC)
16:20-16:30	Concluding (Steve Kuo)

附錄三 Appendix III

Agenda of International Symposium

Assessing Countries' Global Health Security Capabilities

An International Public Health Symposium
Convened by the UPMC Center for Health Security
October 19, 2016
W Hotel, Washington, DC

Agenda

9:00-9:15	Welcome	**Thomas Inglesby**, MD, CEO/Director, UPMC Center for Health Security
9:15-9:20	Overview of the Joint External Evaluation Process	**Jennifer Nuzzo,** DrPH, UPMC Center for Health Security

Learning from Taiwan's JEE and Approaches to Health Security

9:20-9:35	Introductory remarks	**Steve Hsu-Sung Kuo**, MD, MPH, PhD, Former Director-General, Taiwan CDC
9:35-9:55	Overview of the Taiwan JEE	**Yi-Chun Lo**, MD, Deputy Director-General, Taiwan CDC
9:55-10:10	Hospital preparedness in Taiwan	**Hui-Yun Kao**, MSc, Division of Preparedness & EID, Taiwan CDC
10:10-10:30	Taiwan's national laboratory system and pathogen surveillance	**Ji-Rong Yang**, MSc, Center for Research, Diagnostics and Vaccine Development, Taiwan CDC
10:30-10:45	Border control & infectious diseases	**Li-Li Ho**, Division of Quarantine, Taiwan CDC
10:45-11:00	Detection and surveillance of EID	**Shu-Wan Jian**, DVM, MPH, Epidemic Intelligence Center, Taiwan CDC
11:00-11:15	The role of medical universities in global health security	**Nai-Wen Kuo**, PhD, MPH, Dean, College of Public Health, Taipei Medical University
11:15-11:30	Lessons learned from the Taiwan JEE	**Eric Toner,** MD, UPMC Center for Health Security
11:30-12:00	Moderated Q&A	**Steve Hsu-Sung Kuo,** MD, MPH, PhD, Former Director-General, Taiwan CDC

Lunch Talk on Recent GHSA Activities

12:00-1:00	Lunch provided	**Lawrence Kerr,** PhD, Pandemics & Emerging Threats, Office of Global Affairs, HHS

JEE Experiences in Ethiopia, Bangladesh, Tanzania and Pakistan

1:00-1:20	The importance of JEEs to the GHSA and overview of JEEs in other countries	**Jose Fernandez**, PhD, Office of Global Health Affairs, US Department of Health and Human Services
1:20-1:40	Pakistan and Bangladesh	**Kashef Ijaz,** MD, Division of Global Health Protection, CDC
1:40-1:55	Ethiopia	**Lawrence Kerr,** PhD, Pandemics & Emerging Threats, Office of Global Affairs, HHS
1:55-2:10	Tanzania	**William Karesh,** DVM, EcoHealth Alliance
2:10-2:40	Moderated Q&A	**Jennifer Nuzzo,** DrPH, UPMC Center for Health Security
2:40-3:00	Break	

Approach, Challenges, and Value of the US JEE

3:00-3:25	Overview of the US JEE	**Maria Julia Marinissen**, PhD Division of International Health Security, ASPR, HHS
3:25-3:45	CDC involvement in JEE	**Theresa Smith**, MD, Division of State and Local Readiness, US CDC
3:45-4:00		
4:00-4:20	USDA involvement in JEE	**Thomas Gomez**, DVM, USDA
	Moderated Q&A	**Crystal Boddie**, MPH, UPMC Center for Health Security

Conclusion

4:20-4:30	Closing Comments	**Thomas Inglesby**, MD, Director, UPMC Center for Health Security **Yi-Chun Lo**, MD, Deputy Director-General, Taiwan CDC

附錄四 Appendix IV
Symposium Attendee List

Last Name	First Name	Organization
Adams	Martin	GSS Health
Appler	Jessica	US Dept of Health and Human Services
Arabasasdi	Ashley	Management Sciences for Health
Bali	Sulzhan	
Boddie	Crystal	UPMC Center for Health Security
Borio	Luciana	FDA
Callihan	Donald	
Chang	Chia	UDN Group
Chow	Lucy	TECRO
Chuang	Evelyn	Georgetown University
Cicero	Anita	UPMC Center for Health Security
Courtney	Lauren	RTI
Courtney	Brooke	FDA
Elegbe	Olumide	Management Sciences for Health
Farquharson	Christine	Office of Management & Budget
Fernandez	Jose	US Dept of Health and Human Services
Fischer	Julie	Georgetown University
Fish	Rebecca	EBSI
Forino	Marc	US Dept of State
Gomez	Thomas	USDA
Heiberg	Danielle	Global Health
Herrmann	Jack	US Dept of Health and Human Services
Ho	Li-Li	Taiwan CDC
Hsu	Yu-Chen	Taiwan CDC
Ijaz	Kashef	US Centers for Disease Control and Prevention
Inglesby	Tom	UPMC Center for Health Security
Jenkins	Bonnie	US Dept of State
Jian	Shu-Wan	Taiwan CDC
Kao	Hui-Yun	Taiwan CDC
Karesh	William	Eco Health Alliance
Katz	Rebecca	Georgetown University
Kerr	Larry	US Dept of Health and Human Services
Kuo	Nai-Wen	Taipei Medical University
Kuo	Steve Hsu-Sung	Taiwan CDC (ret)
Liu	Han-Hsi	Georgetown University
Lo	Philip Yi-Chun	Taiwan CDC
Lu	Daniel	TECRO
Lubit	Amanda	
Lucey	Daniel	Georgetown University

Last Name	First Name	Organization
Macgregor-Skinner	Gavin	ABT Associates
Manrique	Joanne	Center for Global Health & Diplomacy
Marinissen	Maria Julia	US Dept of Health and Human Services
Meyer	Diane	UPMC Center for Health Security
Michael	Gretchen	US Dept of Health and Human Services
Nalabandian	Michelle	NTI (Nuclear Threat Initiative)
Nuzzo	Jennifer	UPMC Center for Health Security
Pack	Alison	UPMC Center for Health Security
Paranjape	Sumi	MRI Global
Phelan	Alexandra	
Post	Kristin	Davis Defense
Ravi	Sanjana	UPMC Center for Health Security
Reczek	Jeff	US Senate Appropriations Committee
Rosenblum	Deborah	NTI (Nuclear Threat Initiative)
Sell	Tara	UPMC Center for Health Security
Shearer	Matthew	UPMC Center for Health Security
Smith	Frank	Management Sciences for Health
Smith	Theresa	US Centers for Disease Control and Prevention
Sorrell	Erin	Georgetown University
Standley	Claire	Georgetown University
Su	Yi-Feng	Taiwan CDC
Tavares	Erica	International Medical Corps
Thompson	Chelsea	
Toner	Eric	UPMC Center for Health Security
Tyson	Price	UPMC Center for Health Security
Van Der Horst	Kay	MRI Global
Varanay	Emily	Metabiota
Waldhorn	Richard	Georgetown University
Wang	Shiou-Chu	
Watson	Matthew	UPMC Center for Health Security
Yang	Ji-Rong	Taiwan CDC
Yeh	Kenny	MRI Global

附錄五 Appendix V

TB Report

Opportunities to Address Tuberculosis within the Global Health Security Agenda and the World Health Organization IHR (2005) Monitoring and Evaluation Framework Joint External Evaluation (JEE) Tool

Maintaining strong tuberculosis (TB) control programs is vital for ensuring countries' health security. Countries with well-functioning and effective TB programs have developed capacities that can be leveraged for a range of public health emergencies of international concern (PHEICs). Strong TB control programs have functioning network of laboratories, robust systems for surveillance, credible, trusted risk communication efforts, partnerships with community-based organizations, responsive field staff for conducting case and outbreak investigations, strong partnerships with clinicians (including those in the private sector), programs for acquiring, storing and distributing medical countermeasures, programs aimed and preventing antimicrobial resistance. When each of these components are in place and functioning well, countries are well-poised to respond to outbreaks posed by emerging or re-emerging infectious diseases or other PHEICs.

TB in Taiwan

Tuberculosis remains a significant public health problem in Taiwan. In 2015, the incidence of TB was 45.7 cases per 100,000 population, making Taiwan a medium incidence country. Though Taiwan has made important progress in the last 10 years in reducing the occurrence of TB, Taiwan must remain vigilant in its fight against TB. Like in many other industrialized countries that have made significant progress towards decreasing TB incidence, and though the total number of TB cases in Taiwan continues to decrease each year. However due to challenges in recent years, it will likely be difficult to maintain a steady reduction in incidence rate.

Taiwan faces the following challenges in further reducing its TB burden:

- *Introduction from neighboring higher burden countries*: Further declines in TB incidence will likely require screening for and treatment of latent tuberculosis infection (LTBI), particularly in its immigrant population.
- *Limited financial resources*: As Taiwan's TB incidence falls, TB control budgets have decreased, which makes it difficult to make further progress towards TB elimination goals.
- *Limited human resources*: More personnel are needed, particularly at the county and city level, such as public health nurses, outbreak investigators, medical technologists, etc.
- *High burden in hard to reach populations:* Taiwan's TB incidence and number of deaths is highest among the elderly. Expanded community-based partnerships and tailored risk communication efforts are needed to improve diagnosis and treatment of TB in this hard-to-reach risk group.
- *Less than optimal treatment success rate in specific age groups:* Currently, Taiwan's treatment success rate among the elderly population is below the WHO target. Partnerships are needed to ensure patients receive proper treatment and to improve patient adherence.

- *Delay in case finding:* To halt the TB epidemic in Taiwan, early detection of TB cases is the key to reducing infections and stopping transmission that results in new cases.

To further its progress in TB control, in 2006 Taiwan's Executive Yuan approved "National Mobilization Plan to Halve TB in 10 Years", and subsequently, in 2010, the "National Mobilization Plan to Halve TB in 10 Years - Phase 2".[1] Taiwan has received international accolades for its efforts to implement these plans.[2]

The GHSA and the WHO IHR JEE

The Global Health Security Agenda (GHSA) was announced by the United States in February 2014, as an international initiative to "help build countries' capacity to help create a world safe and secure from infectious disease threats and elevate global health security as a national and global priority." The GHSA is currently a partnership of over 50 countries that work at domestically and multilaterally multilateral and multi-sectoral approach to strengthen both the global capacity and nations' capacity to prevent, detect, and respond to human and animal infectious diseases threats whether naturally occurring or accidentally or deliberately spread.

At a meeting in Helsinki, Finland, in early 2014, GHSA-member countries identified eleven discrete GHSA Action Packages (see Box 1), the goal of which is to "translate political support into action and to guide countries toward achieving the GHSA targets." Each of the Action Packages was shaped by technical experts from countries around the world and has been agreed upon by all GHSA countries, who work collaboratively to lead and implement them. All GHSA member countries participate in one or more Action Packages by building capacity at a national, regional, and/or global level. Each of the 11 Action Packages includes a 5-year target, one or more indicators by which to measure progress, and lists of baseline assessment, planning, monitoring, and evaluation activities to support successful implementation.

The World Health Organization's IHR (2005) Monitoring and Evaluation Framework Joint External Evaluation (JEE) Tool was developed in collaboration with the WHO's international partners and initiatives such as the Global Health Security Agenda (GHSA), as part of the IHR (2005) Monitoring and Evaluation framework.[3] Consistent with the goals of the GHSA, the Joint External Evaluation Tool "is intended to assess country capacity to prevent, detect, and respond to public health threats independently of whether they are naturally occurring, deliberate, or accidental." Within the JEE tool there are 19 focus areas (see Figure 2).

Both the GHSA and the WHO IHR JEE process focus on core capacities that cut across a range of health security threats. In doing so, these initiatives are threat-agnostic. They both leave room for countries to determine which pathogens are their highest priorities and to develop capacities to control them. For example, in Uganda, a US-funded GHSA pilot program was developed to address multi-drug resistant *Mycobacterium tuberculosis*, *Vibrio cholerae*, and Ebola virus.[4] The pilot program worked on strengthening laboratory testing, communication, enhancing the existing communications and information systems for outbreak response, and building an emergency operations Center. These core public health capacities will not only be helpful in reducing the threat the three priority pathogens, but will also be useful in addressing a range of public health threats.

TB, the GHSA, and the WHO IHR JEE

International efforts to improve nations' health security capacities represent important opportunities for making further progress in TB control. Both the GHSA and the WHO IHR JEE tool focus on developing public health capacities that are central to TB control. Each of these initiatives call for improvements in laboratory capacity, surveillance, work force development, infection control and efforts to limit the development and spread of antimicrobial resistance—all areas that are core components of TB control and are touched upon in WHO's End TB Strategy (see Figure 3). Additionally, the fact that a primary goal of both the GHSA and the WHO IHR JEE is to increase political commitments represents an important opportunity for TB. Since TB control programs typically compete for resources within national budgets and suffer from insufficient political attention, it may be beneficial to embed TB control goals within GHSA and WHO IHR JEE efforts.

Since Taiwan recently published the results of its WHO IHR JEE, it is worth examining whether TB control goals can be incorporated into Taiwan's future work in developing and improving capacities that were identified within the JEE as priority areas for its health security. There are a number of opportunities within the WHO IHR JEE to address TB (see red text in Figure 2). As Taiwan CDC reviews its JEE results and considers how it will make improvements to its existing capacities, it has the opportunity to use TB as a focusing exercise for these efforts. Taiwan CDC and its partners can examine how its efforts to improve its IHR capacities can also be used to make further progress on "Taiwan's strategy for TB elimination by 2035 to join WHO". This will likely bring benefits to TB control efforts, but will also provide practical opportunities to work on strengthening Taiwan's health security capacities. Since Taiwan routinely experiences cases of TB, the disease will provide regular opportunities to examine Taiwan's response to health security threats.

Opportunities to Strengthen Taiwan's IHR Capacities

Due to its strong core public health programs and experience with a large number of public health emergencies, Taiwan is quite advanced with respect to its current IHR capacities. As revealed in the recently completed IHR JEE, Taiwan received high scores on nearly all components of the external assessment. Continued support for existing TB programs will help Taiwan maintain its existing, advanced IHR capacities in a number of areas (see Figure 2). Additionally, there are several areas where Taiwan has the opportunity to strengthen its current IHR capacities through current or enhanced TB control activities. Below (text in italics) are some areas of Taiwan's IHR JEE where improvements could conceivably be made if Taiwan chose to expand its current TB control efforts. Non-italicized text following an arrow indicates UPMC Center for Health Security's recommendations for improving Taiwan's capacities through its TB control programs.

D.2.1 Real Time Surveillance

- *Taiwan should use their expertise to help other countries bolster their surveillance systems.*

➢ Recommendation: TCDC has advanced systems for communicable disease surveillance. Taiwan has the opportunity to improve its scores in the Real Time Surveillance section of the WHO IHR JEE by sharing its expertise in TB surveillance with other countries.

D.4.1 Human resources are available to implement IHR core capacity requirements

- *Financial restrictions impair the ability to deploy personnel internationally.*
- *Limited trained epidemiologists are available at the city/county level.*
- *Local health bureaus have personnel that can conduct case investigations, but they have no formal training in conducting outbreak investigations.*

➢ Recommendation: Taiwan could ensure that there are adequate numbers of trained public health personnel to respond during PHEICs by increasing the number of trained personnel that work on TB control. As indicated above, increased numbers of case investigators, public health nurses, medical technologists are needed to improve Taiwan's TB control efforts. Were more individuals to be recruited to these positions and/or trained in TB control, this would likely serve as an important reserve of staff that can be utilized during PHEICs.

D.4.2 Applied epidemiology training program in place such as FETP

- *There are no long-term training programs in public health for physicians, nurses, veterinarians, or laboratorians. These personnel learn on the job.*

➢ Recommendation: Increasing the availability of TB-related training programs for laboratory and clinical personnel that work on TB control may bolster both Taiwan's TB control efforts and the availability of trained staff that can be utilized during PHEICs.

R.3.1 Public health and security authorities (e.g., law enforcement, border control, customs) are linked during a suspect or confirmed biological event

- *Formal coordination mechanisms between public health and security authorities at the local level for nonemergency activities could strengthen relationships necessary for identifying health events with security considerations and conducting subsequent investigations. Additionally, Taiwan should direct the development of formal collaboration protocols at the local level to support public health involvement in investigations for these types of incidents.*

➢ Recommendation: Formal partnerships between public health, law enforcement, and border control that are established for TB control may be leveraged for responding to PHEICs. Real-world incidents or exercises involving noncompliant TB patients may be a helpful way to assess and improve coordination between public health and security authorities.

R.5.1 Risk Communication Systems (plans, mechanisms, etc.)

- *TCDC has concerns about the current and expected funding/resource level compared to that required to grow the program. Consistent, dedicated funding for public communications, particular during emergencies, would enable implementation of long-term training programs and improve public risk communications efforts.*

Recommendation: Dedicated funding for risk communication efforts aimed at improving screening and treatment of TB and LTBI patients among high risk groups may be helpful for reducing further TB incidence and for expanding the availability of risk communication resources within TCDC.

R.5.4 Communication Engagement with Affected Communities

- *Further efforts are needed with respect to fully engaging affected communities. Communities are not currently viewed as equal partners in incident response. Engaging with the public and community groups during non-emergency periods can facilitate relationship building that will benefit public communications during emergencies.*

➢ Recommendation: TCDC can work to improve its community engagement scores by developing working, two-way partnerships with community groups for the purposes of improving the diagnosis and treatment of TB.

Figure 1: GHSA Action Packages (APs)*

Prevent 1: Antimicrobial Resistance
Prevent 2: Zoonotic Disease
Prevent 3: Biosafety and Biosecurity
Prevent 4: Immunization
Detect 1: National Laboratory System
Detect 2 & 3: Real-Time Surveillance
Detect 4: Reporting
Detect 5: Workforce Development
Respond 1: Emergency Operations Centers
Respond 2: Linking Public Health with Law and Multisectoral Rapid Response
Respond 3: Medical Countermeasures and Personnel Deployment Action Package

**APs in red denote potential synergies with TB control programs*

Figure 2: Component Areas of the WHO IHR JEE*

Prevent
National Legislation, Policy and Financing
IHR Coordination, Communication and Advocacy
Antimicrobial Resistance (AMR)
Zoonotic Disease
Food Safety
Biosafety and Biosecurity
Immunization
Detect
National Laboratory System
Real Time Surveillance
Reporting
Workforce Development
Respond
Preparedness
Emergency Response Operations
Linking Public Health and Security Authorities
Medical Countermeasures and Personnel Deployment

Risk Communication
Other IHR-related hazards and Points of Entry (PoE)
Points of Entry (PoE)
Chemical Events
Radiation Emergencies

Component areas in red denote potential synergies with TB control programs

Figure 3: Pillars and Components of WHO's End TB Strategy*

INTEGRATED, PATIENT-CENTRED CARE AND PREVENTION

1. Early diagnosis of tuberculosis including universal drug-susceptibility testing, and systematic screening of contacts and high-risk groups
2. Treatment of all people with tuberculosis including drug-resistant tuberculosis, and patient support
3. Collaborative tuberculosis/HIV activities, and management of co-morbidities
4. Preventive treatment of persons at high risk, and vaccination against tuberculosis

BOLD POLICIES AND SUPPORTIVE SYSTEMS

5. Political commitment with adequate resources for tuberculosis care and prevention
6. Engagement of communities, civil society organizations, and public and private care providers
7. Universal health coverage policy, and regulatory frameworks for case notification, vital registration, quality and rational use of medicines, and infection control
8. Social protection, poverty alleviation and actions on other determinants of tuberculosis

INTENSIFIED RESEARCH AND INNOVATION

9. Discovery, development and rapid uptake of new tools, interventions and strategies
10. Research to optimize implementation and impact, and promote innovations

* *Component areas in red denote potential synergies with GHSA and IHR components*

References:

1. National Mobilization Plan to Halve TB in 10 Years - Phase 2
2. Strengthening health security by implementing the International Health Regulations (2005). Development, monitoring and evaluation of functional core capacity for implementing the International Health Regulations (2005): Concept note. Word Health Organization website. http://www.who.int/ihr/publications/concept_note_201507/en/. Accessed November 8, 2016.
3. Borshert J, Tappero J, Downing R, et al. Rapidly Building Global Health Security Capacity — Uganda Demonstration Project, 2013. *MMWR* January 31, 2014 / 63(04);73-76. http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6304a2.htm?s_cid=mm6304a2_x

附錄六 Appendix VI
JEE Final Report

IHR JOINT EXTERNAL EVALUATION OF TAIWAN

JUNE 21 – JULY 1, 2016

UPMC CENTER FOR HEALTH SECURITY

Final Report- November 11, 2016

Table of Contents

EXECUTIVE SUMMARY

Joint External Evaluation Process

This is an independent assessment of Taiwan's capabilities under the International Health Regulations – 2005 (IHR) using the IHR Joint External Evaluation (JEE) tool. The purpose of the evaluation is to guide Taiwan in its progress toward full development of IHR capabilities to prevent, detect, and respond to public health threats, whether they are naturally occurring, deliberate, or accidental. This tool provides a standard metric by which countries can assess their current baseline capabilities and measure future progress. The JEE was used to assess Taiwan's collective capabilities, not just those of the Ministry of Health and Welfare (MOHW) or Taiwan Centers for Disease Control (TCDC). Many of the required capabilities involve other governmental agencies as well, such as agriculture, defense, border control, environmental protection, and nuclear power. Therefore, the external evaluation of Taiwan's capabilities emphasized cross-sectoral and interagency collaboration.

An External Assessment Team consisting of 5 US subject matter experts from the UPMC Center for Health Security and 1 former US CDC official conducted the evaluation in collaboration with a multi-sectoral team of officials from relevant agencies from the Government of Taiwan. The evaluation involved 2 visits to Taipei, Taiwan, including a pre-assessment orientation visit in March 2016 and the evaluation mission which took place from June 21 through July 1, 2016. Prior to the evaluation mission, the Government of Taiwan completed a self-assessment using the JEE tool. During the evaluation mission, Taiwan presented the results of the self-assessment to the External Assessment Team—over the course of 8 working days—followed by structured discussions of each indicator among the Taiwan experts and the External Assessment Team. The External Assessment Team considered the self-assessment, interviewed officials on 19 separate self-assessment teams, and reviewed supporting documentation. The JEE tool addresses 48 indicators that relate to 19 capabilities (elements), with hundreds of corresponding Contextual and Technical Questions. Based on the answers to these questions and supporting documentary evidence, scores were assigned for each of the indicators on a 5-point scale. The scores range from 1 (indicating No Capacity) to 5 (indicating Sustainable Capacity). The scores only apply to the host county and how it compares to the evaluation criteria; the JEE tool is not designed to compare countries to one another.

Taiwan's current strengths, areas which need strengthening, recommended priority actions, and scores were developed through a process of consensus among the External Assessment Team and Taiwan team members. Additionally, the External Assessment Team conducted site visits to a regional health bureau and hospital in the City of Taichung, a large teaching hospital in Taipei, and the TCDC Emergency Operations Center (EOC).

At this time, only 7 other countries have completed and published an external assessment using the JEE tool, and Taiwan is the 8th country to publish its results.

Findings from the Joint External Assessment

Throughout the external assessment, Taiwan's robust strengths in public health were obvious. Taiwan is doing an excellent job in meeting most of the IHR goals. There is clear, Sustainable Capacity (Level 5) for many of the indicators, including points of entry and disease surveillance, and Demonstrated Capacity (Level 4) for many others, such as the development of national policy and antimicrobial stewardship. For some indictors in which a lower capacity is evident, it is often only a small part of a criterion that is missing.

While Taiwan demonstrates considerable capacity in most of the assessed areas, it does face some challenges. These fall into 3 overarching themes that emerged during the evaluation:

- Because of its unique international political status, Taiwan is not a full member state in the WHO and, therefore, cannot participate in some international programs that support IHR capabilities.
- Like many countries, interagency and cross-sectoral collaboration in Taiwan is not optimal for fully achieving some IHR capabilities. For example, closer collaboration between the human public health, animal health, and food inspection sectors at both the local and national levels would enhance food safety and improve outbreak investigation capabilities in Taiwan.
- Personnel and budgetary constraints and cutbacks limit some activities needed to fully achieve some IHR goals. Limited budgets also seem to hinder Taiwan's ability to be more engaged internationally. This inhibits Taiwan's ability to learn from bilateral or multilateral engagement and to share its considerable expertise with other countries.

Summary of Scores

Element	Indicator	Score
National Legislation, Policy, and Financing	P.1.1- Legislation, laws, regulations, administrative requirements, policies, or other government instruments in place are sufficient for implementation of IHR	4
	P.1.2- The state can demonstrate that it has adjusted and aligned its domestic legislation, policies, and administrative arrangements to enable compliance with the IHR (2005)	4
IHR Coordination, Communication, and Advocacy	P.2.1- A functional mechanism is established for the coordination and integration of relevant sectors in the implementation of IHR	4
Antimicrobial Resistance	P.3.1- Antimicrobial resistance (AMR) detection	5
	P.3.2- Surveillance of infections caused by AMR pathogens	5
	P.3.3- Healthcare-associated infection (HCAI) prevention and control programs	4
	P.3.4- Antimicrobial stewardship activities	4
Zoonotic Disease	P.4.1- Surveillance systems in place for priority zoonotic diseases/pathogens	5
	P.4.2- Veterinary or animal health workforce	5
	P.4.3- Mechanisms for responding to infectious zoonoses and potential zoonoses are established and functional	5
Food Safety	P.5.1- Mechanisms are established and functioning for detecting and responding to foodborne disease and food contamination	3
Biosafety and Biosecurity	P.6.1- Whole-of-government biosafety and biosecurity system is in place for human, animal, and agriculture facilities	3
	P.6.2- Biosafety and biosecurity training and practices	3
Immunization	P.7.1- Vaccine coverage (measles) as part of national program	5
	P.7.2- National vaccine access and delivery	5
National Laboratory System	D.1.1- Laboratory testing for detection of priority diseases	5
	D.1.2- Specimen referral and transport system	5
	D.1.3- Effective modern point-of-care and laboratory-based diagnostics	5
	D.1.4- Laboratory quality system	5
Real-Time	D.2.1- Indicator- and event-based surveillance systems	4

Surveillance	D.2.2- Interoperable, interconnected, electronic real-time reporting system	4
	D.2.3- Analysis of surveillance data	5
	D.2.4- Syndromic surveillance systems	4
Reporting	D.3.1- System for efficient reporting to WHO, FAO, and OIE	5
	D.3.2- Reporting network and protocols in country	5
Workforce Development	D.4.1- Human resources are available to implement IHR core capacity requirements	4
	D.4.2- Applied epidemiology training program in place such as FETP	4
	D.4.3- Workforce strategy	5
Preparedness	R.1.1- Multi-hazard national public health emergency preparedness and response plan is developed and implemented	5
	R.1.2- Priority public health risks and resources are mapped and utilized	5
Emergency Response Operations	R.2.1- Capacity to activate emergency operations	5
	R.2.2- Emergency Operations Center operating procedures and plans	5
	R.2.3- Emergency operations program	5
	R.2.4- Case management procedures are implemented for IHR-relevant hazards	5
Linking Public Health and Security Authorities	R.3.1- Public health and security authorities (e.g., law enforcement, border control, customs) are linked during a suspect or confirmed biological event	4
Medical Countermeasures and Personnel Deployment	R.4.1- System is in place for sending and receiving medical countermeasures during a public health emergency	4
	R.4.2- System is in place for sending and receiving health personnel during a public health emergency	3
Risk Communication	R.5.1- Risk communication systems (plans, mechanisms, etc.)	4
	R.5.2- Internal and partner communication and coordination	4
	R.5.3- Public communication	5
	R.5.4- Communication engagement with affected communities	4
	R.5.5- Dynamic listening and rumor management	4
Other IHR Related Hazards and Points of Entry (PoEs)	PoE.1- Routine capacities are established at PoE	5
	PoE.2- Effective Public Health Response at Points of Entry	5
Chemical Events	CE.1- Mechanisms are established and functioning for detecting and responding to chemical events or emergencies	3
	CE.2- Enabling environment is in place for management of chemical Events	5
Radiation Emergencies	RE.1 Mechanisms are established and functioning for detecting and responding to radiological and nuclear emergencies	3
	RE.2- Enabling environment is in place for management of Radiation Emergencies	5

PREVENT

National Legislation, Policy, and Financing

Target

States Parties should have an adequate legal framework to support and enable the implementation of all of their obligations and rights to comply with and implement the IHR (2005). In some States Parties, implementation of the IHR (2005) may require new or modified legislation. Even where new or revised legislation may not be specifically required under the State Party's legal system, States may still choose to revise some legislation, regulations, or other instruments in order to facilitate their implementation and maintenance in a more efficient, effective, or beneficial manner.

States Parties should ensure provision of adequate funding for IHR implementation through their national budget or other mechanisms.

Taiwan Level of Capabilities

Though not an official member state in the WHO, Taiwan has cooperated with the WHO by adopting the IHR since 2007. Taiwan has amended its Communicable Disease Control Act to in accordance with the IHR and has designated the TCDC as the National Focal Point for IHR implementation. In 2009, Taiwan received notification from WHO of approval for its participation in the IHR.

In 2012, Taiwan completed and submitted to WHO its IHR Core Capacity Monitoring Framework self-assessment. For this self-assessment, Taiwan was able to answer in the affirmative to all questions pertaining to the core capacity of "National Legislation, Policy, and Financing." External assessments of IHR capabilities at Taiwan's international airport and seaport also earned full scores.

P1.1 Legislation, laws, regulations, administrative requirements, policies, or other government instruments in place are sufficient for implementation of IHR — Score: 4

Strengths

- Since adoption of the IHR in 2005, the MOHW developed a Task Force—including TCDC and other entities—to review applicable laws and policies in Taiwan to ensure that they comply. The Communicable Disease Control Act, Disaster Prevention and Protection Act, Point of Entry (PoE) regulations, and a number of other legislation and policy were updated to bring them into compliance.

Areas which need to be strengthened

- While there are strong laws and regulations currently in place in Taiwan for communicable diseases and public health, additional legislation, regulation, and financing related to other sectors—including law enforcement/security, agriculture, and customs—should be considered in order to strengthen a multi-sectoral approach to health security.

P1.2 The state can demonstrate that it has adjusted and aligned its domestic legislation, policies, and administrative arrangements to enable compliance with the IHR (2005) — Score: 4

Strengths

- Despite not being a full member state in the WHO, Taiwan has shown earnest commitment to compliance with IHR regulations.

- Taiwan regularly reviews IHR compliance during exercises and actual PHEICs.
- Taiwan has in place agreements and MOUs with many of its neighboring countries to improve cooperation during international public health emergencies.
- There are opportunities for cross-sectoral collaboration between TCDC (National Focal Point) and other ministerial agencies when the Executive Yuan activates the Central Epidemic Command Center (CECC; EOC for epidemics) during national emergencies (e.g., Executive Yuan regularly convened the MOHW and Environmental Protection Administration on "mosquito-borne disease prevention").

Areas which need to be strengthened

- Though ministerial agencies appear to coordinate well during emergencies, additional collaboration across Taiwan government agencies and sectors during non-emergency periods is needed to ensure that existing national legislation, policies, and financing fulfill IHR responsibilities.
- Additional personnel dedicated to reviewing and drafting policy and legislation could strengthen Taiwan's capacity in this area.
- While TCDC has performed a comprehensive review of national legislation and policy related to communicable diseases and public health, other sectors and agencies such as chemical, agricultural, and food safety have not fully reviewed legislation and regulations to determine if any changes are needed to meet IHR obligations.

Recommendations for Priority Actions

- Taiwan has robust programs for detection and reporting of PHEICs caused by communicable disease. Though TCDC has agreements with ministerial agencies to detect and report PHEICs, there is a lack of evidence from these other agencies to determine the robustness with which they are committed and capable of detecting and reporting non-communicable disease emergencies.
- Taiwan's inability to serve as a full member state of the WHO limits its ability to fully participate in IHR implementation. Though Taiwan regularly reports PHEICs, some of its reports have not been distributed to other member states.

Relevant Documentation

- Disaster Prevention and Protection Act (2016)
- Communicable Disease Control Act (2015)
- Toxic Chemical Substances Control Act (2013)
- Nuclear Emergency Response Act (2003)
- Statute for Prevention and Control of Infectious Animal Diseases (2014)
- Budget Act, Executive Yuan (2013)
- IHR Questionnaire for Monitoring Progress in the Implementation of the IHR Core Capacities in States Parties (2012)
- IHR Assessment Tool for Core Capacity Requirements at Designated Airports, Ports, and Ground Crossings (2009)
- Taiwan's Public Health Emergency Preparedness Programs 10 Years after SARS (2012)
- Opening Up and Guarding the Country: Benefits of the 16 Cross-Strait Agreements (2012)
- Legislative documents of the Communicable Disease Control Act (2007)
- Press release for CECC activation in response to a dengue outbreak (2015)
- Directions for establishing a Taipei International Airport Health Security Working Group (2013)
- Taipei International Airport Health Security Working Group roles and responsibilities chart (2013)

- Regulations on Implementation of Communicable Disease Surveillance and Alert System, MOHW (2015)
- Enforcement Rules for the Implementation of the Nuclear Emergency Response Ace (2012)
- Press release regarding the first meeting of the Vectorborne Disease Control and Prevention Joint Meeting (2016)

IHR Coordination, Communication, and Advocacy

Target

The effective implementation of the IHR (2005) requires multi-sectoral/multidisciplinary approaches through national partnerships for effective alert and response systems. Coordination of nationwide resources, including the sustainable functioning of a National IHR Focal Point (NFP), which is a national center for IHR (2005) communications, is a key requisite for IHR (2005) implementation. The NFP should be accessible at all times to communicate with the WHO IHR Regional Contact Points and with all relevant sectors and other stakeholders in the country. States Parties should provide WHO with contact details of NFPs, and continuously update and annually confirm them.

Taiwan Level of Capabilities

Though not a full member state in the WHO, Taiwan has developed a framework for detecting and reporting PHEICs as required by the IHR. There is strong evidence of Taiwan's commitments and ability to detect and report PHEICs that are caused by communicable disease. Additionally, IHR obligations are strengthened through legal agreements between TCDC and the Council of Agriculture (CoA) regarding animal and human health surveillance for zoonotic disease and for some foodborne diseases. Additionally, CoA and TCDC laboratories share sequence data for avian influenza viruses.

P2.1 A functional mechanism is established for the coordination and integration of relevant sectors in the implementation of IHR — Score: 4

Strengths

- Taiwan's Standard Operating Procedures (SOP) for IHR guidelines is written to be consistent with requirements specified by WHA 58.3.
- There are specific risk-based protocols for ministerial coordination and evidence that the NFP distributes IHR-related information with national and local partners.
- There is a well-established mechanism for activating a government-wide CECC during large health emergencies and PHEICs.
- There is strong commitment between CDC and CoA for conducting One Health Surveillance and sharing data to detect and report PHEICs of zoonotic origin.
- Lists of ministerial contact points are updated regularly, and there is evidence of *ad hoc* cross-sectoral collaboration during non-emergency periods and during certain emergency situations (e.g., response to the Fukushima nuclear disaster).

Areas which need to be strengthened

- Though ministerial agencies appear to coordinate during serious national emergencies via the CECC convened by the Executive Yuan, collaboration between agencies outside of national-level events appears to be conducted largely on an *ad hoc* basis. IHR compliance may be strengthened if cross-sectoral and inter-ministerial meetings are convened more frequently or more regularly to discuss smaller health events.
- Taiwan should ensure that its guidelines and SOPs are updated and coordinated across all sectors.
- Taiwan should update its official document for WHA 58.3 that requires ministerial agencies to report potential PHEICs to Taiwan's NFP.

Recommendations for Priority Actions

- Taiwan should ensure that there is high-level support for IHR detection/reporting obligations across all relevant government sectors by regularly scheduling meetings of ministerial officials to examine and discuss mutual IHR-related obligations and by updating cross-ministerial agreements for IHR reporting to the NFP.

Relevant Documentation

- INFOSAN Emergency- Final Update: Melamine-contaminated milk and other food products (2009)
- Event information update: Fukushima earthquake and Dai-ichi and Dai-ni nuclear accidents (2011)
- OIE notification: Rabies (2013)
- Manual for Biohazard Response and Verification and Expert Team
- TCDC EOC Activation Levels algorithm
- Biological Disaster Response Plan, 3rd Edition (2012)
- Taiwan Ministry IHR Contact Points list
- National Focal Point SOPs (2012)
    - Including Flow Chart for International Referrals
- Integrate and Promote the Network on Detection, Surveillance, and Control of Foodborne Diseases in Taiwan (2013)
- Example weekly avian influenza and rabies reports from CoA to TCDC- via SMS/e-mail
- Example weekly foodborne illness report from TFDA to TCDC- via SMS/e-mail (2016)
- Taiwan's Response Effort to the 2013 Rabies Outbreak (2014)
- Guidelines for Dengue/Chikungunya Control, 8th edition (2015)
- Influenza Pandemic Strategic Plan, 3rd edition (2012)
- TCDC Annual Report (2015)
- Example international reporting/referral e-mail regarding tuberculosis and Zika (2016)

Antimicrobial Resistance

Target

Support work is being coordinated by WHO, FAO, and OIE to develop an integrated and global package of activities to combat antimicrobial resistance, spanning human, animal, agricultural, food and environmental aspects (i.e., a One Health approach), including: a) Each country has its own national comprehensive plan to combat antimicrobial resistance; b) Strengthen surveillance and laboratory capacity at the national and international level following agreed international standards developed in the framework of the Global Action plan, considering existing standards; and c) Improved conservation of existing treatments and collaboration to support the sustainable development of new antibiotics, alternative treatments, preventive measures, and rapid point-of-care diagnostics, including systems to preserve new antibiotics.

Taiwan Level of Capabilities

Taiwan has advanced capabilities for antimicrobial resistance (AMR) detection and reporting, which began in 2007. There are multiple systems for surveillance of resistant organisms in the human health and animal health sectors. With respect to human health, Taiwan maintains a National Reference Laboratory that is capable of advanced/confirmatory testing and a network of authorized laboratories at hospitals nationwide. Taiwan has been working to increase the number of authorized laboratories, so as to further decentralize testing efforts. With respect to animal health, Taiwan operates a national laboratory and a network of 28 laboratories that test for and report cases of AMR.

There are multiple, dedicated efforts for verifying laboratory test results through internationally recognized external quality assurance methods.

P.3.1 Antimicrobial resistance (AMR) detection — Score: 5

Strengths

- The National Action Plan on AMR is a multi-faceted, multidisciplinary approach, which works through the implementation of antimicrobial stewardship programs by hospitals, programs for surveillance of resistance, regular review of surveillance patterns and national policies, and allocation of additional resources to conduct enhanced surveillance/research for AMR.
- Taiwan has the capacity to detect and respond to emerging resistant pathogens.
- Hospitals in Taiwan participate in different AMR pathogen detection mechanisms and are able to test any WHO priority AMR pathogens.
- Within the human health sector, AMR testing is verified by external quality assurance (e.g., CAP, Taiwan Accreditation Foundation, proficiency testing by Taiwan Society of Laboratory Testing).
- Taiwan refers to OIE standards to conduct surveillance of AMR and to monitor indicator bacteria within the animal sector. Testing is conducted in accordance with ISO 17025 and the Clinical and Laboratory Standards Institute requirements.

Areas which need to be strengthened

- Additional coordination at the laboratory level is needed between the human health and agricultural sectors. Sharing of data and bacterial isolates and susceptibility information could be improved among TCDC, Taiwan Food and Drug Administration (TFDA), and CoA laboratories.

P.3.2 Surveillance of infections caused by AMR pathogens — Score: 5

Strengths

- All hospitals in Taiwan have responsibility for surveillance of infections caused by AMR pathogens; some hospitals also participate as sentinel sites for monitoring of specific pathogens.
- TCDC and local public health laboratories as well as hospitals can report AMR (and access data) through the National Notifiable Disease Surveillance System (NNDSS), and hospitals can report AMR infections and AMR susceptibility through the Taiwan Nosocomial Infection Surveillance System (TNIS). The Taiwan Surveillance of Antimicrobial Resistance (TSAR) is a biennial longitudinal surveillance program conducted at the national level
- by the National Health Research Institute.

Areas which need to be strengthened

- For AMR surveillance in animals, TFDA only monitors for AMR at slaughterhouses, not at farms, which provides only a small window into resistance patterns. Trace-back to affected farms and removal of animals with resistant organisms from the food supply do not occur.

P.3.3 Healthcare-associated infection (HCAI) prevention and control programs — Score: 4

Strengths

- Taiwan has a national plan to prevent HCAI, which is applicable to all hospitals. It is tied to healthcare performance promotion efforts and is reviewed and updated annually; however, not all designated hospitals have implemented all HCAI programs for 5 years.
- Some hospitals have negative pressure isolation suites and rooms for special management of highly infectious patients and MDR diseases.

Areas which need to be strengthened

- None

P.3.4 Antimicrobial stewardship activities — Score: 4

Strengths

- Taiwan has multiple systems in place to assess antibiotic use patterns for all hospitals. This is accomplished through development of medical quality indicators administered through the National Health Insurance plan, which are tied to hospitals' annual budgets, and through hospital accreditation, which has three indicators related to antimicrobial stewardship.
- The Veterinary Drugs Control Act requires prescriptions for antibiotic use in animals, save for 9 antimicrobials that are not used in humans.
- Taiwan initiated a 3-year National Antimicrobial Stewardship Program (Taiwan ASP) in 2013.

Areas which need to be strengthened

- Not all hospitals have resources to report AMR data. Additional resources and funding at community hospitals would be helpful to promote AMR surveillance, reporting, and management.
- Decisions on antimicrobial use are made at the hospital level and may vary significantly among hospitals. Additional national guidance on AMR stewardship may be helpful.

Recommendations for Priority Actions

- Taiwan should further develop its nationwide antimicrobial stewardship. While Taiwan implemented the National Antimicrobial Stewardship Program in 2013, evidence indicates that there is still considerable variability in antimicrobial use across healthcare facilities. Considering that the program was just initiated in 2013, its full impact may not yet be realized. Effective data collection and analysis could inform program review and adjustment over the next several years.
- Taiwan should work to further improve connections between surveillance systems for foodborne pathogens and AMR organisms.
- Taiwan should consider expanding efforts to test for AMR in the animal sector (prior to slaughterhouses) to ensure that resistance can be traced back to farms.

Relevant Documentation

- Communicable Disease Control Act (2015)
- Categorization of Communicable Diseases
- Regulations on Implementation of Communicable Disease Surveillance and Alert System, MOHW (2015)
- Regulations Governing Inspection and Implementation of Infection Control Measures in Medical Care Institutions, MOHW (2016)
- Regulations Governing Laboratory Testing for Communicable Diseases and Management of Laboratory Testing Institutions, MOHW (2015)
- Statistics of Communicable Diseases and Surveillance Report, 2013
- Annual Surveillance Report of Healthcare-associated Infections Among Medical Centers and Regional Hospitals, 2014
- Annual Surveillance Report of Healthcare-associated Infections in ICUs Among Local Hospitals, 2014
- List of hospitals reporting at least 1 of 8 communicable diseases to NNDSS
- National Patient Safety Goals
- Regulation and standards of hospital accreditation and infection control inspection related to the availability of functioning IPC policy, operational plan and SOPs at hospitals
- Standards for standard pressure and negative pressure isolation room
- Distribution of medical centers with negative pressure isolation room
- The Organizational Structure and Staffing Standards for Hospitals, the standard for IPC professionals staffing
- Criteria of IPC professionals staffing level in infection control inspection and hospital accreditation standards
- Infection Prevention and Control Standards (2016)
- National Health Insurance Pharmaceutical Reimbursement Principle
- Taiwan Guidelines for TB Diagnosis and Treatment (2015)
- International Standard of Tuberculosis Care (2009)
- National Health Insurance Global Budget Payment System Hospital Quality Assurance Program
- National Health Insurance Guaranteed Hospital Global Budget Program, 2015
- Standard Criteria for Hospital Antimicrobial Stewardship Accreditation and Hospital Infection Control Inspections
- National Health Insurance Medical Quality Information website
- Pharmaceutical Affairs Act, MOHW (2015)
- Veterinary Drugs Control Act, CoA (2013)
- TCDC Medical Infection Control Measures Guidelines
- Institute of Labor, Occupational Safety and Health Needlestick prevention advocacy website

- National Notifiable Disease Surveillance System (NNDSS) overview
- Taiwan Nosocomial Infection Surveillance System (TNIS) overview
- Taiwan Surveillance of Antimicrobial Resistance (TSAR) overview
  - List of participating hospitals
- National Antimicrobial Stewardship Program, TCDC (2013)
  - Antimicrobial Stewardship-Related E-Learning Courses List
  - Manual for Antimicrobial Stewardship
  - Assessment Items for Antimicrobial Stewardship Program (2015)
  - Index of Antimicrobial Stewardship Program (2015)
  - Promotional Products for Antimicrobial Stewardship Programs
- Example AMR surveillance and epidemiology research projects
- Master Plan for Healthcare Associated Infections Prevention and Biosafety and Biosecurity Practices, Executive Yuan (2009)
- Healthcare Performance Promotion Program, Executive Yuan (2009)
- Nationwide Campaign on Hand Hygiene
  - List of participating hospitals
- Nationwide Campaign on Central Line Bundle, TCDC (2014)
  - List of participating hospitals and program workbooks/forms
  - Revised implementation and funding (2015)
- Nationwide Campaign on Care Bundles to Prevent CAUTI & VAP, TCDC (2015)
  - List of participating hospitals and program workbooks/forms
- Example Quarterly Surveillance Report of Taiwan Nosocomial Infection Surveillance System (2015)
- Analysis report of surveillance indexes of National Antimicrobial Stewardship Program in 2015
- Example External Quality Assurance certificates for TCDC

Zoonotic Disease

Target

Adopted measured behaviors, policies, and/or practices that minimize the transmission of zoonotic diseases from animals into human populations.

Taiwan Level of Capabilities

Taiwan has a number of policies and practices in place to prevent and respond to zoonotic disease transmission in the country. TCDC has real-time human surveillance capabilities in place through the NNDSS for a number of important diseases that may be transmitted from animals to humans—including influenza, SARS, MERS, Rabies, Japanese Encephalitis, bovine tuberculosis, and hantavirus. In addition, CoA has established surveillance and reporting requirements for diseases of human importance in animal populations, including for highly pathogenic avian influenza viruses, bovine spongiform encephalopathy, brucellosis, and rabies. Wild animal populations are monitored passively and the public is encouraged to report sick animals to the local agricultural authority. Human and animal health data are collected and reported regularly, made publicly available on TCDC and CoA websites, and shared across government agencies via e-mail and interagency meetings. CoA coordinates and trains veterinary staff and leads animal screening, vaccination, quarantine, and mitigation efforts.

P.4.1 Surveillance systems in place for priority zoonotic diseases/pathogens — Score: 5

Strengths

- There are strong surveillance systems in place for zoonotic diseases/pathogens. CoA conducts surveillance of disease in domestic and wild animals. Surveillance systems are updated regularly (weekly), and the data and analyses are made available publicly on the Ministry of Agriculture website.
- CoA has a list of priority pathogens for animal and zoonotic diseases.

Areas which need to be strengthened

- Greater coordination between CoA and TCDC is needed. The two agencies currently coordinate on more of an *ad hoc* basis, and surveillance systems are not directly linked. The 2 agencies, however, share information relatively frequently.
- Currently, there is no One Health policy in Taiwan; however, there is a project being planned to draft a formal One Health policy for the Taiwan government. This project will start at the beginning of 2017.

P.4.2 Veterinary or Animal Health Workforce — Score: 5

Strengths

- CoA provides short, 3-day training sessions to local Bureau of Agriculture staff, including veterinary officers responsible for prevention and control of animal diseases.

Areas which need to be strengthened

- Training of public health staff on controlling zoonotic diseases is minimal.
- Currently, there are no exchanges of staff between CoA and FETP, and FETP staff are not trained as part of the CoA program.

P.4.3 Mechanisms for responding to infectious zoonoses and potential zoonoses are established and functional — Score: 5

Strengths

- TCDC response to human infections is very well coordinated and managed. With real-time surveillance in place, TCDC can respond, isolate, and investigate cases very quickly. During the recent H7N9 outbreak, TCDC isolated and investigated all cases within 24 hours of the patients entering the healthcare system.

Areas which need to be strengthened

- None

Recommendations for Priority Actions

- Develop and implement One Health policies that help clarify roles at the executive, regional, and local government levels and increase coordination among programs for animal and human health preparedness, surveillance, and response.
- Link human health and surveillance systems seamlessly so that TCDC and CoA share human and animal health data automatically.
- Provide additional training to local and regional agricultural staff, and conduct One Health trainings that involve veterinary and animal health workers, human epidemiologists, and public health agency staff.

Relevant Documentation

- One Health Approach to Global Health Security: An Integrated Study of Infectious Disease Prevention and Control (2016)
- Prevention and Control Project of Zoonotic Animal Diseases Program (2016)
- Taiwan's Response Efforts to the 2013 Rabies Outbreak (2014)
- Public Health Responses to Reemergence of Animal Rabies, Taiwan, July 16–December 28, 2013 (2015)
- Taiwan Epidemiology Bulletin, Rabies Issue (2013)
- Communicable Disease Control Act (2015)
- Statute for Prevention and Control of Infectious Animals Disease (2014)
    - Including Enforcement Rules (2009)
- Seasonal Influenza Vaccination Program (2015)
- Voluntary Pre-Pandemic (A/H5N1) Vaccine Immunization Program (2016)
- Enforcement Rules of Statute for Prevention and Control of Infectious Animal Diseases (2009)
- List of Major Zoonotic Diseases: Article 17 of Chapter 3 Epidemic Control, Statute for Prevention and Control of Infectious Animal Disease - announcement on April 24, 2015
- Animals Emergency and Epidemic Situation Reporting Process
- Bureau of Animal and Plant Health, Inspection, and Quarantine weekly surveillance reports
- National Infectious Disease Statistics System
- Application form for furnishing biological material
- Spacer oligonucleotide typing (spoligotyping) Standard Operating Procedures
- Geographical Distribution of Avian Influenza Outbreaks in Taiwan (2016)
- Training Program for Veterinary Clinical Epidemiologists
- Manual for Tuberculosis Control, Chapter 4: Case Management, *M. bovis* infection (2015)

Food Safety

Target

States Parties should have surveillance and response capacity for food- and waterborne disease risks or events. It requires effective communication and collaboration among the sectors responsible for food safety and safe water and sanitation.

Taiwan Level of Capabilities

Taiwan has established regulations and protocols, based on international standards, to govern food safety in the country. While Taiwan cannot participate directly as a member state in the WHO International Food Safety Authorities Network (INFOSAN), the government is in direct contact with INFOSAN in order to gather relevant international information related to food safety and to share information and data from Taiwan with the international community. TFDA has established a Product Management Distribution System (PMDS) to manage food safety inspections nationwide; this system incorporates information on food source, supplier, and supply chain. TFDA has also established PulseNet, a foodborne illness surveillance and reporting system. TFDA shares data on foodborne illness events, food product/environmental sample results, and results from human specimen testing directly and daily with TCDC through PMDS, which is connected seamlessly with TCDC information systems. TFDA, TCDC, and CoA have existing interagency coordination mechanisms and guidelines that govern information sharing between the agricultural and human health sectors and outline procedures for monitoring foodborne pathogens in agricultural, aquatic, and livestock product sources; pathogens in food product sources; and foodborne diseases in the human population. In 2014, Taiwan rapidly and effectively mobilized a response to an incident involving illegally recycled food oil—involving local health bureaus, TFDA, TCDC, MOHW, and law enforcement authorities—to identify the source, resolve the incident, and improve food safety standards in Taiwan.

P.5.1 Mechanisms are established and functioning for detecting and responding to foodborne disease and food contamination — Score: 3

Strengths

- TFDA has a good foodborne illness surveillance and reporting system in place (PulseNet), data from which is widely available on the MOHW website.
- Legislation is in place governing safety of food manufacturing, processing, packaging, transportation, storage, sale, importation, preparation, and service.
- At the national level, TCDC and TFDA regularly work together to share data and control large outbreaks of foodborne illness when they occur. Local health bureau personnel are able to complete Rapid Assessment Forms for outbreak investigations, and FETP-trained personnel from TFDA and TCDC are available to support local food safety and foodborne illness investigations as necessary.
- TFDA capabilities for surveillance, investigation, and response to food contamination incidents involving chemicals or other non-microbiological contaminants are strong.
- TFDA provides annual food hygiene and foodborne illness investigation training and coordinates with outside agencies (e.g., academic programs, private entities) to conduct other rigorous food safety and foodborne illness investigation training courses throughout the country. Trainings include epidemiology theory and practice as well as biostatistics and survey design, culminating with a practical simulated investigation (at least 60 hours of total training).

Areas which need to be strengthened

- Taiwan does not currently participate in INFOSAN, but is striving to participate in some capacity.
- While TFDA and TCDC work well together, there seems to be less collaboration at both the national level between TCDC and CoA and the local level between public health and agricultural authorities.
- At the local and regional levels, sharing of information and isolates between TCDC, TFDA, and CoA does not seem to be frequent or routinized. This may inhibit rapid identification and control of foodborne illness and prevention of food contamination and outbreaks stemming from contamination.
- Currently, TFDA and CoA do not routinely monitor food ingredients for microbiological contamination. Farms are not routinely inspected, only slaughterhouses or production facilities, so microbial outbreaks are rarely traced back to an individual farm or responsible ingredient. There is some reluctance on the part of TFDA and CoA to implement this kind of surveillance.
- While training opportunities for food safety and foodborne illness investigation do exist, many local officials reportedly are unable to participate because they often cannot take the time off from their daily duties and responsibilities to complete the training.

Recommendations for Priority Actions

- Additional routine coordination and communication between the human and animal health sectors could reduce the incidence of foodborne disease and improve investigation and response to outbreaks.
- Making training more available and accessible to local public health officials responsible for health inspection, foodborne illness investigation, and case reporting would be very beneficial. Standardized training at the local level could help reduce the incidence and spread of foodborne illness.
- Additional focus by TFDA and CoA is needed on monitoring pathogens in food product sources and in agricultural, aquatic, and livestock product sources. Regular inspection of farms could help with early identification of contamination in livestock and plant products, would provide surveillance data to assist with detection and trace-back of responsible food products in an outbreak, and would prevent some downstream human illness. More routine testing of food products being sold to restaurants and markets would also provide important surveillance data and would help to prevent illness.

Relevant Documentation

- Executive Yuan Chronicle of the Handling of the Recycled Oil Incident
- Product Management Distribution System website
- TFDA Annual Report (2015)
- Journal of Food and Drug Analysis

Biosafety and Biosecurity

Target

A whole-of-government national biosafety and biosecurity system is in place, ensuring that especially dangerous pathogens are identified, held, secured, and monitored in a minimal number of facilities according to best practices; biological risk management training and educational outreach are conducted to promote a shared culture of responsibility, reduce dual use risks, mitigate biological proliferation and deliberate use threats, and ensure safe transfer of biological agents; and country-specific biosafety and biosecurity legislation, laboratory licensing, and pathogen control measures are in place as appropriate.

Taiwan Level of Capabilities

Taiwan has a multi-sectoral plan for ensuring biosafety at laboratories within the country, which include ISO accreditation, inspection/oversight, and continued training of laboratory workers. It has identified which laboratories house dangerous pathogens and is currently developing regulations and procedures for enhancing biosecurity.

P.6.1 Whole-of-government biosafety and biosecurity system is in place for human, animal, and agriculture facilities — Score: 3

Strengths

- Biosecurity programs are well established in Taiwan. The Communicable Disease Control Act and Regulations Governing Management of Infectious Biological Materials (2005) regulate possession, storage, and handling of dangerous biological pathogens.
- MOHW has established a Laboratory Biosafety Information Management System to monitor numbers and types of collections of dangerous pathogens in the country.
- Medical and research laboratories are typically accredited under ISO 17025 or ISO 15189. Laboratories at the BSL-3 level or above are licensed and are inspected regularly. Licensed laboratories are required to have Institutional Biosafety Committees, training programs, safety equipment, emergency plans, and SOPs for good laboratory practices.
- Access to potentially dangerous pathogens and sensitive information about inventory are restricted to authorized personnel.
- Taiwan has made significant efforts to consolidate dangerous pathogens and toxins to a minimum number of laboratory facilities and will continue these efforts going forward.
- Taiwan's MOHW has developed rules for dual-use research.

Areas which need to be strengthened

- Currently, Taiwan does not have a Select Agent program; however, Operation Directions Governing Management of Select Agents are in the process of being drafted to address this. This program is scheduled to take effect in 2016.
- Biosecurity policies and practices are limited. Aside from access controls, additional security practices such as background checks or personnel reliability programs could enhance biosecurity in Taiwan.
- Consolidation of dangerous pathogens is not yet completed according to TCDC goals.

P.6.2 Biosafety and biosecurity training and practices — Score: 3

Strengths

- Training programs on biosafety and biosecurity are in place (since 2006) for BSL-3 and above laboratories. These trainings are conducted every year.
- Laboratory workers participate in annual exercises and external inspections.
- Regular inspection of high-containment laboratories indicates high compliance with biosafety procedures.
- Taiwan strives to meet both WHO and US CDC guidelines on biosafety/biosecurity policy.
- The government, private sector, and academic institutions cooperate well on biosafety/biosecurity.
- MOHW is planning to increase biosecurity and biosafety trainings for personnel working with Select Agents (the Select Agent Program is expected to begin in 2016).
- Taiwan has in place a program to regularly conduct security-related review of laboratory personnel in high-containment laboratories; however, this does not extend to other personnel that handle dangerous pathogens, such as those who work in the field (e.g., bioterrorism response, specimen collection).

Areas which need to be strengthened

- Training programs are currently not specifically focused on dangerous pathogens. TCDC recognizes the need for additional training in this area and plans to implement training and management for dangerous pathogens in the coming year as part of their Select Agent program.
- Additional expertise and guidance related to high-containment facilities would be helpful in implementation of biosecurity and biosafety measures for select agents.

Recommendations for Priority Actions

- Taiwan should continue with their plan to implement a Select Agent program—including consolidation of dangerous pathogen and toxin inventories—and improve training, physical security, and personnel monitoring (including non-laboratory personnel with access to dangerous agents) accordingly.
- Consolidation of dangerous pathogens into a small, controlled set of laboratories would reduce the risk from work on these pathogens and reduce the resources required to safeguard them.

Relevant Documentation

- Operation Directions Governing Management of Select Agents (Draft), MOHW (2016)
- List of Select Agents kept in Installation Unit in Taiwan, MOHW (2016)
- Regulations Governing Management of Infectious Biological Materials, MOHW (2014)
- Operation Directions Governing Management of Infectious Biological Materials, MOHW (2014)
- Frameworks of National Biosafety and Biosecurity Legislation, Regulations, MOHW (2016)
- Laboratory Biosafety Management: A Compilation of Regulations and Administrative Guidance, 2nd edition, TCDC (2015)
- The Pass Rate of Lab Inspection Criteria (GHSA related items) of BSL-3 laboratories in 2014-2015, MOHW (2016)
- Guideline for Review for Research Projects of Highly Dangerous Pathogens and Biotoxins, MOHW (2016)
- The Implementation of Laboratory Biorisk Management System for High-Protection Laboratories: Research Project Plan in 2015, MOHW
- The Implementation of Laboratory Biorisk Management System for High-Protection Laboratories: Research Project Plan in 2016, MOHW

- The Study of Establishing Laboratory Biorisk Management System in Biotechnology-Related Laboratories: Research Project Plan in 2016, MOHW
- Guideline for Appraisal of the Biosafety Competency of Laboratory Personnel , MOHW (2016)
- Testing Methods of Select Agents Corresponding to Notifiable Infectious Diseases, MOHW (2016)
- Course list of biosafety education and training organized by TCDC in 2006-2015
- Training Course List for the Workers in Facilities Housing or Working with Dangerous Pathogens (Draft), MOHW (2016)
- Course list of laboratory biosafety e-learning courses recorded by TCDC in 2010-2015
- Survey results of laboratory biosafety incident exercises for installation units possessing select agents, MOHW (2016)
- Course list for the biosafety train-the-trainer program organized by TCDC in 2010-2015
- Status of biosafety education and training for installation units possessing select agents, MOHW 2016
- BSL-3 laboratory personal protective equipment inventory status, MOHW (2016)

Immunization

Target

A functioning national vaccine delivery system—with nationwide reach, effective distributions, access for marginalized populations, adequate cold chain, and ongoing quality control—that is able to respond to new disease threats.

Taiwan Level of Capabilities

Taiwan has a robust national-level immunization program, which provides WHO Expanded Programme on Immunization (EPI) vaccines to children at no cost. Taiwan's National Vaccine Action Plan is also closely aligned with the WHO Global Vaccine Action Plan (GVAP). TCDC reviews and updates immunization programs and plans every 5 years to reflect changes in epidemiology, availability of vaccines, and advice from the Taiwan Advisory Committee on Immunization Practices (ACIP). The national vaccination program in Taiwan achieves very high immunization rates, with coverage of over 96% of children for primary doses of vaccines including HepB3, DTaP-IPV-Hib3, varicella, MMR1 and JE2, and over 93% for booster doses when needed. The Ministry of Health and Welfare also provides HPV vaccine at no cost to teenage girls in remote areas and from medium-low income households. Taiwan has strong vaccine delivery systems but limited domestic vaccine production capacity. It is working toward establishing a National Vaccine Fund in order to ensure steady funding and ability to add vaccines (e.g., rotavirus vaccine) to the immunization program in the future.

P.7.1 Vaccine coverage (measles) as part of national program — Score: 5

Strengths

- Taiwan has a comprehensive program for routine childhood immunization, including nationally important vaccines beyond the scope of the WHO Global Vaccine Action Plan.
- Routine vaccination is promoted through the Plan for the Establishment of a National Vaccine Fund and Strengthening Public Immunity.
- Taiwan has an adverse event surveillance system and an immunization compensation fund to which vaccine manufacturers are required to contribute.
- Taiwan has a comprehensive National Immunization Information System (NIIS), which tracks vaccination rates through electronic medical records and school enrolment records. All data are available in real time in a central database and are routinely accessed by medical practitioners.
- Coverage of the overall population for childhood vaccines is very high (98% for MMR1). Coverage of aboriginal peoples living in the mountainous regions of Taiwan is more difficult, but vaccination coverage is still high (over 90%).

Areas which need to be strengthened

- There is no penalty for non-compliance with mandatory vaccination. Children are not barred from entering school if they have not been vaccinated.
- Limited funding for the national vaccination program hinders Taiwan's ability to subsidize vaccine costs as well as efforts to add new vaccines to the national immunization schedule. The national vaccine fund does not cover the costs of new vaccinations that should be added according to the WHO recommendations, including Rotavirus and Hepatitis A vaccines.

P.7.2 National vaccine access and delivery — Score: 5

Strengths

- Taiwan has operational procedures, plans, and equipment in place to ensure cold chain for vaccines, with redundant systems for use during emergencies when power is discontinued. Vaccine management staff monitor vaccine temperatures regularly.
- Taiwan signs long-term contracts with vaccine manufacturers for high-quality vaccines in order to ensure an uninterrupted supply of vaccines for the country.
- Because Taiwan is a small island, much of the population is easily accessed and covered by routine vaccinations. Reaching aboriginal populations is more difficult, but this is being accomplished through targeted campaigns.
- Vaccination promotion information is available in many languages, and marginalized populations receive targeted attention and greater subsidization for vaccine services.

Areas which need to be strengthened

- Domestic vaccine production capacity for the country is currently limited to influenza and Japanese Encephalitis vaccine, but Taiwan is seeking to establish additional capacity in country.

Recommendations for Priority Actions

- A National Vaccine Fund should be established, and additional funding for this program should be allocated to enable an expanded national vaccine program. Steady funding for the National Vaccine Fund should be a priority.
- Taiwan should explore whether establishing additional in-country vaccine production capacity would be cost-effective and feasible for any of the vaccines covered under the national program.

Relevant Documentation

- Communicable Disease Control Act
- Current immunization schedule in Taiwan
- Survey of Willingness and Perceptions of Influenza Vaccination Among Elderly Persons Over the Age of 65, Global Views Survey Research Center (2016)
- The Hepatitis Control Program, Phase I to Phase VI (1981-2010)
- Program of Eradication of Poliomyelitis, Congenital Rubella Syndrome, Neonatal Tetanus and Measles, Phase I to Phase IV (1991-2010)
- Acute Infectious Disease Epidemic Risk Monitoring and Management Program, Phase I to Phase II, 2011-2020
- Plan for the Establishment of a National Vaccine Fund and Strengthening Public Immunity, Phase I to Phase II, 2008-2018
- List of target immunization coverage rates for each EPI vaccine (2015)
- Vaccine cold chain management handbook

DETECT

National Laboratory System

Target

Real-time biosurveillance with a national laboratory system and effective, modern point-of-care and laboratory-based diagnostics.

Taiwan Level of Capabilities

Taiwan has advanced capability for laboratory testing of 10 core tests. There are a total of 1,251 microbiological laboratories in a tiered system that addresses medical, agricultural, food, and environmental needs, including 31 national labs (national level), 23 local health bureau labs (regional level), 405 hospital labs (regional level), 530 university and research institute labs (district level), and 262 private labs (district level). Among these, 13 national labs as well as 16 commissioned regional-level labs, 75 private labs, 18 clinics, 67 district hospital labs, 85 regional hospital labs, 31 medical center labs, and 14 local health bureau labs are authorized to report on various notifiable diseases.

For the animal health sector, the Taiwan Animal Health Research Institute (AHRI) is capable of diagnosing avian influenza and *Mycobacterium bovis*. Additionally, 4 local laboratories spread throughout the country perform active surveillance for avian influenza in the field.

D.1.1 Laboratory testing for detection of priority diseases — Score: 5

Strengths

- Taiwan's national laboratory system is a tiered system and has the capability to test for priority diseases, including all 10 core tests.
- Taiwan ensures the standardization of testing throughout the tiered laboratory system through the Manual of Standard Operating Procedures of Communicable Diseases.
- Taiwan has official agreements with international governments for specialized testing and pathogen confirmation.

Areas which need to be strengthened

- None

D.1.2 Specimen referral and transport system — Score: 5

Strengths

- There are documented regulations governing the specimen referral network for each of the core tests, and there is evidence of a functioning referral system for each of the core tests.
- Courier contracts for specimen transport are funded by TCDC on an annual basis.
- Taiwan participates in several regional and international laboratory networks in both the human and animal health sectors.

Areas which need to be strengthened

- None

D.1.3 Effective modern point-of-care and laboratory-based diagnostics — Score: 5

Strengths

- Commercial point-of-care tests are available and routinely used at clinical sites for influenza and dengue.
- During outbreaks, Taiwan pays the fees for diagnosis using these tests.
- Taiwan has developed and commercialized several point-of-care infectious disease diagnostic tests.
- Taiwan has in-country production and procurement processes for acquiring necessary media and reagents.

Areas which need to be strengthened

- None

D.1.4 Laboratory quality system — Score: 5

Strengths

- Taiwan maintains multi-layered system for laboratory data validation.
- Laboratories are licensed by TCDC and inspected by local health bureaus. Laboratories are accredited by Taiwan Accreditation Foundation and via ISO certification.
- In-vitro diagnostics are regulated by TFDA.
- Laboratory equipment is maintained through maintenance contracts.
- Though laboratories in Taiwan are not able to be accredited by WHO, some laboratories have voluntarily participated in WHO-coordinated proficiency testing for some pathogens/diseases, including polio, *Salmonella,* tuberculosis, and measles, to ensure diagnostic quality.

Areas which need to be strengthened

- None

Recommendations for Priority Actions

- Taiwan should work to improve the interoperability of data systems for human public health and animal health laboratories.
- Due to Taiwan's unique political status, its public health laboratories are unable to be accredited by WHO, which limits Taiwan's ability to fully participate in global laboratory/surveillance networks.

Relevant Documentation

- Manual for Infectious Specimen Collection (2015)
- Taiwan Guidelines for TB Diagnosis and Treatment (2015)
- Certificate of Accreditation (ISO 15189) for TCDC national laboratories (2015)
- Certificate of Accreditation (ISO 17025) for Animal Health Research Institute (AHRI) national laboratories (2016)
- Certificate of Participation in *Salmonella* External Quality Assurance for TCDC Central Region Laboratory (2013-2014)
- Certificate of Participation in WHO Global Foodborne Infections Network (GFN) External Quality Assurance System for TCDC Center for Research and Diagnostics (2014)
- Results of 2015 blood-parasitology peer testing conducted by the College of American Pathologists
- Regulations Governing Laboratory Testing for Communicable Diseases and Management of Laboratory Testing Institutions (2015)
- Requirements for the Quality Assurance Operation to Laboratory Testing Institutions (2015)

- Guidelines for Authorizing Laboratory Testing Institutes, MOHW (2016)
- Malaria Microscopy Training Course: *Plasmodium* spp. Morphology Identification Test (TCDC)
- Monitoring Project for the Quality Control of AIDS and Hepatitis C Virus
- Implementation Regulations Governing Materials for Communicable Disease Control and Establishment of Resources
- Standard Operating Procedures for PPE Used in BSL-3 Laboratories (2013)
- Technical Training Program for New Employees at the TCDC National Laboratory
- Regulations Governing Management of Infectious Biological Materials (2014)
- Rule for approved training courses for new staff in BSL-3 and above laboratories
- Standard Operating Procedures (SOPs) for the Performance of 10 Core Laboratory Tests (2016)
- Standard Operating Procedure for Detection of Highly Pathogenic Avian Influenza Viruses
- Creutzfeldt-Jakob report from the UK (2013)
- Manual of Communicable Disease Standard Operating Procedures (2014)
- Number of clinical specimens submitted to national laboratories for core testing (2013-2015)
- Number of virus isolates submitted to national laboratories for influenza, enteroviral, and other diseases (2013-2015)
- Document of participation in PulseNet Asia Pacific/PulseNet International for *Salmonella* and other pathogens
- WHO Conference Report: Strengthening the influenza vaccine virus selection and development process: outcome of the 2nd WHO Informal Consultation for Improving Influenza Vaccine Virus Selection held at the Centre International de Conférences (CICG) Geneva, Switzerland, 7 to 9 December 2011 (2013)
- Document of attending the 2nd, 3rd, and 4th Vaccine Preventable Diseases Laboratory Network in the Western Pacific Region meetings (2010, 2011, 2013)
- National Documentation for Maintenance of Poliomyelitis Eradication in Taiwan (2015)
- Measles and rubella serology proficiency results , Center for Research, Diagnostics, and Vaccine Development (2015)
- 2015 WPRO Polio PT virus isolation results, HIV and Viral Emerging Infectious Disease Laboratory
- Certificate of Proficiency for tuberculosis phenotypic drug susceptibility testing, TB Reference Laboratory (2015)
- The number of laboratories accredited by TAF in Taiwan
- The number of laboratories accredited by CAP in Taiwan
- Program for Quality Monitoring at Tuberculosis Laboratories in Taiwan (2015)
- Supervision Checklists for TB Laboratories
- Operations for Quality Improvement in National Laboratories of Taiwan CDC (2015)
- Self-Reports for Abnormal Diagnostic Quality in Laboratories (2015)

Real-Time Surveillance

Target

Strengthened foundational indicator- and event-based surveillance systems that are able to detect events of significance for public health, animal health, and health security; improved communication and collaboration across sectors and between sub-national, national, and international levels of authority regarding surveillance of events of public health significance; improved country and regional capacity to analyze and link data from and between strengthened, real-time surveillance systems, including interoperable, interconnected electronic reporting systems. This can include epidemiologic, clinical, laboratory, environmental testing, product safety and quality, and bioinformatics data and advancement in fulfilling the core capacity requirements for surveillance in accordance with IHR and OIE standards.

Taiwan Level of Capabilities

Taiwan has highly developed and varied indicator- and event-based surveillance systems and deep expertise in data management, analysis, and visualization. Taiwan shares its surveillance information with national and local government stakeholders and with the public via open data initiatives. TCDC has developed a "data warehouse" that houses data from many of the disease surveillance systems. This data can be accessed by all local health departments, and users can retrieve, filter, and analyze relevant data. Taiwan regularly tries to improve its surveillance capabilities through cloud-based computing and big data initiatives. A particular strength is the requirement that clinicians view laboratory test results through NNDSS.

D.2.1 Indicator- and event-based surveillance systems — Score: 4

Strengths

- Taiwan consults many, varied data sources to supplement traditional indicator-based surveillance (e.g., NNDSS) and to verify disease/even-based signals.
- Taiwan conducts routine testing of its event-based surveillance systems.
- Taiwan maintains indicator-based surveillance systems that provide complete and timely data to support a range of public health analysis and response.

Areas which need to be strengthened

- Due to its unique political status, Taiwan is unable to participate in formal international surveillance networks; however, the Taiwanese desire to use their expertise to help other countries bolster their indicator- and event-based surveillance systems.

D.2.2 Interoperable, interconnected, electronic real-time reporting system — Score: 4

Strengths

- Taiwan has highly trained surveillance staff. Public health and clinical staff are routinely trained on use of surveillance systems, and feedback is solicited regarding user-friendliness of systems in order to make system improvements. Public health staff also receive training on various surveillance packages to improve their analytic skills.
- Taiwan's Real-time Outbreak and Disease Surveillance (RODS) system routinely monitors a number of diseases and conditions—including enterovirus; influenza-like illness; acute diarrhea; acute hemorrhagic conjunctivitis; hand, foot, and mouth disease; and herpangina. Many of Taiwan's surveillance streams are available publicly and in near-real time—including dengue, enterovirus, influenza, and acute diarrhea.

- Taiwan has been working to improve clinicians' use of NNDSS by reducing barriers to log-on.
- TFDA's Product Management Distribution System is interconnected to the TCDC data warehouse.

Areas which need to be strengthened

- Public health and veterinary surveillance systems are not yet interconnected.

D.2.3 Analysis of surveillance data — Score: 5

Strengths

- Laboratory diagnoses of specimens collected from suspected patients for notifiable diseases are required to be finished within a predefined turnaround time.
- Healthcare workers report and access test results for notifiable diseases via NNDSS which is interoperable with the Laboratory Information Management System used by Taiwan's reference laboratories.
- The Laboratory Automated Reporting System submits daily positive results of diagnoses by clinical laboratories for 20 microbiological organisms of public health concern (but not officially designated as notifiable).
- An agreement between TCDC, TFDA, and CoA established a foodborne diseases information exchange platform that provides notification of positive test results.

Areas which need to be strengthened

- None

D.2.4 Syndromic surveillance systems — Score: 4

Strengths

- Taiwan has multiple, well-established healthcare-based syndromic surveillance systems in routine use, and all utilize electronic reporting.
- Syndromic surveillance systems have extensive coverage of hospitals and populations within Taiwan.
- Taiwan maintains a number of ongoing, multi-faceted data validation efforts to ensure data quality and utility.

Areas which need to be strengthened

- Due to its unique political status, Taiwan is unable to participate in formal international surveillance networks (with the exception of PulseNet International); however, Taiwan desires to use its expertise to help other countries bolster their syndromic surveillance systems.

Recommendations for Priority Actions

- Through its collaboration with Public Health England to develop an application to support surveillance during mass gatherings, Taiwan has demonstrated its potential to share its knowledge and experience with international partners. Taiwan should continue to share its expertise with other countries to boost international surveillance efforts.

Relevant Documentation

- Communicable and Emerging Infectious Disease Report Form (2016)
- Standard operating procedures for the 1922 disease reporting hotline (2010)
- Standard operating procedures for international epidemic surveillance
- Standard operating procedures for the Media Watch Room
- Taipei City Department of Health website

- Event-based surveillance in New Taipei City (2015)
- Operating Manual for National Notifiable Disease Surveillance System (2013-2015)
- Operating Manual for Symptom Surveillance System (2015)
- Operating Manual for School-Based Surveillance System (2015)
- Statistics of Communicable Diseases and Surveillance Reports (2006-2015)
- TCDC website international epidemic information
- Flowchart for testing the 1922 disease reporting hotline
- User operation manuals for indicator-based surveillance systems, TCDC website
- Manuals for training workshops for Department of Health staff
- National Notifiable Disease Surveillance System website
- Taiwan National Infectious Disease Statistics System website
- Taiwan government open data set list website
- Example food-related illness data sharing between TFDA and TCDC (e-mail; 2015)
- Example Disease Surveillance Weekly Meeting Report (TCDC/EIS; 2016)
- TCDC Press Release website
- TCDC Information for Health Professionals website
- TCDC Weekly Report of Enterovirus Infection (weekly reports) website
- TCDC Influenza Express (weekly reports) website
- TCDC Disease Surveillance Express (weekly reports) website
- TCDC Laboratory Automated Reporting System website
- Tuberculosis Case Management System Manual
- TCDC Monitor website- MDR-TB cases and rates
- TCDC Foodborne Diseases Information Exchange platform website
- MOHW annual death registry and statistics
- Universal Health Coverage in Taiwan, Bureau of National Health Insurance (2012)
- Human Surveillance in Response to the 2013 Re-emergence of Animal Rabies in Taiwan (2013)
- Norovirus Surveillance in Taiwan (2015)
- Influenza Express weekly reports, 2015-16 flu season
- Case definitions for national notifiable diseases
- Principle for completeness and timeliness of National Notifiable Infectious Disease Surveillance System evaluation (2009)
- Standard operating procedures for completeness and quality of National Notifiable Infectious Disease Surveillance System evaluation
- Standard operating procedures for timeliness of National Notifiable Infectious Disease Surveillance System evaluation
- TCDC laboratory surveillance testing quality and efficiency assurance program description
- Collaboration with Public Health England to develop mass gatherings medical surveillance app
- Taiwan country page on the PulseNet International website

Reporting

Target

Timely and accurate disease reporting according to WHO requirements and consistent coordination with FAO and OIE.

Taiwan Level of Capabilities

Though not an official UN member state, Taiwan has developed and demonstrated its capacity to report significant events to WHO, FAO, and OIE contact points. Taiwan CDC maintains and regularly updates the list of contact points for IHR reporting, and has standard operating procedures in place for approving and reporting on a potential PHEIC to WHO within 24 hours. All relevant ministries in the Taiwan government are aware of the requirements and protocols to report to WHO, and TCDC has reported real events successfully - well under the 24 hour reporting requirement. In addition to its WHO reporting activities, Taiwan maintains formal and informal relationships with National Focal Points (NFP) in other countries in the region and around the world for the purpose of information exchange and collaboration.

D.3.1 System for efficient reporting to WHO, FAO, and OIE — Score: 5

Strengths

- Taiwan maintains a functional IHR NFP in TCDC, providing the capability to rapidly report PHEICs to the WHO and distribute IHR-related information to other governmental contacts. Additionally, Taiwan maintains an OIE contact point in the Bureau of Animal and Plant Health, Inspection, and Quarantine (BAPHIQ; under CoA).
- Taiwan has demonstrated the capability to rapidly report required PHEIC information to the WHO via the IHR NFP. Taiwan reported their first imported Zika case in January 2016 within the required 2 hours of laboratory confirmation.
- The Statute for Prevention and Control of Infectious Animal Disease mandates information sharing between the IHR NFP and OIE contact point for relevant zoonotic disease events.
- Taiwan maintains bilateral reporting agreements with the People's Republic of China (Cross-Strait Cooperation Agreement on Medicine and Public Health Affairs), facilitating past information exchange such as for avian influenza in 2013. Taiwan's CoA maintains a MOU with New Zealand for food safety and quarantine of animal and plant diseases.
- Taiwan has coordinated informally with the NFPs in Hong Kong, Republic of Korea, Thailand, Japan, New Zealand, and the United States.

Areas which need to be strengthened

- Taiwan cannot report or receive reports through the usual WHO channels. The Taiwan IHR NFP is required to report via e-mail, because—due to its unique political status—there is no access to the online reporting website.

D.3.2 Reporting network and protocols in country — Score: 5

Strengths

- The CECC facilitates interagency collaboration, information sharing, and communication across governmental ministries and agencies. Communication mechanisms between human and animal health sectors are outlined in national-level legislation.

- Taiwan has a designated National Focal Point that, in addition to reporting to WHO, distributes pertinent IHR-related information to its ministerial partners.
- Taiwan has a sustainable process for maintaining and improving reporting mechanisms supported by legislation.

Areas which need to be strengthened

- There are no formalized protocols for multi-sectoral coordination in reporting for health events. Coordination is determined on an *ad hoc* basis by the CECC. Outside of national emergencies, inter-ministry and interagency coordination occurs on an *ad hoc* basis.
- Taiwan has legislation regarding the decision-making protocol for the assessment and notification of PHEICs (based on WHA 58.3); however, it has not been assessed or updated since 2012. Taiwan has not yet assessed PHEIC reporting efficiency outside the context of infectious diseases.

Recommendations for Priority Actions

- Taiwan should continue to work to gain access to the official WHO reporting mechanism, even if it is unable to obtain full member state status with the WHO.
- The Taiwan government should strive to continue to improve and systematize communication and coordination across and among government agencies for public health events that may not meet the threshold of a PHEIC or activation of the CECC, but may still require the resources and input of multiple agencies in order to respond effectively.
- Taiwan should examine protocols and reporting performance for non-infectious disease public health emergencies. The government should ensure that plans are in place and are exercised to enable quality response and timely reporting of other public health emergencies.

Relevant Documentation

- TCDC Annual Report (2015)
- Example NFP e-mail report to IHR for imported Zika case (2016)
- OIE Exceptional Epidemiological Events website
- Major Zoonotic Infectious Animal Diseases (2015)
- The 180 Permanent Delegates of the OIE website
- Memorandum informing relevant sectors in Taiwan about the IHR reporting mechanism (2012)
- Cross-Strait Cooperation Agreement on Medicine and Public Health Affairs
- National Health Command Center website
- Press release for second imported Zika case (2016)

Workforce Development

Target

States Parties should have skilled and competent health personnel for sustainable and functional public health surveillance and response at all levels of the health system and the effective implementation of the IHR (2005).

Taiwan Level of Capabilities

Taiwan has the workforce needed to comply with IHR requirements, but staffing is limited and hiring is difficult. There are professional staff at every local health bureau but not great depth of staffing. Taiwan operates a FETP program, but it is constrained in how many personnel can participate. The full 2-year FETP course trains several personnel each year, but the shorter course aimed at local public health practitioners is difficult for many to attend due to existing work commitments. Taiwan has limited opportunities to send its public health personnel to international events.

D.4.1 Human resources are available to implement IHR core capacity requirements — Score: 4

Strengths

- Taiwan has the capability to deploy personnel domestically to support IHR requirements. There is also the capability and willingness to deploy internationally.
- TCDC employs personnel with a variety of specialties at all levels of public health (national, intermediate, local). Local health bureaus typically have at least one doctor on staff to perform clinical work. All intermediate public health agencies have epidemiology and laboratory capacity to support local responses. Many counties have laboratory personnel on staff, although some do not perform laboratory activities.

Areas which need to be strengthened

- The hiring process is fairly rigid, at times making it difficult to bring in personnel with specific needed skill sets. For example, positions for social scientists (including anthropology/medical anthropology) and informatics are not currently available at TCDC. Additional biostatisticians would be beneficial as well.
- While Taiwan maintains the capability and willingness to deploy personnel internationally, it is unclear whether other nations would be willing to accept assistance from Taiwan. Financial restrictions impair the ability to deploy personnel internationally.
- Limited trained epidemiologists are available at the city/county level. Local health bureaus have personnel that can conduct case investigations, but they have no formal training in conducting outbreak investigations.

D.4.2 Applied epidemiology training program in place such as FETP — Score: 4

Strengths

- The FETP in Taiwan supports public health response capacity across the country. There are currently approximately 50 FETP graduates across the country available to support incident response.
- TCDC also sends personnel to serve in the US CDC EIS program and the European Program for Intervention Epidemiology Training (EPIET) at ECDC.
- While it is sometimes difficult to deploy FETP-trained personnel to other nations, Taiwan maintains a cross-strait agreement with mainland China to collaborate on cross-strait investigations as necessary.

Areas which need to be strengthened

- There are currently only two levels of training courses available (1-month course and full 2-year program). The 1-month course provides only minimal training for local public health professionals. It is unclear how effective the short course actually is, because there is no required examination for the participants.
- Currently trained field epidemiologists are not tracked, although it is presumed that most work for TCDC.
- There are no long-term training programs in public health for physicians, nurses, veterinarians, or laboratorians. These personnel learn on the job.
- The FETP program is limited to public health personnel only. There are no participants representing animal health or academia.

D.4.3 Workforce strategy — Score: 5

Strengths

- Taiwan has a national public health workforce strategy. Allotments for positions within MOHW are assessed and updated regularly.
- TCDC has a wealth of experience in its workforce. The median length of employment is 10 years, and the mean is 14.7 years. 65% of the workforce remains at TCDC until retirement.
- There are a number of efforts to encourage retention of the public health workforce, including partial scholarships for graduate studies, annual leave, and pension plans.
- Personnel can take leave to participate in overseas training and education programs or participate in local programs without sacrificing too much pay.

Areas which need to be strengthened

- The workforce status is reviewed every year by MOHW, but it is not always reported externally.
- The allotments for personnel do not always align with the needs of individual departments and agencies within MOHW.

Recommendations for Priority Actions

- Flexibility in hiring at the TCDC should be sought to allow an optimal mix of professionals.
- Public health training programs for clinicians and laboratorians should be considered.
- TCDC should explore participation in the Global Outbreak and Response Network (GOARN) as a way to gain international experience and share its expertise with others.

Relevant Documentation

- Organization of Taiwan Centers for Disease Control
- MOHW promotion criteria (2014)
- TCDC Promotion Sequence Table (2015)
- TCDC Work Education Regulations (2014)
- MOHW awards regulations (2013)
- MOHW gift certificates memorandum (2016)
- Field Epidemiology Training Program curriculum (2016)
- TCDC personnel allotment table

RESPOND

Preparedness

Target

Preparedness includes the development and maintenance of national, intermediate, and community/primary response level public health emergency response plans for relevant biological, chemical, radiological, and nuclear hazards. Mapping of potential hazards, identification and maintenance of available resources—including national stockpiles—and the capacity to support operations at the intermediate and community/primary response levels during a public health emergency.

Taiwan Level of Capabilities

The Disaster Prevention and Protection Act is the overarching regulatory document for preparedness and response in Taiwan and covers 19 different disaster types—including natural disasters as well as chemical, biological, and nuclear threats. As a requirement of the Disaster Prevention and Protection Act, Taiwan established the Disaster Prevention and Protection Basic Plan (Basic Plan)—a 5-year framework for defining priority disaster types, health risks, policies, and countermeasures—in 2007 and updated it in 2013. The Basic Plan addresses the responsibilities of individual ministries for different types of disasters as well as implementation of IHR core capacities as they relate to emergency preparedness and response. For hazards not covered by the Disaster Prevention and Protection Act, the Executive Yuan Central Disasters Prevention and Protection Council assigns a lead regulatory agency to execute preparedness and response activities.

Taiwan has the capability to establish emergency operations centers (EOCs) at various agencies and levels of government—including 6 Regional Emergency Operations Centers (REOCs), the National Health Command Center (NHCC) and CECC at TCDC and the Central Emergency Operations Center (CEOC) at the Executive Yuan—to provide robust flexibility in disaster response. Stockpiled resources are available for a number of different disaster types—including biological and radiological—and can be rapidly deployed in response to domestic or international incidents. Additionally, antivirals and vaccines are stockpiled for influenza. Disaster response plans are tested regularly and have been activated recently for a myriad of actual incidents. Taiwan also maintains a medical response network that includes 40% of all hospitals nationwide—public and private—to allow for transfer of patients to decompress medical surge during a response.

Taiwan conducts national risk assessments every 5 years—via the Central Disaster Prevention and Protection Commission—and preparedness and response plans are reviewed and updated every 2 years by the applicable authorities. The National Epidemic Risk Assessment is conducted weekly (or as often as twice daily during an incident response).

R.1.1 Multi-hazard national public health emergency preparedness and response plan is developed and implemented — Score: 5

Strengths

- The laws and planning in Taiwan for emergency preparedness and response at the national level are fairly comprehensive. The Disaster Prevention and Protection Act covers 19 different disaster types—including natural disasters and chemical, biological, and nuclear hazards. The Disaster Prevention and Protection Basic Plan identifies lead authorities at the ministry level for different types of disasters.

- Taiwan has the capacity to stand up multiple EOCs in applicable agencies and at multiple levels of government. This provides central leadership and coordination if necessary for cross-sectoral responses and enables responses to scale as required for different incidents.
- Taiwan operates an emergency medical network consisting of 40% of the nation's hospitals—public and private—to provide surge capacity and allow for surge decompression during incident response.
- Plans are reviewed and tested regularly and are updated to reflect lessons learned from exercises or real events.

Areas which need to be strengthened

- The national response system is organized more around natural disasters rather than infectious disease threats. Greater awareness and implementation of infectious disease response is needed at the national level. Taiwan has implemented national infectious disease response plans for a number of diseases and conditions, including HIV, TB, acute infectious diseases, and influenza. Taiwan approved the Risk Surveillance and Preparedness Plan for Emerging Infectious Diseases in 2015 to strengthen preparedness and countermeasures for emerging infectious diseases and implemented theplan in 2016. There are currently no operational plans for compound disasters involving infectious diseases; however, Taiwan does have plans for other types of compound disasters.
- The budget for planning for infectious disease emergencies has been cut substantially in recent years. Funding is a concern for incident response.
- Taiwan needs a central platform to provide real-time resource management across multiple ministries during a response.

R.1.2 Priority public health risks and resources are mapped and utilized — Score: 5

Strengths

- MOHW units are required to undergo risk assessment and report major health risks to the Ministry, which weights and combines the reported risks into a national level risk assessment. Risk assessments are regularly revisited and revised.
- Resource mapping and operational plans are created at the ministry level, and resources such as supplies, hospital beds, and medical countermeasures (MCMs) are incorporated into central databases that enable tracking and reallocation of resources by the competent authorities.

Areas which need to be strengthened

- Annual budgets are insufficient to continually strengthen and improve risk assessment and resource mapping each year.
- The process to obtain funding from the Executive Yuan is slow and could potentially delay emergency response activities. An emergency response fund would provide rapid access to funding as necessary to initiate response actions, particularly for infectious disease incidents.
- It would be helpful to have a single platform that incorporates resource status from various ministries and sectors for a common operating picture. This capability to view the status of all resources in one place would help the Executive Yuan to better manage major disasters in the country.
- Local governments conduct regular training and exercises for preparedness activities; however, there are no metrics for determining the effectiveness of preparedness programs, particularly at the local level.

Recommendations for Priority Actions

- Taiwan needs a mechanism (e.g., standing emergency fund or expedited process) to rapidly allocate funding for emergency response. Delays in obtaining funding could postpone or otherwise negatively impact response activities, particularly with continually decreasing operating budgets.
- A central, cross-sectoral platform for providing real-time resource tracking would benefit central command and control of complex emergencies.
- Established metrics are needed to assess the effectiveness of preparedness programs, particularly at the local level.

Relevant Documentation

- Disaster Prevention and Protection Basic Plan (2013)
- Disaster Prevention and Protection Act (2016)
- List of Disaster Prevention and Protection operation plans
- Biological Disaster Prevention and Response Plan (2012)
- All-Out Defense Mobilization Readiness Act (2014)
- Introduction to Emergency Medical Services System
- Emergency Medical Services Act (2013)
- Regulations for Regional Emergency Medical Operation Centers (2008)
- Regulations for Public Health Authorities and Medical Institutions in Management of Emergency Medical Services for Mass Casualties (2000)
- Communicable Disease Control Act (2015)
- Implementation Regulations Governing Materials for Communicable Disease Control and Establishment of Resources (2016)
- Emergency Management Information Cloud (EMIC) introduction
- Central Epidemic Command Center (CECC) Dengue Fever epidemic report (2015)
- Dengue Fever response SWOT analysis (2016)
- Dengue prevention and control measures press release (2016)
- The Enforcement Rules of the Disaster Prevention and Protection Act (2011)
- List of “intolerable risks” from the Major Risk Analysis and Management Program (2015)
- TCDC Disease Control Consultation Committee member lists (2016)
- Directions for the Establishment of the Central Disaster Prevention and Protection Commission (2014)
- Budget Act (2013)

Emergency Response Operations

Target

Countries will have a public health Emergency Operation Center functioning according to minimum common standards; trained, functioning, multi-sectoral rapid response teams and "real-time" biosurveillance laboratory networks and information systems; and trained EOC staff capable of activating a coordinated emergency response within 120 minutes of the identification of a public health emergency.

Taiwan Level of Capabilities

Taiwan has robust emergency response operation capacity across a range of disaster types. Taiwan operates EOCs at a variety of agencies and levels of government, providing flexibility and scalability for response operations. Specialized EOCs such as TCDC's CECC provide capabilities such as real-time surveillance for biological event response, and the CEOC at the Executive Yuan provides central leadership and cross-sectoral coordination capacity for complex incidents. These EOCs have redundant communications (including video and teleconference) and power sources and space for more than 100 responders operating 24 hours a day. Response and national government leadership can access real-time information via the Emergency Management Information Cloud (EMIC) and NNDSS to support timely decision making.

The Central Disaster Prevention and Response Council consists of a representatives from across many sectors pertaining to health and security. The Council meets twice yearly and holds topic-specific meetings with relevant entities on a more frequent basis. According to the Disaster Prevention and Protection Act, TCDC is designated as the lead agency for epidemic response. TCDC regularly coordinates with other applicable agencies during public health response, including the National Immigration Agency, CoA, Taiwan EPA, Ministry of Foreign Affairs (MOFA), Ministry of the Interior (MOI), and the Executive Yuan. The county and local level governments have their own Councils to facilitate preparedness and response activities at the appropriate level. Public health is involved in a number of disasters at the national level, and counties have their own health departments to support public health response at the subnational levels. The Communicable Disease Control Medical Network and Emergency Medical Services Network can mobilize resources and manpower to provide support for local incidents, and the Taiwan government is authorized by law to engage NGOs in emergency response.

TCDC operates the 1922 hotline (24/7) to provide information and assistance for civilians as well as clinicians regarding infectious diseases, including zoonotic diseases such as rabies. Additionally, BAPHIQ has established a hotline for animal disease consultation.

R.2.1 Capacity to Activate Emergency Operations — Score: 5

Strengths

- There are robust EOCs established at the national and ministry levels. These EOCs are well-resourced, with sufficient communication capabilities and redundant power sources to support 24/7 operations.
- There are also Regional Emergency Medical Operations Centers (REMOC) and local EOCs, which coordinate local response and report up to the national-level CEOC.
- The CECC serves as the EOC for significant infectious disease events. It has a sophisticated public health surveillance system and resource databases available in the NHCC.
- Responders at the national and subnational level conduct regular training and exercises, including an annual large-scale exercise involving 22 county governments. Additional basic and advanced training is conducted for specialized units such as the Disaster Medical Assistance Teams and Vector Control Technicians.

- Specialized training and regular exercises are conducted for EOC staff at the national and subnational level in accordance with the Disaster Prevention and Protection Operation Plan in order to familiarize responders with EOC facilities, communication and coordination systems, and response protocols. Just-in-time training is also conducted as necessary for each exercise or event.

Areas which need to be strengthened

- Taiwan has had few opportunities to join international trainings or meetings to discuss emergency operations, both to share expertise and gain expertise from other countries. While Taiwan may not be able to formally participate in many international training and education opportunities, it should continue to engage internationally, possibly through non-governmental organizations like GOARN or bilateral partnerships, to gain additional experience with emergency response operations.

R.2.2 Emergency Operations Center Operating Procedures and Plans — Score: 5

Strengths

- Taiwan has protocols in place describing which EOC, potentially including the CEOC, is activated for different types of disasters. It is also clear (depending on the type of disaster) which Ministry leads the EOC operations and which representatives are required to staff each EOC.
- There are robust operational procedures, training programs, and plans in place for the EOCs at the national level, particularly for the CECC. These are reviewed and updated every 2 years or as part of incident after-action plans as necessary.
- Taiwan has mechanisms in place to disseminate information for a variety of audiences, ranging from senior response leadership to the public health and medical community to the general public.

Areas which need to be strengthened

- EOC training (US FEMA IS-775 course) is required for EOC staff, but Incident Command System (ICS)-type training is not. It is recommended that basic ICS or similar training (based on the specific system used in Taiwan) be required for all potential responders at the local, regional, and national levels (e.g., FEMA ICS-100/200 for all responders and IS-700/800 and ICS-300/400 for leadership positions) to support consistent and cohesive response activities and provide scalable response capacity.
- TCDC EOC training is currently not conducted in collaboration with other agencies. It would be beneficial for operators to train together, especially for national emergency activations.
- Long-term planning for large emergencies does not appear to be a major consideration in EOC operations.
- Greater consideration for inclusion of external partners in EOC response (e.g., hospital associations, NGOs) would benefit emergency operations.
- There is currently no group, independent of the response, that follows the event and makes independent recommendations. This can help to provide an outside perspective and help avoid groupthink and biases, which can lead to response errors.

R.2.3 Emergency Operations Program — Score: 5

Strengths

- In preparation for a potential case of Ebola Virus Disease, Taiwan conducted a no-notice exercise in 2014 involving a symptomatic traveler returning from an affected West African country. This exercise was conducted at 99 regional hospitals and medical centers to assess healthcare response for a potential Ebola patient (including recording travel history and potential exposures).

- In preparation for a potential Zika virus infection, Taiwan conducted tabletop exercises in 22 local governments over a period of just 3 months in 2016. These exercises often involved participation from local health departments, healthcare facilities, and other relevant entities.
- EOCs at the national level are regularly activated for natural disasters and infectious disease emergencies. These emergencies have tested the capabilities of the EOCs. Activation within MOHW can occur within 30 minutes, and all Ministries are capable of activating their EOCs in under 2 hours.
- Exercises are conducted on a regular basis in addition to a number of actual emergency activations (41 total activations in the past 5 years, including 5 activations for public health events).
- After-action reports and improvement plans are regularly produced following activations and exercises, and updates are made to EOC procedures and operations.

Areas which need to be strengthened

- None

R.2.4 Case management procedures are implemented for IHR-relevant hazards — Score: 5

Strengths

- TCDC has developed case management guidance for 65 infectious diseases. Guidelines for other IHR-related hazards have been developed by relevant agencies, including the Atomic Energy Council (AEC) for nuclear/radiological events and Taiwan EPA for chemical events.
- SOPs are also in place to handle quarantine and transport of potentially infectious patients at the local level and points of entry.
- Procedures and SOPs for case management of IHR relevant hazards are in place and have been tested.
- Staff are also trained for case management of IHR relevant hazards—including vector control, bioterrorism, Ebola and other highly infectious diseases, chemical events, and nuclear/radiological events—to support a myriad of incident response types.

Areas which need to be strengthened

- None

Recommendations for Priority Actions

- Due in part to its unique political status, Taiwan has had little opportunity to participate in international training and educational opportunities with respect to emergency response operations. Taiwan has considerable expertise to share, and the Taiwanese are eager to learn from and engage with other countries. Taiwan needs to keep working to obtain seats at international events and possibly identify creative ways to engage with other countries for mutual benefit. Taiwan has been able to engage internationally outside of the WHO/UN in many other instances; non-governmental organizations such as GOARN could be good options for Taiwan to increase its international emergency response footprint. Taiwan applied for GOARN membership but received no response.
- Additionally, EOC training and exercises should regularly include coordination outside of TCDC. Involvement of multiple agencies, levels of government, and non-governmental organizations or entities (e.g., private healthcare facilities) will improve response capabilities, particularly for large and complex incidents.
- Long-term planning for incident response is not currently a priority for EOC operations. While immediate response activities should be a high priority, a formal process to look ahead to long-term response goals, resource requirements, and recovery would be beneficial.

Relevant Documentation

- Disaster Prevention and Protection Act (2016)
- Organization Framework of the Central Disaster Prevention and Protection System
- Central Emergency Operations Center Floor Plan
- TCDC Emergency Operations Center floor plan/physical structure
- TCDC Emergency Operations Center staff responsibility table (2016)
- TCDC power system scheduled maintenance contract and maintenance reports (2016)
- TCDC Emergency Operations Center/National Health Command Center phone list/chart
- Emergency radio information list
- Mobile satellite communication user's manual
- Police emergency phone/contact list
- Example incident phone/contact list (2015)
- Enforcement Regulations Governing the Central Epidemic Command Center (2008)
- National Health Command Center Communication Framework
- Example of multilateral videoconference capability
- Example TCDC incident Morning Meeting records (2016)
- Example MOHW Conference records (2016)
- Example Zika Virus response weekly situation report (2016)
- Disaster Management Report (2016)
- Global Summary of MERS Epidemic (2015)
- Records of Vector-borne Infectious Disease 2nd Coordination Meeting (2016)
- Records of Avian Influenza Virus 106th Coordination Meeting (2014)
- Example Disaster Prevention and Protection drill report (2015)
- Example Medical Officer Monthly Speech (2016)
- Epidemiological Investigation Basic Training Course agenda
- List of the Central Disaster Prevention Response Council duties
- Disaster Prevention and Protection Network framework
- Civil Defense Act (2014)
- Communicable Disease Control Act (2015)
- All-Out Defense Mobilization Readiness Act (2014)
- Report of Preparedness and Mobilization for Public Health Emergencies (2013)
- Example of Central Epidemic Command Center Activation Levels for Zika Virus Infection
- Example incident response surge staff timetable (2015)
- Disaster Prevention and Protection Basic Plan (2013)
- Disaster Medical Assistance Team (DMAT) Basic and Advanced Certificate Education curricula (2012/2014)
- Disaster Medical Assistance Team (DMAT) Community Emergency Response and Special Disaster Education Training Program curriculum (2016)
- Disease Vector Control Technician training course curriculum (2016)
- Disease Vector Control Technician contact list
- Emergency Management Information Cloud (EMIC) Regular Education Program curriculum (2016)
- Scenario/exercise descriptions for May 2016 tabletop exercises with central and local government
- Central Epidemics Command Center (CECC) Staff Training Program curriculum
- Example FEMA EOC Management and Operations (IS-00775) training certificate (2016)

- Biological Disaster Prevention and Response Plan (2012)
- Arrangement Operation Education curriculum (2015)
- Regional Training Center for Healthcare Workers to Work in West Africa- tentative training curriculum to support deploying healthcare workers to work in Ebola treatment units (2015)
- The Development and Promotion Project for Communicable Disease Control Medical Network Responding Hospitals (2015)
- Central Emergency Operations Center (CEOC) Operating Guidelines (2015)
- Central Emergency Operations Center (CEOC) Response Framework
- Central Epidemic Command Center (CECC) Level Three Activation Framework
- Example list of emergency response guideline with update dates and review frequency
- TCDC Professional website
- Emergency response decision-making framework
- Central Epidemic Command Center (CECC) Organizational Framework
- Example Letter to the Medical Community (2016)
- International epidemic tracking and travel advisory spreadsheet (2016)
- Example Disease Surveillance Express report (2016)
- "A No-Notice Drill of Hospital Preparedness in Responding to Ebola Virus Disease in Taiwan" (2015)
- Zika virus tabletop exercise summary (2016)
- Central Epidemic Command Center Dengue Fever report summary (2016)
- Emergency Operations Center activation event list (2011-2016)
- Central Epidemic Command Center activation event list (2006-2016)
- TCDC Communicable Diseases & Prevention case management guidelines (2016)
- Nuclear Emergency Response Basic Plan (2014)
- Operating Procedures for Nuclear Emergency (2016)
- Toxic Chemical Disaster Response Plan (2015)
- Operating Procedures for Toxic Chemical Disaster Evacuation (2006)
- Emergency Medical Services Act (2013)
- Points of Entry Standard Operating Procedures
- Inbound Quarantine Standard Operating Procedure (2014)
- Compulsory Patient Transfer Standard Operating Procedure (2014)
- List of contracted referral hospitals for transport of patients identified at points of entry
- Operation Role of Communicable Disease Control Network Designated Hospital Activation and Supporting Personnel Mobilization (2015)
- Preparedness Plan for Communicable Disease Control
- Flow Chart for Medical Air Transport
- Toxic Chemical Disaster Drill Seminar curriculum (2016)
- Nuclear Disaster Emergency Response Basic Education Program curriculum (2016)
- Radiological Disaster Response Workshop announcement (2015)

Linking Public Health and Security Authorities

Target

In the event of a biological event of suspected or confirmed deliberate origin, a country will be able to conduct a rapid, multi-sectoral response, including the capacity to link public health and law enforcement, and to provide and/or request effective and timely international assistance, including to investigate alleged use events.

Taiwan Level of Capabilities

Taiwan has a strong system in place for comprehensive cross-sectoral coordination, and collaboration between public health and security authorities in Taiwan is mandated by national legislation—including the Disaster Prevention and Protection Act and Communicable Disease Control Act. Other national-level legislation, policies, and SOPs direct collaboration and information sharing between various agencies and organizations to support routine and emergency operations. Additionally, Taiwan has established several national-level joint working groups to address specific topics, such as food safety, that include representatives from across relevant ministries, including public health and security authorities. Joint and cross-sectoral training is conducted at the national level to provide interdisciplinary and multi-sectoral familiarization of agency roles and responsibilities. At the local level, the Disaster Prevention and Protection Act provides mechanisms for cooperation between public health and security agencies via the incident commander for emergency responses; however, budgetary constraints and lack of firsthand experience have limited the ability of local governments to develop and implement response procedures for bioterror events. Public health and security authorities have demonstrated the capability to collaborate in a myriad of routine activities, exercises, and actual responses.

R.3.1 Public health and security authorities (e.g., law enforcement, border control, customs) are linked during a suspect or confirmed biological event — Score: 4

Strengths

- National-level legislation and policy are in place to ensure cross-sectoral collaboration between public health and security authorities. Relevant documents include the Communicable Disease Act, Administrative Procedure Act, National Police Agency Organization Act, All-Out Defense Mobilization Readiness Act, Statute for Prevention and Control of Infectious Animal Disease, and interagency cooperative agreements such as the Cooperative Agreements on Prevention and Response between the Ministry of National Defense (MOND) and MOHW. These policies direct collaboration between agencies during emergency response as well as daily operations and exercise/training.
- Joint working groups and other national-level collaborations bring together representatives from across many agencies to address issues such as food safety and security, and SOPs outline information sharing mechanisms and requirements between a range of agencies and organizations.
- The Disaster Prevention and Protection Act and the Communicable Disease Control Act facilitate collaboration between public health and security authorities for a range of incidents at the local level via the incident commander.
- Information about health events and threats is shared regularly at the national level between MOHW and the Homeland Security Council.
- The Executive Yuan's Office of Homeland Security coordinates regular exercises for complex incidents that involve participants from MOHW, MOND, Taiwan EPA, AEC, National Police Agency, Customs Administration, and others.

- Regular exercises are conducted at the national level that specifically involve cooperation and coordination between public health and security authorities, including bioterror incidents at Points of Entry.
- There is a Response Plan for Biological and Bioterrorism Event in place, which requires the MOHW and Office of Homeland Security to coordinate and share information and conduct risk assessment during public health events. Additionally, joint SOPs are in place to facilitate response at major Points of Entry to Taiwan.
- Taiwan has legislation in place that provides public health authorities with the power to detain/quarantine individuals who present a public health risk.
- Public health and security authorities regularly collaborate on actual responses, including investigation of foodborne illnesses, isolation and quarantine of potentially infectious patients, Points of Entry surveillance and monitoring, and response to an animal avian influenza outbreak.
- Taiwan conducts several joint/cross-sectoral training opportunities for public health and security personnel. These trainings address Points of Entry surveillance and monitoring (including CBRN threats), food and drug inspections, and animal health and smuggling; however, these trainings seem to be more cross-sectoral (one agency training another) than joint (multiple agencies coordinating in an integrated training session).
- Taiwan has regular security reviews for personnel working in high-containment laboratories.

Areas which need to be strengthened

- There is little coordination between public health and security authorities at the local level to jointly investigate health events with security considerations. Budgetary concerns and lack of firsthand experience have limited the ability of local governments to fully develop and implement bioterror response protocols.
- Increased information sharing between public health and security authorities is needed for suspected intentional biological incidents. Security intelligence could be vital to enabling public health to properly investigate the health effects of these types of events, which in turn, could further benefit security investigations.
- The security review for laboratory personnel mentioned above does not extend to other personnel that handle dangerous pathogens, such as those who work in the field (e.g., bioterrorism response, specimen collection).
- Taiwan is prevented from participating as a State Party or Observer Country to the Biological and Toxin Weapons Convention (BWC) or as a member country in INTERPOL, although it strives to comply with the BWC and coordinate with other INTERPOL member countries to access information on security threats.

Recommendations for Priority Actions

- Formal coordination mechanisms between public health and security authorities at the local level for non-emergency activities could strengthen relationships necessary for identifying health events with security considerations and conducting subsequent investigations. Additionally, Taiwan should direct the development of formal collaboration protocols at the local level to support public health involvement in investigations for these types of incidents.
- The development of a personnel reliability system for high-containment laboratories would provide an additional layer of biosecurity for highly dangerous pathogens.
- The use of more joint training (as opposed to cross-sectoral) would be beneficial for Taiwan. Rather than having one agency host training for other agencies, Taiwan should direct the development of more robust training courses in which participants from multiple agencies perform integrated tasks and improve collaboration across areas of expertise.

Relevant Documentation

- Communicable Disease Control Act, MOHW (2015)
- National Police Agency Organization Act, Ministry of the Interior (2013)
- All-Out Defense Mobilization Readiness Act, Ministry of National Defense (2014)
- Ministry of Health and Welfare/Ministry of National Defense Prevention and Response Cooperative Agreement
- Administrative Procedure Act, Ministry of Justice (2015)
- Statute for Prevention and Control of Infectious Animal Disease (2014)
- Enforcement Rules for Statute of Prevention and Control of Infectious Animal Diseases (2009)
- Disaster Management and Response Plan for Animal and Plant Diseases (2015)
- Disaster Prevention and Protection Act (2016)
- Scenario analysis workshop document for Jinhua communication exercises (2015)
- National Disaster Prevention and Relief Defense Mobilization Exercise plan (2016)
- Kaohsiung International Airport Biological Disaster Response Plan (2013)
- Kaohsiung International Airport Biological Disaster Emergency Operating Procedures (2015)
- Taipei International Airport Biological Disaster Emergency Response Management Operating Procedures (2015)
- Taichung Airport Biological Disaster Emergency Operating Procedures (2016)
- Taichung Port Services Biological Disaster Response Plan
- Taoyuan International Airport Biological Disaster Emergency Operating Procedures
- Port of Keelung Biological Disaster Response Plan
- Disaster Prevention and Response Basic Plan (2013)
- Immigration Act (2015)
- Biological Incident Exercise Plan for Taipei International Airport (abstract)
- Executive Yuan incident management timeline for 2014 gutter oil/food oil incident
- Executive Yuan policy for establishing and operating the Homeland Security Council (2014)
- Directions of Executive Yuan Food Safety Board Establishment (2015)
- Chemical, Biological, Radiological, and Nuclear incident response training course curriculum for Taichung Port (2015)
- Food, Drug, and Cosmetic legal education and inspector training curriculum

Medical Countermeasures and Personnel Deployment

Target

A national framework for transferring (sending and receiving) medical countermeasures and public health and medical personnel among international partners during public health emergencies.

Taiwan Level of Capabilities

Taiwan has a fairly robust set of mechanisms to send, receive, and produce MCMs during an emergency. The Communicable Disease Prevention Act, Pharmaceutical Affairs Act, and Disaster Prevention and Protection Act all provide regulation for the import of pharmaceuticals and medical equipment and address provisions for procuring or producing materiel during an emergency. Additionally, national response plans include logistics protocols that can facilitate distribution of resources in an emergency. Taiwan maintains a stockpile of influenza antivirals and H5N1 vaccine, and hospitals nationwide are required to maintain a stockpile of certain pharmaceuticals and medical equipment for emergency use. Additionally, Taiwan has domestic production capacity for antibiotics and vaccines, and locations are designated throughout the country to store and dispense MCMs during emergency responses. With respect to animal diseases, BAPHIQ is responsible for purchasing and maintaining epidemic prevention and response materiel, including vaccines, and coordinating distribution of these resources during an epidemic. Taiwan is not currently part of any formal international MCM sharing agreements, but the Taiwanese desire to increase their capacity to provide international assistance.

While Taiwan desires to increase international engagement for health emergencies, particularly personnel support, a number of limitations prevent deploying or receiving personnel assistance. Currently, Taiwan does not address liability protection for medical personnel deployed to other countries. While Taiwan has procedures in place for identifying need and requesting international support, there are no mechanisms in place to address licensing or regulatory issues for foreign medical personnel; currently foreign medical teams deployed to Taiwan can perform rescue operations or provide medical advice only (no clinical services). The Taiwan applied for GOARN membership, which could enable them to deploy FETP-trained personnel internationally. The Taiwan International Health Action (TaiwanIHA) task force deployed to Nepal in 2015 to perform evaluation/assessment activities, but they did not perform any medical services. Under several bilateral agreements, Taiwan has recently deployed medical personnel to a number of countries in Asia and the South Pacific outside of emergencies. Taiwan has established the Global Assistance Corps of Taiwan (GOACT) to deploy in support of international infectious disease prevention and outbreak response activities. GOACT has deployed internationally in the past, but due to budgetary constraints, it is not currently active.

R.4.1 System is in place for sending and receiving medical countermeasures during a public health emergency — Score: 4

Strengths

- Taiwan has laws in place for importing needed drugs or vaccines from international sources during emergencies. Additionally, Taiwan has legislation that enables the government to appropriate pharmaceuticals, supplies, or equipment in order to manage distribution of resources in response to or to prevent a shortage.
- Local MCM storage and dispensing sites have been identified nationwide for use in an emergency, and TCDC maintains a central stockpile of influenza MCMs and other medical materiel during non-emergency periods. Emergency transportation of drugs and vaccines to dispensing sites is organized and arranged by TCDC. The

logistics of MCM distribution and dispensing are coordinated by TCDC in coordination with TFDA, Department of Medical Affairs, and MOFA.

- The All-Out Defense Mobilization Readiness Act and the Pharmaceutical Policy Mobilization Readiness Plan contain logistics considerations and plans to facilitate the distribution of resources such as MCMs during an emergency.
- Taiwan has demonstrated the capability to distribute MCMs within 48 hours of the decision to do so in both actual events and exercises.
- Taiwan is among a small handful of countries with domestic production capacity for influenza vaccines. Taiwan also has considerable domestic capacity to produce antibiotics. Additionally, the Ministry of Economic Affairs (MOEA) can support domestic production and distribution of commercial products such as surgical masks during an emergency.
- During an emergency, staff from across relevant agencies are specifically designated to manage the logistics and tracking of MCM distribution and dispensing.
- Taiwan has implemented a pandemic influenza preparedness plan and maintains a national stockpile of influenza antivirals and vaccines as well as national, regional, and local PPE stockpiles. Taiwan also has a designated network of response hospitals in each region to support response and MCM dispensing activities.
- There are plans in place for emergency procurement and dispensing of animal drugs, and BAPHIQ maintains stockpiles of drugs, vaccines, and other countermeasures for animals.

Areas which need to be strengthened

- There are currently no arrangements to provide security during transportation or dispensing of MCMs during an emergency, although there is security at storage locations.
- Taiwan is not currently party to any formal international agreements to share MCMs during an emergency; however, it has demonstrated the capability to deploy significant quantities of PPE both domestically and internationally.

R.4.2 System is in place for sending and receiving health personnel during a public health emergency — Score: 3

Strengths

- Taiwan is willing to participate in global humanitarian and international emergency responses. MOFA is responsible for addressing international requests for medical response teams and coordinating their deployment.
- Medical personnel that deploy internationally are required to have special health insurance during their deployment to cover accident/injury, illness, and accidental death/disability.
- Depending on the requirements of the incident, applicable ministries will be involved to coordinate personnel deployment.
- Taiwan has plans and capabilities to send health personnel to respond to disasters and health emergencies both inside and outside of the country and has demonstrated the ability to deploy medical personnel internationally in non-emergency settings.
- Taiwan has a rescue team that trains together and can and has been deployed internationally and domestically for disasters such as earthquakes.
- The Central Disaster Response Center is responsible for monitoring response capacity for domestic emergencies and determining the need to request international assistance.
- Taiwan has recently deployed personnel to countries in Asia and the South Pacific. In support of the Nepal earthquake response in 2015, Taiwan deployed a team to provide post-disaster evaluations and assessments;

however, clinical services were outside of their assigned duties. Through a series of bilateral agreements, Taiwan has also deployed non-emergency medical personnel to a number of countries—including Palau, Kiribati, Nauru, Tuvalu, Marshall Islands, Solomon Islands, Fiji, and Papua New Guinea in the South Pacific and Sri Lanka, Turkey, Indonesia, and India in Asia.

Areas which need to be strengthened

- Taiwan has a desire to deploy medical personnel to support international responses; however, budgetary constraints and international trepidation regarding its unique political status have precluded any recent deployments. International response personnel are not currently internationally certified, partially due to restrictions on Taiwan's participation in international organizations.
- While not currently a formal member of any international organization to deploy response personnel internationally, Taiwan has applied for GOARN membership but received no response.
- There is currently no mechanism (licensure or regulatory provisions) for foreign medical teams to be able to provide medical care in Taiwan. This may change in an emergency, but there is currently no official language in law or regulation.
- During international deployment of health personnel, there are currently no liability protections to personnel who are not employed by the Taiwan government.
- Taiwan does not currently have an international dispatching center to facilitate tracking of deployed personnel and materials; however, TCDC has expressed interested in establishing one.

Recommendations for Priority Action

- Taiwan should develop, test, and implement plans to provide security during transportation and dispensing of emergency MCMs.
- Due to Taiwan's unique political status, it has been unable to engage in formal agreements to provide international support during health emergencies. Taiwan has expressed interest in providing equipment/supplies, pharmaceuticals, and personnel in support of international emergency response. It is recommended that Taiwan continue to explore all options—including expanded role in the WHO, bilateral agreements, or non-governmental organizations (e.g., GOARN, International Association of National Public Health Institutes [IANPHI])—as mechanisms to increase international engagement.
- Taiwan needs to address licensing and regulatory concerns for receiving foreign medical teams in advance of an emergency that would require such assistance. Additionally, Taiwan needs to proactively address liability protection for medical response teams deploying to other countries.

Relevant Documentation

- Communicable Disease Control Act, MOHW (2015)
- Pharmaceutical Affairs Act, MOHW (2015)
- Disaster Prevention and Protection Act (2016)
- All-Out Defense Mobilization Readiness Act, Ministry of National Defense (2014)
- Criminal Code of the Republic of China- Article 251, Ministry of Justice (2014)
- Press release documenting Taiwan's international deployment of PPE to support the West Africa Ebola response (2014) and domestic deployment of PPE in response to an avian influenza outbreak (2015)
- The Mobilization of Reserve Medicines and Medical Devices Regulations, MOHW (2014)
- Reserve medicines and medical devices inventory list
- Annual Government Epidemic Inventory Warehousing and Transportation Procurement Project (2016)
- Infectious Biomaterial and Associated Biological Specimen Material Import/Export Regulations (2015)

- National Influenza Pandemic Preparedness Plan- Phase III (2015)
- Influenza Pandemic Strategic Plan, 3rd Edition (2012)
- Statute for Prevention and Control of Infectious Animal Disease (2014)
- Veterinary Drugs Control Act, CoA (2013)
- Regulations for Veterinary Drugs Dealers (2012)
- Notice for Coordination in International Disaster Rescue Supports (2011)
- Procedure for Receiving or Dispatching Support Teams During a Disaster
- Civil Servant Service Act (2000)
- Regulations Governing Safety and Sanitary Protection of Civil Service, Civil Service Protection and Training Commission (2015)
- Regulations for Applying the International Trip Allowance (2012)
- Global Outbreak Assistance Corps of Taiwan (GOACT) introduction (2008)

Risk Communication

Target

States Parties should have risk communication capacity which is a multi-level and multi-faced real time exchange of information, advice and opinion between experts and officials or people who face a threat or hazard to their survival, health or economic or social well-being so that they can take informed decisions to mitigate the effects of the threat or hazard and take protective and preventive action. It includes a mix of communication and engagement strategies like media and social media communication, mass awareness campaigns, health promotion, social mobilization, stakeholder engagement, and community engagement.

Taiwan Level of Capabilities

Taiwan maintains strong programs for risk communication for public health issues. TCDC staff communicates on a routine basis with members of the public via traditional and new media channels. It regularly monitors traditional and new media for the appearance of rumors or misinformation. Opinion polling conducted annually and during emergencies is used to update and target communication messages and approaches. After-action analyses are used to update communication plans and messages.

R.5.1 Risk Communication Systems (plans, mechanisms, etc.) — Score: 4

Strengths

- Communication and information sharing between agencies during an emergency is, in many cases, mandated by legislation, special agreement, or other formal mechanism.
- For incident responses managed at the Executive Yuan level, the communication team will often be comprised of representatives from across the affected agencies. Designated members of the communications staff have clearly defined responsibilities.
- Ministries and agencies across the Taiwanese government have 24/7 communications capabilities.
- While funding for incident response is not guaranteed and must be obtained explicitly for each event, communication is a high priority for distribution of funding once it is allocated.

Areas which need to be strengthened

- TCDC has concerns about the current and expected funding/resource level compared to that required to grow the program. Consistent, dedicated funding for public communications, particular during emergencies, would enable implementation of long-term training programs and improve public risk communications efforts.
- Because special funding is required to support incident response, any delays in allocating resources can impair communication efforts.
- Recent budget cuts have resulted in shortfalls for some ongoing risk communication and health promotion campaigns, requiring applications for special project funding in order to continue these programs.
- Staffing level is a concern for communication programs. Taiwan experiences a considerable number of public health emergencies, and surge staffing is required for these responses. Surge staff do not receive regular training on risk communication.

R.5.2 Internal and Partner Communication and Coordination — Score: 4

Strengths

- The CECC facilitates interagency communication during incident response and allows the incident response to coordinate public communications across agencies to mitigate the impact of inconsistent messaging. Taiwan has strong protocols in place to govern partner communication during national emergencies.
- Despite not being a formal member state in the WHO, Taiwan maintains an IHR NFP for international communication about health events, and informal bilateral agreements (e.g., with China, Japan, United States) further facilitate international communications and information sharing.
- Non-governmental organizations—including local health authorities, healthcare entities, and civil society groups—receive official communications directly from the Taiwan government during responses to health events as well as ongoing public health programs. Additionally, these partners are invited to participate in official meetings to coordinate formal communications.

Areas which need to be strengthened

- During several past public health emergencies, poor communication between national governmental agencies led to dissemination of conflicting information to the public. Taiwan has attempted to address this through the creation of the CECC. This is a good start, but Taiwan should work to improve routine collaboration and communication between agencies to ensure strong relationships exist between departments and to improve the consistency of messages that are issued in situations that do not warrant activation of executive-level CECC.
- Non-emergency communication between governmental ministries and agencies is currently conducted on an *ad hoc* basis. These processes could be more formalized and streamlined. Formal protocols will reduce communication mishaps for routine communication efforts and improve collaboration and coordination during emergencies.
- There is a dedicated budget for external support for public communications, but recent budget cuts have impaired this program.

R.5.3 Public communication— Score: 5

Strengths

- TCDC has a dedicated public relations office to manage public communication and social media efforts. Weekly press conferences are held to provide updated health information, and these can be scheduled more frequently during an incident response as necessary.
- Message content, media platform, and language are tailored as necessary to reach the target audience for specific events or programs.
- Mechanisms are in place to monitor public sentiment and rapidly respond to rumors and misinformation. TCDC has regular social media communication with the public, particularly on Facebook, where a minimum of 36 messages are posted daily.
- The 1922 hotline call center provides 24/7 capacity to respond to public inquiries regarding epidemic control.
- Communication standards and guidelines are assessed and updated as necessary to provide sustainable, continuous improvement for risk communication efforts. Additionally, regular analysis of individual communication efforts and messaging enables TCDC to continually improve public messaging across traditional and social media platforms.

Areas which need to be strengthened

- The public relations office in TCDC is staffed by only 10 people. Additional staff would be beneficial, particularly to provide surge capacity. Currently, surge staff receive minimal orientation training.

R.5.4 Communication Engagement with Affected Communities — Score: 4

Strengths

- TCDC's Public Relations Office regularly engages with media and community leaders on health promotion issues. During incident response, TCDC officials are deployed to the affected area and coordinate communication efforts directly with affected community leaders.
- As evinced by the recent response to dengue, local health authorities have strong connections with their respective communities.
- Social mobilization is explicitly included in the National Influenza Pandemic Preparedness Plan.
- Public health officials routinely reach out to coordinate with existing community groups (e.g., HIV/AIDS support, LGBT centers).
- Surveys on traditional and social media messaging and regular meetings with at-risk populations provide data to improve community engagement campaigns.

Areas which need to be strengthened

- Further efforts are needed with respect to fully engaging affected communities. Communities are not currently viewed as equal partners in incident response. Engaging with the public and community groups during non-emergency periods can facilitate relationship building that will benefit public communications during emergencies.

R.5.5 Dynamic Listening and Rumor Management — Score: 4

Strengths

- The capability exists to monitor public sentiment and identify and respond to emerging rumors and misinformation. Rumors and misinformation are addressed in formal communications including press conferences and press releases as well as social media messages.
- TCDC regularly monitors the media and key social media sites to identify potential rumors and events and performs data analysis of information posted via these platforms.
- Taiwan conducts opinion polls annually and during emergencies to determine whether rumors and misinformation are spreading and whether correct information is being taken up by the intended audience.
- The official TCDC website has an area specifically dedicated to addressing rumors and misinformation.
- Big data approaches are utilized to collect information from online and social media platforms to assess public opinion and identify emerging issues. This data facilitates updates to current messaging efforts to address changes in public opinion and awareness.

Areas which need to be strengthened

- Data indicates that the public still struggles with trusting official information, and rumor control remains a challenge. Establishing relationships and trust during non-emergency periods is vital to maintaining them during emergencies. Another key to maintaining public trust is transparency; be honest about what you know, what you don't know, and what you are doing to gather more information.

Recommendations for Priority Actions

- TCDC has developed very strong risk communication programs with a small number of staff; during emergencies, the response must rely on surge staff pulled from other divisions, who have no regular training
- TCDC needs more collaboration with external partners, including community groups and private entities to increase the impact of public communication. A future priority for TCDC is to establish equal partnerships with community groups to develop/disseminate communication plans/materials.
- The extent to which effective risk communication occurs during non-communicable disease emergencies could not be assessed.

Relevant Documentation

- Risk Communication and Response to Major (Emerging) Infectious Diseases Operating Standards

Other IHR Related Hazards and Points of Entry (PoEs)

Points of Entry (PoEs)

Target

States Parties should designate and maintain the core capacities at the international airports and ports (and where justified for public health reasons, a State Party may designate ground crossings) which implement specific public health measures required to manage a variety of public health risks.

Taiwan Level of Capabilities

Taiwan has advanced programs for detecting and responding to public health risks at its international airports and seaports. This capacity includes quarantine officers employed by TCDC, medical evaluation units, and established protocols for medical assessment and care of ill passengers. The system at Taiwan's ports of entry is regularly tested through real-world events, such as detection of cases of dengue and Zika virus among infected travelers. TCDC has established MOUs with other agencies such as local hospitals, BAPHIQ, Customs Administration, AEC, Ministry of Transportation, and Immigration. The division responsible for overseeing Taiwan's public health response at its PoEs regularly evaluates the effectiveness of this response, as evidenced through many academic publications and governmental reports. Though not a full member state in the World Health Organization, Taiwan has completed and published a self-assessment of the extent to which its detection and response capacities at PoEs fulfill expected obligations under the IHR.

PoE.1 Routine capacities are established at PoE — Score: 5

Strengths

- There are established protocols for evaluating public health threats that are tiered, risk-based, and scalable.
- Ill travelers are detected and evaluated through multiple approaches (e.g., fever screening, self-referral, reports from carriers, or PoE personnel). Trained personnel and appropriate facilities are available at PoEs for evaluation of ill travelers.
- Advanced animal and plant health inspection and vector-control programs exist and function regularly.
- Taiwan has established MOUs with between public health authorities and other agencies for reducing the risk to passengers during different public health emergencies.
- Trained personnel and well-established protocols support routine inspection at PoEs to detect hazardous imports. Taiwan has established protocols for detection of disease among imported animals, including birds.

Areas which need to be strengthened

- There are relatively high-rates of turnover among contract workers at PoEs. Dedicated effort to retain personnel would result in reduced resources to train new personnel and improve consistency and continuity for long-term, sustainable success for PoE monitoring and security.
- If resources are limited in the future, it may be useful to undertake a cost/benefit analysis of current PoE screening processes to confirm the necessity and efficacy of current practices.

PoE.2 Effective Public Health Response at Points of Entry — Score: 5

Strengths

- SOPs for evaluating public health risks at PoEs include designated roles and responsibilities with multiple government agencies and other stakeholders.

- Medical assessment capabilities are present at PoEs and existing agreements with local hospitals ensure appropriate evaluation, transport, and care for sick travelers.
- The systems in place for detecting and responding to public health threats at PoEs have been exercised during numerous real world events, such as the global response to MERS. The system has successfully detected cases of dengue and Zika among international travelers.
- Taiwan routinely evaluates the effectiveness of its capacities at PoEs and publishes these assessments in readily accessible government reports and peer-reviewed literature.

Areas which need to be strengthened

- Taiwan noted that while there are existing regulations that require transportation carriers to provide potable water to passengers, more work (inspections) are needed to ensure appropriate levels of compliance with existing requirements.

Recommendations for Priority Actions

- Taiwan has well-developed programs for implementing IHR-related obligations at PoEs. It regularly evaluates its capabilities in this regard and shares lessons learned with internal stakeholders and the international community.

Relevant Documentation

- Communicable Disease Control Act
- Point of Entry Quarantine or Medical Transport to a Local Health Bureau Procedures (2014)
- Point of Entry SOP for Medical Evacuation of Travelers (2016)
- Points of Entry Quarantine Standard Procedures: Airport Quarantine and Seaport Quarantine (2015)
- Compulsory patient/traveler transfer protocol (2014)
- TCDC case referral contract
- Medical Assessment Reply Form for compulsory hospitalization
- Rat Monitoring and Management Standard Operating Procedures and records
- Mosquito Monitoring and Management Standard Operating Procedures and records (2015)
- Local Vector Monitoring and Control Programs, Health and Environmental Protection Bureaus (2016)
- Sanitation Operating Regulations
- Point of Entry documentation:
    - Guidelines for Notifiable Communicable Disease Surveillance (2010)
    - Point of Entry quarantine SOP/port sanitation SOP (2014)
    - Example Vector Prevention and Control Technician and Bioterrorism Response Team licenses
    - Aviation Police: Entry conveyance security checking guidelines (2016)
    - Example PoE contact lists and procedures
    - Example cooperative agreements with local emergency response agencies—e.g., fire, police, emergency medical services
- Ministry of Transportation and Communication:
    - Disaster Prevention and Protection Act (2016)
    - Air Disaster Prevention and Rescue Program
    - Civil Aviation Act
    - Commercial Port Law (2011)
    - Regulations on Port Services at Commercial Ports (2015)
- National Immigration Agency:

    - Immigration Act (2015)
    - Procedures for Customs, Immigration, and Quarantine fast-tracking
- Bureau of Animal and Plant Health, Inspection, and Quarantine:
    - Statute for Prevention and Control of Infectious Animal Diseases
    - Quarantine Requirements for the Importation of Animals and Products
    - Reporting protocols for animal and plant disease and prevention emergency events
    - SOP for handling illegal animal and product importation (2013)
- Aviation Police:
    - SOP for passenger sudden, severe illness and death fast-tracking (2016)
- Atomic Energy Council:
    - Radio-Nuclear Emergency Response Program (2016)
- Example guidelines for various communicable disease prevention and protection programs (2016)
- TCDC website
- National Security Bureau website

Chemical Events

Target

States Parties should have surveillance and response capacity for chemical risk or events. It requires effective communication and collaboration among the sectors responsible for chemical safety, industries, transportation, and safe disposal.

Taiwan Level of Capabilities

Compared to many other countries in the region, Taiwan's chemical safety and response program is robust. In fact, several neighboring nations have visited Taiwan to learn about its chemical safety program, including China and Japan. Taiwan EPA has established and maintains the System for Emergency Response for Toxic Substance Disasters to improve policies and procedures for prevention, preparedness, response, and recovery for chemical incidents.

Taiwan has recently conducted several chemical safety assessments to support subsequent risk assessments and develop and implement recommended exposure limits. Taiwan EPA conducted an evaluation of 40 kinds of toxic substances from 2010-2014, and the Taiwan Institute of Labor, Occupational Safety, and Health performed a study of workplace chemical hazards in 2013. While Taiwan is unable to be a formal signatory to a number of international chemical safety conventions due to its unique political status—including the Stockholm, Rotterdam, Basel, and Mercury Conventions; the UNECE Convention on the Transboundary Effects of Industrial Accidents; and ILO Conventions 170 (Safety in the Use of Chemicals at Work) and 174 (Prevention of Major Industrial Accidents)—it supports and adheres to these regulations voluntarily. Additionally, the Taiwan EPA participates in the Strategic Approach to International Chemicals Management (SAICM).

CE.1 Mechanisms are established and functioning for detecting and responding to chemical events or emergencies — Score: 3

Strengths

- Taiwan has implemented effective mechanisms for detecting, monitoring, reporting, and responding to chemical incidents across multiple sectors of human and animal health—including the Ministry of Labor, MOI, MOHW, EPA, MOEA, TFDA, and CoA—and these policies and procedures are reviewed and updated regularly (annually for most).
- Surveillance and monitoring of chemical accidents and hazards are conducted by the Emergency Response Information Center (ERIC), which has the capability to notify relevant authorities of incidents, including the fire department and Taiwan EPA, and coordinate responses.
- TFDA and CoA both have responsibility over monitoring consumer products with regard to chemical hazards. TFDA has primary responsibility for chemical hazards related to consumer products (e.g., imports of fruit, vegetables, meat, and other food products are subjected to inspection and testing by TFDA for pesticides), and CoA is primarily responsible for regulations related to the management of agro-pesticides and the manufacture and import of feed and feed additives.
- Workers at industrial facilities are required to have baseline health assessments as well as annual follow-up assessments to monitor health.
- Risk assessments and exposure models are utilized to determine the appropriate response to chemical incidents, including personnel or community evacuation and cleanup. Accident reports are completed after each incident, and environmental sampling results are published in annual reports.

- MOHW operates the National Poison Center at the Veterans General Hospital to provide 24-hour support and expertise for chemical events.

Areas which need to be strengthened

- While there is cross-sectoral collaboration for chemical safety issues, there is no single national coordinating body for chemical safety. A number of governmental sectors are involved with chemical safety in Taiwan, and collaboration occurs on an *ad hoc* basis. Additional work is needed to ensure timely and systematic cross-sectoral collaboration for chemical safety monitoring and response.
- While Taiwan EPA is well-funded at the national level, local jurisdictions indicate that they require additional personnel support to implement necessary chemical safety programs. Additionally, funding for Taiwan EPA at the national level is allocated every several years. A lack of stable, long-term funding hinders long-term planning.

CE.2 Enabling environment is in place for management of Chemical Events — Score: 5

Strengths

- Taiwan maintains the capability to conduct thorough risk assessment for chemical incidents, including environmental contamination modelling, to support decisions regarding appropriate interventions and cleanup.
- Taiwan has established response plans for 19 different types of disasters, including chemical accidents, and each response specifically addresses health concerns for that disaster.
- Taiwan EPA requires toxic chemical factories to conduct regular exercises for chemical incident response.

Areas which need to be strengthened

- As discussed above, there is no single national coordinating body for chemical safety; however, Taiwan conducts regular cross-Ministry meetings to address chemical safety, including participants from Taiwan FDA, MOHW, and the CoA.
- Due to the unique political status of Taiwan, it is unable to formally participate in INTOX; however, there may be access to informal international chemical safety networks via the staff at the National Poison Center.

Best Practices, Challenges, Gaps, and Recommendations

- Taiwan should formalize cross-ministry collaboration with respect to chemical hazards monitoring, surveillance, and response. There is currently no single entity in charge, and formally designating a lead agency would help ensure timely and systematic collaboration for chemical events and surveillance.
- Taiwan should establish a mechanism to ensure long-term funding for Taiwan EPA to facilitate long-term planning and as well as forward-looking engagement at the local level.

Relevant Documentation

- Labor Safety and Health Research Annual Report (2013)
- Management Regulations for the Import and Export of Industrial Waste (2013)
- Criteria Governing Methods of and Facilities for Storage, Clearance, and Disposal of Industrial Waste (2006)
- The Equipment and Operation Report for Waste Treatment Facility Located in Receiving Country form

Radiation Emergencies

Target

States Parties should have surveillance and response capacity for radio-nuclear hazards/events/emergencies. It requires effective communication and collaboration among the sectors responsible for radio-nuclear management.

Taiwan Level of Capabilities

Taiwan operates 3 nuclear reactor power plant facilities. Under the Nuclear Emergency Response Act, nuclear reactor facilities are required to periodically submit analysis and planning with respect to risks and protective measures within the Emergency Planning Zone (EPZ) surrounding the facility. Assessments, including evaluating emergency response procedures, were conducted in 2011 for all 3 Taiwan nuclear power plants. Baseline public health assessments have been conducted with respect to radiation safety. Taiwan has had no major radiation emergencies in the past 5 years. Due to Taiwan's unique political status, it cannot be a formal member state in the International Atomic Energy Agency (IAEA); however, Taiwan has implemented all applicable nuclear power regulatory standards and submits to IAEA nuclear safeguards inspections in accordance with a trilateral agreement with the United States and IAEA. Despite not being a formal member of the Organisation for Economic Co-Operation and Development or the Nuclear Energy Agency, Taiwan's Atomic Energy Council (AEC) regularly participates in the International Nuclear Emergency Exercises alongside member countries. Additionally, Taiwan remains committed to the Treaty on the Non-Proliferation of Nuclear Weapons (NPT) even though it is no longer a formal signatory. Taiwan and China have a cooperative agreement that requires that each notify the other of nuclear events.

Taiwan's Radiological Disaster Prevention and Protection Plan and the Nuclear Emergency Response Basic Plan largely govern the monitoring of radiological and nuclear hazards and guide the response to associated incidents. The AEC is primarily responsible for monitoring and response activities, including laboratory analysis.

RE.1 Mechanisms are established and functioning for detecting and responding to radiological and nuclear emergencies — Score: 3

Strengths

- The Radiological Disaster Prevention and Protection Plan and the Nuclear Emergency Response Basic Plan delineate prevention, preparedness, and response responsibilities and activities for radiological and nuclear hazards. These plans are reviewed and updated regularly.
- AEC is primarily responsible for monitoring radiological and nuclear hazards and directing emergency response for radiological and nuclear incidents, including monitoring consumer products and laboratory analysis.
- Current personnel resources are sufficient to meet operational requirements. The budget for radiological and nuclear programs comes from the central government budget; however, it is unclear whether financial resources are sufficient.
- The Radiological Disaster Prevention and Protection Plan designates reference healthcare facilities for radiation emergencies.
- Health authorities in Taiwan are responsible for determining the protocols/guidelines for treating patients in response to a radio-nuclear event, and a tiered system of hospitals is designated to triage and care for patients.

Areas which need to be strengthened

- Taiwan has fairly robust radiation monitoring and surveillance mechanisms in place under the AEC, and MOHW has implemented formal response plans for patient care; however, it is unclear how much systematic and regular communication and coordination between radiological/nuclear and public health authorities occurs to support surveillance and case management activities or reporting of significant events that may result in a Public Health Emergency of International Concern (PHEIC).

RE.2 Enabling environment is in place for management of Radiation Emergencies — Score: 5

Strengths

- The Radiological Disaster Prevention and Protection Plan guides response activities for radiation events. This plan is reviewed and updated regularly.
- AEC is primarily responsible for coordinating radiation event response, and a number of other agencies have specific responsibilities relevant to their areas of expertise—including MOHW, MOND, MOI, and Ministry of Education.
- The Radiological Disaster Prevention and Protection Plan addresses a range of response functions for radiation events—including response roles and responsibilities, communication, patient decontamination and treatment, medical equipment and countermeasures, environmental decontamination, and response funding.
- Taiwan conducts regular exercises, and an assessment process is in place to evaluate performance and response protocols.
- While Taiwan is not a signatory to a number of international conventions due to its unique political status, it adheres to regulations governing the management and transportation of radioactive materials/waste.

Areas which need to be strengthened

- Current radiation safety protocols do not address hazardous sites or poison control.

Recommendations for Priority Actions

- Formal communication and information mechanisms between radiological/nuclear and public health authorities would improve health monitoring, risk assessment, event detection, and incident response (particularly case management).
- Interdisciplinary approaches and multi-sectoral collaboration could facilitate addressing hazardous sites and poison centers—potentially with Taiwan EPA and MOHW, respectively—to comprehensively address radiological and nuclear hazards. Taiwan should develop and formalize these interagency collaborations in established regulations and protocols.

Relevant Documentation

- Nuclear Emergency Response Act (2003)
- Report on the Analysis and Plan Review of Civil Protection Measures in the Emergency Response Plan for Nuclear Power Plants 1, 2, and 3; Taiwan Power Company (2013)
- Occupation Radiation Exposure in Taiwan, Republic of China, 2015 (2016)
- Improvement on Radiation Safety Control Techniques (2013)
- Ionizing Radiation Protection Act
- National Radiation Worker Dose Database
- Disaster Prevention and Protection Act (2016)
- Radiological Disaster Prevention and Protection Plan (2013)
- Atomic Energy Council website

- Operational Procedure of Nuclear Accident Emergency Response Northern Radiation Monitoring Center
- Operational Procedure of Nuclear Accident Response Southern Radiation Detection Center
- Radiation Bomb Accident Emergency Response Procedure
- Radiation Detection Center Overseas Nuclear Disaster Treatment Operational Procedure (2016)
- National Environmental Radiation Monitoring website
- Atomic Energy Council real-time nuclear power plant radiation monitoring website
- Nuclear Disaster Response Mechanism & Nuclear Plant 4 Escape Circle Personnel Evacuation, Nuclear Disaster Radiation Injury Medical Treatment, Environmental and Food Security Report
- MOHW First-Aid Responsible Hospital List (2016)
- Relevant Right and Liability List of Governments at All Levels in Radiation Hazard Prevention and Relief
- Nuclear Emergency Response Basic Plan
- IHR-Appointed Port Core Competence Construction Project- Second Phase Plan (2014)
- Nuclear safety exercise list website
- National Report – in accordance with the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management (2014)
- Summary of the Fourth International Nuclear Emergency Exercise (INEX-4) and Topical Session (2014)

APPENDIX 1: International Health Regulations

Background

In 2005, the Fifty-eighth World Health Assembly (WHA) adopted the International Health Regulations (2005) [IHR (2005)] which subsequently entered into force on 15 June 2007. The purpose and scope of the IHR (2005) are "to prevent, protect against, control and provide a public health response to the international spread of disease in ways that are commensurate with and restricted to public health risks, and which avoid unnecessary interference with international traffic and trade." States Parties are required by the IHR (2005) to State Party obligations to develop certain minimum core public health capacities.

IHR capacity requirements are defined in Article 5 as "the capacity to detect, assess, notify and report events" and in Annex 1A on "Core capacity requirements for surveillance and response" and 1B on "Core capacity requirements for designated airports, ports and ground crossings." In addition, the core capacity monitoring framework also has a checklist and indicators which should be used for monitoring progress in the development of IHR Core Capacities in States Parties (http://www.who.int/ihr/publications/checklist/en/).

As stated in Annex 1A.2, each State Party shall assess the ability of existing national structures and resources to meet the minimum requirements described in Annex 1. As a result of such assessment, States Parties shall develop and implement plans of action to ensure that these core capacities are present and functioning throughout their territories.

In 2012, the World Health Assembly (Resolutions WHA65.23) urged States Parties to take the necessary steps to prepare and carry out appropriate national implementation plans in order to ensure the required strengthening, development and maintenance of the core public health capacities as provided for in the International Health Regulations (2005).

The IHR Review Committee on Second Extensions for Establishing National Public Health Capacities and on IHR Implementation (WHA 68/22 Add.1) suggested that '*…, and with a longer term vision, the Secretariat should develop through regional consultative mechanisms options to move from exclusive self-evaluation to approaches that combine self-evaluation, peer review and voluntary external evaluations involving a combination of domestic and independent experts. These additional approaches should consider, amongst other things, strategic and operational aspects of the IHR, such as the need for high level political commitment, and whole of government / multi-sectoral engagement. Any new monitoring and evaluation scheme should be developed with the active involvement of WHO regional offices and subsequently proposed to all States Parties through the WHO governing bodies' process.'*

The call for the move from 'exclusive self-evaluation' to external evaluation comes from the recognition that transparency and mutual accountability in the international community are essential in implementing IHR collectively. A technical consultation meeting on IHR Monitoring and Evaluation Framework post 2015 was organized in Lyon in October 2015 and suggested development of processes and a tool to conduct joint external evaluation.

The JEE Tool is arranged according to following core elements:

- Preventing and reducing the likelihood of outbreaks and other public health hazards and events defined by IHR (2005) is essential.

- Detecting threats early can save lives.
- Rapid, effective response requires multi-sectoral, national and international coordination and communication.

APPENDIX 2: Joint External Assessment

Purpose of the Joint external evaluation

The Joint External Evaluation Tool - International Health Regulations (2005) is intended to assess country capacity to Prevent, Detect, and Rapidly Respond to Public Health Threats independent of whether they are naturally occurring, deliberate, or accidental. The purpose of the external evaluation process is to measure country specific status and progress in achieving the targets. This will require a sustainable and flexible process to allow for additional countries and regular evaluation visits. The first time the external evaluation is conducted it will establish a baseline measurement of the country's capacity and capabilities. Subsequent evaluations are also necessary to identify progress made and ensure any improvements in capacity are sustained.

Joint external evaluations share a number of important features, including: voluntary country participation; a multi-sectoral approach by both the external teams and the host countries; transparency and openness of data and information sharing; and the public release of reports. It also refers to the joint process during an external evaluation (envisioned to take place approximately every 5 years) where a team of national experts first prepares a self-assessment supplied to the external team prior to the on-site visit and the external team uses the same tool for their independent evaluation, working together with the national team in interactive sessions.

The external evaluation allows countries to identify the most urgent needs within their health security system, to prioritize opportunities for enhanced preparedness, response and action, and to engage with current and prospective donors and partners to target resources effectively. Transparency is an important element in order to attract and direct resources to where they are needed most.

Process

The first stage of the evaluation is a country survey completed by the country using self-reported data for the various indicators on the joint external evaluation tool. This information is then given to the joint external evaluation team comprised of national and international subject matter experts. Review of this self-assessment data provides the team members with a baseline understanding of the country's health security capabilities. These subject matter experts then visit the country for facilitated in-depth discussion of the self-reported data as well as structured site visits and meetings organized by the host country. The evaluation team uses findings of various relevant evaluation and assessments like OIE PVS pathway, monitoring and evaluation of disaster risk reduction and others.

After conducting the evaluation visit, the evaluation team drafts a report to identify status levels for each indicator, as well as an analysis of the country's capabilities, gaps, opportunities, and challenges. This information is then shared with the host country and, with permission of the host country, various other stakeholders in order to facilitate international support of country implementation efforts, share best practices and lessons learned, promote international accountability, engage stakeholders, and inform and guide IHR implementation both in the host country and internationally.[1]

[1]In the WHO African Region, the IHR implementation is within the context of Integrated Disease Surveillance and Response (IDSR) Strategy and in Asia Pacific (SEAR and WPR), the IHR implementation is in the context of Asia Pacific Strategy for Emerging Infectious Diseases.

Format

Every indicator in the evaluation tool has attributes that reflect various levels of capacity with scores of 1-5 (one indicates that implementation has not occurred; five indicates that implementation has occurred, is tested/reviewed/exercised and that the country has a high level of capability for the indicator). For each indicator, a country will receive a single score based on their current capacity. The Technical Area Questions will help the evaluators determine the appropriate score. Most of the measures are descriptive and qualitative. Countries will be asked to provide documentation for some if these items in addition to the responses. The documentation and responses will be reviewed by the evaluators, and will then be discussed during the external assessment. Final report will include scores as well as report narrative identifying existing capacities, gaps, and challenges. The results of the JEE are to guide IHR implementation in the country.

The tool was developed to provide an external mechanism to evaluate a country's IHR capacity for ensuring health security. This tool draws on the original IHR core capacities and incorporates valuable content and lessons learned from tested external assessment tools and processes of several other multilateral and multi-sectoral initiatives that have supported the building of capacity to prevent, detect, and respond to infectious disease threats.

Color Scoring System

While overlaps exist among the capacity sections of the tool, each is considered separately in the evaluation exercise. The implementation status of each core capacity is delineated by a level of advancement or scoring, which reflects the capacity to be institutionalized and sustainable. The following describes the level of advancement or scoring with color coding.

No Capacity – 1: Attributes of a capacity are not in place. Color Code: **Red** - 

Limited Capacity – 2: Attributes of a capacity are in development stage (some are achieved and some are undergoing; however, the implementation has started). Color Code: **Yellow -** 

Developed Capacity – 3: Attributes of a capacity are in place; however, there is the issue of sustainability and measured by lack of inclusion in the operational plan in National Health Sector Planning (NHSP) and/or secure funding. Color Code: **Yellow -** 

Demonstrated Capacity – 4: Attributes are in place, sustainable for a few more years and can be measured by the inclusion of attributes or IHR (2005) core capacities in the national health sector plan. Color Code: **Green -** 

Sustainable Capacity – 5: Attributes are functional, sustainable and the country is supporting other countries in its implementation. This is the highest level of the achievement of implementation of IHR (2005) core capacities. Color Code: **Green -** 

1. Without achievement of all attributes, at one level a country does not progress or advance to subsequent levels. For example, in order to reach the Demonstrated Capacity level, a country has to meet all the attributes for the Limited Capacity and Developed Capacity levels. Additionally, a country that does not meet the criteria for the Demonstrated Capacity level will be scored at the Developed Capacity Level or lower, even if they meet the criteria for the Sustainable Capacity level.
2. All the positive responses should be documentable.

APPENDIX 3: Taiwan Assessment Background

Mission Place and Time

Taipei, Taiwan; 21 June to 1 July, 2016

Mission Team Members [External Assessment Team]

Eric Toner	Senior Associate, UPMC Center for Health Security (Team Lead)
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Crystal Boddie	Senior Associate, UPMC Center for Health Security
Matthew P. Shearer	Analyst, UPMC Center for Health Security

Host Country Lead Agency

Taiwan Centers for Disease Control, Ministry of Health and Welfare

Participating Agencies / Institutions

Office of Homeland Security, Executive Yuan
Office of Disaster Management, Executive Yuan
Development of Medical Affairs, Ministry of Health and Welfare
Office of International Cooperation, Ministry of Health and Welfare
Food and Drug Administration, Ministry of Health and Welfare
National Health Research Institutes
Taichung Hospital, Ministry of Health and Welfare
Health Bureau of Taichung City Government
Bureau of Animal and Plant Health Inspection and Quarantine, Council of Agriculture
Animal Health Research Institute, Council of Agriculture
Ministry of Foreign Affairs
Environmental Protection Administration
Industrial Technology Research Institute
Atomic Energy Council
National Police Agency, Ministry of the Interior
National Fire Agency, Ministry of the Interior
Bureau of Mines, Ministry of Economic Affairs
National Science and Technology Center for Disaster Reduction

Taiwan CDC Assessment Team

Taiwan Centers for Disease Control, MOHW

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Jih-Haw Chou, 周志浩	Director-General (September 2016 – Present)
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Yi-Chun Lo, 羅一鈞	Deputy Director-General
Ying-Hwui Chen, 陳穎慧	Chief Secretary
Yu-Chen Hsu, 許瑜真	International Cooperation Office
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Yung-Ching Lin, 林詠青	Division of Planning and Coordination
Shu-Hua Hsu, 許淑華	Division of Planning and Coordination
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Preparation and Implementation of the Mission

Prior to the assessment visit in late June 2016, an introductory visit to Taiwan was made in March 2016 by the External Assessment Team. The External Assessment Team met with the host country team members over 4 days and reviewed in detail the self-assessment tool. Assessment mission agenda and logistics were developed through frequent emails.

Acknowledgements

The team from the UMPC Center for Health Security would like to deeply thank all those who participated in this assessment, especially the Taiwan CDC GHSA Task Force, without whose support and guidance the external evaluation would not have been possible.

APPENDIX 4: Acronym List

AEC	Atomic Energy Council
BAPHIQ	Bureau of Animal and Plant Health, Inspection, and Quarantine
CECC	Central Epidemic Command Center
CEOC	Central Emergency Operations Center
CoA	Council of Agriculture, Executive Yuan
EOC	Emergency Operations Center
GOARN	Global Outbreak Alert and Response Network
INFOSAN	International Food Safety Authorities Network
MCM	Medical countermeasure
MOEA	Ministry of Economic Affairs
MOFA	Ministry of Foreign Affairs
MOHW	Ministry of Health and Welfare
MOI	Ministry of the Interior
MOND	Ministry of National Defense
NFP	National Focal Point
NHCC	National Health Command Center
NNDSS	National Notifiable Diseases Surveillance System
PMDS	Product Management Distribution System
SOP	Standard Operating Procedure
TCDC	Taiwan CDC
TFDA	Taiwan Food and Drug Administration