



我國加入 WHO 2035 消除結核 第一期計畫

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目 錄

壹、計畫緣起	1
一、依據	3
二、未來環境預測	4
(一)我國結核病防治之優勢(S)	4
(二)我國結核病防治之劣勢(W)	6
(三)外部環境之機會(O)	9
(四)外部環境之威脅(T)	11
三、問題評析	12
(一)新興技術導入防治策略緩慢	12
(二)缺乏消除傳染源之決心	13
(三)社會仍普遍認為結核病為弱勢族群專屬之疾病	14
(四)基層執行結核病防治人力不足	14
(五)缺少民間團體支持	14
(六)全民健康保險給付體制對醫療之限制	15
(七)鄰近國家抗藥性疫情對我國之衝擊	16
四、社會參與及政策溝通情形	16
貳、計畫目標	18
一、目標說明	18
二、達成目標之限制	18
三、績效指標、衡量標準及目標值	18
參、現行相關政策及方案之檢討	22
肆、執行策略及方法	39
一、主要工作項目	39
二、分期(年)執行策略	39
三、執行步驟(方法)與分工	43
(一)強化防疫基礎建設與預防策略	43
1.落實防治單位之角色與權責	43
2.培植民間團體拓展防治網絡	44
3.推動結核病防治人才之培育	45
4.積極推展傳染源之阻斷策略	46
5.落實高風險環境之感染控制	53
6.提高全民之結核病防治知能	56

(二)以病人為中心的整合照護策略	57
1.提升醫院診療結核病之意願	57
2.精進結核病患者之診療服務	58
3.優化檢驗診斷及服務之品質	61
4.提升結核病個案之管理品質	64
5.強化困難或特殊個案之照護	66
(三)加強作業研究與開創新興技術	70
1.自動化系統以監測流行趨勢	70
2.加強業務研究與發展新策略	74
(四)拓展跨國合作與國際防治奧援	75
1.辦理跨國合作投入國際防治	75
2.參與國際會議訓練促進交流	76
伍、期程與資源需求	77
一、計畫期程	77
二、所需資源說明	77
三、經費來源及計算基準	77
四、經費需求(含分年經費)及與中程歲出概算額度配合情形	78
陸、預期效果及影響	80
柒、財務計畫	82
一、資金籌措來源	82
二、經費負擔原則	82
三、年度預算安排	82
四、經資比規劃	82
五、自償性率規劃	82
捌、附則	86
一、替選方案之分析及評估	86
二、風險評估	86
三、有關機關配合事項	89
四、中長程個案計畫自評檢核表(如附錄三)	94
五、附錄	95
附錄一：「結核病十年減半全民動員計畫」外部評值(External review)專家建議	96
附錄二：Draft global strategy and targets for tuberculosis prevention, care and control after 2015	130
附錄三：中長程個案計畫自評檢核表(含性別影響評估表)	157
六、參考文獻	168

壹、計畫緣起

世界衛生大會(WHA)於2014年5月通過世界衛生組織(WHO)提出之「Global strategy and targets for tuberculosis prevention, care and control after 2015」,揭櫫以「終止全球結核病的流行」為未來努力目標,並以「零死亡、零個案、零負擔」為願景,期望2025年相較於2015年結核病發生率可降低50%,至2035年可降低90%;與2015年相比,減少75%的結核病死亡,至2035年可減少95%,逐步邁向消除結核病,並且達到沒有家庭因為結核病,而需面臨重大財務負擔之目標。為落實計畫目標,該組織呼籲應積極透過「以病人為中心的方式,整合照護和預防體系(Integrated, Patient-Centred Care and Prevention)」、「大膽的結核病防治政策與支持體系(Bold Policies and Supportive Systems)」及「強化研究與研發(Intensified Research and Innovation)」等3大支柱來推行各項防治策略[1]。同年7月3日,WHO與歐洲呼吸學會(European Respiratory Society)、及已進入消除前期(pre-elimination;結核病個案每年少於百萬分之一百)的33個先進國家代表,在義大利羅馬共同發表聲明:承諾藉由確保足夠的預算支持結核病控制計畫、加強弱勢/移民等族群的結核病診斷和照護、研發新診斷及治療工具、以及支持全球的結核病控制等行動,除致力於實踐WHO之目標外,並且將更進一步要在2050年達到結核病個案每年少於百萬分之一[2]。

其實早在2002年聯合國以消滅貧窮、飢餓與疾病為號召,制定千禧年發展目標[3];終止結核夥伴組織(Stop TB Partnership)及WHO接續於2006年推出「The Global Plan to Stop TB 2006-2015」,就全球結核病負擔之影響及所需的行動與資源,進行全面評估及實施遏制結核病之防治策略[4],並提出結核病盛行率及死亡率減半之目標,共同致力於結核病防治工作。依據2013年WHO公布資料顯示,全球累計治癒人數已達5,600萬人,並且挽救了2,200萬例瀕死個案之生命。儘管

結核病防治在全球已有重大且豐碩之成果，惟究大部分的結核病例是可以預防及治療成功的前提下，該疾病在2012年仍奪走130萬條人命，僅次於愛滋病，依然有改善的空間，另估計每年約近300萬人沒有被衛生單位發覺及接受治療，而大多數人罹患結核病而不自知，且這些人多居住在最貧窮及弱勢的社區中，加上抗藥性結核病及合併愛滋病等問題亦日趨嚴重等議題，造成目前全球結核病發生率每年以2%的速度下降實屬緩慢[5]。因此，WHO仍將結核病防治列為具急迫性的全球公共衛生議題與挑戰。

從成本效益的角度來看，世界銀行（World bank）於2007年研究分析指出：投資結核病的收益成本比率比其他教育或農業發展等計畫的投資效益高，其中在非洲區域，投入成本1元可獲得9元的效益[6]。而Akachi等人的研究也發現，在22個高負擔國家結核病控制計畫經費每增加每人1美元的經費，隔年可以增加1.9%的個案發現率。當個案發現率達到70%以上，可有效下降結核病的發生率、盛行率與死亡率[7]。WHO更提醒，防疫資金的缺口將可能造成疫情逆轉，因此，呼籲各國及民間組織應共同重視結核病防治議題並應有穩定且充足之防治經費，知名國際組織/企業家亦積極響應，包括微軟創辦人比爾·蓋茲（Bill Gates），透過成立之「比爾及梅林達-蓋茲基金會」，自2004~2012年總計挹注結核病防治工作達13億3,070萬美元，除致力於結核病的檢驗設備、疫苗及治療藥物之研發作業外，並捐助大筆基金予「全球對抗愛滋病、肺結核和瘧疾基金會（The Global Fund to Fight AIDS, Tuberculosis & Malaria, GFATM）」，援助低/中低收入國家的結核病防治工作[8]。此外，世界經濟論壇（World Economic Forum；WEF），更將「結核病發生率」及「未來五年肺結核對商業的影響程度」列入全球競爭力指數之評比項目內容[9]，顯見國際各界對於結核病防治議題之重視及積極參與。

反觀我國結核病防治的現況，臺灣地狹人稠，人口密集且流動性大，人口老化及共病問題日趨嚴重，加上社會高度發展致人際關係疏

離且貧富距離拉大，近貧人口增加，種種因素導致病人的發現及管理均面臨前所未有的挑戰。此外，全球化的發展及與各國交通往來之便捷，我國與鄰近結核病高負擔國家，透過開放觀光、外勞引進、新住民及貿易、投資等往來密切之因素影響下，亦須採取更全面性及積極主動的介入措施，以突破目前防治工作的瓶頸，保障民眾健康。我國於 2006 年（民國 95 年）WHO 宣示減半目標後，同步提出「結核病十年減半全民動員計畫」，每年疫情雖持續穩定下降，惟囿於防治經費逐年縮減之影響，針對國際間較新穎的防治策略或檢驗技術，難以積極引入推展，致無法提供更快速的介入措施，及早進行疫情防堵，進而造成結核病下降幅度受限，策略推行之邊際效益亦無法得到有效彰顯。此一影響結果，導致我國結核病發生率下降幅度不若其他先進國家或部分受到國際組織援助之國家，這一點可自我國於 WEF 公布之全球結核病發生率負擔值排名位居 72 名之變動情形得到驗證[9]，也警醒我們須有更充足及穩定的資源投入結核病防治工作，才能跟得上國際間之發展腳步。

結核病至目前為止，仍是影響我國民健康的嚴重傳染病之一，其嚴重性比所有其他傳染病的總和還大，不但危害民眾健康及生命，耗損社會生產力，更嚴重影響國家競爭力及國際形象。為擘劃我國未來 20 年之國家結核病防治策略並爭取足夠之資源，爰參考 WHO 提出之「Draft global strategy and targets for tuberculosis prevention, care and control after 2015」，並廣納國內外專家建議，研提「我國加入 WHO 2035 消除結核第一期計畫」，期以透過更強而有力的介入措施，達到終止結核菌傳播之最終目的。

一、依據

(一)傳染病防治法

(二)民國 102 年 9 月 5 日行政院第 3364 次會議：

有關我國「2013-2014 年 WEF 全球競爭力報告」相對落後或退

步的項目，依例會請相關機關注意分析及檢討，這些項目大如「政府財政赤字與債務」，細如「肺結核發生率」等，都要請相關部會瞭解這些項目名次變化背後所代表的意義，詳細冷靜思考這些項目是否確實做得不好需要改進，請經建會於「國際評比改善小組」運作機制，召集相關機關分析此次的競爭力報告並研議對策，希望未來再創佳績。（「國際評比改善小組」業於 103 年 5 月 13 日解除任務編組，改由各評比主政機關自行列管及辦理後續事宜）

二、未來環境預測

（一）我國結核病防治之優勢（S）

1. 傳染病防治法規範

我國於「傳染病防治法」之規範中，針對中央及地方已有明確權責之劃分，中央統合運作整體防治作為，監督、指揮、督導及考核地方縣市衛生局執行傳染病相關事項；地方就執行政策進行因地制宜之規劃，並執行各項防治業務。此外，為保護大眾公益，對於不合作或有感染他人之虞者，均可由縣市衛生局依傳染病防治法所訂程序，執行法定傳染病隔離措施，以預防傳染性結核病患者在社區中傳染，有效阻斷疫情蔓延。

2. 防疫組織分層動員、體系健全

我國自民國 90 年以「醫療體系」、「檢驗體系」及「公共衛生體系」三大網絡模式，規劃建構全新結核病防治體系。透過公衛與醫療間互相合作，提供病患診斷、完整的治療及追蹤個案管理服務。我國之整體防治網絡，包括疾病管制署（下稱疾管署；含各分區管制中心）、縣市衛生局、鄉鎮衛生所、診療醫院、實驗室等單位，共同致力於我國結核病防治工作，不僅就個案之醫院診療面及社區照護面，相互合作提供完善服務，並對罹患結核病之高風險對象，提供主動篩檢/預防之服務機制，

有效落實三段五級之防治策略。

3. 結核菌檢驗資源豐沛，檢驗品質維持一定水平

依據民國 98 年「臺灣地區醫療院所結核菌檢驗狀況調查」資料顯示，民國 97 年全國計有 102 家醫療院所執行抗酸性抹片染色檢驗，其中，46 家可執行抗酸菌培養、36 家可執行結核菌鑑定及結核菌藥敏試驗。而為提升結核病檢驗品質，自民國 97 年起推動結核病認可實驗室制度，藉由鼓勵實驗室參與認證、能力測試及人員定期訓練，以提升檢驗正確率及縮短檢驗時效。於民國 103 年國內計有 31 家結核病認可實驗室，平均每年執行全國 60~70 萬件結核菌檢體檢驗工作，並在外部品管系統（External Quality Assurance, EQA）的監測輔導下，各實驗室皆可提供穩定的檢驗品質，使臨床醫師對於結核病患者之診斷，均有可信賴及完整的檢驗結果。並可透過追蹤患者治療過程中之痰液細菌殘量之多寡，對於治療成效進行客觀性評估，作為有效阻斷結核病傳播之監測依據。

4. 全民健保制度、醫療資源普及與醫院/公衛之整合

全民健保的政策目標，在於保障民眾的就醫權利，去除就醫的經濟障礙。而我國結核病的診斷和治療費用，亦屬全民健康保險制度之給付範疇。疾管署亦自民國 95 年起，透過公務預算支應治療者就醫之部分負擔，以減輕民眾就醫之經濟壓力。此外，我國醫療院所遍布各地區，亦提供民眾便捷及自由選擇的就醫環境。不僅如此，我國相較於其他國家，除了透過公共衛生護士提供的社區照護外，亦推行醫院「結核病個案管理制度」，透過醫院個案師提供結核病個案衛教及照護，促進臨床與公衛端之共同合作。鼓勵醫院設立「結核病防治委員會」，就結核病病患之醫療處置進行專業討論，提供更即時且適切的治療，藉以提高民眾積極就醫之意願及穩定性，給予高品質的照護服務。

5. 結核病個案管理過程資訊化

透過建置資訊系統平台方式，使得臨床與公衛人員於執行結核病個案管理作業過程中，能有緊密之連結。個案管理人員於取得個案診斷治療過程中之訊息後，即鍵入管理系統並進行資料維護，系統內之資訊包括個案之基本資料、處方用藥、檢驗結果、都治執行情形、訪視紀錄及副作用評估等。因此，不論是公衛端或是醫療端的個案管理人員，皆可透過系統平台，即時了解各單位執行個案管理之情形，提供個案必要之協助及服務，亦可藉由系統資料，針對個案管理品質進行評估與監測。此外，相關個案治療及管理資訊亦得以透過系統進行長時間之累積及儲存運用，可進行長期結核病流行病學資料分析，提供我國防治政策調整之評估及依據，系統亦應依實際需求隨之改版，以更符合第一線使用者的需要。

(二)我國結核病防治之劣勢 (W)

1. 整體防疫經費短絀

WHO 呼籲「結核病」是全世界各國政府必須正視之重大公共衛生議題，其中「政府的承諾、足夠的資源」是結核病防治成功的重要基礎。我國在運用各項結核病防治策略的積極介入下，發生率雖已逐年下降，惟為了提升防疫策略之精緻度及更臻周延，防治作為須更為細緻，且防治時間點亦須提早至預防階段，避免感染者發病。是以，在達到根除階段前，預算需求不應因為個案數下降而隨之下降，反而需要更多的預算挹注，以確保各項防疫作為的維持，並在個案數減少後建置更為敏感及精準的個案發現策略，以有效介入阻斷其傳播。惟我國前一期之結核病防治經費，由原計畫編列預算至核定經費，平均縮減約 34%；民國 103 年實際核定經費相較 96 年再縮減 20%。防疫經費及資源投注逐年減少，較新穎的防治策略或檢驗技術，難以積極引用推展，無法提供更快速的介入措施，及早阻斷傳

播，該經費短絀的困窘亦使得我國發生率降幅受限，原訂 10 年減半之目標不易達成。另美國於 1972~1982 年間，即曾因個案數下降而大幅刪減防治預算，導致後續結核病疫情大幅攀升，經投注數倍經費後，始能控制疫情，該國之前車之鑑足以為戒。

2. WEF 全球競爭力報告，我國國際排名進步有限

近年來，國際評比排名向來是一國政府對內宣傳施政效能、對外提升國際知名度與競爭力的最佳工具，而透過相對客觀中立單位發表的評比結果，亦可作為一國施政規劃之重要依據。對臺灣而言，國際排名更是我國與國際接軌的重要管道之一，同時也可提供政府作為外商投資、外人來臺，以及我國參與國際活動的重要依據指標。惟我國受限於防治經費逐年縮減之影響，針對國際間較新穎的防治策略或檢驗技術，難以積極引入推展，致無法提供更快速的介入措施，及早進行疫情防堵，進而造成結核病下降幅度受限，策略推行之邊際效益亦無法得到有效彰顯，致使結核病發生率雖穩定下降，但在全球競爭力之整體排名卻無明顯突破（如表一），影響我國該評比指標之整體分數及名次。

指標項目	2014 年 排名* (分數)	2013 年 排名 (分數)	2012 年 排名 (分數)	2011 年 排名 (分數)	2010 年 排名 (分數)	2009 年 排名 (分數)	2008 年 排名 (分數)
H4.03 結核發生率（每 10 萬人結核案例數）	72 (49.4)	84 (70.0)	83 (75.0)	83 (81.0)	83 (84.0)	82 (85)	82 (87.0)

*2014 年 WEF 接受臺灣爭取使用結核病新案實際發生率數據，作為競爭力評比

表一、2008~2014 年我國結核發生率於 WEF 之排名

3. 防疫人員流動頻繁，防治經驗不足

依據民國 101 年疾管署與各縣市衛生局調查資料顯示，經統計全國約有近半數以上從事結核病防治工作之各階層工作

人員，其工作年資小於 3 年，且縣市迭次提出因整體工作負荷過重，導致第一線公衛人員異動頻繁致專業及經驗不足，或有部分公衛人員對結核病防治工作認同度不佳，或常需因應急性傳染病疫情等因素，造成基層屢有人力斷層及量能不足之窘境。加上結核病防治工作經緯萬端，倘人員輪替頻仍，防治經驗即無法有效累積，進而影響對於結核病個案之整體照護品質與相關防治策略之推展。

4.我國因人口老化及共病因素，影響疾病預後

依據國家發展委員會於民國 103 年就我國 103 年至 150 年人口結構進行推估之資料顯示，我國於 82 年即已成為高齡化社會（65 歲以上人口占總人口比率達到 7%），預計將於民國 107 年及 114 年分別邁入高齡社會（aged；65 歲以上人口占總人口比率達到 14%）及超高齡社會（super-aged；65 歲以上人口占總人口比率達到 20%）[10]。老年人口因受到其他並存慢性疾病或免疫力逐漸下降等因素，以致潛伏於體內之結核菌易活化發病，使得 65 歲以上之結核病患佔全國結核病個案半數以上。此外，國內外研究資料亦顯示，糖尿病病人不論是否接受治療，相對於沒有糖尿病者，均有較高的結核病發病風險。此外，隨著糖尿病的併發症越多，嚴重度越高，結核病發病風險隨之增加[11]。結核病患者不論因合併罹患糖尿病、HIV 感染、末期腎臟疾病（ESRD）等共病，其治療後之痰液中結核菌檢出陰性結果均較無合併疾病者慢，並增加結核病治療期間死亡的風險，提高了結核病個案管理及治療之困難。

5.地方政府投入防疫心力程度不一

統計民國 102 年各縣市政府自行籌措結核病防治預算經費，佔該縣整體所需之結核病防經費比例為 0%~76% 不等、各縣市歷年之結核病新案發生率之降幅、對於基層公衛人員執行防治工作成效之管理及考核內容之寬鬆不一，上述資料顯示地方政

府對於結核病防治所投注防疫心力程度不一。

6. 流動人口及合併 HIV 結核病個案之接觸者追蹤不易

臨時工、經常性於國際間往返之國人、街友及合併 HIV 等結核病個案，大多受生活型態特性、居住/工作處所不固定、重視隱私或擔心汙名化等因素，無法或不願提供與其接觸人員完整或清楚資料，致該些接觸者行蹤相對不易掌握，進而導致公衛人員在找出潛在感染源以及早控制疫病散播之成效受限。

7. 社會經濟不景氣、失業率高，形成就醫障礙

保持良好生活型態，提升免疫力係維持健康之不二法門，景氣惡化現象所衍生的問題，諸如失業率持續攀升，造成家庭成員失業或事業經營失敗，以致家庭經濟陷入困境，皆可能造成民眾因壓力大或生活失序，倘又不幸罹患結核病，因經濟上之困難，不易被及早發現，且結核病之診斷與治療是需要透過定期返診追蹤。過去即曾有結核病個案受限於經濟因素，不願請假住院或返診接受治療，造成疫病持續於社區中傳播。

(三) 外部環境之機會 (O)

1. 全球重視之防疫議題之一

聯合國於 2002 年以消滅貧窮、飢餓與疾病為號召，制定千禧年發展目標，其中「目標 6.C：到 2015 年遏制並開始扭轉瘧疾和其他重要疾病的發生率」，其他重要疾病即指結核病，另在該指標 6.8 即為結核病的發生率、盛行率和死亡率[3]。終止結核夥伴組織(Stop TB Partnership)及世界衛生組織(WHO)，於 2006 年推出「The Global Plan to Stop TB 2006~2015」，就全球結核病負擔之影響及所需的行動與資源，進行全面評估及實施遏制結核病防治之策略，並提出結核病 10 年減半計畫，規劃到 2015 年全球結核病盛行率及死亡率與 1990 年之基準相比可以減少一半，與千禧年發展目標相互鍵結[4]。2014 年更於 WHA 會議中通過「後 2015 年後全球結核病預防、控制及照護

之戰略和目標」[1]。而世界經濟論壇(World Economic Forum ; WEF)，更將「結核病發生率」及「未來五年肺結核對商業的影響程度」列入全球競爭力指數之評比項目內容[9]，國際間亦不乏知名企業及基金會，透過金援及技術支援，協助高負擔結核病國家推展防治工作，顯見結核病防治已為全球共同關注及重視之議題。

2. 國際新藥、疫苗及檢驗技術的發展

結核病治療期程漫長及服藥所產生的副作用，往往影響患者服藥遵從性，進而造成抗藥性菌株增加之風險；迄今之惟一疫苗—卡介苗之保護效果，在世界各地的報告中亦有極顯著的差異。藉著分子生物學科技的快速發展，針對結核病之預防、診斷及治療等議題，國際上已有諸多研究，提供新疫苗、新診斷工具及新藥發展之新契機，尤其，部分新診斷工具及新藥已有初步成果，得以更有效地對抗結核病。

3. 國內生技、醫藥研發產業發展趨於成熟

政府長期以來，運用政策方案，積極推動生技醫藥產業，發展優質的臨床研究及醫療體系，以及高品質、合宜成本的研發生產環境，逐漸加速並建立創新生技醫藥產業之發展與升級。疾管署亦自民國 96~102 年透過研究計畫方式，委託社團法人國家生技醫療產業策進會，透過產官學之合作，致力於結核病諸如：基礎研究、診斷工具、治療及流行病學等議題進行研究，陸續已有具潛力及應用價值的成果呈現[12]；此外，國內亦有致力於檢驗研發之業者，透過核酸探針檢驗技術，發展出一系列結核分枝桿菌檢驗試劑。憑藉國內生技/醫藥研發產業趨於成熟之發展，對於未來結核病診斷及防治策略之精進，具有實質助益。

4. 衛生福利部成立，整合社會福利單位

結核病是一種較易發生在貧窮及弱勢族群的疾病。隨著經

濟景氣的改變、家庭結構的變遷，以及人口老化與少子（女）化等趨勢，更衍生出弱勢扶助及長期照護之需求增加，爰此，衛生福利部於民國 101 年成立，將有利於衛生與社福間業務的整合與協調，並透過健全福利服務體系，加強弱勢族群之照顧，對於國人生、心理及社會各層面，提供更全方位之照護，將可減輕其因貧而病、因病而貧之惡性循環，促進全民健康與福祉。

(四)外部環境之威脅 (T)

1.全球結核病流行現況

自 1980 年代起，由於許多國家防治計畫不完善、多重抗藥性結核的產生、愛滋病的盛行及全球人口的快速流動，全球普遍面臨結核病疫情回升的嚴峻挑戰。WHO 有鑑於結核病疫情日益惡化，於 1993 年宣布結核病為「全球緊急危機」，指出結核病迄今仍然是全球性最重要的健康問題之一，呼籲各國重視結核病防治工作，嚴密防範結核病的全面反撲。依據 WHO 公告之「2013 全球結核病報告」資料顯示，全球約 860 萬例結核病患，其中 110 萬人（13%）合併感染 HIV；130 萬人死於結核病，其中包含 32 萬人（25%）合併感染 HIV，另在抗藥性結核病疫情部分，2012 年全球約有 45 萬例多重抗藥性結核病個案，有 17 萬人因此而死亡。整體而言，大部分的結核病個案分布於東南亞（29%）、非洲（27%）、和西太平洋（19%）地區，其中，印度和中國兩國之病例數分別佔全球的 26% 和 12%。不過，更值得注意的是 WHO 於 2012 年估計全球約有 300 萬例結核病患者未被通報，故無法獲得適當的治療與照護，造成疫情持續於社區中傳播[5]。

2.國際交流頻繁

依據 WHO 最新公布之統計資料指出，全球共計 22 個結核病高負擔國家中，位於亞洲的國家包括：柬埔寨、中國、印

度、印尼、緬甸、菲律賓、泰國及越南等 8 國，其中，除泰國外，其他國家亦同時為全球多重抗藥性結核病之高負擔國家[5]。這些國家與我國交流密切且頻繁，泰國、菲律賓、印尼及越南亦為我國外籍勞工的主要輸入國。統計資料顯示，國內通報為結核病確診之外籍人士，自民國 97 年約 450 例個案，逐年增加，至民國 101 年已達 700 例個案。此外，亦有數起於中國經商之臺商感染多重抗藥性結核病後，返臺接受治療，或自中國來臺就學之學生於我國被診斷罹患多重抗藥性結核病之案例，顯示鄰近國家之結核病疫情，對於我國國民健康已構成日益嚴重的威脅。

3. 全球經濟不景氣

自 1997 年以來，全球先後受到美國金融海嘯、歐洲數國債務危機之影響，整體經濟疲弱不穩，先進國家及新興國家經濟也都受到衝擊，進而影響全球結核病防治預算之穩定性，包括國際組織/慈善團體減少對於防治及研發之補助金額，使得防治進程受到影響。此外，國內、外就業環境之變遷，造成國人往返結核病高負擔國家經商之頻率增加。而企業為了節省能源成本及受節能省碳議題影響，紛紛簡化工作場所之空調設備，採用室內空氣冷循環之設計，造成室內換氣不足的情形，進而衍生空氣品質不佳，再加上辦公、教室、醫療院所診間環境擁擠，無形中增加空氣傳播之疫病如結核病於室內空間散播之風險。

三、問題評析

(一) 新興技術導入防治策略緩慢

提升結核病的診斷能力，讓結核病患在發病時都能迅速診斷獲得治療，儘早解除其傳染性，是結核病防治的重要原則。因此，WHO 早在 2008 年及 2010 年，陸續建議使用各類痰液檢體快速分

子檢測方法(2008年推薦使用 Line Probe Assay; 2010年推薦使用 Integrated NAAT)[13], 透過縮短檢測時間及提升結核病檢測品質, 達到提早治療阻斷傳染源之目的。囿於整體結核病防治預算逐年減少(如表二), 因此, 我國至2010年(民國99年)及2013年(民國102年)始依WHO之建議, 陸續引進快速診斷之檢驗技術, 期望透過早期診斷及早進行疫情防堵[14]。惟新興新技導入防治策略緩慢, 致使我國發生率降幅受限, 策略推行之邊際效益亦無法得到有效彰顯。

年度	計畫原編經費	法定預算	核撥比率
95年	1,658,148	984,111	59.4%
96年	1,665,855	1,257,101	75.5%
97年	1,673,907	1,239,117	74.0%
98年	1,682,323	1,239,102	73.7%
99年	1,691,118	1,252,919	74.1%
100年	1,096,600	1,083,910	98.8%
101年	2,255,346	1,023,196	45.4%
102年	2,055,944	1,007,046	49.0%
103年	1,920,890	998,626	52.0%
104年	1,828,108	872,626(概算)	47.7%
總計	17,528,239	10,085,128	57.5%

表二、「結核病十年減半全民動員計畫」經費表(千元)

(二) 缺乏消除傳染源之決心

過去結核病防治多以診療發病個案為核心工作, 但結核病畢竟是一種傳染性疾病。依據WHO資料顯示, 未接受治療的結核病個案平均每年會使10~15名接觸者受到感染[15]。美國2001年研究指出, 約有30%的接觸者在暴露後會成為潛伏結核感染者, 潛伏感染者一生中有10%的機會進展至結核病, 半數的感染者可能會在感染後的2年內發病[16], 然而我們無法確認哪一個接觸者會進展為發病。另根據我國研究資料顯示, 結核病個案接觸者發病率為一般民眾之8~240倍[17]。目前國內以預防醫學角度之防治策略比重較為缺乏, 如何運用更強而有力的介入措施來消滅傳染

源，終止疾病傳播，以促進及維持大眾的健康，進而阻止疾病發生才是正本清源之道。

(三) 社會仍普遍認為結核病為弱勢族群專屬之疾病

國際上將結核病稱之為「Silent killer」-無聲殺手[18]，顯示社會普遍將結核病誤認為是一種慢性病，遺忘其於社區中持續傳播對健康造成之嚴重威脅，甚至將結核病誤認為僅發生於弱勢族群的一種疾病。社會大眾忽視其嚴重性，缺乏充分的警覺心，無形中亦造成各類預防策略推展受到限制。

(四) 基層執行結核病防治人力不足

結核病個案的治療與管理是需具有一定的醫護背景，才能提供良好的照護服務，由於衛生所負責的業務相當龐雜且多樣性，加上結核病個案合作程度不一、居無定所的街友、山地鄉居民及貧困獨居者等特殊性，往往需耗費更大心力、時間來執行管理工作，無形中造成基層工作人員一項沉重的負擔。不僅如此，近年來我國結核病防治策略，更致力於結核病接觸者調查與檢查、潛伏結核感染治療等早期預防之公共衛生防治策略，更需要增加基層防治人員的投入，確保提供足夠的工作量能，以避免影響各項策略推行之品質與後續效益。

(五) 缺少民間團體支持

國際著名的民間團體 Partners In Health(PIH)，結合學術單位，共同致力發展中國家的社區擺脫貧窮與疾病，透過提供治療、照護等輔助，促使秘魯結核病發生率已達 WHO 十年減半之目標[19]，顯示民間團體與國家防治體系的介接，對於防治策略之推展確實有明顯助益。綜觀國內參與愛滋病防治計有 22 個民間團體，亦積極投入愛滋病患者人權保障議題、爭取福利、提供短期照護、篩檢及衛教等服務，部分團體另就愛滋病防治議題，提供教學與研究之平台，號召各族群共同致力愛滋病防治，亦有一定程度之邊際效益。而國內登記有案的 2,000 多位罕見疾病患者，亦有 10 餘

個民間團體，投入病友支持團體之成立、患者及家庭關懷/照護服務、民眾宣導及相關法案的推動等事務[20]。相對於我國每年平均 1 萬餘名結核病個案的支持與照護，目前仍以透過醫療及公衛體系，執行各項防治及衛教策略之推展，由於，缺乏民間團體大力地支持，致使防治網絡難以擴展。

(六) 全民健康保險給付體制對醫療之限制

我國於民國 90 年 11 月，中央健康保險署（前為中央健康保險局）開始試辦結核病論質計酬計畫（pay for performance, P4P），並於民國 93 年正式納入支付標準，期以提升結核病患照護品質，使結核病患者能確實完治、節省醫療資源之浪費並提高醫療利用之效率。追蹤資料顯示，於民國 90 年參與結核病論質計酬個案追蹤 18 個月完成治療比例為 74.6%，未參加個案為 63.0%；於民國 93 年之追蹤 18 個月完治率為 83.5%，未參加者為 61.1%，顯示參與結核病論質方案的個案治療成果較佳，而實務上醫療及公共衛生體系的夥伴合作關係亦更加緊密[21]。但由於醫療機構對於加入論質計酬方案之個案，可能出現選擇病患效應（cherry pick，選擇容易照顧的個案），顯示運用此方案來提升結核病個案診療及照護之目的，仍未竟全功。

同時，健保給付仍為影響專科醫師人力消長的重要因素，給付點數高、醫療風險低的科別成了醫學生的首選。此外，健保在「不同工同酬」的支付制度基礎下，診療費無法反映醫師工作負荷度，致使大部分醫師選擇投入給付較高且輕鬆之工作[22]。再加上總額支付制度的實施，醫療院所的營收控制在總額成長範圍內，以及給付點值上下浮動等因素，即使結核病診療已透過論質計酬提供「財務誘因」，但對於提高臨床醫師投入結核病診療之意願仍嫌不足，並且對於提供適切的快速診斷工具等醫療行為亦有所侷限，無形中致使國內結核病醫療人才，缺乏留任及永續經營之動力與環境。

(七) 鄰近國家抗藥性疫情對我國之衝擊

國際抗藥性疫情以中國為例，該國 2012 年研究結果指出，2007~2008 年結核病新病人中平均有 5.7% 診斷為多重抗藥性結核病 (MDR-TB)，再治病人則為 25.6%；其中又以遼寧省，河南省，內蒙古自治區和黑龍江省為較嚴重的區域，但北京市和上海市也有 2.3% 和 3.9% 的結核病新案病人診斷為 MDR-TB[23]。因此，該國 MDR-TB 疫情，相較於臺灣 (新病人 1%，再治病人 6~8%) 更為嚴峻，另依據 WHO 資料顯示鄰近其他國家，如：菲律賓與越南，其多重抗藥性結核病疫情亦較臺灣嚴重。近年來，我國亦有數起於中國經商之臺商感染 MDR-TB 後，返臺接受治療，或自中國來臺就學之學生於我國被診斷罹患廣泛抗藥性結核病 (XDR-TB) 之案例，顯示鄰近國家之抗藥性結核病疫情，對於我國國民健康已構成日益嚴重的威脅。

四、社會參與及政策溝通情形

(一) 邀請國際專家審視我國結核病防治成效並提供建議 (評核結果如附錄一)。

為客觀了解我國「結核病十年減半全民動員計畫」執行成效，疾管署於民國 102 年 2 月 25 日至 3 月 4 日邀請包括美國疾病管制中心、英國衛生部、日本防癆協會及新加坡衛生部四國共六名國際專家，進行外部評核作業。為期 7 天的評核行程，安排由疾管署人員先進行各項防治策略之專題報告，再安排國外專家至臺南市、花蓮縣、新竹市、臺北市衛生局所等地方衛生單位，及行政院衛生署胸腔病院 (現為衛生福利部胸腔病院)、臺北市立萬芳醫院、臺灣大學附設醫院等，進行實地參訪及結核病個案住家訪查，透過不同層面來了解我國結核病防治體系與實際執行情形及成果。

(二) 運用疾管署 1922 諮詢專線、署長信箱、全球資訊網頁及發布新聞

稿等方式，作為民眾與疾管署對於結核病防治政策之溝通橋梁。

- (三) 民國 100-102 年間，透過民意調查方式，針對不同族群之民眾，對於我國結核病防治政策之了解及認同度，民調結果亦為政策調整之參考依據。
- (四) 本計畫籌劃過程，邀集結核病診治、檢驗、公共衛生、新聞媒體及法律等領域之專家學者，透過召開多次專案會議，對本計畫提供審議建議，使我國未來結核病防治政策規劃之內容能更臻周延。

貳、計畫目標

一、目標說明

響應 WHO，大幅降低國內結核病新案發生率，提供國人安全無虞之生活環境，並提升國際結核病發生率排名，提高國家競爭力吸引企業投資，另發揮濟弱扶傾之精神，協助友邦國家結核病防治工作，改善我國之國際形象。

二、達成目標之限制

- (一) 若防疫經費及資源無法到位，將導致較新穎的防治策略或檢驗技術，難以積極推展，無法提供更快速的介入措施，及早進行疫情防堵。
- (二) 國內愛滋病疫情倘未能獲得有效控制，將造成結核病之疫情防堵更趨嚴峻。
- (三) 病原體倘發生變異，造成國內外大規模流行，無法及時有效控制疫情。國際學者曾在南非 12 年的追蹤研究中發現，感染北京株之發病個案呈指數型成長，約 4.8 年此類個案數達到雙倍。而在越南的研究也發現：帶有 C allele of TLR-2 T597C allele 基因型別的人，感染東亞流行的北京株結核菌較其他地區流行株更易發病，而北京株是亞洲地區主要的流行型別。若菌株流行型別的變異和人群的易感受性發生交互作用，確有未來可能面臨大規模流行之風險[24]。
- (四) 鄰近結核病高負擔國家之結核/多重抗藥性結核病疫情，若出現失控情形，將大幅增加疫病境外移入我國之機率。

三、績效指標、衡量標準及目標值

為使本計畫指標更具評估意義，經徵詢專家學者意見，並配合我國結核病流行病學趨勢，預期績效指標經專家建議規劃如下：

(一) 主要目標

自十年減半計畫起始至民國 102 年，我國結核病發生率已自 72.5 例/每 10 萬人口，降至 49.4 例/每 10 萬人口，年平均降

幅達 4.7%。103 年初估我國結核病發生率為 48 例/每 10 萬人口，104 年預估值為 46 例/每 10 萬人口，本期計畫呼應 WHO 提出至 2035 年達 10 例/每 10 萬人口之全球目標，我國結核病新案發生率至計畫起始第 5 年（民國 109 年）降至 32 例/每 10 萬人口，至計畫執行第 10 年（民國 114 年）降至 23 例/每 10 萬人口之減半目標，以促使我國至 2035 年（民國 124 年）邁向結核病消除之最終目的。

（二）績效指標

1. 結核病個案管理績效

年齡分組之治療成功率：至民國 109 年，44 歲以下族群可達 90%；45~64 歲族群可達 80%；65 歲以上族群達 58%

我國近年來致力於都治計畫推動，結核病患在都治關懷員協助下，大多能順利完成治療，扣除死亡個案後，完治率的成長空間有限，加上人口老化及共病等問題，將嚴重影響治療成功之比率。依據現行舊制，101 年度世代之年齡分組治療成功率為：44 歲以下族群 87.3%；45~64 歲族群 78.9%；65 歲以上族群 61.3%；但自 105 年起始，計算方式將依 WHO 最新之治療失敗定義進行修正，將對象由初查痰塗片陽性個案擴大為所有結核病個案，並將其治療後 5 個月塗片或培養仍然為陽性者均納入失敗計算，預估失敗率可因此增加 5~7%，連帶降低治療成功率。但，本期計畫透過年齡層分組方式，運用不同防治策略，克服防疫人員不足及增加臨床醫師診療意願，將可提高患者治療成功率，進而達成預定目標。

2. 高風險對象管理績效：至民國 109 年，遭感染之接觸者接受潛伏結核感染治療比率達 85%

依據我國研究資料顯示，受結核菌感染且經評估符合納入「潛伏結核感染治療計畫」之 13 歲以下接觸者，透過完整治療可減少 96% 的發病風險。但本項指標之達成會受年齡結

構影響，在 103 年上半年度 12 歲以下的治療比率為 83%，13~28 歲為 68%，合計為 75%。本期計畫將擴大參與治療之年齡層上限，雖因副作用等個人因素無法治療之比率將隨之增加，但可有效避免該族群日後疾病之發生，進而減少日後治療結核病患醫療費用支出。

3. 實驗室檢驗品質監控績效：至民國 109 年，實驗室檢驗品質指標—初痰鑑定為結核菌群 28 天時效達成率達 88%

本項新創指標，於 103 年試評資訊系統及資源較完善充足的 7 家合約實驗室，達成率約為 79.3%；本期計畫將再納入 33 家認可實驗室進行監控。透過推展提升檢驗效能及內外部品管系統，藉以縮短實驗室提供報告之時限，以利防疫作為及時介入，並提升結核菌檢驗品質。

大類	項 目	衡量標準	執行年度				
			105	106	107	108	109
主要目標值							
結核病新案發生率以平均 6% 降幅逐年下降	年度結核病新增個案數 ÷ 年中人口數 × 100,000	43	40	37	35	32	
績效指標（一）結核病個案管理績效							
年齡分組之治療成功【註 1】率	≤44 歲： 年度結核病 ≤44 歲新案，經 12 個月追蹤，其結果為治療成功之個案比率	86	87	88	89	90	
	45~64 歲： 年度結核病 45~64 歲新案，經 12 個月追蹤，其結果為治療成功之個案比率	76	77	78	79	80	

大類	項 目	衡量標準	執行年度				
			105	106	107	108	109
		≥65 歲： 年度結核病≥65 歲新案，經 12 個月追蹤，其結果為治療 成功之個案比率	58	58	58	58	58
績效指標（二）高風險對象管理績效							
	潛伏結核感染接 觸者治療比率【註 2】	潛伏結核感染接觸者加入治 療人數 ÷ 潛伏結核感染接 觸者人數 × 100%	77	79	81	83	85
績效指標（三）實驗室檢驗品質監控績效							
	實驗室檢驗品質 指標－初痰鑑定 為結核菌群 28 天 時效達成率	（初痰鑑定為結核菌群日期 －收件日期 ≤ 28 天之件數）÷ 初痰鑑定為結核菌群件數 × 100%	75	80	83	85	88

備註：

1. 「治療成功」定義：病人被治癒或完成治療。本目標比照世界衛生組織(WHO)年報，採用計畫年度前二年之追蹤世代(如至 109 年 12 月 31 日計畫結束時，本指標係為採計 107 年世代追蹤之結果)。
2. 「潛伏結核感染接觸者治療比率」定義：符合疾管署政策推行潛伏結核感染接觸者加入治療之比率。

參、現行相關政策及方案之檢討

一、整體結核病防治成果之檢討

(一)結核病新案發生率

我國結核病新案數整體呈現下降趨勢(如圖一)。以結核病十年減半全民動員計畫實施前1年(民國94年)的16,472例為基準，民國102年新增確定病例11,528例，新案數累積降幅為30%；新案發生率為49例/每10萬人口，相較民國94年的73例/每10萬人口下降32%。



圖一、結核病政策現況

(二)結核病個案年齡分布情形

我國結核病個案以65歲以上老年人口居多，民國94~101年間其比率佔病例數總51%~53%，明顯高於其他年齡層。年齡別發生率隨年齡增加而呈上升趨勢，65歲以上老年人口發生率約為國人平均5倍，但65歲以上個案發生率降幅亦較其他年齡層顯著。

(三)結核病個案性別分布情形

民國101年男性發生率為74.2例/每10萬人口，女性為31.7例/每10萬人口，男性為女性的2.3倍，男性發生數及發生率均高於女性。

(四)結核病個案之地理分佈

發生率整體趨勢為東部高於西部，南部高於北部。民國94~101

年各縣市發生率均已呈現下降。進一步以山地鄉來分析，民國 101 年山地鄉之結核病新案發生率為 193.3 例/每 10 萬人口，約為全國發生率 53.0 例/每 10 萬人口的 3.6 倍，該地區於民國 94~101 年發生率累積降幅達 34.0%，整體已有明顯改善。

(五)結核病死亡監測

臺灣結核病個案死亡趨勢逐年下降，死亡數由民國 94 年 970 例降至 101 年的 626 例；死亡率由 4.3 例/每 10 萬人口，降至 2.7 例/每 10 萬人口，降幅達 37.2%，又 94~101 年的死亡個案年齡層以 65 歲以上為主，約佔總數的 81.2%~85.6%。性別分佈情形，民國 101 年男性死亡率 4.1 例/每 10 萬人口，女性 1.3 例/每 10 萬人口，男性為女性的 3.2 倍。地理分佈情形，則以東部地區死亡率較高，民國 101 年以臺東縣最高，除南投縣、桃園縣及嘉義市外，其餘縣市 101 年死亡率均較 94 年下降。

(六)抗藥性結核病監測

近幾年的資料顯示，臺灣結核病新案中，任何一種抗結核病藥物之抗藥比率約 14%，再治個案則約 23%。近 3 年再治個案中 MDR-TB 之比率由民國 99 年的 8.2% 下降至 101 年的 5.3%；MDR-TB 佔新案之比率則維持在 1% 上下。

(七)HIV/TB 共同感染

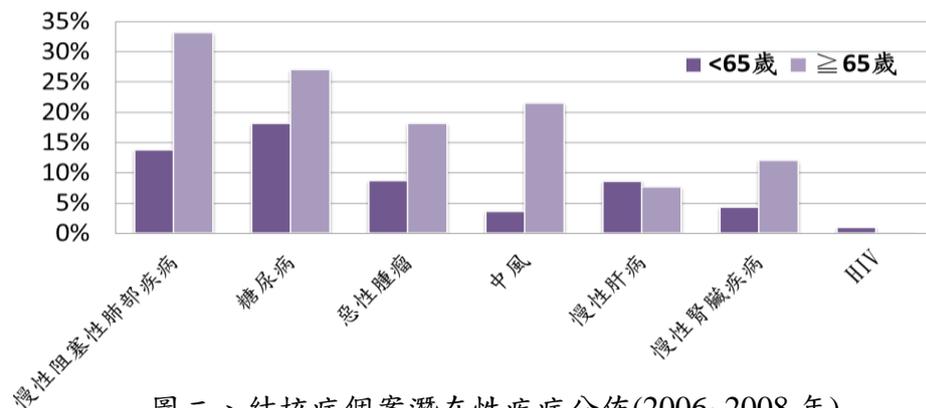
相較於全球，民國 101 年結核病新案中之 HIV 盛行率在 WHO 的分級中，屬於 0~4% 的最低等級。101 年結核病新案中 HIV 感染比率為 0.75%（男性：1.02%，女性：0.14%），當中 15~49 歲結核病新案中 HIV 感染比率達 2.42%（男性：3.76%，女性：0.18%）。

(八)世代追蹤治療結果

以民國 94~101 年通報個案進行 12 個月的世代追蹤治療結果，50 歲以下族群治療成功率在 101 年達 86%，符合 WHO 85% 以上目標；而老年人口可能受其他癌症及糖尿病等共病的因素影響，死亡率高，致使治療成功率低於其他年齡族群。

(九) 結核病個案潛在疾病分析

針對民國 95 至 97 年間通報之結核病新案，進行個案通報後追蹤 12 個月死亡之危險因子分析，結果顯示：約有 16.5% 的個案於追蹤期間死於結核病，12.5% 的個案於追蹤期間死於其他疾病，且主要發生於通報後兩個月內。整體而言，年齡、HIV 感染、慢性腎臟病 (CKD)、中風、癌症、慢性肝病及肝硬化 (cirrhosis) 為死亡的高風險因子。其中，0~64 歲之結核病個案族群，倘為伴隨 HIV 感染、慢性腎臟病 (CKD)、癌症、慢性肝病、肝硬化或糖尿病之共病者，則具有較高死亡風險 (如圖二)。因此，針對伴隨共病之結核病個案，應於結核病治療期間提供較良好之醫療照護與個案管理，提升患者預後[25]。



圖二、結核病個案潛在性疾病分佈(2006~2008 年)

(十) 各類族群風險分析

依據國內各項研究分析結果顯示，我國結核病高發生族群，依估計之每 10 萬人口發生率，依序為結核病個案接觸者(967 例)、TNF- α -blocker users (530 例)、HIV 感染者 (500 例)、洗腎患者 (300 例)、矯正機關(244 例)、山地鄉(227 例)、新移民(176 例) 糖尿病共病患者 (100 例) 及經濟弱勢族群 (59.7 例)，如下表三。

風險族群	估計族群人數	年齡層	估計潛伏感染比例	估計結核病發生率 (per 100,000)	資料來源
接觸者	>100,000/年	全年齡層	30%	967	contacts' first year of TB incidence, 2005,
山地鄉	178,047	全年齡層	55.1%	227	external review 報告、2011 年生策會報告
新移民	141,420	20-49 歲	---	40.3-176.2	INT J TUBERC LUNG DIS 18(8):931-938
經濟弱勢*	678,296	全年齡層	---	59.7	IUATLD 2014 abstract
矯正機關	65,000	全年齡層	25%	244	Thorax 2013;68:263-268、法務部 2013 統計資料
TNF- α -blocker users	5,383	50 歲以上	18.6%	293-530	TFDA RMP report、2012 年生策會報告
HIV	22,000	15-49 歲為主	6.8%-15%	390-500	external review 報告、生策會報告、PLoS ONE 8(8): e73069
糖尿病	1,200,000	40 歲以上	25.4%	99.9-150	生策會報告、: Clinical Infectious Diseases 2012;54(6):818,Au
洗腎	74,216	50 歲以上	26.6%	300	生策會報告、Clin Microbiol Infect 2011; 17: 1646-1652

*依據 2012 年中低/低收入戶資料，目前的主動篩檢涵蓋此一族群約 10%

表三、各類族群風險分析表

二、個案主動發現及診斷

(一)強化個案發現

1. 特定族群監測

我國針對外籍人士及新住民申請入臺者，雖已要求檢附健康檢查證明，但近年疾病監測資料顯示，新住民入臺後結核病發生率仍為國人之 1.7~7.3 倍，與新住民主要來自結核病或多重抗藥性結核病高負擔之中國或東南亞地區國家有關[26]。另依據內政部移民署與戶政司統計資料顯示，截至民國 102 年 6 月我國新住民人數已逾 48 萬人，且逐年增加。如何持續監測該類族群入臺後結核病發病情形，避免造成家戶或社區後續之疫病傳播，無疑

為未來防治之挑戰。

目前針對引起聚集感染之特定場所，皆已納入為常規監測對象，民國 100~102 年期間，確認為聚集感染事件發生之場所依序分別為：校園佔 40% (25/62)、人口密集機構佔 29% (18/62)、職場佔 20% (12/62)、醫療院所佔 11% (7/62)。由於目前聚集事件監測方式，多仰賴公衛人員逐案比對結核病確診個案之通報活動地，非常耗費人力及時間。因此，自民國 103 年推動建置結核病個案地理位置資訊，運用以地理資訊 (GIS) 為基礎之監測策略，並考量聚集事件之結核病個案接觸者具有較高的發病風險，搭配 LTBI 治療，期以增進聚集事件監測之靈敏度及預防接觸者發病，以提升防治效益。此外，如何於平時透過維持良好室內換氣品質及完善的感染控制措施，防範疫情於未然，更是防堵聚集事件之根本要件。

此外，HIV 感染的流行是近年國際上結核病罹病率及死亡率下降曲線反轉的主因[27]。推動「愛滋病及結核病合作管理模式」，並與國民健康署合作，於成人及老人健檢門診進行結核病症狀問診。另針對糖尿病、HIV 感染等高危險共病患者加強篩檢，期以及早發現個案及醫療介入。

2. 加強接觸者檢查

我國自推動接觸者檢查以來，每例個案之接觸者檢查平均數由民國 95 年 2.2 人提升至 102 年 9.5 人，已有長足之進步。民國 102 年結核病確診個案之 1 個月內接觸者檢查完成率亦高達 96%，顯現公衛人員之積極努力，惟確診後第 12 個月接觸者檢查完成率僅 76%，顯示接觸者之第 2 次追蹤檢查結果仍須加強。因此，為提高接觸者檢查及追蹤效益，將建立以「接觸者為中心」之追蹤檢查及管理模式。此外，匡列正確且完整之高風險族群，及確實追蹤接觸者，以完成相關檢查，俾及早找出社區感染源及潛伏感染者，即早介入相關防治作為，以阻斷社區傳播，亦是未來

須努力之方向。

另針對結核病個案接觸者追蹤成效進行分析，結果顯示：第 1 次完成 CXR 檢查的接觸者 39 萬 5,656 人，於檢查後 15 日內有 814 例（90 日有 1,062 例）接觸者被診斷出結核病，隨著個案之傳染性愈高，則發現率愈高，其發現率均高於一般民眾結核病發生率（55 例/每 10 萬人口）。資料顯示第 1 次 CXR 檢查對於主動發現病人有其效益。惟若指標個案為單純肺外，則需 6,260 人接受檢查才能找到 1 名個案，成效不佳。另於第 12 個月 CXR 檢查且於 15 日內主動發現結核病個案共 153 例，主動發現率 130 例/每 10 萬人口；於 90 日內主動發現個案共 169 例，主動發現率約為 150 例/每 10 萬人口（依敏感性測試來看無明顯差異），推斷第 12 個月接檢確實是發現接觸者轉病人的重要篩檢時間點。此外，隨著個案傳染性愈強，接觸者第 12 個月主動發現率愈高。為減少接觸者遭受不必要之放射線暴露風險，將檢討現行結核病個案接觸者後續追蹤檢查之期程，以妥善分配及運用有限資源。

3. 推動潛伏結核感染治療政策

我國自民國 95 年推動小於 13 歲接觸者進行潛伏結核感染治療（以下稱 LTBI 治療）以來，截至 102 年 10 月之資料顯示 LTBI 治療執行率達 81%；民國 97 年擴大執行 LTBI 治療對象至 13 歲以上至民國 75 年 1 月 1 日以後出生之接觸者，於民國 103 年，此類接觸者 LTBI 執行率亦達到 72%。此外，接受 LTBI 治療者，加入直接觀察預防治療（DOPT）比率以及完成治療比率皆達九成。依據國內追蹤研究結果顯示，13 歲以下接受治療之接觸者可降低 96% 的發病機率[17]，有效保護潛伏結核感染者並降低日後發病之風險，因此，未來將持續擴大推動 LTBI 治療對象，以有效降低結核病個案發生，達到消除結核病之目標。

LTBI 治療經各種文獻證實，可有效避免結核菌感染者之病程進展，且具有成本效益的防疫作為，故成為 WHO 主推的一項

結核病防治策略，因此，逐步擴大 LTBI 治療對象，亦為我國結核病防治重要策略之一。然對於如我國全面進行 BCG 接種政策及環境中 Non-tuberculous Mycobacterium (NTM) 較高比例的國家[28]，選用 IGRA 作為 LTBI 治療前評估之檢驗工具，可將有限之公衛資源集中於有較高發病風險族群之管理及追蹤，提升執行 LTBI 治療之成本效益，對結核病防疫作為可產生積極正面效益。

4. 加強 X 光篩檢

為提升 X 光巡迴篩檢品質並善用資源，除運用疾管署配置於全國各區之 6 台數位 X 光巡迴車外，並委託品質優良之醫療院所，結合各縣市之自籌經費及資源合作辦理巡檢業務，自民國 100~102 年底，全國累計篩檢 105 萬 7,907 人次。此外，同步檢討巡迴篩檢政策執行之對象，針對醫療資源缺乏的山地鄉、醫療可近性低的經濟弱勢族群、結核病患親密接觸者等高發病危險族群，擴大辦理胸部 X 光巡迴篩檢。另針對山地鄉 12 歲以上居民全面造冊，進行胸部 X 光篩檢，民國 100~102 年底累計篩檢 16 萬 2,523 人，平均每年在戶人數到檢率達 6 成以上。針對 12 歲以上經濟弱勢族群進行胸部 X 光篩檢，民國 100~102 年底累計篩檢 10 萬 6,053 人。執行成效部分，民國 100~102 年山地鄉篩檢平均發現率為 238 例/每 10 萬人口，經濟弱勢族群篩檢平均發現率為 95 例/每 10 萬人口，接觸者團檢平均發現率為 82 例/每 10 萬人口，均遠高於我國 102 年平均發生率 49.4 例/每 10 萬人口。

為加強設籍山地鄉但外出就學之學生參與篩檢，疾管署於民國 100~101 年推動設籍山地鄉學生結核病防治主動篩檢計畫，計畫成果指出該些學生雖居住於就學地，但其篩檢發現率仍高達全國同年齡層族群 5 倍以上。故自 102 年起，將非居住於山地鄉之設籍山地鄉民眾主動發現納入為委託縣市衛生局辦理傳染病防治計畫之工作執行重點。

另分析巡迴篩檢政策執行之效益，依我國民國 100 年執行資料進行 X 光巡檢成本效益分析，目前每投入新臺幣（以下同）1 元成本，至少能獲得 6.6 元的效益，且現行巡檢頻率對受檢者之輻射暴露，致癌風險低，該策略符合成本效益（如表四）。將持續結合政府與民間之力量，運用已購置之數位 X 光車或縣市自有之 X 光車，加強高風險族群之篩檢工作。

執行工作天數(天)	篩檢人數(人)	發現個案(人)	發現率(*100,000)	全國投入經費(元)	預估獲得效益(元)
2,700	209,217	269	128.57	40,304,726	264,591,900

表四、100 年 X 光巡檢效益分析表

(二) 疫情通報監測

依據近期國內研究資料顯示，經勾稽健保資料庫資料發現服用 2 類或 2 類以上抗結核病藥物的病人中，有 3.7% 未進行結核病通報。而未通報之影響因素包括：年齡（25~44 歲）、再治病人、外籍人士、肺外結核、診所就醫以及就診次數少者。另依通報時效分析顯示，81.8% 病人治療 7 天內通報，18.2% 病人治療 7 天後通報。延遲通報之因素包括：高齡（ ≥ 75 歲）、再治個案、本國人、痰塗片陰性、痰培養陰性、大型醫院就診以及就診次數少者[29]。由於目前仍有少部分結核病人未被通報，以及部分病人有延遲通報情形，故應持續改善影響通報完整性及時效性之因素，以強化結核病監視系統。

此外，過去我國有關延遲診斷之研究分析發現，於病人延遲之中位數為 7 天、醫療機構延遲之中位數為 23 天、總延遲為 44 天，其中，痰塗片陽性病人醫療機構延遲為 13 天，痰塗片陰性病人醫療機構延遲為 37 天。由於結核病的潛伏期長，初發病時往往沒有明顯或特異性的症狀等，導致個案延遲就醫，而結核病之診斷必須綜合臨床表現、影像學資訊和實驗室檢驗，隨著檢驗技術

的發展，期能縮短延遲診斷之時程[30]。

另統計分析民國 101 年共有 9,454 人接受抗結核藥物治療，其中，1,929 人之後續鑑定為 NTM 或是無細菌學證據。未能及早排除診斷，且 1,929 人均接受治療者，佔治療人數約 20.4%，顯示醫療費用中有五分之一為無效醫療。若進一步將 WHO 推薦之快速檢驗方法納入常規檢驗流程，則每年將增加支出約新臺幣（以下同）4,056 萬 6,725 元，但可以節省醫療費用、接觸者檢查等直接費用及公衛管理人力、勞動力損失、交通費用等達 6,986 萬 8,508 元，扣掉支出後淨節省 2,930 萬 1,783 元，具成本效益。另計算健保 NAA 檢驗支付點數為 1,000 點，假設痰塗片陽性者後續皆進行 NAA 檢驗，增加支出約 954 萬 5,725~1,530 萬 6,725 元，可節省醫療費用、接觸者檢查等直接費用及公衛管理人力、勞動力損失、交通費用等成本達 3,475 萬 0,117 元，同樣具成本效益[31]。據此，如何運用快速檢驗技術來提高診斷效益，亦是未來工作要項。

(三)提升實驗室檢驗品質，推動認證制度

為提升結核病檢驗品質，疾管署自民國 97 年起推動結核病認可實驗室制度，除確認抗酸性抹片鏡檢、病原體培養、鑑定及藥物感受性試驗等服務項目均一性外，並藉由鼓勵實驗室參與認證、能力測試及人員定期訓練，以提升檢驗正確率、縮短檢驗時效。另透過結核病認可實驗室、區域委託實驗室及國家級實驗室之檢驗分級分工，以提供更完善與優質之結核病檢驗服務及監測，提升國內結核病檢驗品質，以邁向優質快速檢驗之目標。

目前已完成第一階段檢驗分級分工、檢驗項目均一化、實驗室認證及人員定期訓練等目標；第二階段將朝向各認可實驗室檢驗方法學標準化，及建立檢驗品質指標動態監測制度，透過輔導建立臨床實驗室各自標準化品管系統，並進行定期評鑑。結核病檢驗時效與品質監控目前已訂定並定期檢討之核心指標包含：固態培養基污染率 2-5%、抹片 24 小時達成率 99%、培養陽性 21

天完成率 60%、結核菌群鑑定 7 天達成率 90%(自培養陽性日起)、結核菌群鑑定 28 天達成率 65%(自收件日起)、藥敏測試 28 天達成率 90%、3 天運送至實驗室達成率 99%，未來品管項目亦將納入認可實驗室必要審核項目之一。

三、提升臨床結核病診療水準

(一) 提升醫師專業

1. 醫師教育訓練

結核病診治議題已納入「一年期醫師畢業後一般醫學訓練計畫」，讓受訓醫師在臨床指導教師指導下學習結核病的診斷、治療與照護能力，並配合政府衛生政策，提供民眾周全性及持續性的全人照護。

2. 處方審查相關作為

及早並有效診斷個案，進而提供精確治療，是結核病防治的第一步，因此，透過與中央健康保險署合作，進行結核病處方立意抽樣審查，核刪不符標準之處方，藉以導正不適當用藥。民國 100 年更推動「結核病醫療品質提升方案」，委託專科醫學會之醫師，協助通報結核病個案較多之醫院，依「結核病診治指引」建議處方為基礎，定期到院進行輔導及病例審查。結果顯示，於計畫執行初期接受審查之處方通過率為 35~60%，至計畫結束時，審查處方通過率達 87~88%，顯見結核病診療品質已略具成效。

3. 結核病諮詢小組運作

為解決結核病個案診療疑慮，以及進行抗結核二線藥物用藥申請之審查作業，茲敦聘我國結核病診療臨床經驗豐富的專科醫師擔任「結核病診療諮詢小組」諮詢委員，該小組以召開會議、書面審查及實地面訪困難個案等方式，提供臨床醫師於診療結核病發生疑義時之專業諮詢管道。諮詢小組運作迄今，平均每年針對結核病患者診療疑義進行討論人次數達 5,600 人次，二線藥物

申請之審查作業約計 2,100 人次，並進行約 50 人次之困難個案實地訪，透過該些程序同時達到教育結核病醫療工作同仁之實質效益，亦間接提升結核病整體照護水準。

(二)提升醫院診療意願

1. 編列公務預算補助因結核病就醫之部分負擔

為減少就醫障礙，提高治療成功率，避免疫情擴散，爰將結核病患就醫部分負擔納入疾管署公務預算，平均每年補助列管結核病患、接觸者檢查及潛伏結核感染治療之部分負擔，約 1 億 6 千萬元（25 萬人次）；由於減少結核病患就醫障礙亦為 WHO 提出之重要目標，故將持續編列公務預算支應部分負擔，並兼顧公平正義之概念，以為民眾健康提供完整保障。

2. 院內感染控制成效

為提高醫療院所診治結核病患之意願以及提供高品質診療環境，防止病原體在院內散佈，以避免病人、家屬和工作人員等在醫院內得到感染，爰編訂「結核病院內感染控制指引」提供各醫療院所參考，並將結核病院內感染防治列為醫院評鑑以及醫院感染管制查核基準項目，積極宣導其重要性且持續與相關學會合作，推動教育訓練工作。此外，加強感染管制查核，完成「降低空氣傳播疾病風險之醫院通風建議」之研擬作業，輔導各級醫院落實相關措施，持續朝主動因應之目標邁進以降低感染風險。

(三)困難個案診療服務

為提高多重抗藥性結核病等治療難度較高、治療時間較長的病人治癒情形，我國於民國 96 年成立「多重抗藥性結核病（MDR-TB）醫療照護體系」，以「病人為中心」的照護方式，並配合執行社區進階都治（DOTS-plus）服務，提升病患的服藥順從性，並由政府提供充足且有品質的免費二線藥物，讓 MDR-TB 病患獲得完善的照護和治療。醫療照護體系執行迄今之成效卓著，超過 9 成的多重抗藥性病人於團隊中接受治療照護。

於 103 年，我國多重抗藥性結核病個案追蹤治療 24 個月之治療成功率已達 77%，超越 WHO 於全世界五個地區執行 DOTS-Plus 方案之治療成功率。

另就我國 Rifampin 抗藥性個案進行追蹤分析，該類個案於通報後 0.5~3 年間，有 67 例發展成 MDR-TB，隨著治療時間增長，轉為 MDR-TB 比率越高。因此，進一步分析，倘比照 MDR-TB 個案，提供所有 Rifampin 抗藥個案二線藥敏檢驗，每年約可減少 3,200 萬元醫療支出（不含其他非必要成本）；每付出 1 元檢驗費用，可減少未來支出 57-213 元之醫療費用。據此，自民國 103 年起，針對 Rifampin 抗藥個案，中央實驗室開始提供二線藥敏檢驗服務，以作為患者臨床治療用藥之參考。

為持續對於國內抗藥性結核病個案與對第一線抗結核藥品嚴重副作用或過敏之困難個案，提供診療服務，針對國內尚無藥證之第二線抗結核藥品如 Capreomycin、Terizidon 及 Clofazimine 等，由公務預算以專案進口方式購置提供，以確保足夠種類之抗結核藥物，供應國內多重抗藥性結核照護體系使用。併維持專案進口藥物品質，持續追蹤 WHO、無國界醫師組織（Medicins Sans Frontieres, MSF）及國際防癆暨肺疾聯盟（International Union Against Tuberculosis and Lung Disease, The Union；IUATLD）等國際組織發布之藥物品質評鑑認證相關訊息，以確保其品質。

目前國際上有數種新研發的藥物，在臨床試驗中有亮眼的治療效果，應予持續關注並適時引進，以縮短傳染期及治療期程，提升防疫績效。

四、落實個案管理

（一）提升個案管理績效

1. 整體個案管理各項策略及查核措施

為確保結核病防治政策得落實於日常個案管理流程，透過

中央與地方每月執行實地查核作業結果顯示，各項管理重點達成率均於九成以上。另監測資料亦顯示，我國 94~101 年期間之結核病新案治療結果，治療成功率自 69.2% 上升至 71.3%；失落率自 2.7% 下降至 1.7%；未結案率則自 7.4% 下降至 4.5% [32]，可見近年來，個案管理照護品質已持續改善。惟整體結核病患中仍不乏治療順從性不佳、經濟弱勢、流動人口或不合作個案，因此，透過多重策略、結合包括社會福利單位及特定職業工會等機關團體的資源，以共同提升特殊結核病個案之關懷與照護品質。

另就公衛管理人員流動率偏高，造成個案管理人力斷層問題，國際防癆暨肺疾聯盟 (IUATLD) 多次建議以世代回顧 (cohort review) 方式執行個案管理評價，能有效提升結核病防治成效。故我國自民國 102 年起開始推動「結核病個案管理品質評價計畫」，由疾管署各區管制中心協助全國各鄉鎮衛生所人員回顧該鄉鎮所管理個案之辦理情形，使個案管理人員瞭解其工作與個案治療結果之緊密關聯，透過管理技巧之溝通與分享，進而提升工作責任感與管理知能，全國縣市衛生局亦能藉此機制建立自主管理與流病診斷能力，並鼓勵於未來自主辦理品質評價會議機制。

2. 都治計畫 (DOTS) 執行情形

依 WHO 覆蓋率定義 (DOTS population coverage)，臺灣都治覆蓋率為 100%。若以各縣市接受都治的結核病患比率而言，至民國 101 年，全國平均之都治執行率 (服用抗結核藥物個案應加入且已加入 DOTS 之比率) 已達 96%，除金門縣、連江縣之個案數過少緣故外，其餘縣市執行率均在 90% 以上。為瞭解我國都治計畫執行成效，我國曾與美國疾病管制中心合作進行執行成效分析，結果顯示，痰塗片陽性 DOTS 納入執行率與痰塗片陽性 3 個月陰轉率及 12 個月治療成功率呈現線性正相關，且有劑量

效應。以 DOTS>60%的病人癒後為基準，<60%的病人預後不佳的風險增加 10 倍，而一天都沒有 DOTS 的病人預後不佳的風險則達到 73 倍[33]。我國結核病個案完治後 2 年內復發的比率亦由民國 94 年 1.8%降低至 99 年 0.7%，顯見全力推動 DOTS 計畫之成效。

都治執行雖已略見成效，惟目前仍有約 10%個案因工作、生活型態、隱私權考量或擔心標籤化等因素，未加入都治計畫，可能造成防治上的問題。憑藉目前行動通訊與無線網路技術提升，以及行政院大力推動「雲端運算產業發展方案」等各項契機，現已規劃透過行動載具搭配 App 軟體執行「雲端都治試辦計畫」，取代無法實地關懷服藥的部分，並先將潛伏結核感染治療者列為計畫服務對象，確保其規律服藥並提供副作用評估服務，陪伴治療者度過漫長療程，以提升完治率。

(二)特殊個案管理

1.慢性傳染性個案收容管理成效

對於治療失敗或因嚴重副作用而無法繼續治療的慢性傳染性結核病人，於民國 103 年累計有 13 例列於管理名單，其中 4 例痰陽個案，透過補助住院營養暨生活費 600 元/日，鼓勵及勸導該些個案於指定醫院接受隔離療養，藉以阻絕傳染源於社區中持續傳播之風險。

2.不合作病患隔離治療措施

我國依法執行隔離治療人數，從民國 98 年 180 人次逐年降低至 102 年 139 人次，經檢視施行隔離治療原因，多為不合作及未按規服藥之結核病個案。民國 102 年修訂傳染病防治法第 62 條，增列罹患第二類多重抗藥性傳染病病人，如不遵行各級主管機關指示（如：隔離治療命令），致傳染於人者，得處以刑責之相關內容，以利防疫措施之執行。惟目前仍發現少數在社區有傳染之虞的不合作個案，因未即時援引傳染病防治法，

進行必要之隔離防治措施，無形中增加了在社區傳播機率，危害民眾健康。

五、全民結核病防治知能

搭配世界結核病日，運用社區衛教動員，如：七分篩檢及媒體、網路等通路，積極辦理結核病防治衛教宣導，據民國 102 年結核病防疫政策民意調查結果顯示，46%的民眾若罹患結核病會擔心遭受歧視，約 80%的民眾誤將潛伏感染結核者認為具傳染性，而整體擁有正確的結核病傳播、治療、檢查等知識之民眾平均約占 60%，顯示民眾對於結核病仍有一定程度的汙名化認知及對於結核病正確知識不足之現象[34]。

另為提高原住民族群對於結核病防治知能，陸續開發阿美族、排灣族、泰雅族、賽德克族、太魯閣族及布農族族語之結核病衛教教材，提供予該些族群分布較多之地區國小及衛生單位衛教使用，並於民國 101 年與原住民族委員會（下稱原民會），就結核病防治討論後續合作內容，102 年起與原民會正式合作，於每季初將已排定之山地鄉巡檢排程表提供各地原住民族行政單位、家婦中心及日間關懷站配合宣導，並結合原民會主辦之「部落 3H 動力工程專案試辦計畫」，將胸部 X 光篩檢及結核衛教納入活動規劃。另由原民會提供當年度預計辦理活動，轉供衛生局視活動特性安排結核宣導及篩檢活動。疾管署亦協助原民會修訂結核病防治衛教單張，並辦理「山地鄉結核病防治衛教推廣討論」，推動已開發之原住民族語衛教教材之應用。

未來將持續透過多元化，推動山地鄉等高風險族群結核病防治衛教，提升民眾對於結核病防治，特別是症狀了解與及早就醫的正確認知，同時維持跨部會溝通管道，整合衛教資源與平台。

六、提供卡介苗接種服務

我國於民國 91~101 年卡介苗接種完成率皆可維持在 97~98%。另依據民國 91~97 年出生世代追蹤資料分析結果顯示，未接種卡介苗之幼童比起接種者罹患結核性腦膜炎的風險增加了 47 倍，足見卡介苗之保護效益。為使接種後產生不良反應之機率能降到最低，透過進行卡介苗菌株之安全及安定性分析、落實監控運送及保存流程之標準程序、提升施注人員之專業技術等策略，並追蹤瞭解國際新式結核病疫苗之研發進度，期提供國內更安全、有效的疫苗接種服務。

七、人才培育、加強研究及國際合作

(一)辦理專業人員訓練

每年皆透過結合醫療、護理、防疫及校護協會等民間組織，辦理「結核病醫療處方研習會」、「進階個案管理專員教育訓練」、「校園防疫人員結核病防治教育訓練」及「結核菌素測驗及卡介苗接種技術訓練計畫」等研習課程，藉以提升臨床醫師結核病診療水準、維持第一線工作人員管理結核病個案等所需之專業技術能力與品質，並提升校園防疫人員對於結核病防治之專業技能與態度。

(二)加強國際合作與經驗交流

積極參與各項國際活動或邀請專家學者來臺，給予我國結核病防治政策建議及指導，除增加國際能見度，更有效促使我國防治策略與成效與國際接軌。因此，為客觀了解我國「結核病十年減半全民動員計畫」執行成效，疾管署於民國 102 年邀請 6 名國際專家進行外部評核作業。專家對於我國能落實結核病防治計畫，及建構完整的結核病預防、控制和治療照護體系給予高度肯定，其中，特別稱許我國推動「多重抗藥性結核病人醫療照護計畫」之成效，表示此計畫在其他國家推動相當不易，我國成功的經驗與防治模式足以提供其他國家參考，顯示我國結核病十年減半計

畫，已經獲得具體成效。

(三)鼓勵專業研究

透過委託辦理「結核病防治研究計畫」，發展診斷工具或技術、特殊族群防治模式及開發符合國人劑型之抗結核藥物，均有初步成果，其中，亦有多項研究已提出專利申請，相關研究結果，諸如：特定年齡族群罹患糖尿病、癌症等共病因素與接受潛伏結核感染治療及預防感染方案、結核病個案接觸者調查進階計畫、結核病完治個案復發分析及結核病危險因子及其對累積發病風險之影響等之研究結果，皆作為目前/未來政策研擬之實證基礎。

八、強化各級政府效能

結核病防治需結合各階層之力量，特別是縣市衛生局更須大力推展並落實各項防疫措施。據此，透過召開結核病防治共識/檢討會議，邀請縣市衛生局負責督導結核病防治工作之主管與會，針對各縣市執行各項重要防治策略之目標與落實度進行討論，並將成功策略相互分享，藉以為年度之結核病防疫工作奠定基石、凝聚共識，促進執行效能之提升。另經由制定考評指標與獎勵措施，鼓勵地方政府依循中央研訂之結核病防治政策並結合地方資源，提升個案追蹤管理績效，以有效達到結核病控制目標。

肆、執行策略及方法

一、主要工作項目

- (一)強化防疫基礎建設與預防策略
- (二)以病人為中心的整合照護策略
- (三)加強業務研究與開創新興技術
- (四)拓展跨國合作與國際防治奧援

二、分期（年）執行策略

執行策略 / 工作項目		執行年度				
		105	106	107	108	109
一、強化防疫基礎建設與預防策略						
落實中央 與地方合 作與分工	落實防治單位角色與權責，各司其職編列防治預算					
	落實轉銜制度，強化公衛及醫療體系之連結					
	依縣市提出之專案計畫，提供部分人力、預算之補助					
	增加地方執行結核病防治工作之所有權（local ownership）					
培植民間 團體拓展 防治網絡	結合各類專業及社區組織並培植民間團體成立					
推動結核 病防治人 才之培育	規劃我國結核病防治人才培育中心					
	整合網路數位技術，提供多元學習管道					
積極推展	推動高風險對象主動發現策略：					

執行策略 / 工作項目		執行年度				
		105	106	107	108	109
傳染源之阻斷策略	透過強化疾病認知、運用新式診斷工具，並購置相關設備，擴展高風險族群如：共病患者、流動人口、結核病個案接觸者、山地鄉/經濟弱勢族群及外籍人士等之主動發現服務之利用率及績效					
	避免高風險對象發病策略： 強化潛伏結核感染（LTBI）者治療及管理策略、聚集事件監測與管理等策略					
落實高風險環境之感染控制	鼓勵人口密集機構強化通風管理，輔導機構建立自主管理機制，並推動手部衛生、呼吸道衛生及咳嗽禮節。另透過查核及輔導機制逐步推廣落實相關感染管制措施					
	推動醫院落實呼吸道衛生/咳嗽禮節及手部衛生，訂定「降低空氣傳播疾病風險之醫院通風建議」，輔導醫療機構建立自主管理機制。另透過醫院評鑑及查核輔導機制					
	與教育單位合作，強化教室內通風換氣，並加強自主健康管理，落實檢查異常者之後續轉介就醫追蹤流程					
提高全民	整合各部會共同營造結核病防治					

執行策略 / 工作項目		執行年度				
		105	106	107	108	109
之結核病 防治知能	的支持性環境，並透過分眾方式， 進行各類高發病風險族群之結核 病衛生教育		—			
	配合全球結核病宣導主軸，擴大辦 理世界結核病日的宣導活動		—			
二、以病人為中心的整合照護策略						
提升醫院 診療結核 病之意願	提供合理之診療及檢驗之健保給 付條件或提升醫療品質之專案獎 勵制度		—			
精進結核 病患者之 診療服務	搭配新興檢驗技術並結合實驗室 通報策略，調整現行個案通報程序	—				
	引進新興、低副作用藥物或處方	—				
	打造醫療、實驗室與公衛三重體系 之資訊全自動匯流平台	—				
	開發處方適當性之檢核程式		—			
	提供品質穩定之標準一線、二線及 特殊專案進口等抗結核藥物	—				
優化檢驗 診斷及服 務之品質	引用及開發新診斷工具	—				
	檢驗策略以傳統方法為基礎，逐步 精進檢驗流程	—				
	逐步擴大建置結核菌基因分子資 料庫之對象	—				
	加強實驗室認證品質系統及監測 例行檢驗之準確性	—				
提升結核	制定個案管理工作標準指引	—				

執行策略 / 工作項目		執行年度				
		105	106	107	108	109
病個案之 管理品質	建立管理資訊自動預警及提示等功能					
	運用雲端技術 (e-DOTS)					
強化困難 或特殊個 案之照護	針對經濟弱勢、藥物副作用、共病、流動人口、留臺治療之外籍人士、行蹤不明失聯、抗藥性結核病及不合作等個案，訂定不配合治療及特殊個案之監測與管理策略					
三、加強業務研究與開創新興技術						
自動化系 統以監測 流行趨勢	建置完善通報平台，並以自動化機器對接					
	透過巨量分析工具，進行個案發現、追蹤及治療結果之即時動態監測					
	透過公有雲端平台環境，進行資料介接與釋出					
	依國際結核病防治重點指標，建立臺灣本土數據，並與國際資料庫進行比較					
加強業務 研究與發 展新策略	結合產官學界，強化檢驗、臨床治療、流病及防疫策略層面之業務研究					
四、拓展跨國合作與國際防治奧援						
辦理跨國 合作投入	參與國際性研究計畫及辦理外國衛生人員之訓練計畫					

執行策略 / 工作項目		執行年度				
		105	106	107	108	109
國際防治	協助鄰近高負擔國家結核病防治					
	工作之技術奧援					
參與國際 會議訓練 促進交流	選派優秀專業人員參與國際會議					
	與訓練					

三、執行步驟（方法）與分工

（一）強化防疫基礎建設與預防策略

1. 落實防治單位之角色與權責

（1）落實中央與地方合作與分工

依據現行傳染病防治法及地方自治精神，中央政府負責制定政策，並給予地方政府必要之協助；地方政府應配合中央政府政策，督導所轄人員，確實執行各項防治工作，以達分層負責之目的，而各級工作人員依據現行之規範與工作流程辦理各項防治業務，並透過分層查核與輔導機制，確保執行各項防治作為之落實與品質，各層級負責工作說明如下：

甲、中央層級：

為利防治工作之推行，由中央制定國家結核病防治政策，並透過跨部會、跨單位諸如：法令規範之調整等合作，整合全國防治資源，並應爭取足夠之預算，共同合作努力推動各項結核病防治工作。

針對新訂或修改之重要政策，分層級召開相關說明會議，務使基層工作人員或臨床醫師了解政策規劃之緣由與方式，以利政策推行，並同步進行政策評估及分析研究，以作為政策推動之實證基礎及後續調整之參考依據。另視需要召開溝

通/業務檢討會議，並對於各縣市結核病防治績效進行討論及經驗分享，以提升整體防疫效能。

制定考核及獎勵策略，促進縣市良性競爭。此外，強化縣市結核病防治能力，於配合國家結核病防治目標下，研訂縣市層級監測指標項目，包括過程與結果指標等，藉以達成全國防治成效之目標。

依縣市提出之專案計畫，提供部分人力、預算之補助，鼓勵縣市精進防治作為並提高工作能量，以舒緩部分人力不足之窘境，維持防治品質。

乙、地方層級：

依「中央對直轄市及縣（市）政府補助辦法」之規定，除由中央補助部分經費外，地方亦應自行籌措或積極爭取特殊或專案等防治經費，並配合中央政策，依據地方特性因地制宜，訂定縣市層級之結核病防治計畫及督導考核之指標，亦可研提防治創意計畫，中央亦將依計畫提供適當之補助經費，以強化縣市政府之防治作為。另整合並發展在地化的資源，結合轄內之醫療、公衛及民間團體（如：部落健康營造計畫相關合作單位）等，增加地方執行結核病防治工作之所有權（local ownership），並妥善運用各項組織及跨縣市之協調與支援，共同推動結核病防治，俾使防治工作推行順遂無誤，以提高整體防治效益。

(2) 加強公衛及醫療體系之連結

結核病防治需要公衛與醫療緊密結合，透過完善且落實之轉銜制度，以使結核病篩檢、轉介、治療及後續照護等過程，皆能銜接順暢，以提供結核病個案、潛伏結核感染治療者與接觸者最優質的照護服務，並確保每位個案之治療均能順利完成。

2. 培植民間團體拓展防治網絡

結合各類專科醫學會、護理學會、學校衛生學會、各類密集機構、執業公會、縣市自行推展結核病防治之合作單位或相關社會支持系統等專業及社區組織等，透過培植民間團體之成立，增加結核病防治網絡，共同協力推展預防、醫療、照護等結核病防治策略，以提供民眾/患者更完善、友善的支持環境。

3. 推動結核病防治人才之培育

(1) 規劃我國結核病防治人才培育中心

有鑑於我國結核病個案逐年減少及醫療與防疫人才輪替頻繁，為避免結核病診療與防治經驗流失，規劃成立我國結核病防治訓練中心，協助規劃及辦理國內、外與結核病治相關之防疫及醫療教育訓練課程，透過安排臨床實習、演練、案例分享及參訪等實務課程，促使防治經驗得以有效傳承。另可藉由該中心，整合包括心理及精神等專業，建立部分困難個案診治之經驗模式。預期於中心建立後，可持續訓練及培養國內結核病防治專業人才，傳承防治經驗，並可推展我國成功防治經驗予其他國家分享，而協助包括鄰近之中高發生率國家提升防治能力，除承擔全球結核病防治責任外，亦可降低結核病自境外移入國內之風險。

(2) 精進醫療及防疫人員之專業素養

建構結核病防治系列網路數位課程，透過多元化的學習方式，讓醫療及公衛人員，可不受時間與空間之限制，隨時進行結核病防治專業技能之充實。特別對於首次接觸結核病防疫工作之人員，透過網路課程可快速掌握防治工作要項，以減輕受人員輪替頻繁，造成防治經驗無法有效傳承之困境。此外，對於完成學習者，提供相關專業學分之認證，以提高並鼓勵學員主動參與學習之動機。

另運用各類管道、機會及教學方式等，補助或委託專業機關團體，協助執行結核防治業務之各類人員，如醫師、結核病

個案管理專員、校園防疫人員、結核菌素測驗及卡介苗接種人員及公衛/護理/檢驗人員等之教育訓練，藉以提升結核病防治之專業知識、態度及技術品質，提高照護品質及解決病患問題之能力，以間接提升結核病個案對醫囑的之順從性、落實接觸者檢查及良好的追蹤管理等工作要項，以提升我國結核病防治專業水準。

4. 積極推展傳染源之阻斷策略

(1) 推動高風險對象主動發現策略

甲、逐步推動高風險對象主動發現策略

高發病風險族群依其病情和免疫狀態，臨床可能出現非典型或肺外結核而易延遲診斷，運用新興診斷工具例如分子檢測技術於該些對象，藉以加速個案發現、提升檢驗準確度、縮短延遲診斷時差、瞭解抗藥情形等目的，以利及時給予適當治療，同時避免病人於就診期間交叉感染和聚集事件的發生。另將胸部 X 光檢查作為合併多重危險因子之高風險族群結核病篩檢工具，藉以拓展結核病主動發現網絡。

免疫力較低弱為結核病發病風險增加的主要原因之一，而影響免疫狀態因素包括：HIV 感染、糖尿病、慢性腎臟病、癌症、使用免疫抑制劑、吸菸和營養不良等。相關研究資料顯示，罹患特定疾病者，其結核病發病風險、治療失敗率及死亡率較未有該些疾病者高，如人類免疫缺乏病毒（HIV）感染者相較於非 HIV 感染者有 20~37 倍的結核病發病風險 [27]、糖尿病人相較於非糖尿病人有 3 倍的結核病發病風險 [11]。爰此，除針對高風險族群進行衛教宣導，提升自我防治知能外，持續與相關單位和學會溝通合作，或與其他涉及部會/單位之計畫相互結合，將結核病症狀評估納入診治指引，列為初診和後續例行就診之常規問診評估項目，並轉介疑似個案至專科醫師處接受進一步診療，並就執行成果進行效益

評估，以擴大防治網絡。另亦持續監測國際間新興診斷工具之發展情形，選擇適合我國特性之新興診斷工具，提供符合效益之高風險族群使用，以限制疾病傳播。

乙、流動人口衛教及監測

透過跨部會、跨單位、公/工會及民間團體溝通及合作等方式，掌握流動人口名單及分布，藉以分析該些族群特性，制定符合該族群特性之結核病發生監測與防治機制。另加強衛教宣導，提升該些族群之結核病症狀認知，進而注重自我健康狀況，以克服諸如街友、臨時工以及經常於結核病高盛行國家經商或居住往返等民眾不易管理之困境。該些族群長期暴露於高風險環境中，為較高罹病風險對象，將以系統性方式加強預防及監測，以減輕該族群發病後，公衛人員難以掌握其分布及行蹤之困難，而能順利執行接觸者調查及個案管理等防疫工作。

丙、山地鄉/經濟弱勢族群主動發現策略

規劃結合健康雲、電子病歷及山地鄉衛生所之遠距醫療等資訊系統於結核病防治工作；另為減少山地鄉偏遠地區民眾，因交通不便等因素，影響接受主動發現檢查服務之意願，將規劃購置相關設備及車輛，以提升主動發現服務之利用率及績效。另與縣市衛生局合作，聘請胸腔專科醫師支援偏鄉衛生所，以提高偏遠地區診療品質並提升結核病患就醫可近性，降低山低鄉民眾就醫障礙。

依據分析資料顯示，我國山地鄉目前之結核病盛行率仍符合 WHO 所建議進行系統性篩檢[35]執行對象之條件，且山地鄉結核病發生率約為全國平均之 4 倍；而設籍於山地鄉但外出就學之學生，其結核病發現率仍與山地鄉相近。此外，經濟弱勢族群中 15~54 歲年齡層之篩檢發現率為全國同年齡族群發生率之 2~5 倍高，顯見該些高危險對象仍需要更多的

結核病防治介入措施。爰此，將持續針對地處偏遠、醫療資源不足地區及醫療可近性較低之高風險族群（如：山地鄉民眾及經濟弱勢族群等），並參用國際研究及指引所推薦之胸部 X 光篩檢方式，提供巡迴檢查服務。此外，並監測國際間新興之技術、器材及診斷工具之發展，於符合我國需求時，即適時引進，以提供該些結核病高風險對象使用，期以提早確診及進行治療，縮短個案可傳播期，阻斷社區傳染鏈，以減少社區中結核病感染的發生，有助於降低我國結核病發生率。

另針對設籍山地鄉但未實際居住之民眾，亦進行主動發現策略；除主動發現結核病個案外，並推動結核病症狀認知衛教，以提升民眾關注自我健康意識。透過主動篩檢活動之推展，及早發現個案，避免結核病個案的不良治療結果、後遺症及衍生社經層面的負面影響，以降低山地鄉結核病的盛行率與死亡率，縮小該族群健康不平等之現象。

丁、結核病個案接觸者

為提高接觸者管理效能，推動以「接觸者為中心」之管理模式，擴充現行「中央傳染病追蹤管理系統」中有關結核病個案接觸者管理之功能，並將接觸者依感染風險分級，研訂接觸者追蹤期程，除協助公衛人員執行並落實接觸者追蹤/檢查作業外，並可減少民眾遭受不必要之放射線暴露，以提升執行效益。另針對高傳染性多重/廣泛多重抗藥性結核病（MDR/XDR-TB）個案之兒童接觸者，應於指標個案可傳染期間內，將個案施予隔離治療措施或啟動兒童接觸者緊急安置之機制，以避免兒童長期暴露於多重抗藥之結核菌環境，降低後續感染發病之風險。

結核病接觸者追蹤/檢查是結核病防治工作重要的一環，透過接觸者追蹤檢查找尋感染源，及早轉介就醫，阻斷社區

傳染鏈；另外，接觸者透過追蹤檢查，可以早期監測到是否有發病的情況，及早診斷治療。依據我國研究資料顯示，接觸者發病率為一般民眾之 8~240 倍[17]，為能更加落實該項工作，參考國外執行模式並依本土化經驗，建立國內之接觸者進階追蹤模式，積極推廣並落實於基層公衛人員之接觸者追蹤技巧教育訓練課程，以提升調查品質，俾能正確匡列具高發病風險之接觸者。另搭配制訂接觸者調查及檢查相關指標，據以評估縣市執行品質，確保第一線公衛人員能落實推動接觸者調查與檢查工作，以早期發現受感染之接觸者或發病個案，且能及早給予適當治療，預防後續發病。

此外，編列公務預算以支應接觸者檢查所須之部分負擔費用，鼓勵其按預定期程接受檢查，保障接觸者之就醫權益，期能及早發現已受感染者，甚至發病者，提供其追蹤治療服務，將可減少傳染源並減少社區傳播機會。

戊、外籍人士入境篩檢

藉部會合作逐步擴大推動結核病高風險外籍人士之篩檢對象，如：新住民入臺後之定期健康檢查、外籍學生於申請入學前須檢附健康檢查證明，並參考目前先進國家對移民的結核病控制策略，檢討我國對於外籍人士之篩檢項目及後續預防發病等配套策略。另藉與相關單位(如移民署、新移民支持團體…等)結合，推動文化融入的衛教宣導，提升外籍人士結核病症狀自我監測與及早就醫之概念。

有鑑於我國與鄰近國家交流日益頻繁，且其中中國與東南亞諸國多屬於結核病或多重抗藥性結核病高負擔國家，且是新住民或外籍勞工之主要來源國。近年之疾病監測結果顯示，新住民入臺後結核病發生率仍為我國國人之 1.7 至 7.3 倍[26]，故強化我國對於外籍人士之入境篩檢作業與結核病監測，為刻不容緩之要務。

因此，在臺工作之外籍勞工，除於申請時應檢附所屬國醫院之合格健康檢查證明外，且應依相關法規，如「受聘僱外國人健康檢查管理辦法」，定期於我國指定醫院辦理接受健康檢查（含肺結核篩檢）。外籍人士（含新住民）申請在臺居留者，則應依相關法規檢附所屬國醫院或於我國指定醫院之合格健康檢查證明（含肺結核篩檢）。同時為確保我國健檢指定醫院品質，健檢醫院應建立標準作業程序，而衛生單位及認證機構亦應辦理定期、不定期之健檢醫院品質查核，以達到阻絕疫病於境外之目的。

(2) 避免高風險對象發病策略

甲、潛伏結核感染（LTBI）者治療及管理

LTBI 治療是國際間公認進一步根除結核病所需之更積極及重要的防治策略。研究指出，當活動性結核病患者有 75% 被治療時，治療 41% 新近之潛伏結核感染者（early LTBI treated）則可消除結核病；至於非新近而為感染期程超過數年以上之潛伏結核感染者（long-term LTBI treated）則需治療達 61% 之該族群數，始可達到相同結果，因此，治療 LTBI 新近感染者之治療效益較佳[36]。故為避免 LTBI 患者後續發病，逐步將所有 LTBI 之結核病個案接觸者及非接觸者但具高發病風險之 LTBI 對象（如：矯正機關內 HIV 陽性之藥癮者、使用免疫抑制劑之患者或其他高風險共病患者，包括 HIV 感染、糖尿病、慢性腎衰竭且進行透析治療等），納入治療計畫。另強化管理資訊系統預警、提示等功能，並研擬短程治療處方之可行性，俾利個案管理及追蹤，增進管理效能，提升潛伏結核感染者治療意願及完治率。

為確保 LTBI 之檢測服務能持續進行不間斷，我國已建置診斷試劑「精製結核菌素（PPD）」之儲備及檢測系統，務使檢測工作能順利執行。另外，針對高發病風險之接觸者，

逐步增加如「丙型干擾素釋放檢驗 (IGRA)」等靈敏度及準確度較高之檢驗方式，以協助醫師進行潛伏結核感染之診斷作業，作為後續執行潛伏結核感染治療之評估依據。倘國際有研發並推薦新興診斷工具，且經確認符合國內實際需求時，亦將積極引進並列入指引。

此外，接受 LTBI 治療者，須配合直接觀察預防治療 (DOPT)，方能有良好成效，將加強並落實親自關懷，以提升潛伏結核感染治療個案管理品質。

乙、聚集事件監測與管理

推動聚集事件監測新策略，結合個案地理資訊與菌株基因分型資訊，構建全國結核病分子流行病學藍圖，並強化公衛人員聚集事件疫調、事件處理及環境改善能力，使防疫作為更臻周延。

當發生結核病聚集感染事件時，常需藉由更詳細的接觸者調查與疾病篩檢來釐清潛在傳染源，與一般結核病個案之疫調相較，常需要投入更多及更密集的人力及資源。為使防疫作為達最大效益，公衛人員應能即時監測並及早介入結核病聚集感染事件。因此，建立以結核病個案地理資訊 (GIS) 為基礎之聚集事件監測策略，並結合結核菌株基因分型資訊，構建全國結核病分子流行病學藍圖，掌握流行趨勢，不僅可就醫療院所、校園、安養等人口密集機構進行密切監測外，另可對結核病高發生率社區之疾病通報情形進行全面監控，透過監測敏感度之提升，及時啟動疫情調查與防疫作為之介入，得以有效防堵疫情擴散。

為強化公衛人員調查能力，除辦理教育訓練提升結核病個案訪查及疫調技巧外，並提升事件處理及環境改善包括通風調查之能力與檢測設備，以避免後續類似事件之發生。當確認為聚集感染事件時，透過邀請專家委員成立「結核病聚

集感染事件專家會議」，協助提供接觸者範圍、追蹤頻率、潛伏結核感染治療計畫等建議，運用 IGRA 等新的檢驗方式，更有效就聚集事件之接觸者進行潛伏結核感染評估與後續介入措施，降低接觸者發病之風險。另就室內通風部分，透過諮詢勞動部等之環境安全專家，提供環境設施危險因子之改善措施。

建立聚集事件監測與管理之查核機制，針對符合疑似聚集事件定義者，定期查核督導疫調之落實情形、並追蹤管考防疫作為處理進度；針對特殊聚集事件，透過專案報告方式，掌握辦理情形，並就相關防疫措施進行討論，以累積經驗，增進處理事件之能力。

丙、提供兒童卡介苗（BCG）接種及副作用監測

依據國內追蹤資料分析結果顯示，未接種幼童比起接種者罹患結核性腦膜炎的風險增加了 47 倍，足見卡介苗之保護效益。故將持續追蹤瞭解國際新式結核病疫苗之研發進度，提供更安全、有效的疫苗接種服務，並隨時進行疫苗接種政策之檢討，以符合維護國人健康之最大效益。

依據相關資料評估，我國在短期內尚無法達到國際公認可全面停止接種卡介苗之標準，故將持續購置/儲備充足的卡介苗數量，提供政策對象進行疫苗接種，以避免幼童發生結核性腦膜炎及散發性結核病所造成的死亡或終生殘疾。另為使接種卡介苗後產生不良反應之機率能降到最低，持續透過進行卡介苗菌株之安全及安定性分析、落實監控運送及保存流程之標準程序、辦理施種人員之接種技術訓練及評價等認證作業、提供家長充足之資訊及協助嬰幼兒接受新生兒篩檢等，以降低接種後副作用之發生，並同時進行卡介苗接種副作用通報與監測機制，協助發生副作用孩童之家長依「預防接種受害救濟基金徵收及審議辦法」申請救濟，提供民眾獲

得適當的協助與實質救濟。

5. 落實高風險環境之感染控制

(1) 人口密集機構感染控制策略

鑒於我國近年結核病發生數中約 52.1% 為 65 歲以上老年人，且我國正面臨高齡少子化現象，對長期照護機構需求日增。此外，監獄等矯正單位/長期照護機構之群體生活特性，亦增加結核菌感染及傳播的潛在風險；為避免護理/長期照護、矯正單位等人口密集機構形成結核病的防治缺口，因此新增該等機構感染管制策略，依其屬性分階段推動如通風自主管理機制與長照機構查核等感染管制策略。

甲、輔導機構建立通風自主管理機制

鼓勵機構強化通風換氣及空調設備，輔導機構配合政策，依據「室內空氣品質管理法」及其相關規定，改善室內空氣品質，降低肺結核在機構內傳播風險。

乙、推動呼吸道衛生及咳嗽禮節

製作呼吸道衛生與咳嗽禮節的宣導教材，包括海報、單張等，提供機構在住房區、交誼區等公共區域張貼及放置，提醒工作人員、機構住民及來訪親友如有發燒或呼吸道症狀應主動配戴口罩並儘速就醫診治，以保護自己和他人的健康。

丙、落實健康管理機制

建立咳嗽監測機制，落實工作人員及服務對象健康管理；並依照機構特性訂定相關感染管制措施指引，推動機構相關工作人員確實遵循訂定之感染管制措施指引，以及機構工作人員、住民與訪客共同落實良好之衛生習慣。

丁、加強工作人員相關教育訓練

辦理結核病防治衛教，提升服務對象正確認知及警覺性，若有可疑症狀時應立即就醫，降低呼吸道疾病傳播風險，以

防止群聚事件發生，維護工作人員與服務對象的安全與健康。

戊、建立機構感染管制查核及輔導機制

依機構屬性分階段逐步推廣落實，以強化各機構內之感染管制組織架構，提升緊急應變及處理群聚事件能力，降低結核菌感染風險。

(2) 醫院感染控制策略

參考 WHO 出版的 Implementing the WHO Policy on TB Infection Control in Health-Care Facilities, Congregate Settings and Households 對醫療機構之建議，由行政控制、環境控制和個人防護裝備等面向，發展因地制宜的醫療機構防治策略。

甲、發展因地制宜的呼吸道衛生與咳嗽禮節推動策略

製作呼吸道衛生與咳嗽禮節的宣導教材，包括海報、短片等，提供醫療機構在所有入口與診區、病房區等區域張貼，或在診區、病房區等區域定時撥放；並藉由網路、雜誌等各類管道發展政策行銷策略，同時將病人及陪探病家屬參與納入手部衛生的推廣策略，建立民眾如有發燒或呼吸道症狀應主動配戴口罩就醫與正確執行各項衛生習慣，以保護自己和他人。

另期透過先驅計畫方式，按醫院規模或層級，分階段建立醫院門診、急診、病房等醫療區域的呼吸道衛生與咳嗽禮節推動策略，整合運用志工、護理人員等人力，負責發現有咳嗽症狀病人，主動提供口罩教導民眾配戴或進行分流；再依據先驅計畫結果建立各項工具（如：查檢表、教材、成效評估等），提供全國醫療機構參考運用。

乙、強化病人分流機制

我國許多醫院因為門診急診求診病人數眾，以及醫護人力短缺、空間限制等因素，使病人分流在實務上成為一項知

易行難的策略。有鑒於此，擬透過委託進行風險評估，建立我國應進行分流病人條件之優先順序，並規劃操作策略，以降低傳播風險。

丙、醫療機構自主通風換氣管理

文獻資料顯示，醫療機構內的通風換氣和結核病等空氣傳播疾病的散佈風險具有相關性，因此將鼓勵醫療機構依據「室內空氣品質管理法」及其相關規定，進行醫療區域的通風管理；另因建築物的通風管理需建築、冷凍空調等非醫療專業領域共同合作，在可行情況下，擬委託專業團體或相關系所等機構及單位，參考國外相關指引與建議，評估建立我國醫療機構內不同區域的建議換氣標準，提供施行建議。

丁、推動醫療機構落實個人防護裝備正確使用

醫療機構須提供醫護人員適當的個人防護裝備並教導如何正確使用，並於在職訓練中持續複習及更新其觀念與認知，以建立工作人員正確觀念且落實執行；尤其是有收治結核病等空氣傳播疾病感染病人之醫療機構，期由本計畫規劃相關人員訓練教材，輔導建立機構內的呼吸防護計畫及落實口罩密合度查檢（fit check）等相關知能，維護工作人員之健康。

戊、持續透過醫院感染管制查核作業等外部評核機制，督導醫院落實結核病感染管制措施

依據政策將設有專人負責結核病個案管理及衛教工作、具有結核病診治機制、完整的院內接觸者追蹤及結核病個案管理作業等醫院結核病管理與感染控制評值項目，納入感染管制查核基準，藉由定期外部稽核機制確保管理制度之落實。

己、醫護工作者健康監測

針對醫護工作者，除依現行規範應定期執行胸部 X 光檢

查作業，倘院內醫院工作人員為結核病個案接觸者，亦應追蹤列管，並按規定每年進行胸部 X 光檢查，透過醫院主動偵測員工健康狀態，藉以評估院內感染控制程序是否落實。此外，另將檢討並評估醫護工作者之結核病健康監測機制，確保執行效益。

(3) 校園/補習班結核病防治管理策略

與教育單位合作，強化教室內通風換氣，並加強自主健康管理，於平時辦理咳嗽監測及定期健康檢查，建立健康檢查異常者之後續轉介就醫追蹤流程，且落實執行，以避免聚集事件之發生。

學生族群之結核病發生率雖遠低於我國國人平均發生率，但每當校園發生結核病事件時，家長常認為學校未盡衛生管理之責，易衍生媒體事件，為減少此類事件發生，除與教育部共同編撰「校園結核病防治專書」外，並將持續互相合作，推動各級學校於平時辦理結核病防治衛教，提升教職員工生之結核病正確認知與警覺度，當有可疑症狀時，能即早就醫。另配合「室內空氣品質管理法」及其相關規定，預先強化通風換氣及空調設備，以避免不良通風造成之疾病傳播。

與教育單位合作推動各級學校加強自主健康管理，除於平時定期針對校內教職員工生辦理咳嗽監測外，亦能定期健康檢查，並建立檢查異常者之後續轉介就醫追蹤流程，以及早偵測校園結核病個案，避免衍生聚集事件。

當校園出現結核病個案時，教育及衛生單位應即合作辦理疫調、接觸者調查/檢查及相關疫情處理，並由專家進行室內環境通風之評估，以降低疫情之擴大並避免疫情再度發生。

6. 提高全民之結核病防治知能

疾病預防三段五級中之初段預防（primary prevention），為第一級促進健康，也就是針對一般健康環境、行為與生活型態

及健康檢查的改造、調整及執行，以減少疾病的發生。

綜觀結核病的流行現況，不論是國際間或國內，皆反映出健康不平等之現象。長久以來，結核病一直和弱勢族群息息相關，若欲溯源而上解決結核病的根本原因，須集結不同部門的力量，喚起全民對於結核病防治的意識。由健康促進的觀點，以民眾健康作為公共政策之核心價值，結核病防治是各部會的共同責任，不同部會間應充分協調溝通，合作訂定完整的結核病防治策略，營造結核病防治的支持性環境，並提升民眾相關知能，進而促進自發性社區行動，再配合主動發現策略及潛伏結核感染治療，從前端阻絕結核病疫情發生。

依據過去政策民調結果顯示，民眾對結核病初期症狀的警覺仍需加強，且多數民眾對結核病的認識不甚清楚完整，錯誤的觀念易導致歧視的問題。為了提高全民結核病防治知能，因此，將運用各類傳播媒體宣導結核病防治相關訊息，製作創意文宣或教材，透過多元行銷通路針對不同目標族群進行衛教，尤其是對象範圍較難掌握的特定高風險對象，如臨時工、臺商等。因目標對象的範圍較難掌握，需透過跨部門或跨部會合作，強化民眾自我監測與及早就醫的概念，並降低因錯誤認知所導致的不正確行為。

除持續針對民眾需求辦理各項結核病衛教宣導活動外，並將定期進行成效評估，以調整衛教方向，同時，配合全球結核病宣導主軸，擴大辦理世界結核病日的宣導活動。

(二)以病人為中心的整合照護策略

1. 提升醫院診療結核病之意願

提供合理之診療及檢驗之健保給付條件，透過保障點值，不依總額浮動、增修支付標準項目/費用等保障總額預算之協商因素，以增加醫院/臨床醫師診療結核病患之誘因。另對山地鄉之高危險群，結合「山地離島地區醫療給付效益提昇計畫」(簡

稱 IDS 計畫) 平台，將結核病防治納入標準化，或可透過提升醫療品質方案費用，期以鼓勵臨床醫師投入結核病診療與其相關預防治療服務，間接培植臨床醫師加入結核病治療之意願，促進人才永續經營。

2. 精進結核病患者之診療服務

(1) 縮短診斷時效

搭配新興檢驗技術，逐步將分子診斷技術納入常規檢驗流程，並結合實驗室通報策略，檢討並調整現行結核病個案通報程序，另透過強化非結核病診療專科醫師/醫學生的診斷能力或建置轉診網，藉以縮短結核病個案診斷時間並提高通報效益，減少民眾接受不必要之醫療處置，促使醫療及防疫資源能獲得有效分配，並妥善運用。

落實「傳染病防治法」有關個案通報之規定，並責成各縣市衛生局加強督導醫療院所依規定通報結核病患，確保疑似結核病患皆能完成通報，以納入後續追蹤管理，及早介入適切之防疫措施。另結合「中央健康保險資料庫」與結核病通報個案用藥資料進行勾稽及分析監測，以及利用衛生福利部之死亡登錄資料，建置定期自動化資料交換機制，將死因登記為結核病之個案名單，與「中央傳染病追蹤管理系統」通報資料勾稽比對，以偵測結核病死亡未通報個案，掌握臨床通報時效與效率，以落實用藥即應通報制度及「傳染病防治法」之精神。

(2) 引進新藥縮短治療期程

參酌國際對於多重抗藥性結核病及潛伏結核感染者之臨床治療發展與新型藥物治療之研究效益，並視國內需求，引進新興、較低副作用之藥物或處方，以提供國內臨床使用，藉以縮短結核病患或潛伏結核感染者治療之期程。確保國內備有足夠種類之治療藥物，以提供醫師選擇提供個案最適之治療組合，並能減少藥物副作用之發生，除可提高個案治療意願及罹病期

間之生活品質外，亦可減少個案及政府對於醫療及防疫費用之額外支出。

(3) 落實醫院個案照護品質與提升管理效能

建立以「結核病個案為中心」之照護服務以及公衛與醫療間之連續性管理服務之宗旨下，打造醫療、實驗室與公衛三大體系之資訊全自動匯流平台，協助結核病照護人員及時掌握最新醫療訊息，且提供依病人需求量身打造之照護服務。

由於現行結核病系統資訊多仰賴第一線照護人員鍵入及維護相關內容，為減少資料維護之人力/時間成本耗損及人為錯誤，當務之急為推廣醫院診療資訊系統與中央傳染病追蹤管理系統之介接作業，使結核病個案之實驗室檢驗結果、抗藥資料、醫令、及照護紀錄等各類診療資訊，得由醫院端自動寫入「中央傳染病追蹤管理系統」，並將整合後之系統資料回饋醫院端，以便醫院工作者即時掌握結核病個案之各項訊息，並使公衛及醫療人員能有更充裕的時間執行結核病個案管理之業務，有效達到公衛與臨床診療資訊即時整合，提升個案相關照護資訊的完整性與正確性。

「結核病個案為中心」，為結核病個案管理之首要目標。故將持續與中央健康保險署合作推動「結核病品質支付制度」，鼓勵醫療院所將結核病人納入高品質個案管理服務，並確保醫療院所對於結核病個案醫療照護之品質。另透過「醫院感染管制查核作業查核基準」設定醫院結核病管理之評值項目，包括設有專人負責結核病個案管理及衛教工作、具有結核病診治機制、完整的院內接觸者追蹤及結核病個案管理作業等感染控制要項，以確保管理制度之落實。

為因應與時俱進的結核病診療技術與防治政策，持續辦理醫院結核病個案管理師教育訓練，經由完整設計之教育訓練及雙向討論模式，針對特殊個案照護進行經驗分享，以持續加強

及提升個案管理師之照護經驗與專業知能。

(4) 提升醫療品質管理與診療醫師專業水準

於「中央傳染病追蹤管理系統」開發處方適當性之檢核程式，以利相關單位就有疑義之處方進行後續確認及討論，藉由確保結核病用藥正確性，提升醫療品質，以提供精確的治療，達成防治結核病的第一步驟。

參考國際結核病診療趨勢及新知，定期及不定期邀集國內專家及相關之專科醫學會共同研修我國「結核病診治指引」，並於臨床及公衛推廣使用，促進臨床診療經驗之交流，以提升臨床醫師對於結核病的診療水準，確保開立抗結核藥物處方之正確性，以使個案能完成治療，並降低後續產生抗藥性菌株或復發之風險。

邀集國內結核病之臨床診療專家，成立「結核病診療諮詢小組」，針對疑似結核病個案及因其他診療衍生之相關問題，提供處置諮詢/建議、協助個案確診，並給予抗結核病二線藥物使用審查與建議等，使所有個案均能獲得正確及適當之診斷及治療。另協助各類結核病教育訓練有關診療議題之課程講授，以建立公衛與醫療之溝通管道；並持續與中央健康保險署合作，針對經疾管署醫療品質提升方案及公衛護理人員於個案管理發現之處方不適當醫師進行病歷抽審，且針對不符診治指引之處方予以核刪，使臨床醫師依據相關診治指引開立正確的治療處方，以維持高品質之醫療處置。

(5) 穩定提供有品質之抗結核治療藥物

蒐集目前具國內藥證之第一線及第二線抗結核藥物之價格、劑型、通過 PIC/S GMP 確效作業等藥品相關資訊，以監視目前市場供應之抗結核藥品供需及品質穩定性。並經由國內外各管道了解藥品原料供給情形，對於可能遭原物料短缺衝擊之抗結核藥品，瞭解國內原料及藥品庫存情形，並評估全國安全

庫存量，俾能先行研議因應措施。

持續監測抗結核藥物及其原料之市場供需情形，並針對部分因市場需求量較少，醫療院所多未提供之抗結核藥物，或國內尚無藥證而需以專案進口方式取得之第二線抗結核藥物，由疾管署購置並建置相關藥物之配發機制，以提供醫師對於發生抗藥及副作用等非一般處方治療之病患，能有更多治療藥物之選擇，以提升該些個案之治療成功機率。

另透過由公務預算進行購置之特殊抗結核藥物，倘屬於國內產製藥物，須通過 PIC/S GMP 評鑑認證，藥物運送及倉儲須合乎 GMP 相關規範；國外產製之藥物則需經國際嚴格藥物監管機構 (Stringent Drug Regulatory Authority, SRA)、WHO (List of Prequalified Medicinal Products) 或全球基金專家委員會 (Expert Review Panel of Global Fund) 之認可，以確保提供品質穩定之抗結核藥物。

針對現行市面抗結核藥物品質管控部分，將持續與食品藥物管理署 (下稱食藥署) 合作進行監測作業，以確保藥物安全性，同時進行療效評估。

3. 優化檢驗診斷及服務之品質

細菌學檢驗結果是結核病確診之重要科學依據。藉由引用及開發新診斷工具，將有效的快速診斷個案及阻絕疾病之傳播。檢驗策略宜以傳統方法為基礎，逐步精進檢驗流程，加強實驗室認證品質系統及監測例行檢驗之準確性。逐步擴大建置結核菌基因分子資料庫之對象，協助流行趨勢之監測及制定防治作為。

(1) 提升檢驗效能

甲、推動快速檢驗機制，縮短報告時效

(甲) 全面進行檢驗流程改良

各臨床實驗室設定的檢驗流程不一，造成量能及時效落

差大。將引進新檢驗方法推動更有效益的檢驗流程。

(乙) 推動認可實驗室指定檢驗方法

結核病各項檢驗項目的方法不只一種，常造成不同敏感度，將推動指定檢驗方法，如：熱染法取代冷染法鏡檢。

乙、加速新檢驗方法的臨床應用

(甲) 推動以分子生物方法學進行鑑定及抗藥性檢測

標準化臨床分子檢驗應用，以補強傳統檢驗法及有效縮短時間。

(乙) 評估新檢驗方法之可行性

由疾管署國家級分枝桿菌參考實驗室定期評估全球結核菌新興檢驗科技，如：WHO 推薦之新穎結核菌檢測方法。經臨床適用性及經濟效益評核後，擇優推廣運用於臨床檢驗。

丙、加強檢驗分級分工合作模式

(甲) 推動結核病認可實驗室代檢

依「傳染病檢驗及檢驗機構管理辦法」第四條及「認可傳染病檢驗機構作業要點」，持續辦理結核病認可實驗室，提供優質的結核菌檢驗服務。另將推動線上實驗室品質監控、分析各項品質指標，期提升檢驗時效及檢驗品質。

(乙) 提升區域結核病實驗室功能

由衛生福利部立醫院或公/市立醫院的結核病實驗室中，優擇數家擔任區域結核病實驗室。除支援公衛及疑似結核病聚集事件之相關檢驗外，並同時負責與督導區域內結核病實驗室品質與協助執行外部品管系統 (External Quality Assurance, EQA)、監控實驗室異常事件與調查、提供諮詢與輔導等。此外，協助執行區域內其他結核病實驗室檢驗人員技術能力及加強生物安全教育訓練。定期辦理人才培訓，以有效提升國內專業結核病檢驗技術

人員之專業知識、檢驗準確性及保障操作人員安全，並落實結核病檢驗技術人員認證制度。

(丙) 強化國家級分枝桿菌參考實驗室角色

疾管署研究檢驗中心分枝桿菌實驗室負責特殊結核菌檢驗之執行(如基因鑑定、菌種鑑定)、結核菌株庫/基因庫之建置、標準實驗室運作系統建立、全國結核病實驗室品管系統建立、結核檢驗技術之學術研發、及對全國結核菌檢驗單位之輔導、支援及考核。為提供國際上最新及時之檢驗方法及資訊作為研訂政策參考，將密切注意全球結核菌新興檢驗科技進展，依專家實務共識訂/修定各項結核菌檢驗指引，包括檢驗技術及品管，並定期舉辦區域實驗室訓練，以落實認可實驗室之品質管控。另配合防疫需求，將規劃收集全國每年新通報結核病患菌株，建置國內基因分型資料庫並逐步電子化。資料庫建置初期以 MDR、XDR 及發生聚集等結核病特殊族群為首要對象，再階段性擴展為全面性結核病患菌株基因分型，以利疫病監測及調查。

(2) 品質系統執行

甲、實驗室認證及管理

與國內認證機構及檢驗相關學會合作，監督品質管理一致性及促進技術系統之精進。

乙、品質指標監測

藉由品質指標動態監測，及早發現異常結果，以進行即時校正，並據以更新品質指標，精進實驗室能力。

丙、落實內外部品管系統

透過教育訓練，以輔導建立臨床實驗室標準化品管系統，並進行定期評鑑。

(3) 監測與確認特殊分枝桿菌群

甲、監控結核菌抗藥性情形

透過區域參考實驗室監測資料，掌控國內結核菌抗藥性情形，以評估結核病個案管理品質，及早介入解決問題。

乙、與「中央傳染病追蹤管理系統」進行整合分析，監測人畜共通結核病及卡介苗接種副作用等。

(4) 結核病研究與檢驗方法改良與開發

甲、鼓勵學術研究單位及與生技產業，共同進行結核病相關研究及評估與開發新興檢驗方法及技術平台等。

乙、為配合 WHO 針對結核病分子檢驗採分級制度，將我國結核菌實驗室臨床分子檢驗項目予以標準化，並針對檢驗架構推動核酸檢測及基因分型之分級檢測網絡。

丙、非結核分枝桿菌已成為近年來結核菌檢驗項目日益嚴重問題，建立非結核分枝桿菌鑑定及藥敏試驗標準方法學，以解決非結核分枝桿菌引起之診斷疑慮及有效釐清疑似結核病患治療時所造成之抗藥性問題。

4. 提升結核病個案之管理品質

(1) 落實結核病個案標準化管理流程

提供結核病個案管理工作標準指引與促進個案管理經驗傳承，並強化公衛人員及醫療院所溝通機制，確保病患醫療照護品質。

針對管理過程訂定「結核病工作手冊」，詳實規範各項工作流程，使第一線工作人員可隨時查詢並依據辦理，協助每名病患均能獲得完善之服務，並將結核病個案管理之各類程序，納入為基礎及在職教育訓練教材。另依各縣市辦理結核病個案管理情形，辦理結核病世代回顧討論會 (cohort review)，協助第一線工作人員瞭解結核病個案管理工作與疾病治療結果之密切關連性，並強化工作專業知能。

利用「TB 就診手冊」及「結核病個案診斷、治療情形調

查表」等，作為公衛與醫療溝通之工具，協助公衛端與醫療端，對於病患治療過程中衍生之問題如用藥副作用或各種診療疑義等，得以即時且充分地溝通，以協助病患順利完成治療。

(2) 加強個案管理品質監測

建構醫療、實驗室與公衛系統資訊整合之防治網策略，於結核病個案管理系統內，建立管理所需之重要資訊自動預警及提示等功能，俾提供第一線公衛人員方便操作使用之介面平台，提高管理效能。

高效能/品質的個案管理，端賴管理人員能即時掌握病患之服務需求及醫療訊息，及時介入提供適切之服務與處理治療疑義。故為確保每一個案均能接受高品質之個案管理照護服務，運用「全國結核病人資料庫」即時監測個案管理品質，提供例行性監測報表，協助各縣市衛生局瞭解個案管理缺失及應加強事項等，以利研擬改善因應措施。另透過中央與地方分層分級之查核制度，由督導層級之縣市衛生局及疾管署各區管制中心進行個案實地抽查訪視並提供第一線管理人員適時之相關諮詢及輔導。

同時依據本計畫之指標及防治工作重點訂定評核指標，提供全國執行成果予各縣市參考，同時運用標竿學習良性競爭原理，給予優秀縣市獎勵，提供觀摩檢討之機會，鼓勵其他縣市藉由學習並發展因地制宜之防治模式。

(3) 都治計畫拓展及品質提升

WHO 強力推薦每一位結核病個案均應實施「都治計畫」(Directly Observed Treatment Short-Course, DOTS)。於多年努力下，國內結核病個案多以納入都治計畫，除持續推動並維持品質外，並為落實「以病人為中心」之精神，擴大觸及無法配合傳統都治的民眾，協助關懷每一位病人皆能服下每顆藥之服務，藉由科技進步以及行動通訊普及化等優勢，透過即時影音

視訊關懷服藥等雲端技術（e-DOTS），擴展都治計畫之服務範疇。

惟考量人口老化問題加劇，仍需藉由聘請關懷員之方式，執行送藥關懷之服務，以陪伴患者面對疾病治療所帶來的不適、副作用及長期服藥的堅持，並避免未能持續規則服藥，進而影響治療成效，及後續產生抗藥性細菌，繼續傳染他人，造成更嚴重的防疫問題。公衛人員藉由關懷員之協助互相合作下，將可有更充裕的時間處理較為棘手之個案管理工作。

另關懷員及公共衛生護士可在完成工作後，運用手中的行動載具，直接完成資料登錄並上傳管理系統，以減省人力並能即時完成資料維護工作。此外，搭配關懷員都治送藥過程之實地訪查作業、定位方式以及各類獎勵措施等「標準化之管理模式」，對於過程面與結果面進行督導並以科技化方式進行管理，提升執行品質及效能。

5. 強化困難或特殊個案之照護

治療順從性不佳或不合作個案，極可能造成抗藥性結核病或不良治療結果，故針對常見可能不配合治療之特殊個案，訂定配套管理策略，以減低個案失落之風險。

(1) 經濟弱勢個案

為避免經濟弱勢個案無法依醫囑定期返診，透過轉介申請各類社會輔助資源外，編列公務預算，支應部分醫療費用，以減輕就醫障礙；另針對特定且未參加全民健康保險之個案，由公務預算協助支付全額之醫療費用，使該些族群均能完成治療。針對弱勢個案，結合長期照護或社會資源，協助家屬轉介短期安置/照護等喘息服務，使結核病案得以安心接受臨床各項治療處置。

此外，將強化外籍及新住民等高危險族群之管理異常偵測及警示；導入社會人口統計資訊，讓防治規畫方向更貼近地方

或不同族群個別特性；並整合社會救助資源，協助轉介個案接受扶助，以減少就醫及經濟障礙。此部分將可進行系統性之監測，以協助基層工作人員，針對特定族群提供完整之社會福利需求評估及後續轉介機制。

(2) 藥物副作用個案

藥物副作用為導致病患服藥順從性降低之常見原因，透過公衛人員定期訪查服藥情形、醫療院所轉介及結核病諮詢小組之運作，即時監測服藥副作用及提供病人適當之治療模式。

(3) 共病個案管理

發展整合型醫療照護模式，透過與其他部會/單位之計畫相互連結，擴大防治網絡，以提高患者服藥順從性和治癒率，同時避免抗藥性細菌的產生。

結核病為 HIV 感染者常見的伺機性感染之一，相對於非 HIV 感染者，HIV 感染者於結核菌感染後發病率和死亡率均較高，而結核病亦會惡化 HIV 感染的情形，兩共病間相互影響甚鉅，不僅加速病情發展，也影響用藥時機和使用藥物之選擇。故將持續推動 HIV/TB 合作模式管理原則，定期分析我國結核病合併 HIV 感染之趨勢，並視執行效益，調整實施對象。對於其他影響結核病發病和治療之共存疾病（如：糖尿病），則參照 HIV/TB 的合作模式，整合相關資源，發展適合該些族群之照護措施，並將結核病共存疾病個案照護之應注意事項納入教育訓練，提升個案管理人員照護品質及整合性照護之能力。

(4) 流動人口

因工作需求而不定期往返不同地點之特殊個案，如臺商及臨時工等，常因時間因素，不易配合都治送藥或醫囑回診。為解決該些個案管理問題，將與移民署合作勾稽密切往返大陸地區之結核病個案，並將該些個案列為重點管理對象，另一方面透過相關公/工會宣導按時服藥之重要性。針對難以配合關懷員

都治送藥者，評估是否透過其他方式目視個案服藥，使公衛管理人員得以掌握及了解結核病人服藥情形。

(5) 留臺治療之外籍人士（含新住民）

持續提供個案管理及都治送藥之服務，確保外籍結核病個案完成治療。

(6) 行蹤不明失聯個案

對於目前行蹤不明及失聯之個案，公衛人員可透過包括戶役政系統、健保就醫紀錄、電信通訊及警政系統等多重管道，進行個案查找作業，避免該些個案中斷治療，減少於社區中傳播疫病之風險。

(7) 抗藥性結核病個案（MDR/XDR TB）

我國自多重抗藥性結核病醫療照護體系成立以來，配合公衛各項防治政策推行，治療成效十分卓越，除維持現有管理及照護品質之外，亦期待藉由新藥之引進使用，進一步縮短療程，降低病人服藥之阻礙及減輕公衛人力之負擔。

近年來，國內結核病防治有成，治療失落或失敗導致的多重抗藥性結核病個案逐漸減少，新發病即為 MDR-TB 的個案即成為現階段之防治重點，又因應鄰近結核病高負擔國家，該些地區之結核病(含抗藥性)疫情將對於我國的防治成效產生一定程度之影響及衝擊。故將強化目前 MDR-TB 監測與通報機制，除全面執行 MDR/XDR-TB 菌株複驗作業，同時針對 MDR-TB 高風險之結核病通報痰抹片陽性個案，提供分子快速檢驗，期及早進行抗藥性結核病之診斷與疫情偵測，並透過結合地理資訊系統，建立 MDR-TB 菌株基因資料庫，掌握國內 MDR-TB 分布與流行趨勢。此外，並加強落實 MDR-TB 接觸者追蹤檢查，並同時啟動感染源調查機制，以期有效阻斷多重抗藥性結核病之後續傳染。

在醫療照護方面，持續推行「MDR 結核病醫療照護體系」，

以收治並照護抗藥性結核病人及治療上較為困難之個案等，除提供專業醫療服務外，個案並須接受進階都治計畫之服務，以提升個案治療成功率。另配合國際趨勢引進抗結核病新藥物，期能縮短多重抗藥性結核病的治療時程。

(8) 慢性傳染性肺結核個案

針對需長期隔離之慢性病患，以人性化方式規劃收容安置模式，同時兼顧病患人權及防疫需求。鼓勵慢性傳染性肺結核病人至指定醫院長期住院治療，補助其住院營養暨生活費，同時由公務預算支付住院期間之病房費、診察費及部份負擔，期使病患規則治療，以阻絕社區傳染源。倘有新發展且有實證療效之藥物或治療方式，亦積極協助醫師引進並安排合適之個案接受治療。

(9) 不合作個案

針對不合作且具傳染性之結核病個案，地方主管機關可適時援引「傳染病防治法」進行各項必要之防治作為，包括行政裁罰及施予強制隔離措施等，以強化公權力之落實，避免不合作病人成為社區傳染源。另為提升不合作個案之管理作為及品質，將強化其正當程序及結合不同資源，以解決不合作個案管理之困境。

(10) 65 歲以上老年族群

考量我國人口老化問題加劇，持續透過都治計畫之推行，藉由聘請關懷員之方式，執行送藥關懷及副作用評估等服務，以陪伴患者面對疾病治療所帶來的不適、副作用及長期服藥的堅持。共病因素嚴重影響老年人疾病預後，因此，運用共病個案管理所建置之合作管理模式，發展整合型醫療照護模式，並透過與其他部會/單位之計畫相互連結，如社區關懷據點等，以擴大照護網絡。另結合長期照護或社會資源，協助家屬轉介短期安置/照護等喘息服務，使結核病案得以安心接受臨床各項治

療處置。

(11) 山地鄉個案

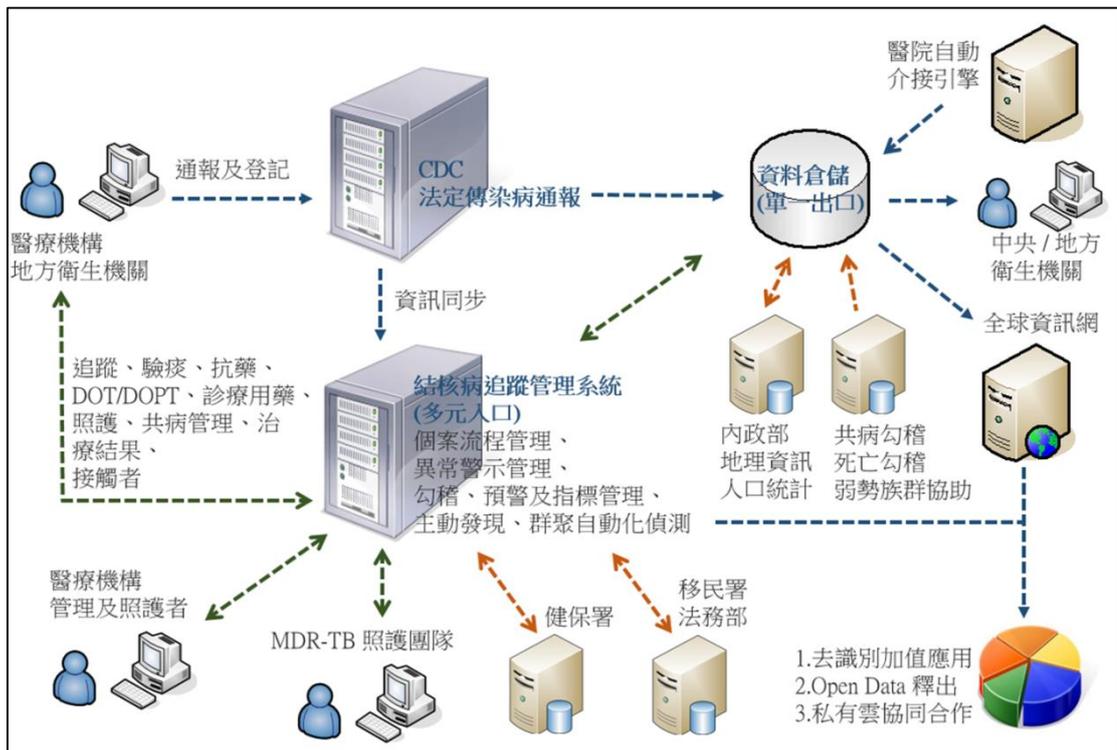
聘請胸腔專科醫師支援偏鄉衛生所，以提高偏遠地區診療品質並提升結核病患就醫可近性，降低山地鄉民眾就醫障礙，另結合「山地離島地區醫療給付效益提昇計畫」（簡稱 IDS 計畫）平台，將結核病防治納入標準化程序，提升山地鄉結核病個案整合性照護服務。此外，個案管理部分，則依前述工作事項，針對符合條件之山地鄉結核病個案亦一併提供相關照護與資源。

(三) 加強作業研究與開創新興技術

1. 自動化系統以監測流行趨勢

WHO 認為各國應致力提高結核病通報資料的可信程度、監測系統的方便性和完整性。而行政院亦早已通過「雲端運算應用產業發展方案」，因此，疾管署除落實衛生福利部「健康雲」之防疫雲子計畫推動外，本計畫亦明確未來資訊系統架構及定位部分，主要為達成結核病之早期發現、適當診療治療、個案關懷照護及跨域跨機關協同合作之角色，致力提升整體系統涵蓋面、分析效能及品質，並結合雲端運算及巨量分析工具應用，強化各部會防疫資料介接、增值與統計資訊釋出，期以結合各界力量，提升防治綜效。

在追蹤管理系統設計上係以人為本思考，以進行個案及接觸者追蹤管理，讓橫向及縱向照護者均能掌握一致的跨院際照護管理資訊，避免地方公共衛生、都治關懷員、醫院個案管理、檢驗及醫護人員重覆作業，期藉由高效能作業模式，推動高風險族群偵測及個案共病管理照護。在資料流部分，落實標準化、多元出入口、單一出口管理，以避免訊息紊亂導致誤解而影響防治。在系統使用者部分，除以第一線工作者外，亦考慮各級管理者資訊轉銜及資料指標增值需求服務（如下圖三）。



圖三、結核病個案追蹤管理系統架構

(1) 跨機關（構）資訊自動化介接及加值

甲、多元入口，機器對接防疫關鍵資訊

良好完善的防疫作業，除常規疫情監測資料外，常需輔以其他之衛生及社經人口基礎資訊，以更全面、深入及完整資料提供疫情研判分析應用。因此，為減少資料蒐集人工交換耗時及穩定性問題，將持續建立區域級以上綜合醫院資料機器對接，以導入檢驗、抗藥及追蹤用藥資訊。此外，為強化資訊加值並使用於防疫工作，將導入健保用藥勾稽機制，避免用藥未通報或未納管問題；強化 HIV/TB 共管、潛伏感染治療、外籍及新住民等高危險族群之管理異常偵測及警示；導入社會人口統計資訊，讓防治規劃方向更貼近地方或不同族群個別特性；整合社會救助資源，協助轉介個案接受扶助，以減少就醫及經濟障礙。

乙、整合流行病學監測、檢驗及地理資訊，自動偵測疑似聚集事件，動態預警以及時導入防疫措施

聚集事件之偵測、分析及預警為控制結核病散播之重要手段。而現行無論中央、地方衛生機關或醫院，以「中央傳染病追蹤管理系統」針對個案進行登記收案、檢驗、追蹤治療，乃至接觸者管理均已是常規系統管理工作。惟如果要更快速有效地偵測出疑似聚集事件，還須充分整合時序變化、地理特徵及菌株比對歸戶資訊，因此，將導入內政部圖資雲及「最小統計區」之應用，以不洩漏個資方式，藉由常規排程動態分析可疑關聯事件，協助地方衛生單位以有效率方式研判感染個案間關係和傳播鏈，彌補慢性病在疫調上的困難。

丙、加強流動人口及困難個案偵測管理

於中國及東南亞等結核病高負擔國家投資之臺商、工作者、新住民及學生等如入出境頻繁，又同時為結核病個案時，極不易固定就醫與追蹤，出境後規則服藥狀況及檢驗亦是必須面對的問題。目前已常規與移民署進行傳染性結核病患資料交換及出境勾稽，未來將強化出入境勾稽，掌握入出境頻繁及長期在外之管理治療中個案，以落實結核用藥及檢驗管理，避免個案失去追蹤或衍生抗藥問題。另一方面，並將境外人士、外勞及新移民列入常規監視統計範疇，以因應我國經商活動與人口結構變化對結核病防治的衝擊。在個案及接觸者追蹤管理部分，則持續針對管理單位變化、跨院就醫或中斷治療及不合作情形，以系統自動提出警示。

丁、偏鄉發生天然災害及交通中斷預警，提醒儲備適量藥物

每年颱風、暴雨常造成部分地區交通中斷，導致都治關懷員無法順利前往或冒險送藥情形。藉由與國家災害防治中心的合作，介接各小範圍區域之即時災害預警，可提前 1 日

警示有暴雨或交通中斷之虞地區，都治關懷員可事先獲得資訊，給予個案關心通知並提前交付足量藥物，避免用藥中斷問題發生。

(2) 監測資訊之分級開放及巨量分析工具整合應用

甲、強化地方衛生機關防疫資訊應用

將透過多元入口收錄之結核病追蹤管理資訊，經由資料倉儲系統於夜間進行資料庫分群加值，依個案所屬縣市產生資料集，開放地方於擬定資安計畫，經審查通過後，可介接回機關指定伺服器，以供地方防疫需求。

乙、追蹤管理資訊導入雲端，並開放巨量分析工具

建立私有雲應用環境，將已去識別每日滾動更新之結核病追蹤管理資料拋轉雲端，授權中央衛生機關、縣市衛生局、指定醫院或跨域合作對象，應用巨量分析工具進行深度分析。

在每日動態追蹤管理指標部分，則經由夜間排程方式，以不同維度進行分析及加值產生發生、追蹤及結果指標，常規於雲端展示平台公布，回饋予地方衛生管理需求。

另外，配合結核病靜態資料庫之每年更新，提供地方衛生機關，在無個資洩漏疑慮的雲端環境，以不影響本署系統資源下，進行所屬權限之深度流行病學監測及長期趨勢分析。

丙、結核病防疫資料庫應用及公開資料源推廣

在跨域/機關資訊整合部分，持續本署獨立作業區及衛生福利部資料協作中心之合作，協助針對在取得倫理委員會證明要件下及專案簽核，並經審查同意前提下，進行資料截取、勾稽或串檔，以促進防疫合作及成果。而在公有雲應用部分，基於政府資訊公開、動員整合民間智慧及防疫能量，經由倉儲將不涉個資之人時地結核病分群指標每日統計檔，以及鄉

鎮別以上靜態年度指標資訊，於公有雲端平台環境揭露，提供各界開發 API 或 APP 加值應用，以結合學界及民間資源，共同防疫。

2. 加強業務研究與發展新策略

結合學術團體、產業界與政府組織，發展基礎研究及檢驗、臨床治療、流病及防疫策略層面研究，由推動基礎研究延伸至提高診斷之研發，進行新藥引進與評估，鼓勵臨床醫師加入國際新藥實驗之網絡，並強化業務研究（Operational Research），以作為政策擬定之實證基礎及調整依據。

結核病防治已成為全球性公共衛生之重要議題，隨人口結構老化與國際社會型態的轉變下，將面臨更艱鉅之挑戰，為突破現有瓶頸，實需藉由科技發展研究扮演輔助的角色。結合產、官、學等領域互助合作，建立流行病學之實證基礎與發展新技術，並運用於結核病防治政策推動。藉由委託或疾管署自行研究方式辦理，透過開發潛伏結核感染與結核病之診斷工具，評估及推廣新型分子技術，並整合診斷技術及建立結核病定點照護（Point of Care）之診療與判定工具；持續評估新藥與新型疫苗推廣效用與使用時機，促進藥品之安全使用與管理，並發展不同族群適合之醫療照護模式；另藉由執行流病資料監測或觀察施政現況，進而瞭解目前介入措施與政策成效。另針對高危險族群實施系統性篩檢評估，以規劃公衛、臨床治療與檢驗層面需求為導向，並結合衛生評估、社會科學與資訊化作業等層面，以完善預防與診斷治療結核病為目標發展新策略與工具。

依據研究計畫成果提供政策參採應用，透過論文發表與專利申請，提升我國學術與產業成就，並輔以管考與退場機制。透過持續之檢討改進，讓研究計畫能與政策之執行相配合，與時俱進，研究計畫之成果作為政策執行之依據及實證基礎，使

政策之執行具有嚴謹及完整之說帖，並與國際結核病相關研究接軌，以期由研究發展提升結核病防治量能。

(四) 拓展跨國合作與國際防治奧援

1. 辦理跨國合作投入國際防治

結核病防治為全球重視之健康議題，先進國家或民間組織包括美國及比爾及梅林達-蓋茲基金會等均以提供大量經費、技術指導及技術研發等協助國際/國家進行結核病防治工作，且由於結核病患者多為經濟弱勢族群，該些國際防治計畫除為人道考量外並能彰顯世界各國共同對抗結核病之意義。而我國在結核病防治已累積相當之經驗及成就，在結核病防治之努力歷程亦足以提供國際或其他國家參考，是以，必須積極參與國際，共同合作對抗結核病。

根據 WHO 報告，全球 8 成結核病例集中在 22 個「高負擔結核病」國家，其中 4 個國家就位於西太平洋地區[5]。結核病高負擔國家往往受到防治經費不足及專業技術限制之挑戰，造成結核病診斷和成功治療患者之成效不彰，進而無法有效防止疾病傳播。

臺灣身處西太平洋/結核病高負擔地區，可透過提供高負擔國家結核病檢驗、照護（如：MDR/XDR-TB 個案診療經驗、DOTS-Plus、e-DOTS）、監測及管理技術奧援，分享我國成功防治經驗，或可藉由協助有意願之國家建立結核病防治體系，包括實驗室（如：檢驗之軟硬體建置）、資訊管理（如：個案管理系統建置）及醫療系統等，必要時，並可提供經費支援。此外，自行或結合國際組織辦理外國醫事人員、公衛人員訓練計畫，培育防治人才。這些互助措施除可提高其他國家之防治成效外，並可避免長期往來高負擔國家之國人、新住民或外籍勞工境外移入結核病之風險，可間接降低我國結核病疫情受鄰

近國家之影響和衝擊，保障我國民眾之健康，並可達防疫外交之邊際效益。

此外，積極參與國際性研究計畫，提供及獲得最新技術、結核菌株庫/基因庫等相關資訊，透過建立實驗室合作診斷、研發區域網絡，並參與國際監測平台，促進菌株資料比對，擴大防治效益，除可提升我國專業能力，也提升我國積極參與結核防治之國際形象。

邀請國際專家來臺分享研究成果或防治經驗，增加聯絡管道，尋求合作機會，藉此促進學術及經驗交流，宣揚我國防治經驗，汲取他國成功案例，共同提昇結核病防治水準。

2. 參與國際會議訓練促進交流

透過 WHO、IUATLD 等國際組織，進行各項專業交流與聯繫。選派優秀專業人員前往國外開會、考察、研習，汲取新知和國際經驗，以提升國內診療及防治品質。另自行或透過如 APEC 等組織共同舉辦國際性學術研討會，促進學術及經驗交流。

伍、期程與資源需求

一、計畫期程

- (一) 本計畫屬 20 年長程計畫，並以 5 年為一期。
- (二) 本計畫自民國 105 年 1 月 1 日起至 109 年 12 月 31 日。

二、所需資源說明

(一) 人力需求

以短期工服人力以應新增工作需求。

(二) 財務需求

本計畫執行期間為民國 105 年至 109 年，所需經費共為 18,390,319 千元。

三、經費來源及計算基準

(一) 經費來源：

1. 每年依循公務預算編列程序辦理。
2. 國際組織（如：APEC 等）、各機關等合作單位提供部分經費。

(二) 計算基準(表五)： (單位：千元)

工作內容	執行年度				
	105	106	107	108	109
一、強化防疫基礎建設與預防策略					
小計	979,530	860,450	766,550	711,030	683,750
落實中央與地方合作與分工	58,000	58,000	58,000	58,000	58,000
培植民間團體拓展防治網絡	30,000	30,000	20,000	20,000	20,000
推動結核病防治人才之培育	63,000	63,000	63,000	63,000	63,000
積極推展傳染原之阻斷策略	779,480	652,900	574,500	521,480	491,700
落實高風險環境之感染控制	25,500	25,500	27,500	26,500	27,500
提高全民之結核病防治知能	23,550	31,050	23,550	22,050	23,550

工作內容	執行年度				
	105	106	107	108	109
二、以病人為中心的整合照護策略					
小計	3,011,017	2,933,017	2,781,498	2,605,998	2,375,979
提升醫院診療結核病之意願	130,000	130,000	120,000	100,000	90,000
精進結核病患者之診療服務	750,300	730,300	710,300	670,300	650,300
優化檢驗診斷及服務之品質	697,100	689,100	578,100	562,600	523,100
提升結核病個案之管理品質	525,225	525,225	525,225	475,225	425,225
強化困難或特殊個案之照護	908,392	858,392	847,873	797,873	687,354
三、加強作業研究與開創新興技術					
小計	28,000	24,000	28,000	24,000	27,000
自動化系統以監測流行趨勢	28,000	24,000	28,000	24,000	27,000
加強業務研究與發展新策略	390,000 千元另透過整合型計畫爭取預算辦理相關研究				
四、拓展跨國合作與國際防治與援					
小計	112,500	106,500	112,500	106,500	112,500
辦理跨國合作投入國際防治	100,000	100,000	100,000	100,000	100,000
參與國際會議訓練促進交流	12,500	6,500	12,500	6,500	12,500
合計	4,131,047	3,923,967	3,688,548	3,447,528	3,199,229

四、經費需求（含分年經費）及與中程歲出概算額度配合情形

（一）經費需求

1. 本計畫執行期間為民國 105 年至 109 年，所需經費共為 18,390,319 千元（不含人事費）。按年度分，105 年度所需經費為 4,131,047 千元，106 年度所需經費為 3,923,967 千元，107 年度所需經費為 3,688,548 千元，108 年度所需經費為 3,447,528 千元，109 年度所需經費為 3,199,229 千元（表六）。另其他單位分工辦理部分，應由各機關自行編列預算支應。

2. 前列經費將逐年提出先期作業計畫，並經預算編列程序核定後辦理。

(單位：千元)

年度項目	105	106	107	108	109	總計
經常門	3,927,267	3,798,967	3,620,548	3,377,748	3,136,229	17,860,759
資本門	203,780	125,000	68,000	69,780	63,000	529,560
合計	4,131,047	3,923,967	3,688,548	3,447,528	3,199,229	18,390,319

表六、分年經費需求

(二) 與中程歲出概算額度配合情形

本計畫所需經費之計算基準係依未來推廣工作所需項目進行估算與編列，並於逐年辦理年度先期作業計畫及編製年度概算時，配合檢討經費需求，調整資源分配並依法定預算數調整修正計畫經費。另依年度作業計畫及疫情之實際需求，適時調配資源及經費。

陸、預期效果及影響

經由本計畫之推行，投入大量資源，使我國結核病防治成果逐漸與世界各國接軌，預期效果及影響如下：

- 一、與 WHO 計畫內容及目標呼應，至民國 114 年達結核病新案發生率減半之目標；結核病發生率之大幅降低，將可展現健康的國家形象，提升外資投資及吸引國際人才來臺定居的誘因。
- 二、透過各部會/單位資源整合防疫及社會福利資源，提供社會救助、強化弱勢照護，達到「沒有家庭因為結核病，而需面臨重大財務負擔」之目標。
- 三、透過各階層防治單位落實結核病防治之角色與權責，整合全國結核病防治資源，以提高管理效能與執行品質。
- 四、透過新興檢驗技術，縮短診斷期間及提升診斷正確率，降低民眾接受不必要之醫療處置，使防疫資源分配與運用更具效益。
- 五、引進新處方或新藥物，縮短治療期程，提升治療者生活品質，縮短公衛防疫投注時程，減少醫療及防疫費用額外支出。
- 六、透過全面推展潛伏結核染治療策略，預估每年可避免 500 位 LTBI 之結核病個案接觸者發病，至民國 124 年即可減少 10,000 人進展為結核病，達到消除結核（10 例/每 10 萬人口）之目標。
- 七、運用雲端、自動化監測等資訊技術，簡化各項行政程序並及時提供監測數據，提升各階層之管理效能，並利執行品質之監測。
- 八、建置多元結核病防治人才培育方案，提升醫療診治水準及防疫人員專業素養，使臨床醫師能熟悉結核病診療，提供病患適當之處置，並使防疫人員可提供更精緻且完善之防疫作為。
- 九、整合各部會協助提供多面向衛教宣導，使一般民眾對結核病之認知提升，能及早就醫，並減輕結核病標籤化之現象。
- 十、透過積極參與國際會議及合作計畫，培養結核病防治相關公衛與醫界新血，賡續投入防治工作，拓展我國結核病防治量能及視野，並與國際接軌。

- 十一、對鄰近結核病高負擔國家提供防治技術之奧援，間接減輕其結核病發生率，降低境外移入我國之風險，維護全民健康，另可彰顯防疫外交之效益。
- 十二、整體結核病個案數減少，有效擷節健保支付結核病醫療費用，促使政府財政資源得以進行更妥適之配置。
- 十三、透過本計畫之推行，預估至 109 年累計至少可協助 3 萬 2,158 例結核病個案完成治療，恢復健康，避免社區傳播的機會，並因發生率的降低，可避免約 1,000 人因感染而發病。除了生命與健康之挽回，倘以醫療利用之直接成本，及社會生產力損失、陪病家屬生產力損失以及早逝個案未來經濟損失等間接成本(500,000 元/人)，估計另可避免至少 47 億 5 千 6 百萬元之耗損，及提升我國國際競爭力評比/結核病對商業影響及發生率之排名，除國家競爭力提升外，並可展現健康及高生活品質的國際形象。

柒、財務計畫

一、資金籌措來源

本計畫主要透過每年依循公務預算編列程序辦理，並積極與國際組織（如：APEC 等）、國內各機關或地方政府等合作單位，爭取經費之挹注。

二、經費負擔原則

本計畫係屬中央主辦計畫，將依相關法令規定規劃經費及運用，另亦依「中央對直轄市及縣（市）政府補助辦法」之規定，除由中央補助地方部分經費外，地方亦應自行籌措或積極爭取特殊或專案等防治經費，以強化縣市政府之防治作為。

三、年度預算安排

- (一) 本計畫各項工作內容經費分配權重，請參閱表七。
- (二) 本計畫所需經費之計算基準係依未來推廣工作所需項目進行估算與編列，並將於逐年辦理年度先期作業計畫及編製年度概算時，配合檢討經費需求，調整資源分配並依法定預算數調整修正計畫經費。另依年度作業計畫及疫情之實際需求，適時調配資源及經費。

四、經資比規劃

本計畫非屬政府公共建設計畫，故計畫總經費可不受經常門不得超過資本門之二分之一之規範。

五、自償性率規劃

本計畫非屬「跨域增值公共建設財務規劃方案」，故無設定自償率門檻。

表七、各項工作內容經費分配權重

工作內容	執行年度					整體計畫各項策略
	105	106	107	108	109	分配比例
一、強化防疫基礎建設與預防策略						
小計	979,530	860,450	766,550	711,030	683,750	21.8%
落實中央與地方合作與分工	58,000	58,000	58,000	58,000	58,000	7.2% 內含： 補助縣市專案計畫費用 86% 縣市考評獎勵制度 14%
培植民間團體拓展防治網絡	30,000	30,000	20,000	20,000	20,000	3.0% 內含： 補助民間團體 100%
推動結核病防治人才之培育	63,000	63,000	63,000	63,000	63,000	7.9% 內含： 成立人才培育中心 79.4% 各類人員教育訓練 17.4% 建置數位學習平 3.2%
積極推展傳染原之阻斷策略	779,480	652,900	574,500	521,480	491,700	75.5% 內含： LTBI 診斷及治療補助 46.2% 接觸者追蹤檢查費用 26.2% 執行 X 光巡檢業務 16.8% 高風險對象防治 7.5% 聚集事件 2.8% 卡介苗接種 0.5%
落實高風險環境之感染控制	25,500	25,500	27,500	26,500	27,500	3.3% 內含： 密集機構及醫療院所之感染管制

						評估與考核作業 91% 校園結核病防治宣導 9%
提高全民之結核病防治知能	23,550	31,050	23,550	22,050	23,550	3.1% 內含： 辦理一般大眾宣導 60% 辦理特殊對象宣導 40%
二、以病人為中心的整合照護策略						
小計	3,011,017	2,933,017	2,781,498	2,605,998	2,375,979	74.5%
提升醫院診療結核病之意願	130,000	130,000	120,000	100,000	90,000	4.2% 內含： 提供診療照護品質補助 100%
精進結核病患者之診療服務	750,300	730,300	710,300	670,300	650,300	25.6% 內含： 引進 TB 及 LTBI 治療新藥 92.4% 購置有品質二線藥物 7.1% 處方檢覈及諮詢小組運作 0.5%
優化檢驗診斷及服務之品質	697,100	689,100	578,100	562,600	523,100	22.3% 內含： 引進新/快速檢驗方法 93.2% 建構分子基因資料庫 2.7% 檢驗方法改良研究 2.1% 抗藥性結核菌檢驗監測 1.3% 實驗室品質監控 0.6%
提升結核病個案之管理品質	525,225	525,225	525,225	475,225	425,225	18.1% 內含： 推行都治計畫 94.9% 推行雲端都治 5% TB 個案管理文件 0.1%

強化困難或特殊個案之照護	908,392	858,392	847,873	797,873	687,354	29.9% 內含： 結核病個案醫療補助費 66% 抗藥性個案照護費 27% 隔離治療補助費 7%
三、加強作業研究與開創新興技術						
小計	28,000	24,000	28,000	24,000	27,000	0.7%
自動化系統以監測流行趨勢	28,000	24,000	28,000	24,000	27,000	100% 內含： 管理系統功能擴充及建置 38% 建構雲端系統 32% 跨機關資料庫整合介接 23% 分子基因資料庫資訊系統建置 7%
加強業務研究與發展新策略	390,000 千元另透過整合型計畫爭取預算辦理相關研究					
四、拓展跨國合作與國際防治奧援						
小計	112,500	106,500	112,500	106,500	112,500	3.0%
辦理跨國合作投入國際防治	100,000	100,000	100,000	100,000	100,000	90.8% 內含： 高負擔國家技術/設備支援 100%
參與國際會議訓練促進交流	12,500	6,500	12,500	6,500	12,500	9.2% 內含： 辦理國際會議 55% 出國訓練及參與國際會議 45%
合計	4,131,047	3,923,967	3,688,548	3,447,528	3,199,229	

捌、附則

一、替選方案之分析及評估

本計畫係為我國唯一之結核病防治計畫，具獨特性，故無替選方案，倘因整體經費受限，將造成計畫之執行面、技術面推展困難，故亟需挹注充足經費持續支應，以確保我國結核病防治工作能順遂推動。

二、風險評估

依據「行政院所屬各機關風險管理及危機處理作業基準」之規範，針對「風險評估」之定義，進行下列要項之評估：

(一) 風險辨識 (發掘可能發生風險之事件及其發生之原因和方式)

本計畫未來可能受到「疾病特性」、「鄰近國家結核病疫情境外移入之衝擊」、「防疫人才不足/斷層，響防疫品質」及「整體防治經費不足，延宕新技術導入時機」等因素，造成整體計畫無法順利推展，最終致使國內結核病疫情無法達成計畫目標並有效控制，相關因素摘要說明如下：

1. 疾病特性：

結核病的傳染途徑是飛沫與空氣傳染，當痰中帶菌的結核病患者，在吐痰、咳嗽、講話、唱歌或大笑時，會產生帶有結核桿菌的飛沫。如果一位健康的人吸入患者產生的飛沫，就有可能受到感染。根據過去許多的研究發現，感染結核菌終身的發病率為5-10%。惟一旦感染結核菌，感染之後的前2年，發病機會最高，另我國接觸者追蹤資料亦顯示，愈年幼之接觸者，感染後之發病機率愈高，尤其是學齡前幼童約為同齡者發病機率之240倍，而成人則為同齡者之8~50倍；倘未發病，則會進入潛伏結核感染狀態，暫時不會進展到造成疾病的狀態。但是當身體免疫機能下降時，結核菌可能在潛伏感染者身上突破免疫系統的城牆，而再

度活化引起臨床相關症狀。由於結核病的潛伏期長，加上初次感染者的症狀如發燒、咳嗽、體重減輕等症狀都不明顯，痰液也不一定驗得出結核菌，因此，常延誤就診的時間，並造成疾病以一傳十的方式於社區中散播。

2. 鄰近國家結核病疫情境外移入之衝擊：

據 WHO 最新公布之統計資料指出，全球共計 22 個結核病高負擔國家中，位於亞洲的國家包括：柬埔寨、中國、印度、印尼、緬甸、菲律賓、泰國及越南等 8 國，其中，除泰國外，其他國家亦同時為全球多重抗藥性結核病之高負擔國家。這些國家與我國交流密切且頻繁，泰國、菲律賓、印尼及越南亦為我國外籍勞工的主要輸入國。近年來，我國曾有數起於中國經商之臺商感染 MDR-TB 後，返臺接受治療，或自中國來臺就學之學生於我國被診斷罹患廣泛抗藥性結核病（XDR-TB）之案例。此外，文獻指出，感染東亞流行的北京株結核菌較其他地區流行株更易發病，而北京株是亞洲地區主要的流行型別。若菌株流行型別的變異和人群的易感受性發生交互作用，確有未來可能面臨大規模流行或疫情反轉上升之風險。

3. 防疫人才不足/斷層，響防疫品質：

我國整體防疫架構雖已分層負責，組織架構完整且運作嚴謹，惟現實之種種因素造成基層公衛人員流動頻仍，致使整體防治經驗不足或人員接續斷層之情形層出不窮。然而結核病個案管理時程長達 6~24 個月，各項結核病防治策略之行政作業繁雜，使得個案管理之落實、效能與品質良莠不齊，再加上地方政府投入防疫心力程度不一，將可能影響整體防治政策之推行。

4. 整體防治經費不足，延宕新技術導入時機：

若防疫經費及資源無法到位，將導致較新穎的防治策略或檢驗技術，難以積極推展，無法提供更快速的介入措施，及早進行疫情防堵。

(二) 風險分析(系統性運用有效資訊,以判斷特定事件發生之可能性及其影響之嚴重程度)

1. 政府形象部分：

我國整體發生率倘無法大幅下降並跟上國際腳步,將造成結核病發生率等基礎指標遠遠落後其他國家,影響全球競爭力指數(WEF)排名,其他國家恐誤認臺灣為不健康的居住環境及傳染病防治執行不力等,不僅影響我國之國際排名,更將重挫我國整體競爭力及國際形象,間接亦影響企業投資之信心,損失之投資金額恐無法估計。

此外,近年發生迭起規模較大的校園聚集、接種卡介苗產生不良反應等事件,因部分民眾對於結核病仍不甚瞭解,並具有負面之烙印,致發生無謂之恐慌及非理性反應,部分民眾,而進而訴諸媒體,致使事件處理更加複雜化,倘防疫作為不夠嚴謹及即時,或無法有效進行衛教與溝通時,將導致政府形象及民眾對於防疫能力之信任感受到嚴重傷害。

2. 人員傷亡部分：

結核病雖為可治癒之慢性傳染病,惟 2012 年全球仍有 130 萬人死於結核病。而我國於民國 101 年亦有 626 人因結核病死亡,是造成我國死亡人數最多之法定傳染病,倘結核病患者合併罹患糖尿病、HIV 感染、慢性腎臟疾病等共病因素,將提高結核病治療期間死亡之風險。此外,個案雖接受治療,但缺乏好的管理機制或不正確的治療,將有極大機會衍生為抗藥性個案,其他人的健康將受到嚴重威脅,整體的防治更為困難。

3. 民眾抗爭部分：

校園發現結核病個案時,肇因民眾對於疾病的誤解及過度恐慌,常造成家長/師生的不諒解,進而引發媒體及各界關注。民眾透過立委、民代甚至到機關抗爭,或經由 1922 疫情通報諮詢專線、陳情信箱等管道,表達政府未提供民眾安全無虞之生活環境,或未落實守護民眾健康責任之訴求時有所聞。

4. 財物損失部分：

本計畫倘無充足預算支應，至無法順利推展，若以醫療利用之直接成本，及社會生產力損失、陪病家屬生產力損失以及早逝個案未來經濟損失等間接成本（500,000 元/人），估計將可能至少 47 億 5 千 6 百萬元之耗損，並將造成國家競爭力衰退，影響國際形象。此外，美國於 1972~1982 年間，即曾因結核病個案數下降而大幅刪減防治預算，導致後續結核病疫情大幅攀升，經投注數倍經費後，始能控制疫情之前車之鑑。

5. 目標達成部分：

預估我國結核病防治工作成效，倘僅維持現有防治資源條件，無法推行更新穎、更全面之防治工作，預估未來結核病新案發生數，於民國 114 年至多僅能降低達到 30 例/每 10 萬人口（目前設定目標值為 23 例/每 10 萬人口）；至民國 124 年（2035 年），僅能達到 20 例/每 10 萬人口之目標，遠低於 WHO 提出之邁向消除結核目標（10 例/每 10 萬人口）。

(三) 風險評量（決定風險管理先後順序之步驟，將風險與事先制定標準比較，決定等級）

倘無法有效推行我國結核病防治工作，經風險圖像評估風險等級結果顯示，影響程度屬「非常嚴重」；發生機率屬「可能發生」。

三、有關機關配合事項

部會/單位	配合事項
內政部	
警政署	一、協助辦理傳染性結核病失聯個案查找作業。 二、必要時，協助公衛人員執行不合作個案執行隔離治療措施。
役政署	辦理替代役男結核病防治教育宣導。
移民署	一、負責進行新住民、外籍勞工等對象結核病防治衛教

部會/單位	配合事項
	<p>宣導。</p> <p>二、與衛生單位合作辦理行蹤不明外勞結核病個案之通報與收案及後續處置作為。</p> <p>三、交流入出境紀錄資訊，以掌握結核病之高風險族群。</p> <p>四、協助進行個案相關資料分析，提供衛生單位擬定政策參考。</p>
國防部	
軍醫局	負責辦理軍人結核病防治教育宣導、篩檢、個案診治及管理作業。
外交部	
外交部 所屬部門	<p>一、依據計畫所需，協助規劃各種國際合作事宜，透過外館、醫療團瞭解各國防治現況與實際需求，以作為研擬合作計畫之參考。</p> <p>二、協助透過政府及非政府間國際組織之管道，積極參與相關區域或多邊合作計畫。</p> <p>三、與衛生單位合作，透過外交管道協助有意願之國家建立結核病防治體系，如實驗室系統、資訊管理系統及藥物管理系統等。</p> <p>四、協助於我國所辦理之國際結核病研討會/多邊會議相關事宜。</p>
教育部	
教育部 所屬部門	<p>一、主動督導各級教育單位，辦理學校結核病防治教育宣導，灌輸教職生正確觀念，加強學生生活輔導。</p> <p>二、鼓勵入學/就職前及定期之體檢，並建立體檢異常追蹤轉介機制，尤其加強對於來自結核病高發生率國</p>

部會/單位	配合事項
	<p>家之外籍學生等之體/篩檢工作，以防止校園傳播之可能性。</p> <p>三、於發現個案時，配合衛生單位辦理疫情調查、接觸者檢查及疫情處理，避免疫情擴大。</p>
法務部	
<p>法務部 所屬部門</p>	<p>一、依法辦理各矯正機關收容人篩檢作業，並進行結核病防治教育宣導，配合衛生單位辦理個案管理與治療事宜，於個案可傳染期內，配合衛生主管機關及單位，針對仍具傳染性之個案，提供適當之隔離場所，並協助個案接受治療、管理及提供 DOTS 服務；同時進行相關資料分析，提供衛生單位擬定政策參考。</p> <p>二、對於矯正機關內結核病個案之追蹤管理，建置常規勾稽機制，掌握每日入監、出監、移監之結核病通報個案動態，協助地方第一線同仁於受刑個案治療期間完整追蹤。</p> <p>三、與衛生單位共同規劃及評估不合作個案之處理。</p>
勞動部	
<p>勞動力 發展署</p>	<p>配合衛生福利部規劃外籍勞工健康檢查事宜，倘發現外籍勞工結核病個案不符在臺治療之要件，如：外籍勞工於入國後 3 日內辦理之健康檢查，有檢出肺結核，依法不予核發聘僱許可，或未配合都治計畫治療，經判定健康不合格，依法廢止其聘僱許可者，並副知內政部移民署及其所屬服務站，督促雇主儘速安排外籍勞工返國。</p>
<p>勞動部 所屬部門</p>	<p>協助透過通路，於辦理相關研討活動時協助結核病防治之宣導。</p>

部會/單位	配合事項
衛生福利部	
醫事司	將醫師感染管制在職教育採認為繼續教育積分，並協助管控並提升醫院照護品質，及辦理醫院評鑑工作。
護理及健康照護司	負責長期照護相關業務推展，辦理護理機構評鑑、管理（含設置標準）、輔導與業務督導考核。
心理及口腔健康司	辦理精神護理機構評鑑、管理（含設置標準）、輔導與業務督導考核。
社會救助及社工司	<p>一、協助辦理低收入戶、中低收入戶及街友等經濟弱勢族群之結核病防治衛教宣導。</p> <p>二、交流資訊，協助進行結核病患佔低收入戶、中低收入戶比例及其醫療耗用分析，以供衛生單位擬定政策參考。</p> <p>三、對於治療未完成且未住院之街友等，於不構成院內聚集感染結核病之前提下，協助進行安置管理，避免成為傳染源。</p>
綜合規劃司	辦理計畫研考追蹤。
國民健康署	透過已建立之健康照護網絡體系如糖尿病照護網、腎臟病健康管理等，針對結核病高發病風險，如糖尿病、慢性腎臟病、吸菸者及 65 歲以上年齡者等族群，協助進行衛教宣導，疑似症狀者則協助轉介專科醫師進行診斷治療。
食品藥物管理署	<p>一、辦理疾管署申請之專案進口抗結核藥品及疫苗審查作業。</p> <p>二、辦理抗結核藥物短缺及通報等市場管理機制之運作。</p>

部會/單位	配合事項
	<p>三、針對現行市面抗結核藥物品質管控部分，持續進行監測作業，以確保藥物安全性，同時進行療效評估。</p>
<p>中央健康保險署</p>	<p>一、協助代撥付結核病、潛伏結核感染者及結核病接觸者之相關醫療處置費用給付。</p> <p>二、辦理公務預算支付結核病醫療費用相關受託作業，依受託內容，協助執行結核病申報案件之審查作業。</p> <p>三、協助定期進行結核病確診、完成治療及接觸者健保申報資料之勾稽，另為強化個案通報，合作進行結核病用藥等資料勾稽，落實用藥即應通報制度。</p>
<p>社會及家庭署</p>	<p>一、配合執行老人安養機構結核病防治教育宣導。</p> <p>二、辦理老人安養機構評鑑、管理（含設置標準）、輔導與業務督導考核。</p> <p>三、協助多重抗藥性結核病個案之兒童接觸者/家屬，短期安置等喘息服務。</p> <p>四、配合疾管署擬訂政策需要，協請機構提供個案相關資料供疾管署研議分析。</p>
<p>行政院其他單位</p>	
<p>環境保護署</p>	<p>一、依室內空氣品質管理法逐批公告列管有關醫療機構、護理機構、其他社會福利機構等場所。</p> <p>二、執行已公告列管之醫療機構、護理機構、其他醫事機構及社會福利機構所在場所之室內空氣品質稽查作業。</p>
<p>農業委員會</p>	<p>一、協助提供畜牧業者名單，以利監測國內畜牧業者感染牛結核之流行病學狀況。</p> <p>二、協助輔導畜牧從業人員之健康檢查篩檢監測及追</p>

部會/單位	配合事項
	蹤作業。
原住民族 委員會	負責進行推動原住民族健康促進，提升居住環境品質的健康生活，並推行結核病防治教育宣導及配合篩檢，鼓勵個案規則治療，完成療程，改善生活習慣，推動節制飲酒、少菸及少檳，降低原住民族結核病患率及死亡率。
國家 通訊傳播 委員會	協助輔導電信業者配合，以利防疫單位依法進行傳染性結核病失聯個案之通信紀錄及使用者資料調閱，以利後續查找作業之進行。
其他	
各地方縣 市政府	提出縣市在地化結核病防治計畫，執行及評估在地化結核病防治成效，同時有效率進行人力調度作業，以發揮最大工作成效。
相關學 術、社會 團體	與衛生單位共同辦理結核病防治教育宣導、學術研究、疾病偵測及國際交流合作等事宜。
各級醫療 院所	負責結核病個案診斷、門診及住院治療與追管照護事宜，協同主管機關提高結核病醫療、檢驗品質、追蹤管理及進行相關教學、研究。

四、中長程個案計畫自評檢核表（如附錄三）

五、附錄

附錄一：「結核病十年減半全民動員計畫」外部評值(External review)
專家建議

附錄二：Draft global strategy and targets for tuberculosis prevention,
care and control after 2015, WHO

附錄三：中長程個案計畫自評檢核表（含性別影響評估表）

External review of “Halving TB in 10 years program in Taiwan, 2006 – 2015” 24 February – 4 March 2013



Review panel

- Dr. Peter Cegielski, Centers for Disease Control and Prevention, USA
- Dr. John Jereb, Centers for Disease Control and Prevention, USA
- Dr. Toru Mori, Japanese Anti-TB Association, Japan
- Dr. Thomas Shinnick, Centers for Disease Control and Prevention, USA
- Dr. Yee Tang Wang, Tan Tock Seng Hospital, Singapore
- Dr. John Watson, Health Protection Agency, UK

Executive summary

Taiwan has a strong national program for the treatment, prevention, and control of tuberculosis (TB) which is still the number one infectious cause of death in Taiwan. Combined with economic and demographic changes in the population, the activities within the national TB program, including the “Halving TB in 10 Years Program, 2005–2016,” are resulting in a sustained decrease in TB incidence in all parts of the Taiwanese population. A continuation of the present trends will not achieve the target of halving the TB incidence rates from 2005 to 2016, but the trends are coming quite close to achieving that target.

Recommendations have been made, based on an external review by an independent international team, which will contribute to a further strengthening of the program and will also enable some increased efficiencies in the use of resources. The recommendations should be adapted to meet the needs of Taiwan: Taiwan’s excellent data collection systems, surveillance activities, mycobacteriology laboratories, and epidemiologic research should be used to guide the customization and implementation of the recommendations. Key recommendations include:

- Strengthen adherence to national guidance on the treatment of TB.
- Increase the use of testing for latent TB infection, which includes the use of interferon- γ release assays (IGRAs) for contacts of TB, with chest radiography reserved for those with positive results or symptoms in most circumstances.
- Reduce the use of routine chest radiographic screening, including in the follow up of patients who have completed treatment.
- Maintain the investment in laboratory systems to ensure a high level of service and contribution to the care of patients.
- Increase the age for the treatment of latent TB infection in conjunction with IGRA testing of contacts, to further reduce the incidence of TB.
- Screen students from high incidence countries for TB and include international migrant workers in the national TB statistics.
- Increase the use of intermittent treatment regimens in the treatment of TB disease and latent TB infection in order to reduce the work burden of direct observation.
- Strengthen systems for infection control for congregate settings which include residents who are at high risk of TB.
- Study the dynamics of TB transmission in the population and high-risk subgroups of the population by combining the results from genotyping and epidemiologic investigations.
- Increase the evaluation of the specific components of the “Halving TB” plan by using collated local and national data and operational research.

The approach to the treatment, prevention, and control of TB in Taiwan provides a model for other countries in the region. The combination of adequate resources, political will, and a strong national program, and an expert and enthusiastic workforce, are critical factors in the success of the national

TB program. This combination must be sustained and strengthened to maintain progress in the control of TB.

Introduction

At the invitation of Taiwan Center for Disease Control (TCDC), an independent international panel reviewed the Taiwan national TB program and the plan to halve the incidence of TB in ten years (“Halving TB in 10 Years Program in Taiwan 2006–2015”). The outcome of the review is also intended to inform the development of a prospective scheme for the next ten year national TB control program to be implemented in 2016–2025.

The panel, which included experts in the field of TB from the United States, Singapore, Japan, and the United Kingdom, carried out the review over six days in February–March 2013. The panel heard presentations on the occurrence of TB and its prevention and control in Taiwan from national specialists from TCDC, hospital clinicians, and local community based TB workers. In addition, the panel visited hospitals, TB laboratories, branch offices of TCDC, and local health centers as well as accompanied program workers in the observation of patients receiving TB treatment. Additional information was made available to the panel on request.

Although TB remains the number one infectious cause of death, TB incidence rates have been declining in Taiwan in recent years in all age groups and in all parts of the country. Over the same period, the standard of living of the population in Taiwan has improved rapidly as measured by gross domestic product which has risen to US\$20,000 per capita in 2011. The panel recognized that the decline in TB observed during this period was probably resulting from the demographic changes and the improvement of living standards generally in the Taiwanese population, as well as the impact of treatment of patients with TB and the wider TB control program. The panel was asked to recommend potential ways to accelerate the decline in rates of TB which, despite the current declining trend, will not reach half of the 2006 levels by 2015. While many of the recommendations of the panel will contribute to a further decline in TB rates, none are thought likely to lead to such a substantial acceleration of the decline that the target of half the 2006 rate will be achieved by 2015. Many of the recommendations, however, are intended to provide ways to improve resource allocation and increase the efficiency of the current program.

The panel was extremely impressed by the strength of the Taiwanese national TB program and its commitment to collecting and using evidence for selecting the best practices for Taiwan. The program appears to have strong national and local political support. The national program is guided by a strategy with guidelines for clinicians, laboratorians, and public health workers. The system of national health insurance and coverage from central funds for other co-payments for most patients with TB means that ability to pay is not a barrier to effective TB treatment. The national program provides social support, where this is needed, to patients on TB treatment. The system of “no

reimbursement without notification” has ensured that almost all patients with TB enter the national system with case information being collated in an excellent national web-based surveillance system. The review panel met staff of the national program who were all well informed about TB and their role and who were enthusiastic and diligent in their work.

Such are the strengths of the national TB program in Taiwan that the panel considers that it could be a model for other programs in the region. An indication of the strength of the program is the willingness of the Taiwanese authorities to open up the national program to external international review and scrutiny.

This report is divided into sections reflecting key issues in the prevention and control of TB in Taiwan. Each section includes recommendations for operational strengthening of the system and recommendations for related research. The recommendations are collected together into a summary at the end of the report.

Epidemiology

The epidemiology of TB in Taiwan today reflects historical and demographic changes in the population over the past century. These include— (1) rapid economic development since the early 1970s, (2) immigration from mainland China in 1949 and from Japan prior to 1945, (3) disparities between the immigrant groups and their offspring born and raised in Taiwan, (4) high rates of TB in the aboriginal population groups of the island, (5) universal access to medical care through National Health Insurance (NHI) with its system of guiding practice through reimbursement policies, and (6) adaptation of the WHO-recommended “DOTS” strategy.

NHI provides universal access to healthcare services, thus eliminating financial barriers to medical and public health services for TB. In 1997, NHI implemented a “No-notification→no-reimbursement” policy, resulting in near-universal reporting of TB cases. After officially adopting the DOTS strategy in 2006, with its highly standardized recording and reporting system, surveillance data became even more accurate.

The epidemiology of TB in Taiwan today exemplifies the age-period-cohort effect described by Wade Hampton Frost. Age-stratified TB morbidity and mortality over the past decades consistently reflect this birth cohort effect. For example, TB incidence in Taiwan among those born in 1952 fluctuates with a relatively narrow range of 60–70 cases/100,000 persons/year and rises to 650–770 among those born in 1922. At present, 52% of Taiwan’s TB cases occur in the 10% of the population aged ≥ 65 years.

For each age range, TB incidence decreases with each calendar year. For example, among those aged 65–74 years, it decreased from 292/100,000 in 2002 to 147/100,000 in 2011. Among those

aged 75–84 years, it decreased from 553/100,000 in 2002 to 340/100,000 in 2011. Among those aged 0–14 years, reflecting TB transmission in Taiwan after 1997, TB incidence decreased from 5/100,000 to 2/100,000 over the same 10 year period. Therefore, in the modern era of universal access to healthcare and reliable surveillance data, the main determinant of Taiwan's TB incidence and the decreasing trend in TB incidence is the age distribution and origin of different segments of the population, including the year-by-year aging and mortality of the elderly population. Taiwan's rapid economic development since the 1970s increased the GDP per capita from <\$1000 in 1971 to >\$20,000 in 2011. The low and diminishing TB burden in those born after 1970 reflects this rapidly increasing standard of living.

As a result of these historical, political, and socioeconomic determinants, the number of reported TB cases in Taiwan is decreasing at a steady rate of approximately 4% to 5% per year. This trajectory will probably continue for the foreseeable future, not quite reaching the goal of halving 2006's TB incidence by 2015, although it will be close. To reach its goal, Taiwan would need to double the rate of decrease from 5% per year to 10% per year or the annual decrease in case counts from about 650 cases to about 1200 cases per year. It may be possible, but it would require substantial changes in TB control policies and practices because 10% per year decreases in TB incidence are uncommon, and such a large acceleration of the decrease in the burden would be nearly unprecedented.

Realistically, primary prevention strategies (e.g., find infectious cases and promptly start effective therapy) will not sharply reduce TB incidence in the short term, although such measures are the foundation of TB control in the long term. Reaching the target of halving incidence would require preventing an additional 2000 TB cases by 2015. One possibility would be to provide preventive treatment for greater than 40,000 recently infected individuals. These persons have a roughly 5% chance of developing TB with 2 years and effective treatment might prevent 2000 cases of TB. However, the feasibility of doing this would have to be determined in the context of other TB control priorities.

A better understanding of the epidemiology and transmission of TB can help TB control programs focus their efforts onto effective strategies and to evaluate the impact of interventions. The panel recommends that TCDC study the dynamics of the TB transmission of TB infection in the population and high-risk subgroups of the population by combining the results from genotyping and epidemiologic investigations.

Case detection and diagnosis

Passive case detection relies on finding TB patients among symptomatic persons seeking healthcare. The DOTS strategy was based originally on passive case detection by sputum-smear microscopy for

acid-fast bacilli (AFB) because it was inexpensive, feasible in low-income settings, and because it detects the most infectious cases. Because of NHI, the infrastructure, the human resources, and the technologically advanced medical care, passive case detection is highly developed and effective in Taiwan, although its efficiency and expense have room for improvement. In contrast, active case finding requires the healthcare system to take the initiative in determining which persons are at high risk of developing TB, seeking them out, and evaluating them to diagnose and treat any who have active TB disease.

In both strategies, the principal tools for case detection and diagnosis for the individual patient are the same: (1) medical history, (2) physical examination, (3) tests for immunological sensitization of *M. tuberculosis*, (4) radiography, (5) microbiology, and (6) histopathology.

A 2008 study in Taiwan demonstrated TB treatment was initiated based on radiography alone in more than 45% of cases. However, radiographic abnormalities are reported to have a sensitivity for TB of 80% to 94% and specificity for TB of 67% to 73%. Given the relatively low prevalence of TB in person suspected to have TB, this could lead to inappropriate treatment for TB in persons with an abnormal chest radiograph but who do not have TB. Furthermore, there is a risk of cancer from exposure to X-ray radiation; although small, it increases with the number of chest radiographs. The panel raised concerns that Taiwan's program might rely too much on chest radiography for screening and active case finding; for follow-up of patients receiving treatment and after treatment; and for those with ongoing risk of developing TB such as healthcare workers and TB contacts.

The results from the mycobacteriology laboratory are crucial for current TB control efforts. Isolation of *M. tuberculosis* from patient specimens confirms the TB diagnosis and enables testing for drug susceptibility and genotype. For pulmonary TB, the routine specimen is spontaneously expectorated sputum. Concerns were discussed that the quality of some expectorated sputum specimens were inadequate, particularly those from patients who did not have a productive cough. For confirming the diagnosis of pulmonary TB in such instances, sputum induction with aerosolized hypertonic saline, a relatively simple, safe, and low-cost procedure, may be used to overcome this problem.

In general, in an era of economic constraints, finding and treating more TB cases with less effort and lower cost become important considerations. To this end, the panel recommends increased use of economic analysis, cost-effectiveness analysis, risk-benefit analysis, and decision analysis for developing rational policies, and increased use of social and behavioral sciences to promote the associated behavioral changes among healthcare professionals.

Laboratory systems

The standard laboratory services available for the laboratory confirmation of TB include AFB-smear microscopy (Ziehl-Neelsen and fluorescent stains), culture on solid (Lowenstein-Jensen, LJ) and liquid media (Mycobacterium Growth Indicator Tube, MGIT), species identification (immunochromatographic test or molecular test), and first-line drug susceptibility testing (agar proportion method). Second-line drug susceptibility testing is available for all isolates with rifampin resistance, including multidrug-resistant (MDR) TB isolates.

The testing is provided by a network, overseen by the National TB Laboratory, of eight contract laboratories (three of which are regional reference laboratories), 24 authorized laboratories, and primary laboratories. Primary laboratories collect specimens, do AFB smear microscopy, and ship specimens to authorized laboratories. Some primary laboratories also do culture. Authorized laboratories do AFB smear microscopy, culture on solid and liquid media, species identification, and first-line drug susceptibility testing. Any MDR TB isolate is transferred to the National TB Reference Laboratory for second-line drug susceptibility testing. In addition to the diagnostic testing, the three regional reference laboratories do molecular tests on sputum specimens to detect rifampicin resistance in known contacts of MDR TB cases and persons at high risk of MDR TB (relapse or treatment failures). The National TB Reference laboratory conducts first-line and second-line drug susceptibility testing, strain typing (spoligotyping, 15-locus MIRU typing, IS6110 RFLP) for outbreak investigations, and research. Spoligotyping is also used for the differential diagnosis of disease caused by *M. bovis*, *M. bovis* BCG, and *M. tuberculosis* strains.

The total estimated laboratory testing in 2011 included 834,000 AFB smears, 827,000 cultures, 88,000 species identification tests, and 30,000 drug susceptibility tests. In 2011, about 9,780 cases were bacteriology confirmed. The authorized TB laboratories do the majority of the TB diagnostic testing. Each authorized laboratory has three to five staff members assigned to daily work in the laboratory and conducts tests on 30,000 to 45,000 specimens per year. This is a very large workload, which may be excessive if the large workload detracts from the quality of testing. The effect of this large workload on laboratory performance and capacity should be reviewed regularly. It may be necessary to establish additional authorized laboratories. The program may also consider the feasibility of testing fewer specimens per patient. The current Taiwanese standard is three specimens for the initial diagnostic testing. The World Health Organization has recommended an algorithm that includes testing of only two specimens in programs with quality-assured laboratories. The National TB Reference Laboratory estimated that by testing only two instead of three specimens, about 4% of TB cases might be missed. On the other hand, reducing the workload in high volume laboratories in other countries has shown improvements in case detection rates. Any change in testing recommendations must be carefully considered by the program, clinicians, laboratorians, and policy makers.

Thirty-one of the thirty-two authorized TB laboratories are accredited by the Taiwan Accreditation Foundation or the College of American Pathologists and accreditation of the thirty-second laboratory is expected in 2013. This is an outstanding accomplishment and should be of considerable pride to the Taiwanese laboratories and program. The laboratory facilities either meet the BSL-3 containment criteria or are BSL-2 facilities with negative pressure containment rooms. This is in compliance with the most recent recommendations of the World Health Organization for biosafety in the TB laboratory. The eight quality indicators monitored by the National TB Reference Laboratory on a per specimen basis include smear positive rate, culture positive rate, contamination rate for the first LJ culture, specimen transport times, and turnaround times for smear, growth detection on LJ medium, identification of *Mycobacterium tuberculosis*, and drug susceptibility testing.

- The smear positivity rate is 6.8% overall and the culture positivity rate is 12.3% overall. These rates depend not only on laboratory performance but also on the population being tested. The positivity rates are stable over time which indicates good quality laboratory performance. However, these rates are somewhat less than would be expected for testing of symptomatic persons (i.e., typical passive case finding). This raises the possibility that specimens are being tested from persons that have a low likelihood of having TB. On the other hand, active case finding and intensive contact investigations can lead to lower positivity rates. The program should determine the underlying reasons for the low positivity rates and evaluate the current recommendations for testing to ensure that there is a balance between the need to find TB cases and the laboratory capacity to do the testing.
- The contamination rate for the first LJ culture is about 3% which is very good. It is recommended that the program also measure and monitor the contamination rate of the MGIT cultures.
- More than 99% of specimens are received by the contract TB laboratories within the targeted 3 days from specimen collection. This is excellent. It is recommended that individual laboratories monitor specimen transport times from individual collection sites to discover any potential transportation problems.
- The targeted turnaround time of 24 hours for AFB smear microscopy is met for more than 99% of specimens. Laboratories should report turnaround time from receipt of specimens to recording of AFB smear results. To provide a realistic performance measure, it is often necessary to separate turnaround times for specimens received from Monday through Thursday from those that are received on Friday afternoon but not tested until the next work day (Monday).
- The targeted turnaround time of 21 days for the detection of growth was met for only about 60% of the specimens submitted to the contract laboratories. This turnaround time is for detection of growth on LJ. The program should confirm that the laboratories are reporting the time to detection of growth and not the time to detection of *M. tuberculosis* (growth plus species identification). If only the latter is easily reported, the program should consider changing the performance indicator to 28 days for growth detection and species identification.

It is also recommended that the program monitor the turnaround time for growth detection or growth detection plus identification in liquid culture (MGIT).

- The targeted turnaround time (28 days) for drug susceptibility testing is being met for about 90% of isolates. This is acceptable performance for the agar proportion method. If drug susceptibility testing is done using MGIT, that turnaround time should be monitored separately.
- It was noted that the non-contract laboratories performed a little less well than the contract laboratories. It is recommended that the program continue efforts to bring the performance of the non-contract laboratories to the same level as the contract laboratories.

Overall, the performance indicators provide a good assessment of laboratory performance. One additional performance indicator to monitor is the percentage of AFB-smear positive initial diagnostic specimens that yield positive cultures for any mycobacteria (target $\geq 95\%$). This indicator monitors the performance of the liquification and decontamination process and is useful for interpreting the culture-contamination rates. The program may also consider setting the performance targets the indicators for the growth based indicators as turnaround times for 90% of strains. This is because there are strains of *M. tuberculosis* that grow more slowly than the average *M. tuberculosis* strain. This is often the situation with MDR TB strains.

The high quality of the work in the laboratory results from a comprehensive training and quality assessment program. The regional reference laboratories provide training and external quality assessment for AFB-smear microscopy. The National TB Reference laboratory provides training and external quality assessments programs for culture, identification, and drug susceptibility testing. The quality assurance program is time-consuming and labor intensive. Sufficient resources must be allocated to the quality assurance program to maintain the excellent performance of the Taiwanese TB laboratories.

The current testing algorithm is to (1) process specimens (liquification, decontamination, and concentration), (2) perform AFB smear microscopy and inoculate cultures from the concentrated sample, (3) identify the species of any growth observed in the cultures, (4) conduct first-line drug susceptibility for all *M. tuberculosis* isolates, and (5) conduct second-line drug susceptibility testing for all rifampicin-resistant isolates. This is a good algorithm for susceptible isolates. To improve the testing algorithm, it is recommended that—

- Second-line drug susceptibility testing be conducted for all rifampicin-resistant isolates, not just MDR TB strains. This is because there appears to be an unusually large rate of rifampicin-resistant isolates that are not MDR TB isolates, and treatment of rifampicin-resistant TB is more difficult than treatment of susceptible TB.
- A role for molecular diagnostic tests in the detection of TB and the detection of rifampicin resistance should be explored. Molecular diagnostic testing has great potential to improve the prompt detection of TB and drug-resistant TB and initiation of effective therapy. The TB

laboratories in Taiwan are well prepared to take advantage of recent advances in molecular diagnostic testing. The program and laboratory should evaluate the potential use of molecular diagnostics in Taiwan. Given the excellent specimen transport system, a centralized or regionalized high-throughput molecular testing approach may be more cost effective than a decentralized approach that relies on expensive tests such as the Cepheid GeneXpert MTB/RIF Assay. Operational research to evaluate the cost and performance of such testing algorithms is essential to provide the evidence for implementation.

- Second-line drug susceptibility testing must include testing to at least the injectable second-line agents available in Taiwan (capreomycin and kanamycin) and the fluoroquinolones used in Taiwan (levofloxacin and moxifloxacin). The national laboratory does this routinely, but some variability in this was observed in the regional reference laboratories.

The laboratory confirmation of tuberculosis is complicated by the high frequency of non-tuberculosis mycobacteria found in sputum specimens. It is thought that up to half of AFB-positive or mycobacterial culture-positive samples are positive because of the presence of non-tuberculosis mycobacteria. At the National Taiwan University Hospital, the non-tuberculosis mycobacteria accounted for about 70% of the mycobacteria-positive specimens. Thus, it is important that the laboratory should rapidly identify the species of *Mycobacterium* that is present in a sample to guide treatment decision. For AFB-smear positive samples, a molecular diagnostic test may be the most efficient way to detect the presence of *M. tuberculosis* and allow prompt initiation of therapy. The frequency of NTM warrants investigation. Studies should be done to determine the characteristics of patients with NTM, clinical significance of NTM-positive cultures, and potential impact of NTM detection on TB diagnosis (e.g., mixed infections).

The electronic laboratory information systems in the contract laboratories and National Reference Laboratory are outstanding and provide much useful information. The program is encouraged to expand this laboratory information and reporting system to as many of the authorized laboratories as possible. The use of the laboratory information system may provide an opportunity for the laboratory to facilitate reporting of the isolation of *M. tuberculosis* to the clinician and TB control program.

The National TB Laboratory plays a strong leadership role for the TB Laboratory Network through its testing activities, quality assurance activities, and research. Adequate resources must be provided to the National TB Reference Laboratory to maintain and strengthen its leadership. The program and laboratory should work together to develop a research program for the laboratory that builds the evidence needed for national recommendations and policy. This could include evaluation of the performance and costs of different testing algorithms and of new diagnostic tests, characterization of new molecular tests and testing approaches (e.g., centralized sequencing for drug resistant strains), and molecular epidemiology studies.

Understanding the molecular epidemiology of TB is essential to guide TB control efforts to prevent transmission. The National Laboratory currently has the capability to conduct typing of *M. tuberculosis* strains, although they do not have adequate resources to conduct large-scale molecular epidemiology projects. The current strain-typing capacity must be increased to accommodate TB outbreak investigations and molecular epidemiology. The program and laboratory should work together to develop studies to define the molecular epidemiology of TB in the general population and high risk populations. In particular, is there transmission from the elderly to children, from elderly persons to elderly persons, from foreign workers to Taiwan residents, and among aboriginal people?

Current strain typing methods include spoligotyping, 15-locus MIRU, and IS6110 RFLP. Given the large proportion of Beijing-family strains in Taiwan, the laboratory should consider using 24-locus or 27-locus MIRU typing for better discrimination of Beijing-family strains. The use of strain typing for the differential diagnosis of *M. bovis* BCG in about 30 extrapulmonary TB cases in children less than 5 years old per year is useful. On the other hand, given the low frequency of *M. bovis* TB (i.e., 0.4% of cases overall), spoligotyping to differentiate *M. bovis* and *M. tuberculosis* should be reserved for specific epidemiologic investigations.

Management of TB cases

The clinical care of patients with TB in Taiwan is directed by a physician, usually based in hospital, in tandem with local public health systems for delivering and monitoring outpatient care. National clinical treatment guidance is provided by TCDC and adheres to evidence-based internationally accepted recommendations on the treatment of TB. Successful outcome of treatment is reported in a very high proportion of patients treated, which suggests that clinical management is highly effective (see below).

Physicians are encouraged to follow the national guidance but are not obliged to do so. Variation from the standard guidance was observed frequently by the panel: examples included extension of the 2-month initial phase to 3 or more months, extension of the total length of treatment from 6 months to 9 or more months and frequent deviation from the standard combination of drugs recommended. A survey of in-hospital therapy was reported in which 28% of patients received “non-standardized regimen in combination,” 32% of patients received “inadequate/over dosage,” and 19% of patients received treatment with “inappropriate frequency.” At 12 months after commencement of treatment, the outcome of treatment could not be evaluated in 4% to 5% of cases, and, in most of these instances, the problem was reported to be that the patients were still receiving treatment.

The panel believed that the variation from standard recommended treatment occurred much more frequently than could be justified on clinical grounds. International experience indicates that consistently good results, including the avoidance of drug-resistant and multidrug-resistant TB, are achieved by adherence to standard regimens. In addition, standard regimens avoid excessive treatment of patients and related costs. The panel recommends that a survey be conducted of all treatment courses implemented, and the reasons for variation from national standard regimens, with a view to providing evidence about treatment practice. This evidence should be used, in combination with the international literature, to place strong pressure on all physicians to adhere to national guidance in treating all patients other than when clinical circumstances oblige variation.

At the time of diagnosis, the clinical condition of some patients is poor and they require inpatient care. During this period, infection control is considered so as to ensure that patients do not to present a threat to other patients, hospital staff, or visitors. The priority is to ensure that patients with infectious forms of TB are isolated and that staff, other patients, and visitors are protected. This is particularly important for those with pulmonary smear positive disease but also for those with pulmonary smear negative disease where potential contacts may be vulnerable. Patients with infectious drug-resistant disease are managed in negative pressure isolation where this is available. Patients who are not infectious, but need hospital care due to their clinical condition, are admitted to general hospital wards.

Patients who are well enough to be managed in their own home should be allowed to go home if at all possible. Patients with infectious disease are advised not to return to school or work or other equivalent setting until they have completed two weeks of treatment. For patients with infectious forms of TB, an assessment should be carried out by the community team to determine the appropriateness of care at home. In most instances, where the patient is well enough, it should be possible to manage care while the patient is at home unless there are concerns about compliance with treatment or infection control, especially when there are vulnerable contacts in the home from whom the patient cannot be separated. The panel found evidence that some clinicians were requiring patients to stay in a hospital during the early weeks of their treatment in the belief that this was essential for preventing spread of infection in the community. The panel recommends that, where an assessment in the community indicates that the patient can be safely managed in the community, all patients should be managed at home unless there are overwhelming clinical or infection control reasons to do otherwise.

Modern TB therapy is highly effective. With patients for whom cure is documented or with patients for whom culture results were negative and treatment was completed, relapse after completion of treatment is uncommon. International guidance indicates that patients can be safely discharged at the end of treatment having been provided with information about their condition and the need to seek medical care early for further assessment if they develop symptoms that could be due to TB. The panel saw evidence, however, that patients who had successfully completed treatment were

often being followed up with repeat chest radiography at 6-month and then annual intervals. This is unnecessary and wasteful of resources, and it subjects patients to potentially harmful radiation. The panel recommends that patients be discharged from follow up at the end of successful treatment and that further follow up be reserved for those patients who have had drug resistant disease or other complications of their treatment course.

Most patients are enrolled onto directly observed therapy, short course (DOTS), which is administered both in hospital and in the community. The quality of DOTS is assessed routinely using the proportion of doses actually directly observed. While 84% of DOTS was administered to the highest level of quality in 2011 (level A — 70% or more of doses witnessed in the intensive phase, 60% or more in the continuation phase), 16% of patients were administered directly observed therapy to a lower standard. The panel recommends that every effort be made to increase the proportion of patients treated with the highest standard of DOTS in the intensive phase and that similarly high levels of supervision be achieved in the continuation phase for patients with any kind of complication of treatment or in whom problems with compliance are anticipated or observed.

Treatment in the continuation phase currently employs daily dosing regimens. The panel recommends the investigation of the use of intermittent regimens in the continuation phase which could considerably reduce the burden of observation in DOTS for the health team. A similar issue applies to the application of directly observed preventive treatment which is currently administered daily. The panel recommends the exploration of intermittent treatment for latent infection such as nine months of isoniazid twice a week. However, the panel notes that international experience has shown that patients who have HIV infection and extensive pulmonary TB disease should receive daily regimens throughout the course of treatment — this re-enforces the need to know the HIV-infection status of all TB patients.

Direct observation of receipt of every dose of treatment is labor intensive. This remains essential for treatment of disease during the intensive phase and for patients with complications of treatment or problems with compliance. For many patients, however, during the continuation phase of treatment of active disease, and for many patients taking treatment for latent infection, observation of treatment may be achieved to an adequate level without direct observation on site and still achieve effective treatment. Taiwan has recently been investigating the use of electronic forms of treatment observation which is reported to be particularly acceptable to a younger generation of IT-familiar patients. The panel recommends that further study be carried out to evaluate methods to achieve remote observation of treatment (of disease and latent infection) using electronic methods while ensuring that overall effectiveness of treatment is not allowed to decline. Caution should be exercised, however, to ensure that direct observation of treatment is continued for all patients in the intensive phase and for patients in the continuation phase where there have been treatment complications, problems with compliance, or any drug resistance.

The intensive phase of standard treatment with four drugs lasts for 2 months to be followed by 4 months of two drugs. Drug susceptibility results should be available by the 2-month point and any alteration to treatment initiated on the basis of the results.

Patients with mono-resistance to either isoniazid or rifampicin require a change to the standard treatment regimen, and treatment should be managed on the basis of advice from the TB laboratory and national and international guidelines.

Patients with multidrug-resistant TB (MDR TB) require both alteration and extension of their treatment which should be based on drug susceptibility information. A project to assess the application of the WHO DOTS Plus approach in Taiwan (Taiwan MDR TB Consortium, TMTC) has recently been carried out and was demonstrated to be highly effective in increasing the proportion of patients achieving a successful outcome. The panel recommends that this approach be rolled out to include all patients in Taiwan who have MDR TB. Information on the regimen used, combined with patient information, drug susceptibility pattern, and treatment outcome, should be collected for every case in order to monitor the effectiveness of the DOTS Plus program.

Outcome of TB treatment

Information on the outcome of TB treatment in Taiwan is available for the years 2005 to 2010. Treatment “success” was reported in approximately 70% of patients who started treatment during this period. This is lower than the WHO-recommended minimum level of 87% successful treatment and seems to suggest that the results in Taiwan are suboptimal, by international standards, in treating TB patients. The data, however, require further scrutiny before any conclusions can sensibly be drawn. For example, treatment failure is reported in approximately 3.0% of cases, which suggests that treatment “success” is better than reported.

Patients older than age 65 years account for approximately half of all TB patients in Taiwan but only one tenth of the population. This contrasts with the pattern of TB incidence in the majority of countries around the world where a greater proportion of TB cases occur in young adults. The rates in each population segment, age 65–74 years, age 75–84 years, and age older than 85 years, are progressively larger. The likelihood of dying having been diagnosed with TB increases very substantially in older patients: only 3.8% of those younger than 50 years in 2010 died whereas 25.9% of those older than 50 years died. About a quarter of those dying after the diagnosis of TB were reported to have died before treatment commenced. Many of those dying while still receiving treatment were reported to have died as a result of other conditions rather than from TB itself.

In approximately 5% of TB cases in Taiwan, the outcome of treatment cannot be evaluated at 12 months and this is usually because the patient is still receiving treatment. The panel was concerned that in some instances this was because the treatment has been altered from the standard

recommended regimen without adequate reason. Less than 2% of patients are reported to default from treatment which is a low rate. A very small number of patients are transferred to other countries so that their outcome cannot be determined.

In the light of this more complete understanding of the facts behind the statistics of treatment outcome, the panel believes that Taiwan achieves a high level of successful treatment completion in those patients where treatment completion is feasible. Monitoring of treatment completion should be continued. The panel recommends that more detailed investigation be carried out into the causes of death in those dying while on TB treatment, and in those dying before TB treatment starts, to determine how many deaths are preventable.

Contact Investigations

Per current national policies, contact investigations are initiated for all TB cases, regardless of sputum-AFB-microscopy and culture status. Contact investigations are done around both pulmonary cases and extrapulmonary cases without evidence of pulmonary disease.

- Chest radiography is done for all contacts at the start of the investigation.
- Contact investigations are done around extrapulmonary TB index cases to find the source of infection and co-prevalent cases.
- For index cases of pulmonary TB, the types of tests for the contact investigations depend on the (1) the AFB results from sputum-smear microscopy and culture for the index case, (2) the presence of a pulmonary cavity in the index case, and (3) the age of the contacts.
 - For index cases with AFB seen on sputum-smear microscopy,
 - For contacts age 25 years and younger, chest radiography and a tuberculin skin test. The chest radiograph is done at the start of the investigation, but the skin test is delayed until at least 1 month after the end of the exposure period, in allowance for the latency of delayed-type hypersensitivity. This is true for all groups of contacts who are tested with tuberculin.
 - For contacts age 25 years and older, chest radiography but not a skin test.
 - For index cases with negative results from sputum-smear microscopy but a positive culture result or a pulmonary cavity (but not necessarily both),
 - For contacts age younger than 13 years, chest radiography and a skin test.
 - For contacts age 13 years and older, chest radiography but not a skin test.
- Chest radiography is repeated at 12 months, for—
 - Contacts who are younger than 13 years, if the skin test result was positive but preventive therapy was not taken.
 - Contacts who are age 13 years and older, all contacts unless TB was diagnosed from first-round evaluation or in the interim.

The average number of contacts per index TB case was 8.1 in 2011. This means more than 102,000 contacts for the 12,634 cases that year.

The review panel did not see information about how many contacts younger than age 13 years are investigated annually. However, for the contacts who were diagnosed with positive skin test results (i.e., latent *M. tuberculosis infection*, LTBI), the results are very good. The number started on preventive therapy in this age group was 2,455 (80%) of the 3,068 who were eligible. Of those who started, approximately 90% were treated under direct observation (i.e., DOPT). Fully 90% of those who started treatment completed it, which is a much better rate than reported from most operational settings worldwide.

The review panel also did not see information about how much chest radiography is being done for contacts who were evaluated with radiography only (i.e., without a skin test) and what the yields of these activities were. In 2011, active case finding with chest radiography overall found 808 cases (6.4% of the national total of 12,634), and this includes contact investigations. Assuming that all 808 cases were detected through contact investigations, the case yield would be 0.7% (808/102,335). This yield rate is slightly low: most studies of contact investigations have found a rate of 1%–2%.

The review panel also did not see information about how many contact investigations were done around extrapulmonary-only index cases or pulmonary cases with negative AFB sputum-smear and culture results. These two classes of TB cases are less likely to be contagious in comparison to bacteriologically-confirmed pulmonary TB cases, and the slightly low yield rate of contact investigations might be explained by the inclusion of contacts to non-contagious types of TB. The yields of all kinds of TB contact investigations in Taiwan should be compared, for selecting the strategies that are more productive and thus more purposeful.

Recommendations:

Extensive resources are being invested in the many activities that comprise contact investigations. Therefore, the yield and costs of contact investigations should be assessed. The first area for exploration would be the yield of universal chest radiography for contacts. The analysis should focus on these groups:

- For contacts who were tuberculin skin tested, a comparison of the radiography yield in tuberculin reactors and tuberculin non-reactors.
- Contacts who had only chest radiography (and not skin tests before radiography).
- Contacts of extrapulmonary-only TB.
- Contacts of pulmonary TB that was not confirmed by bacteriology.

In addition, for each group that is subjected to routine repeat chest radiography at 12 months, the yield should be determined.

If, as anticipated, the yield of chest radiography is low for some of the current activities, the panel expects that recommendations similar to the following will be supported by the findings:

- The order of priority for investigating pulmonary TB cases that are confirmed by *M. tuberculosis* cultures should be (1) those with AFB seen on sputum smear microscopy and (2) those without AFB on sputum smear microscopy. Culture-confirmed cases with negative AFB microscopy results but with a pulmonary cavity are uncommon: they can be grouped with those having positive microscopy results (i.e., higher priority).
- Laryngeal TB cases should be investigated as higher priority regardless of AFB bacteriological findings.
- Extrapulmonary TB cases should not be investigated except when the index patient is a child, and then with the intention only of finding a source of infection for the child.
- Pulmonary TB cases without bacteriologic confirmation generally should not be investigated except when the index patient is a child, and then with the intention only of finding a source of infection for the child.
- Pulmonary TB cases without bacteriologic confirmation can be investigated electively if the contacts are especially vulnerable to TB (e.g., childcare pupils, dialysis mates).
- Expand the testing for LTBI to progressively older age groups. Usage of IGRA instead of the skin test will obviate the concerns about segments of the population with multiple BCG dosage, and it will avoid severe tuberculin reactions in persons who have had previous positive skin test results. Older age groups (i.e., older than the current cut-off age of 25 years) should be included incrementally, as the medical community gains experience with patients who could have a greater rate of isoniazid-associated hepatitis because of age. In anticipation of potential problems, TCDC should institute national sentinel surveillance and intense scrutiny for adverse effects.

The panel recommends the following modifications to the contact investigation procedures:

- Interview all contacts for TB symptoms and pertinent medical history (e.g., diabetes mellitus or HIV infection).
- Consider using IGRA instead of the TST for contact investigations, especially in situations where the more accurate identification of LTBI is important, e.g., in congregate settings such as prisons, mental institutions and nursing homes.
- Reserve chest radiography for contacts with TB symptoms or positive results from the skin test or IGRA. Cease doing routine repeat chest radiography at 12 months.
- In select circumstances, such as investigating confirmed outbreaks or evaluating contacts who are nonverbal, routine chest radiography can be applied.

Currently, information about symptoms is not captured in the database. It is recommended that this information be added to enable future analysis.

Latent TB Infection

As a rule, the tuberculin skin test can be used to screen for LTBI. The reduced specificity of the skin test for BCG-vaccinated populations may increase the number of persons with false positives who are then subjected to the unnecessary risk of INH-associated hepatitis. Setting the skin-test cutoff at 10mm increases the specificity of the test, but at the expense of losing sensitivity in comparison to setting a smaller skin-test cutoff. A loss of sensitivity will cause some LTBI to be missed, which will lead to otherwise preventable TB cases.

IGRAs may be more useful than the tuberculin skin test in contact investigations, especially where BCG vaccination coverage is almost universal and where older segments of the population received multiple (i.e., ≥ 2) BCG doses. (See also above recommendations about introducing IGRA testing into contact investigations.) When the result of either the skin test or IGRA is positive, the contact should be interviewed about TB symptoms again and a chest radiograph should be done to ascertain the absence of TB disease, which defines LTBI.

Hepatitis is the major safety concern with the 9-month INH regimen, and a patient-candidate for this regimen should be assessed for the risk of hepatotoxicity. A history of alcohol use, underlying liver conditions, hepatitis B or C viral carriage, and concomitant potentially hepatotoxic drugs should be obtained. In those born before 1986 (the year universal hepatitis B vaccination at birth began in Taiwan), hepatitis B serology should be done. In those who are at risk of hepatitis C (e.g., injection drug users), hepatitis C serology should be done.

The optimum methods for monitoring the safety of patients who are taking INH for LTBI is not known, and most guidance is based on observational studies and expert opinion. The following recommendations are based on common elements in guidelines or standards from the National Institute for Health and Clinical Excellence (i.e., NICE), the American Thoracic Society, and the Public Health Agency of Canada:

- Patients who are taking INH should be educated about the warning symptoms of hepatitis, and they should be seen monthly by a clinician (beyond the community treatment observer) and asked about these symptoms and warned to stop taking INH and seek healthcare in the event of these symptoms. The community treatment observers also should be trained in how to elicit these symptoms from their patients.
- Serum transaminase concentrations should be measured for patients who have hepatitis symptoms at any moment during treatment.
- Baseline serum transaminase concentrations should be measured for patients who
 - are older than 35 years
 - have a history of alcohol abuse or liver disease
 - have hepatitis B or C carriage
 - have any other risk so determined by the history (e.g., other medications)

- Serum transaminase concentrations should be measured at routine intervals only if a baseline value was greater than the upper limit of normal or the patient has one of the medical risks for liver injury.

Currently, INH preventive therapy is given daily for 9 months under direct observation (i.e., DOPT). Although the quality of DOT for TB cases is satisfactory as judged by the categories A, B and C performance indicators, there is room for improvement because the definition thresholds for the indicator categories are relatively lenient. Resources should be focused on improving performance for TB case DOT before focusing on DOPT.

Recommendations:

- The panel proposes using the twice-weekly INH regimen, while closely monitoring local experience and national data for this regimen's safety and efficacy. The twice weekly-regimen would reduce the workload for the treatment observers who can then devote more time to DOT for TB cases.
- If direct observation of LTBI treatment (DOPT) remains the standard practice, then the use of Rifapentine and INH once weekly for 12 weeks can be considered, but it must be emphasized that this regimen should only be given under direct observation and when active disease has been diligently excluded. This regimen should not be adopted for widespread use until pilot projects in Taiwan have demonstrated its safety and feasibility. Currently, the usage of the INH-Rifapentine regimen is widespread only in the United States, and the experience with this regimen there should be tracked for the early indications of safety and feasibility in public health programs.

BCG vaccination

BCG vaccination is routine for all newly born infants in Taiwan. Babies are vaccinated soon after birth using the intradermal method with a vaccine manufactured in Taiwan using the Tokyo172 strain. The vaccine coverage was as high as 98% during the past several years. In order to monitor for adverse reactions associated with BCG vaccination, the Taiwan program has established a good surveillance system for BCG vaccine injury. This system is supported by the molecular epidemiology investigations to show whether isolates from a patient with extrapulmonary tuberculosis are *M. bovis* BCG.

Recommendations:

- In view of the high incidence rate of TB in Taiwan overall, the benefit from the current BCG vaccination program to infants is clear, and therefore the program should be maintained with a high coverage and technical level and with safety consideration on adverse reactions.
- The quality of vaccine and vaccination technique should be regularly assessed with post-vaccination tuberculin skin test using a sampling strategy.

- Trends of TB incidence and vaccine adverse reactions should be monitored carefully, in order to allow discussions on the balance of benefit and cost/risk of BCG vaccination, for the future modification of the policy, such as discontinuation or targeted vaccination to selected groups or areas.

High Risk Populations

Certain subgroups of Taiwan's population have higher TB incidence rates or are more vulnerable to TB and merit specific consideration, including the aboriginal peoples, persons from specific geographic regions, the elderly, HIV-infected persons, persons living in nursing homes and psychiatric hospitals, and persons from high-incidence countries, for example, Indonesia.

Taiwan controls TB among guest worker immigrants from high-incidence countries by systematic chest radiography that is tied to remaining documented for legal status in the country. On the other hand, the panel was informed of several apparent outbreaks or pseudo-outbreaks of TB in universities involving students from other countries. The panel recommends that students who come from other countries to study in Taiwan's schools, colleges, and universities be screened for TB, but the epidemiology of TB in these students should be studied for designing efficient screening activities, and the frequency and the methods of screening should be evaluated with data showing the productivity and efficiency. (See other recommendations about curtailing the present, extensive usage of chest radiography.)

HIV infection is relatively uncommon in Taiwan. Less than 1% of all TB patients are coinfecting with HIV. However, the HIV situation should not be regarded as static, and among TB patients aged 15–54 years the prevalence of HIV infection already ranges from 2.0% to 5.2% for males and 1.1% to 3.0% for females. Because of a reluctance to broach the subject of HIV testing, physicians are hesitant to test all TB patients for HIV infection, which hinders their ability to care for TB patients co-infected with HIV. In contrast, screening HIV-infected persons for TB is standard practice. Effective antiretroviral treatment and other medical services are available to all HIV-infected persons through NHI. HIV testing all TB patients is recognized globally as a standard of practice. The panel recommends that Taiwan moves rapidly towards testing all TB patients for HIV, just as all HIV patients should be evaluated for TB. Effective behavioral interventions have been developed in many countries and cultures to assist physicians and other healthcare providers learn to speak with their patients about getting tested for HIV.

Taiwan's aboriginal population comprises 2.3% of the total population (approximately 528,000 persons), including 25%–35% (approx. 170,000 persons) of the population of two mountainous and relatively rural counties on Taiwan's east coast, Hualien and Taitung. This region is home to many of Taiwan's aboriginal peoples, and the TB burden is affecting them disproportionately more. The high incidence rate of TB in these groups has led to extensive use of radiographic screening to

detect TB disease. From general experience globally, mass radiography for active case finding has been shown to have little effect on a population's TB incidence. As noted in several sections of this report, the panel is concerned about too much reliance on chest radiography, especially for screening and active case finding. The combination of IGRA testing to indicate infected persons followed by chest radiography may reduce the reliance on radiography and improve the accuracy and economy of case detection.

Although international evidence of the TB risk conferred by diabetes mellitus is now undeniable, the epidemiological studies of the TB-diabetes association in Taiwan show inconclusive results. Nonetheless, diabetes probably is contributing to TB incidence in Taiwan in some regions or population segments, such as the aboriginal tribes of the mountainous regions, and diabetes complicates the treatment of TB. Similarly, the roles of chronic renal failure and other diseases are unclear in Taiwan. The options would be to continue studying the epidemiology of these intersecting problems or to apply international guidance to decisions about Taiwan's strategies for TB prevention.

Outbreak investigations and infection control in congregate settings

Per Taiwan national policy, a suspected cluster is defined as at least two cases connected to the same institution within one year, with proximity or a relationship creating the likelihood of exposure. The cluster is designated as "possible" by an advisory committee if genotypes of the *M. tuberculosis* isolates are not available, and it is designated as "confirmed" if the cases are linked by genotypes. In the period 2011–2012, TCDC received reports of 150 suspected outbreaks. The detection of outbreaks has relied on the TCDC branch office or the local health bureau finding a matching institutional address or a similar patient type (e.g., long-term care). Recently, an outbreak also can be uncovered by an automatic sentinel-surveillance alarm called "contact becomes a case," which is triggered when a patient who has been registered in the national data as a TB contact subsequently is reported as having a TB case.

The public health nurse (PHN) is dispatched to the setting to re-interview the patients about the exposure linkages, and this phase is to be completed within 10 days of detecting a suspected outbreak. The TCDC branch office instructs the health bureau to initiate genotyping of the *M. tuberculosis* isolates if the PHN believes that transmission was possible, but the genotyping is done in most instances anyway. The TCDC branch office reports suspected outbreaks to the Third Division of TCDC.

The PHN collects information in a standardized national format, which becomes part of the information put before a local advisory committee. A pulmonologist and an infectious diseases specialist are invited as advisory committee members to guide the interventions. The committee recommends a plan, such as the priorities for the investigation, the scope of the investigation, what

additional information should be collected by the PHN, and how many persons will be included for skin tests or possibly IGRAs. All persons who are listed as contacts are evaluated with chest radiography, regardless of whether the situation is designated as an outbreak. The advisory committee monitors the findings from the ongoing investigation and continues to influence the process, including whether genotyping is done.

The subsequent actions depend on genotype results. For outbreak investigations, genotyping includes spoligotype, MIRU15, and RFLP. For non-matching patterns, contact tracing remains routine, as per standard national policy for contact investigations. Any infection control problems that were noted coincidentally are reported to the advisory committee, and further assessments will clarify the problems. Most responsibility for changes rests on the institution. TCDC will pay for skin testing if it is recommended. Any additional chest radiography will be funded by either NHI or the institution. The costs for environmental or administrative changes are borne by the institution.

If genotypes match, TCDC designates the cluster as a confirmed outbreak. For long-term care settings, the major approaches are to assess the indoor environment and to increase the frequency of symptom screening and chest radiography. By policy since late 2012, the contacts undergo chest radiography every 6 months for 2 years after finding the last case. Not necessarily everyone in the institution is included, depending on the findings of the contact investigation. The healthcare workers maintain an annual schedule for radiography, unless the TB exposure has exceeded the national threshold of 40 hours (without use of personal respiratory protection), in which instance chest radiography is done every 6 months for 2 years, the same as it would be for other contacts.

After an outbreak is confirmed at a school, the major change is to increase of emphasis on tests and treatment for LTBI. For contacts younger than age 13 years, tuberculin testing will have been done regardless of the index patient, as per guidelines for routine contact investigation. For contacts ages 13 through 25 years, tuberculin testing will be done only after exposure to sputum-microscopy-positive index patients unless the event is a confirmed outbreak, in which instance, the contacts in the 13–25 age group will be tested and treatment will be offered to the infected subjects. However, the decisions about additional tests and treatment are guided by the advisory committees—some clinicians are reluctant to administer INH monotherapy because of anecdotes of treatment-associated adverse effects.

Three outbreak investigations were presented to the review panel: one in a 658-bed veterans' long-term care and psychiatric hospital in Tainan, one in a 4,000-bed long-term psychiatric hospital in Hualien, and one in a university in Taipei. In both of the healthcare-associated outbreaks, most of the residents and the TB patients were elderly. In the outbreak at Tainan, 48 cases (33 in long-term care patients, 14 in psychiatric patients, and 1 in a healthcare worker) were included, 2010–2012, with four genotype clusters, the largest cluster with 13 cases. In the outbreak at Hualien, 62 cases were included, with 51 culture confirmed, 2009–2012, and 20 of the *M. tuberculosis* isolates were

grouped into five clusters, with 7 isolates/cases in the largest cluster. In the outbreak at Taipei, 24 cases among 892 students at a large urban university were included, with 11 of 20 isolates/cases falling into one genotype cluster. In each outbreak, the public health response was focused on either environmental controls or activities for case finding. The university outbreak also included some testing for latent *M. tuberculosis* infection with subsequent treatment. Some of the students who had TB were from overseas, but the contribution to this case cluster was not discussed during the review.

TCDC first published TB infection control guidance for healthcare settings in 2003, with subsequent updates. The contents include early case detection, environmental controls, administrative controls, and personal protection for healthcare workers. TCDC and the Ministry of Labor jointly published engineering guidance for infection control. The content of these two sets of guidance was not reviewed during this visit except for selected sections, and the infection control practices in healthcare settings were not systematically assessed. The review team visited the Chest Hospital in Tainan, Department of Health, Tainan, and toured the 51-bed airborne-infection isolation unit and noted that negative pressure was correctly maintained for the patient rooms, but half of the rooms lacked antechambers, which could be reducing the effectiveness of the environmental controls. The other infection control activities at this hospital were proficient. The team also visited the 11-bed airborne-infection isolation unit in Wanfang Hospital in Taipei City and observed it to be proficient, in terms of administrative and environmental controls. Practices for personal protection and visitors were not assessed.

Healthcare workers at inpatient care settings undergo chest radiography annually, as a requirement for institutional accreditation. The yield has not been determined. Surveillance for latent infection, for example, annual testing with IGRA, is not done.

Concluding observations:

- The events that were described as outbreaks seem to have been a mixture of cases from recent transmission, prevalent cases, and possibly unrecognized multi-event recent institutional transmission. Some clusters might have matching genotype patterns because of background prevalence of certain strains, and the current methods do not allow an assessment.
- Without question, *M. tuberculosis* is being transmitted in some large institutions in Taiwan, and the circumstances at these institutions are conducive to transmission:
 - A large underlying TB prevalence rate in several types of institutional populations.
 - The tendency toward late TB diagnosis in elderly patients who in addition have a large incidence rate.
 - The proximity and the extended contact with source cases in institutions.
 - At least in some institutions, insufficient ventilation.

- The relative contribution of institutional transmission to the national TB burden is unknown, and measuring this relative contribution is important for deciding resource allocation.
- TCDC monitors the compliance with the annual chest radiography of healthcare workers, but the yield and the effectiveness of annual chest radiography has not been determined nationally.
- The sentinel-surveillance alarm called “contact becomes a case” creates the opportunity for investigating outbreaks outside of institutional settings: this could be especially important in mountainous regions (i.e., Hualien County and Taitung County) where the epidemiological profile is suggestive of recent transmission to younger segments of the population.

Recommendations:

- The relative contribution of institutional transmission to the national burden should be measured by a combination of systematic genotype studies and epidemiological models.
- If the fractional contribution of transmission in healthcare is determined to be sufficiently large, TCDC should undertake a campaign for reducing the size and frequency of outbreaks:
 - Ongoing education of healthcare workers on approaches for earlier TB diagnosis.
 - Assessment of time-to-diagnosis in institutional settings, for usage in quality improvement.
 - Periodic (e.g., biannual) review of national guidelines for healthcare TB infection control.
 - Nationwide improvement of adherence to guidelines on administrative and environmental controls for preventing transmission, for example, the inclusion of a single antechamber in each airborne-infection isolation room.
 - Consideration of more intensive standard environmental control measures, such as portable ultraviolet air purifiers, in settings with patient populations having high TB incidence rates, for example, veterans’ hospitals, but especially in settings where TB outbreaks already have been confirmed.
- TCDC and collaborating agencies should determine the need for adopting more intensive administrative and environmental controls in settings besides healthcare institutions, on an institution-by-institution basis, depending on the demonstration of transmission or the high risk that would be predicted by the nature of the institutional population, for example, psychiatric patients.
 - Students from overseas could be required to undergo TB screening on entry to Taiwan; the testing methods could include chest radiography or IGRA, and the productivity and efficiency of these screening activities should be assessed by collecting data on the results and analyzing the yields.
 - Other institutions, such as homeless shelters or dormitories for foreign workers, might need improvements in routine environmental controls.
- The Taiwan national TB program, led by TCDC, should move toward IGRAs instead of, or in addition to, tuberculin skin tests, and subsequently new emphasis on treating contacts

with latent infection, beyond the current age limitations. TCDC should institute national sentinel surveillance and intense scrutiny for adverse effects, in order to immediately detect any serious problems associated with treatment of latent infection. (See also sections on contact investigations and LTBI.)

- The utility of annual chest radiography for occupational screening of healthcare workers should be determined, as one part of a larger strategy of reassessing the systematic routine radiology.
- Community (i.e., non-institutional) outbreaks should be studied, starting with the “contact becomes a case” alarm system, epidemiology, and focal studies of *M. tuberculosis* genotyping. These findings should be generalized to TB control practices for contact investigations.

Surveillance and Data Management

Overall, the data management system is well designed, it is linked with relevant health-related databases, and it facilitates high quality surveillance by the Taiwan national TB program.

The current web-based system introduced in 2001 is a comprehensive TB database that includes records of patients’ history, clinical findings, and progress, and details of patient’s contacts. The initial report of a new patient from a diagnosing doctor can be obtained either with a mailed or faxed report form or through the TCDC web-based Communicable Disease Reporting system. Reporting is mandatory, and at the same time, supported by the medical fee reimbursement in the NHI system to which the reporting is a prerequisite.

The basic key of this system is the personal identification number of the Taiwan nationals. This key enables linkage of this system with other related databases such as the Death Registry and the NHI database. Also, the system allows laboratorians and hospital staff to enter and access results of tests and other patient information.

In addition to the aggregate data outputs such as tables of number of new cases according to several background factors for surveillance purpose to be included in the annual report, the system automatically produces a series of tables and lists for administrative purposes, e.g., patients with drug resistance, patients not receiving DOTS observers visits, etc. Also, the system has alert functions to remind workers of the necessary actions.

This is a pioneering example of the comprehensive use of an electronic data system integrated into the general health related information system. Furthermore, this system has a profound potentiality toward the future, given the progress of electronic information system in terms of hardware as well as software, such as combined uses with smart phone.

Recommendations:

- The high level of security of the data in the system should be maintained.
- The accuracy and completeness of data, especially those inputted manually by workers in the periphery should be evaluated.
- The use of this information system for epidemiological, microbiological, clinical, and operational studies on TB and related factors should be encouraged.
- In order to avoid errors and to save labor, the use of remote electronic data entry, such as with a smart phone, should be explored.
- The data collection elements should be expanded to enable more efficient contact investigations; for example, symptoms of TB during a possible outbreak.

Summary of Recommendations

Epidemiology

- Study the dynamics of the TB transmission of TB infection in the population and high-risk subgroups of the population by combining the results from genotyping and epidemiologic investigations.

Case detection and diagnosis

- The review panel is concerned that Taiwan's program might rely too heavily on chest radiography, especially for screening and active case finding in high risk populations; not only for initial thoracic imaging, but also for follow-up of persons receiving treatment, after treatment or at with ongoing risk such as healthcare workers and TB contacts.
- For persons unable to produce an adequate expectorated sputum specimen, the use of sputum induction or bronchoscopy procedures may be considered.
- In general, in an era of economic constraints, finding and treating more TB cases with less effort and lower cost become important considerations. To this end, the panel recommends increased used of efficiency studies, economic analysis, cost-effectiveness analysis, risk-benefit analysis, and decision analysis for developing rational policies, and increased use of social and behavioral sciences to promoted the associated behavioral changes among healthcare professionals.

Laboratory systems

- The very large workload in the authorized TB laboratories should be carefully monitored. Adequate resources should be provided to maintain the high level of services. Additional laboratories may be need if the workload remains at the current level.
- Adequate resources should be provided to the external quality assessment system.

- Laboratories should be required to report the recovery of *M. tuberculosis* isolates to the clinician, local TB control officer, and TCDC. In the United States, we have found that such a system helps ensure that all TB cases are reported the TB Control Program.
- The use of molecular diagnostic tests to detect TB and rifampicin resistant TB should be explored. Operational research to evaluate the performance and implementation of molecular tests is needed.
- Second-line drug susceptibility testing
 - should be conducted for all rifampicin-resistant isolates, not just MDR TB strains.
 - should include testing to at least the injectable second-line agents available in Taiwan (i.e., capreomycin and kanamycin) and the fluoroquinolones used in Taiwan (i.e., levofloxacin and moxifloxacin).
- Performance indicators
 - Individual laboratories should monitor specimen transport times from individual collection sites to discover any potential transportation problem.
 - Turnaround times for growth detection and contamination rates should be monitored for both liquid solid cultures.
 - The percentage of AFB-smear positive specimens that yield positive cultures (target 95%) should be monitored.
- The program and laboratory should work together to develop studies to define the molecular epidemiology of TB in the general population and high risk populations.
- The laboratory should investigate the utility of 24-locus and 27-locus MIRU typing for molecular epidemiology and outbreak investigations.
- The frequency, clinical significance, and clinical and epidemiologic characteristics of patients that produce specimens containing NTM should be investigated.

Management of cases of TB

The panel recommends —

- A survey of all treatment courses implemented, and the reasons for variation from national standard regimens, with a view to providing evidence about treatment practice. This evidence should be used, in combination with the international literature, to place strong pressure on all physicians to adhere to national guidance in treating all patients other than when clinical circumstances oblige variation.
- Less reliance on in-hospital care and more case management with patients at home, unless there are overwhelming clinical or infection control reasons to do otherwise.
- The discharge of most patients from follow up at the end of successful treatment. Any further follow up after treatment should be reserved for those patients who have had drug resistant disease or other complications of their treatment course.
- A high priority on increasing the proportion of cases treated with the highest standard of DOTS in the intensive phase, and similarly high levels of supervision in the continuation

phase in patients with any kind of complication of treatment or in whom problems with compliance are anticipated or observed.

- The adoption of intermittent regimens in the continuation phase, which could considerably reduce the burden of observation in DOTS for the health team.
- The exploration of intermittent treatment for latent infection such as nine months of isoniazid twice a week.
- Further studies of remote observation of treatment (of disease and latent infection) using electronic methods while ensuring that overall effectiveness of treatment is not allowed to decline. Caution should be exercised, however, to ensure that direct observation of treatment is continued for all patients in the intensive phase and for patients in the continuation phase where there have been treatment complications, problems with compliance, or drug resistance.
- The adoption of the Taiwan MDR TB Consortium, TMTC, approach to include all patients in Taiwan who have MDR TB. Information on the regimen used, combined with patient information, drug susceptibility pattern and treatment outcome, should be collected on all cases in order to monitor the effectiveness.

Outcome of TB treatment

- The panel recommends that more detailed investigation be carried out into the causes of death in those dying while on TB treatment, and in those dying before TB treatment starts, to determine if an appreciable burden of preventable deaths is occurring.

Contact Investigations

The yield and costs of contact investigations should be assessed. The first area for exploration would be the yield of universal chest radiography for contacts. The analysis should focus on these groups:

- For contacts who were tuberculin skin tested, a comparison of the radiography yield in tuberculin reactors and tuberculin non-reactors.
- Contacts who had only chest radiography (and not skin tests before radiography).
- Contacts of extrapulmonary-only TB.
- Contacts of pulmonary TB that was not confirmed by bacteriology.

In addition, for each group that is subjected to routine repeat chest radiography at 12 months, the yield should be determined.

The panel recommends the following on when to initiate contact investigations:

- The order of priority for investigating pulmonary TB cases that are confirmed by *M. tuberculosis* cultures should be (1) those with AFB seen on sputum smear microscopy and (2) those without AFB on sputum smear microscopy. Culture-confirmed cases with negative AFB microscopy results but with a pulmonary cavity are uncommon: they can be grouped with those having positive microscopy results (i.e., higher priority).

- Laryngeal TB cases should be investigated as higher priority regardless of AFB bacteriological findings.
- Extrapulmonary TB cases should not be investigated except when the index patient is a child, and then with the intention only of finding a source of infection for the child.
- Pulmonary TB cases without bacteriologic confirmation generally should not be investigated except when the index patient is a child, and then with the intention only of finding a source of infection for the child.
- Pulmonary TB cases without bacteriologic confirmation can be investigated electively if the contacts are especially vulnerable to TB (e.g., childcare pupils, dialysis mates).
- Expand the testing for LTBI to progressively older age groups. Usage of IGRA instead of the skin test will obviate the concerns about segments of the population with multiple BCG dosage, and it will avoid severe tuberculin reactions in persons who have had previous positive skin test results. Older age groups (i.e., older than the current cut-off age of 25 years) should be included incrementally, as the medical community gains experience with patients who could have a greater rate of isoniazid-associated hepatitis because of age. In anticipation of potential problems, TCDC should institute national sentinel surveillance and intense scrutiny for adverse effects.

The panel also recommends the following modifications to the contact investigation procedure:

- Interview all contacts for TB symptoms and pertinent medical history (e.g., diabetes mellitus or HIV infection)..
- The use of IGRA can be considered. IGRA testing would be especially useful in populations where BCG vaccination coverage is almost universal and especially in the age groups having multiple (i.e., ≥ 2) BCG doses.
- Reserve chest radiography for contacts with TB symptoms or positive results from the skin test or IGRA. Cease doing routine repeat chest radiography at 12 months.
- In select circumstances, such as investigating confirmed outbreaks or evaluating contacts who are nonverbal, routine chest radiography can be applied. .

Latent TB Infection

- If INH is used for treating LTBI, the panel proposes using the twice weekly regimen, while closely monitoring local experience and national data for the regimen's safety and efficacy. The once-weekly 12-dose INH-Rifapentine regimen should be considered, with a cautious, gradual introduction starting with pilot projects. This regimen should only be given under DOPT.
- Patients receiving INH should be seen at least monthly to monitor clinically for side effects especially hepatotoxicity and to encourage adherence.
- Serum transaminase concentrations should be measured if symptoms or signs suggest hepatotoxicity at any time during treatment.
- Serum transaminases need not be measured at regular intervals for most patients.

- Baseline serum transaminases should be measured for patients who are age 35 years and older.
- Baseline and sequential measurements of serum transaminases should be done when there are risk factors present (e.g., alcohol abuse, underlying liver disease, hepatitis B or C carriage, concomitant therapy with hepatotoxic drugs or if the baseline transaminases are elevated).

BCG vaccination

- The current BCG vaccination program should be maintained with a high coverage and technical level and with safety consideration on adverse reactions.
- The quality of vaccine and vaccination technique should be regularly assessed with post-vaccination tuberculin skin test using a sampling strategy.
- Trends of incidence of tuberculosis and adverse reactions should be monitored carefully, for the future modification of the policy, such as discontinuation or targeted vaccination to selected groups or areas.

High Risk Populations

- The panel recommends that students from other countries who attend Taiwan's schools, colleges, and universities be screened for TB, but the optimal methods and schedule of screening should be determined by studying the epidemiology of TB in these students and routinely assessing the efficiency and productivity of the screening activities.
- The panel recommends that Taiwan moves rapidly towards testing all TB patients for HIV infections, just as all HIV patients should be evaluated for TB.
- For diabetes and other chronic medical conditions that may increase TB incidence, the Taiwan national TB program can consider two courses of action: pursue further epidemiological studies for demonstrating the risk factors that are most important in Taiwan, or adopt international guidance for preventing TB in such groups.

Outbreak investigations and infection control in congregate settings

- The relative contribution of institutional transmission to the national burden should be measured by a combination of systematic genotype studies and epidemiological models.
- If the fractional contribution of transmission in healthcare is sufficiently large, TCDC should undertake a campaign for reducing these outbreaks:
 - Ongoing education of healthcare workers on approaches for earlier diagnosis.
 - Assessment of time-to-diagnosis in institutional settings, for usage in quality improvement.
 - Periodic review of national guidelines for healthcare TB infection control.
 - Nationwide improvement of adherence to guidelines on administrative and environmental controls for preventing transmission.
 - Consideration of more intensive standard environmental control measures, such as portable ultraviolet air purifiers, in all settings with patient populations having high TB incidence rates.

- TCDC and collaborating agencies should determine the need for adopting more intensive administrative and environmental controls in settings besides healthcare institutions, on an institution-by-institution basis.
 - Students from overseas could be required to undergo TB screening on entry to Taiwan: the testing methods could include chest radiography or IGRA, and the productivity and efficiency of these screening activities should be assessed by collecting data on the results and analyzing the yields.
 - Other institutions, such as homeless shelters or dormitories for foreign workers, could require improvements in environmental controls.
- The Taiwan national TB program, led by TCDC, should move toward IGRAs instead of, or in addition to, tuberculin skin tests, and subsequently new emphasis on treating contacts who have latent infection, beyond the current age limitations. TCDC should institute national sentinel surveillance and intense scrutiny for adverse effects during treatment of LTBI, in order to immediately detect any serious problems.
- The utility of annual radiography for occupational screening of healthcare workers should be determined, as one part of a larger strategy of reassessing systematic routine radiology.
- Community (i.e., non-institutional) outbreaks should be studied with the “contact becomes a case” alarm system, epidemiology, and focal studies of *M. tuberculosis* genotyping. The findings should be generalized to TB control practices for contact investigations.

Surveillance and Data Management

- The high level of security of the data in the system should be maintained.
- The accuracy and completeness of data, especially those inputted manually by workers in the periphery should be evaluated.
- The use of the information systems for epidemiological, microbiological, clinical, and operational studies on TB and related factors should continue and be encouraged.
- In order to avoid errors and to save labor, the use of remote electronic data entry, such as with a smart phone, should be explored.
- The data collection elements should be expanded to learn more from contact investigations, for example, symptoms of TB.

Annex 1 : 2014/1/16 Addendum 1 to the report, External review of “Halving TB in 10 years program in Taiwan, 2006 – 2015”:

Usage of sputum induction or more aggressive methods for collecting respiratory specimens for mycobacteriological studies

Frequency of routine specimen collection for mycobacteriological studies during TB treatment

Statement of problems

After the international external review team visited Taiwan and whilst it still worked on its report, the team members discussed the schedule for collecting sputum specimens for mycobacteriology during the treatment for pulmonary TB and about the need for interventions for obtaining valid sputum specimens. These discussions were motivated by (1) the team’s observation that the number of specimens processed in the mycobacteriology laboratories of Taiwan exceeded both the capacity of the mycobacteriology laboratories and the number of specimens that would be anticipated by the number of patients, (2) questions from Taiwanese physicians and public health officials about collecting valid respiratory specimens for mycobacteriological testing after patients have become free of productive cough because of successful treatment, (3) the need to monitor treatment success for each patient, and (4) WHO guidance about confirming “cure” at the end of treatment by testing sputum specimens.

Discussion and conclusions

The review team discussed the problems, reached several conclusions, and left some issues open. First, the burden on the mycobacteriology laboratories has to be ameliorated. The current burden on the laboratories confers the risk of impairing laboratory performance, and it should be corrected by submitting only the necessary number of specimens from each patient. Simultaneously, laboratory capacity should be increased either by adding infrastructure, such as equipment and space, or by extending the service hours, which might require more personnel.

The burden to laboratories could be lessened somewhat by decreasing the number of sputum specimens for initial diagnosis from three to two. More information is needed for determining precisely whether the excessive number of specimens stems from too many patients being evaluated for suspected TB or too many sputum specimens being collected from TB patients during or after their treatment.

Second, the procedures of sputum induction, bronchoscopy, and other interventions for specimen collection should be reserved primarily for medical indications when patients cannot spontaneously expectorate sputa. The reasons for doing these procedures should be related to patient care: the confirmation of an initial TB diagnosis and especially the isolation of *Mycobacterium tuberculosis* for susceptibility testing. Sputum induction and other interventions should not be done for purely programmatic reasons. For managing pulmonary TB, the submission of a monthly sputum specimen during treatment until the sputum-smear microscopy result or the culture result is negative is in

keeping with standards of practice in some countries. Although this practice might be helpful in the medical management in some instances, for example, multidrug-resistant TB, the overall utility of routinely collecting monthly sputum is unknown.

Finally, in monitoring the response to treatment and documenting cure, the medical needs are different from the programmatic needs. This is especially true when it comes to collecting sputum at the end of a full treatment course, which is not necessary for medical care in most instances. The WHO guidance for program evaluation and cohort review was developed for resource-poor settings with a reliance on sputum-smear microscopy to diagnose TB and then to confirm the cure. A national TB program such as the one in Taiwan has the option of designing its own distinct indicators for program evaluation, in keeping with its resources and its technological capabilities.

Recommendations

The review team did not reach full consensus on all details, but a summary of recommendations, with points left open for discussion, follows:

Investigate the sources of the excessive number of specimens. This could be done from the laboratory focus, from the clinical-care focus, or from both. The “Bayesian approach,” which is patient centered, is the preferred method. Use the findings of these investigations to design interventions for standardizing specimen-collection practices and reducing unnecessary submissions to laboratories.

Consider reducing the number of initial specimens for diagnosis from three to two as a temporary measure while reducing the burden caused by excessive specimens during treatment.

On the basis of medical judgment, use sputum induction, bronchoscopy, and other interventions for ascertaining the TB diagnosis and obtaining an *M. tuberculosis* isolate for drug susceptibility testing. Sputum induction and the other methods confer health risks to the patient and infection control risks, which should be taken into account. These interventions should not be used routinely when the response to treatment is satisfactory.

For managing pulmonary TB, collect sputum specimens for mycobacterial culture at the end of the second month of treatment. This is important for assessing the efficacy of treatment and for adjusting the treatment regimen (i.e., either the medications or the duration). Sputum induction is not necessary for routine sputum collection at 2 months. If there are indications the treatment may not be working satisfactorily, and the patient cannot produce an adequate sputum specimen, then sputum induction might be medically indicated for selected cases.

Collect expectorated sputum specimens during treatment as recommended by current treatment guidelines in Taiwan, while avoiding excessive numbers of specimens. The panel reached consensus that, for pulmonary TB patients who display signs or symptoms suggesting that the response to treatment is unsatisfactory, sputum specimens should be collected at least monthly, which includes the possible use of sputum induction or other interventions when medically indicated, that is, to detect a potential treatment failure or relapse as early as possible. If a patient with pulmonary TB that is caused by drug-susceptible *M. tuberculosis* is observed to be adhering to

treatment and responding well clinically, the need for subsequent routine collection of sputum samples is uncertain and considered unnecessary in some countries. In monitoring the response to treatment and documenting cure, the medical needs are different from the programmatic needs. This is especially true when it comes to collecting sputum at the end of a full treatment course which is not necessary for medical care in most instances. Taiwan should consider adopting different criteria for collection of sputum specimens during the continuation phase of treatment in uncomplicated patients which could streamline clinical practices and moderate the burden on mycobacteriology laboratories.

Define “cure” or “completion of therapy” in Taiwan both for medical care and for program evaluation. Separate definitions might be needed for medical care and for program evaluation. The WHO definitions (i.e., those used for the standard registry, for a cohort review, and for program evaluation) offer the benefits of simplicity, rigor, and comparability across countries. but the definitions in Taiwan could differ from the WHO definitions. Adopting definitions that are designed for Taiwan could streamline clinical practices and moderate the burden on mycobacteriology laboratories.

Draft global strategy and targets for tuberculosis prevention, care and control after 2015

Report by the Secretariat

1. The Executive Board at its 134th session noted an earlier version of this report,¹ and adopted resolution EB134.R4. The version of the report that follows has been updated taking into consideration the comments on the report made during the session and new information available.
2. The modifications to the text include: (i) deletion of the specific name “Xpert MTB/RIF” of a new rapid diagnostic test for tuberculosis and update to the figures indicating wide application of the new test across countries (paragraph 9); (ii) reference to “delamanid”, a second new medicine developed for use in treatment of multidrug-resistant tuberculosis (paragraphs 9 and 74); (iii) specific mention of the need for “in-country coordination and cross-border collaboration” to address issues related to “migrant populations” (paragraphs 37, 57 and 70); and (iv) specific mention of the need to develop “accessible” and “affordable” new tools for diagnosis, treatment and prevention (paragraphs 71 and 73).
3. WHO’s declaration of tuberculosis as a global public health emergency in 1993 ended a period of prolonged global neglect. Together the subsequent launch of the directly observed treatment, short course (DOTS) strategy; inclusion of tuberculosis-related indicators in the Millennium Development Goals; development and implementation of the Stop TB Strategy that underpins the Global Plan to Stop TB 2006–2015; and adoption of resolution WHA62.15 on the prevention and control of multidrug-resistant tuberculosis and extensively drug-resistant tuberculosis by the Sixty-second World Health Assembly have all helped to accelerate the global expansion of tuberculosis care and control.
4. In May 2012, Member States at the Sixty-fifth World Health Assembly requested the Director-General to submit a comprehensive review of the global tuberculosis situation to date, and to present new multisectoral strategic approaches and new international targets for the post-2015 period to the Sixty-seventh World Health Assembly in May 2014, through the Executive Board.² The work to prepare this has involved a wide range of partners providing substantive input into the development of the new strategy, including high-level representatives of Member States, national tuberculosis programmes, technical and scientific institutions, financial partners and development agencies, civil society, nongovernmental organizations, and the private sector.

¹ See document EB134/12 and the summary records of the Executive Board at its 134th session, second meeting, section 1 and fourth meeting, section 1 (document EB134/2014/REC/2).

² Document WHA65/2012/REC/3, summary record of the sixth meeting of Committee B, section 3.

5. **The process.** WHO's Strategic and Technical Advisory Group for Tuberculosis approved the broad, inclusive scope of the consultative process for the development of the draft strategy. It began with a web-based consultation to seek ways in which to strengthen the current strategy and introduce any new components. During 2012, as part of the annual meetings of national tuberculosis programmes, each regional office organized consultations on the proposed new strategic framework and targets with health ministry officials, national tuberculosis programme managers and partners. In November 2012, officials of countries with a high tuberculosis burden discussed the draft strategic framework, as did 700 stakeholders attending the global symposium at the annual World Conference on Lung Health, held in Kuala Lumpur, Malaysia. In 2013, three special consultations including senior officials of Member States, technical experts and civil society were organized in order to discuss (i) formulation of the post-2015 tuberculosis targets; (ii) approaches to building on the opportunities presented by expansion of universal health coverage and social protection to strengthen tuberculosis care and prevention; and (iii) research and innovation for improved tuberculosis care, control and elimination. In June 2013, the Strategic and Technical Advisory Group for Tuberculosis endorsed the draft, including the global targets and their rationale.

6. The framework of the draft post-2015 global tuberculosis strategy is presented in Figure 1.

Figure 1. DRAFT POST-2015 GLOBAL TUBERCULOSIS STRATEGY FRAMEWORK

VISION	A world free of tuberculosis – zero deaths, disease and suffering due to tuberculosis
GOAL	End the global tuberculosis epidemic
MILESTONES FOR 2025	75% reduction in tuberculosis deaths (compared with 2015) 50% reduction in tuberculosis incidence rate (less than 55 tuberculosis cases per 100 000 population) – No affected families facing catastrophic costs due to tuberculosis
TARGETS FOR 2035	95% reduction in tuberculosis deaths (compared with 2015) 90% reduction in tuberculosis incidence rate (less than 10 tuberculosis cases per 100 000 population) – No affected families facing catastrophic costs due to tuberculosis
PRINCIPLES	
<ol style="list-style-type: none"> 1. Government stewardship and accountability, with monitoring and evaluation 2. Strong coalition with civil society organizations and communities 3. Protection and promotion of human rights, ethics and equity 4. Adaptation of the strategy and targets at country level, with global collaboration 	
PILLARS AND COMPONENTS	
1. INTEGRATED, PATIENT-CENTRED CARE AND PREVENTION	
<ol style="list-style-type: none"> A. Early diagnosis of tuberculosis including universal drug-susceptibility testing; and systematic screening of contacts and high-risk groups B. Treatment of all people with tuberculosis including drug-resistant tuberculosis; and patient support C. Collaborative tuberculosis/HIV activities; and management of comorbidities D. Preventive treatment of persons at high risk; and vaccination against tuberculosis 	

2. BOLD POLICIES AND SUPPORTIVE SYSTEMS

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

3. INTENSIFIED RESEARCH AND INNOVATION

- A. Discovery, development and rapid uptake of new tools, interventions and strategies
- B. Research to optimize implementation and impact, and promote innovations

ACHIEVEMENTS

7. **Steady progress.** WHO-coordinated global efforts to control tuberculosis led by Member States and supported actively by technical and financial partners have produced remarkable results. Target 8 of Millennium Development Goal 6, “to have halted and begun to reverse the incidence of tuberculosis” by 2015, has already been achieved. Between 1995 and 2012, 22 million lives were saved and 56 million people were successfully treated for tuberculosis. The burden of tuberculosis has been declining in all WHO regions since 2001. The tuberculosis mortality rate has decreased 45% since 1990 and the world is on track to achieve the Stop TB Partnership’s global target of a 50% reduction in the mortality rate by 2015. In 2012, 6.1 million newly diagnosed cases notified to national tuberculosis programmes were reported to WHO. Globally, treatment success rates have been maintained at 85% or more since 2007.

8. **Evolving response.** The response to the global tuberculosis situation has evolved in line with countries’ situations and needs. The 2009 ministerial meeting in Beijing and the adoption of the subsequent commitments made by the World Health Assembly in resolution WHA62.15 stimulated renewed commitment by Member States with a high-burden of drug-resistant tuberculosis to address the problem. Data on the magnitude of the problem of drug resistance are now available for all countries with a high burden of tuberculosis. Global mechanisms have been set up to procure quality-assured medicines and diagnostics and to strengthen laboratory networks equipped with mycobacterial culture and drug susceptibility testing facilities. WHO-recommended tuberculosis/HIV collaborative activities are a widely accepted global norm implemented across countries. Public-private mix approaches have helped diverse public, voluntary, private and corporate care providers in many settings to align their practices with international standards, and partnerships with communities and civil society have grown in strength. Programme-based operational research has allowed a swift translation of evidence into national policies and field practices.

9. **New technologies and tools.** Noteworthy progress has been made in the development of new tools. Seven WHO-endorsed new diagnostics are being rolled out. The recent introduction of a rapid molecular test to diagnose tuberculosis and rifampicin resistance simultaneously has been particularly impressive, with application in 98 of the 145 low- and middle-income countries eligible for concessional pricing. The pipeline of new tuberculosis medicines has expanded substantially. Bedaquiline, the first new tuberculosis medicine in four decades, has recently been recommended by WHO for the treatment of severe cases of drug-resistant tuberculosis. A second new tuberculosis medicine with the same purpose, delamanid, is in the process of review by WHO. Twelve candidate vaccines are also in the pipeline.

CHALLENGES

10. **Persisting burden.** The achievements over the past two decades are far from enough to ensure progress towards elimination of tuberculosis. The latest data on the global tuberculosis epidemic are available from WHO's *Global tuberculosis report 2013*. In 2012, there were an estimated 8.6 million new cases, and 1.3 million people died from tuberculosis, including 320 000 among people living with HIV. Notably, in the same period, 410 000 women, 160 000 of them HIV-positive, died of tuberculosis, making it a top infectious killer of women. There were also an estimated 500 000 cases of tuberculosis and at least 74 000 deaths in children. Africa and Eastern Europe are not on track to achieve the 2015 target of halving tuberculosis deaths compared with the level in 1990. The poorest countries are worst affected, and in all countries the poorest and most vulnerable bear the greatest burden of tuberculosis.

11. **Stagnating case notifications.** After a steady rise until 2006, notifications of tuberculosis cases have now stagnated. Many of the notified cases have been detected only after long delays. Data from tuberculosis prevalence surveys from many countries have revealed a large hidden burden of asymptomatic tuberculosis cases. This finding underscores the limitations of the current methods of case detection. There remains much scope to activate and institutionalize engagement with civil society organizations, communities and people with tuberculosis in order to drive demand for tuberculosis care that is accessible to all who need it. In most high-prevalence settings, mapping at-risk populations and providing priority attention to the most affected still needs to be undertaken.

12. **Multidrug-resistance.** The problem of resistance to medicines poses a great threat to tuberculosis control and remains a major concern for global health security. In 2012, there were an estimated 450 000 new cases of multidrug-resistant tuberculosis, defined as resistance to at least isoniazid and rifampicin (the two most important medicines used in the treatment of tuberculosis). However, only about 94 000 cases were notified and 82% of those patients were reported to have been started on treatment. Among the patients treated, the reported treatment success rate globally was only 48%. Extensively drug-resistant tuberculosis, a more severe and lethal form resistant also to the most active second-line medicines, has been reported by 92 countries. Several health system barriers persist, preventing the rapid expansion of programmatic management of drug-resistant tuberculosis.

13. **HIV-associated tuberculosis.** The HIV epidemic continues to fuel the tuberculosis epidemic especially in Africa, which accounted 75% of the world's HIV-positive tuberculosis cases in 2012. Globally, nearly 50% of all tuberculosis patients did not know their HIV status and only a little over 50% of those with associated HIV infection received antiretroviral treatment in 2012. A significant proportion of people living with HIV are not screened regularly for tuberculosis. Chemoprophylaxis for tuberculosis is still not provided to all who could benefit from it. Importantly, in the absence of appropriate care and prevention, a large proportion of people living with HIV die from undiagnosed tuberculosis.

14. **Noncommunicable diseases and tuberculosis comorbidities.** Risk-factors of tuberculosis such as diabetes, tobacco-smoking, silicosis, alcohol and drug misuse, and undernutrition hamper tuberculosis control, especially in low- and middle-income countries. A large pool of latently infected people contributes to a growing proportion of future tuberculosis cases. The increasing prevalence of noncommunicable diseases also changes the profile of tuberculosis comorbidities, complicating clinical management and worsening health outcomes. Few links currently exist between health services for communicable and noncommunicable diseases.

15. **Weak health systems.** Inadequate coverage and weak performance of health services limit access to high-quality tuberculosis care. Many public and private health providers remain delinked from national tuberculosis control efforts. Absence of universal health coverage aggravates the economic burden on the poor. This hardship is compounded by a lack of social protection mechanisms to address associated income loss and non-medical costs. Regulatory mechanisms essential to ensure effective infection control, rational use of tuberculosis diagnostics and medicines, mandatory disease notification, functioning vital registration systems, and protection of the legal rights of people with tuberculosis remain weak. Data collection, quality and use need to be improved at all levels. The weaknesses in health systems have limited the linkages that are required across social sectors in order to address poverty, undernutrition and risk factors that adversely influence people's vulnerability to tuberculosis, and the health outcomes of people with tuberculosis.

16. **Slow decline in incidence.** The fall in incidence at an average annual rate of some 2% globally is too slow to achieve tuberculosis elimination in the foreseeable future. Ending the tuberculosis epidemic will entail early diagnosis and proper treatment of all cases of active tuberculosis as well as a gradual removal of the pool of latent tuberculosis infection in some 2000 million people. Diagnosis of tuberculosis remains demanding in the absence of a point-of-care test, and the duration of treatment remains too long in the absence of shorter and better regimens for drug-susceptible and drug-resistant tuberculosis, as well as for latent tuberculosis infection.

17. **Funding gaps.** There has been a substantial increase in financing for tuberculosis in disease-endemic countries – from less than US\$ 2000 million in 2002 to about US\$ 6000 million in 2013 – dominated by major enhancements in domestic funding and external funding through the Global Fund to Fight AIDS, Tuberculosis and Malaria. However, global tuberculosis control efforts remain under-funded. To supplement growing domestic funding, international donor funding of about US\$ 2300 million per year is needed for implementation of existing interventions up to 2015 and US\$ 2000 million per year is needed for research and development. Estimated gaps amount to about US\$ 2000 million per year for implementation and US\$ 1300 million per year for research between 2013 and 2015. Funding requirements are likely to increase in the immediate post-2015 period, for two reasons. Accelerated progress towards the goal of universal health coverage is required to ensure that all people with tuberculosis can access diagnosis and treatment without facing catastrophic costs.¹ Increased investments in research and development are required to deliver the technological breakthroughs that can help to end the global tuberculosis epidemic. Funding requirements may subsequently fall as reductions in tuberculosis incidence accelerate and outweigh the costs associated with improved coverage of tuberculosis prevention, diagnosis and treatment interventions.

18. **Underlying determinants.** Overall, global and national political choices will determine the future impact of social, economic and environmental determinants of tuberculosis. Tuberculosis care and prevention will continue to benefit from general economic growth. The important underlying determinants of the tuberculosis epidemic that need to be addressed include poverty and inequity, food insecurity, adverse effects of population movements and complex emergencies. Specifically, effective tuberculosis prevention will require actions resulting in poverty reduction, improved nutrition, and better living and working conditions as well as strategies to mitigate the impact of migration, ageing populations and chronic diseases, such as diabetes, that are risk factors for tuberculosis.

¹ Out-of-pocket expenditure on health care exceeding 40% of discretionary household expenditure has been defined by WHO as a catastrophic level. The threshold for catastrophic total cost (including indirect costs) has not yet been established.

APPROACHES

19. ***Expanding care, strengthening prevention, and intensifying research.*** Addressing the above challenges will require innovative, multisectoral, and integrated approaches. The DOTS strategy strengthened public sector tuberculosis programmes to help to tackle a large burden of drug-susceptible disease. The Stop TB Strategy,¹ built on DOTS, helped to begin addressing drug-resistant tuberculosis and HIV-associated tuberculosis while promoting research to develop new tools. It also helped to expand partnerships with all care providers, civil society organizations and communities, in the context of strengthening health systems. Ending the tuberculosis epidemic will require further expansion of the scope and reach of interventions for tuberculosis care and prevention; institution of systems and policies to create an enabling environment and share responsibilities; and aggressive pursuit of research and innovation to promote development and use of new tools for tuberculosis care and prevention. It will also require a provision for revisiting and adjusting the new strategy based on progress and the extent to which agreed milestones and targets are being met.

20. ***Eliciting systemic support and engaging stakeholders.*** In practical terms, continuing progress beyond 2015 will require intensified actions by and beyond tuberculosis programmes within and outside the health sector. The new strategy envisages concrete actions from three levels of governance in close collaboration with all stakeholders and engagement of communities. At the core are national tuberculosis programmes or the equivalent structures that are responsible for coordination of all activities related to delivery of tuberculosis care and prevention. Above them are the national health ministries that provide critical systemic support, enforce regulatory mechanisms, and coordinate integrated approaches through interministerial and intersectoral collaboration. Above all, the national governments have to provide the overall stewardship to keep tuberculosis elimination high on the development agenda through political commitment, investments and oversight, while making rapid progress towards universal health coverage and social protection.

21. ***Elevating leadership and widening ownership.*** Tuberculosis care and control need to be strengthened further and expanded to include prevention of tuberculosis. For this purpose, in-country leadership for tuberculosis control ought to be elevated to higher levels within ministries of health. This is essential in order to effect coordinated action on multiple fronts and to accomplish three clear objectives: (1) achieving universal access to early detection and proper treatment of all patients with tuberculosis; (2) putting supportive health and social sector policies and systems in place to enable effective delivery of tuberculosis care and prevention; and (3) intensifying research to develop and apply new technologies, tools and approaches to enable eventual tuberculosis elimination. The three pillars of the global tuberculosis strategy are designed to address these objectives.

22. ***Specific actions proposed for Member States.*** The 10 components of the draft global tuberculosis strategy contain specific country-level actions. These specifically focus on adapting, implementing and monitoring a substantially enhanced and holistic response to countering the tuberculosis epidemic and ending it by 2035. The role of the WHO Secretariat is focused on providing support to Member States through normative guidance, policy advice and monitoring and evaluation.

¹ The six components of the Stop TB Strategy are: (i) pursue high-quality DOTS expansion and enhancement; (ii) address TB/HIV, MDR-TB and other special challenges; (iii) contribute to health system strengthening; (iv) engage all care providers; (v) empower people with tuberculosis, and communities; and (vi) enable and promote research.

VISION, GOAL, MILESTONES AND TARGETS

23. The vision for the draft post-2015 tuberculosis strategy is “a world free of tuberculosis”; also expressed as “zero deaths, disease and suffering due to tuberculosis”. The goal is to end the global tuberculosis epidemic.

24. The Millennium Development Goal target “to halt and begin to reverse the incidence of tuberculosis by 2015” has already been achieved. The related Stop TB Partnership targets of reducing tuberculosis prevalence and death rates by 50% relative to 1990 are on track to be achieved by 2015. Under this draft strategy, new, ambitious yet feasible global targets are proposed for 2035. These include achieving a 95% decline in deaths due to tuberculosis compared with 2015, and reaching an equivalent 90% reduction in tuberculosis incidence rate from a projected 110 cases/100 000 in 2015 to 10 cases/100 000 or less by 2035. These targets are equivalent to the current levels in some low incidence countries of North America, Western Europe and the Western Pacific. An additional target proposed to ascertain progress of universal health coverage and social protection is that by 2020, no tuberculosis-affected person or family should face catastrophic costs due to tuberculosis care.

25. Milestones that will need to be reached before 2035 are also proposed for 2020, 2025, and 2030. Table 1 presents key global indicators, milestones and targets for the draft post-2015 strategy.

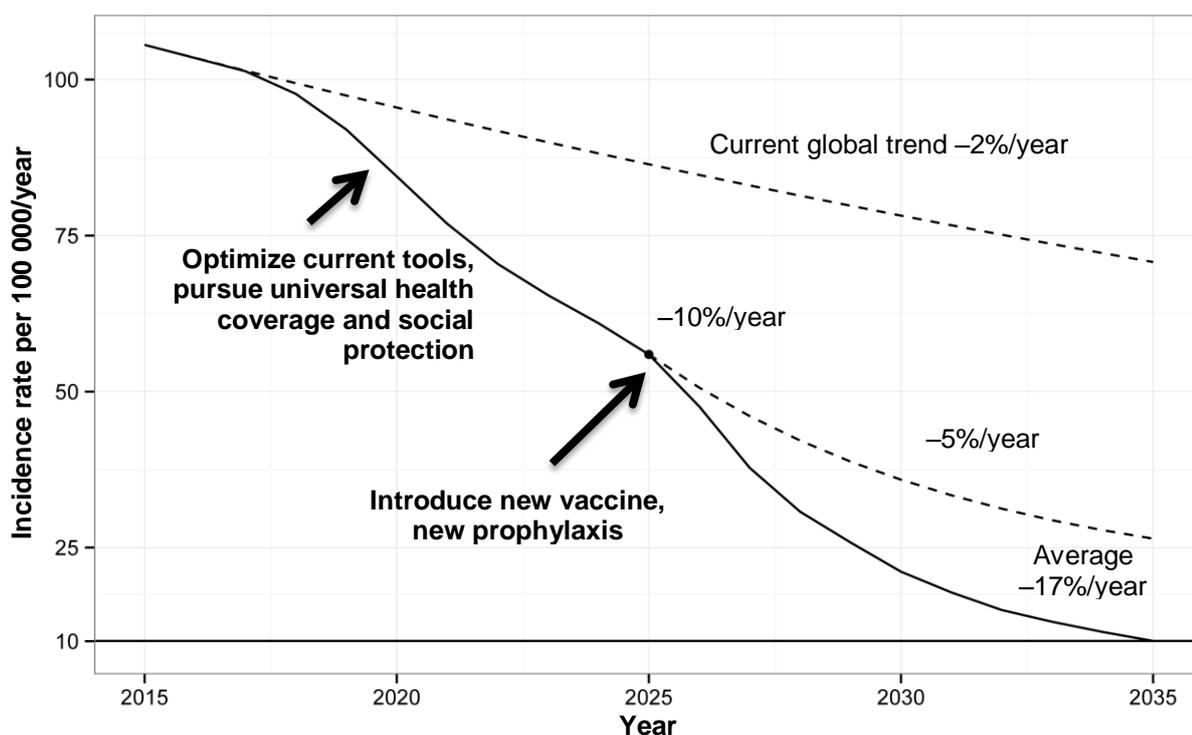
26. A milestone is a 75% reduction in tuberculosis deaths by 2025, compared with 2015. This will require two achievements. First, the annual decline in global tuberculosis incidence rates must accelerate from an average of 2% per year in 2015 to 10% per year by 2025. A 10% per year decline in tuberculosis incidence is ambitious yet feasible; it has been projected on the basis of the fastest rate documented at national level, which occurred in the context of universal access to health care and rapid socioeconomic development in Western Europe and North America during the second half of the past century. Secondly, the proportion of incident cases dying from tuberculosis (the case-fatality ratio) needs to decline from a projected 15% in 2015 to 6.5% by 2025. It has been modelled that rapid progress towards universal access to existing tools combined with socioeconomic development can lead to a 75% reduction in tuberculosis deaths. Furthermore, improved tools, such as a rapid point-of-care test and improved tuberculosis treatment regimens are likely to emerge soon from the research and development pipeline thus facilitating achievements of the milestones.

Table 1. Key global indicators, milestones and targets for the draft post-2015 tuberculosis strategy

Indicators with baseline values for 2015	Milestones			Targets
	2020	2025	2030	2035
<i>Percentage reduction in deaths due to tuberculosis (projected 2015 baseline: 1.3 million deaths)</i>	35%	75%	90%	95%
<i>Percentage and absolute reduction in tuberculosis incidence rate (projected 2015 baseline 110/100 000)</i>	20% (<85/100 000)	50% (<55/100 000)	80% (<20/100 000)	90% (<10/100 000)
<i>Percentage of affected families facing catastrophic costs due to tuberculosis (projected 2015 baseline: not yet available)</i>	Zero	Zero	Zero	Zero

27. In order to sustain progress beyond 2025 and achieve by 2035 a reduction in tuberculosis deaths of 95% and a 90% reduction in the incidence rate from 110 cases/100 000 to less than 10 cases per 100 000, there must be additional tools available by 2025. In particular, a new vaccine that is effective pre- and post-exposure, and better diagnostics as well as safer and easier treatment for latent tuberculosis infection will be needed. Achievements with existing tools complemented by universal health coverage and social protection would be remarkable but not sufficient to maintain the rate of progress required to achieve the 2035 targets. For new tools to be available for introduction by 2025, greatly enhanced and immediate investments in research and development will be required. Figure 2 shows the projected acceleration of the decline in global tuberculosis incidence rates with optimization of current tools combined with progress towards universal health coverage and social protection from 2015, and the additional impact of new tools by 2025.

Figure 2. Projected acceleration in the decline of global tuberculosis incidence rates to target levels



28. The milestone that no families affected by tuberculosis face catastrophic costs implies minimizing direct medical costs, such as fees for consultations, hospitalization, tests and medicines as well as direct non-medical costs such as those for transport and any loss of income while under care. It requires that tuberculosis patients and tuberculosis-affected households have access to appropriate social protection schemes that cover or compensate for direct non-medical costs and income losses. With sufficient political commitment, tuberculosis-related costs could be rapidly reduced in all countries, and therefore many countries may be able to reach the target by 2020.

THE PRINCIPLES OF THE DRAFT STRATEGY

Government stewardship and accountability with monitoring and evaluation

29. Activities under the draft tuberculosis strategy span the health and social sectors and beyond, including finance, labour, trade and development. Stewardship responsibilities should be shared by all levels of the government – local, provincial, and central. The central government should remain the “steward of stewards” for tuberculosis care and prevention, working with all stakeholders.

30. The success of the draft post-2015 global tuberculosis strategy will depend on effective execution of key stewardship responsibilities by governments in close collaboration with all stakeholders: providing the vision and direction through the national tuberculosis programme and the health system; collection and use of data for progressive improvements in tuberculosis care and prevention; and exerting influence through regulation and other means to achieve the stated goals and objectives of the strategy.

31. To ensure accountability, regular monitoring and evaluation need to be built into strategy implementation. Progress will need to be measured against ambitious national targets and indicators. Table 2 presents an illustrative list of key global indicators that should be adopted and adapted for national use and for which country-specific targets should be set. These indicators should be supplemented by others considered necessary to capture progress in the implementation of all essential activities. Examples of targets that could apply in all countries include a treatment success rate of at least 85%, and testing of 100% of tuberculosis patients for drug susceptibility and HIV.

Strong coalition with civil society and communities

32. The affected communities must also be a prominent part of proposed solutions. Community representatives and civil society must be enabled to engage more actively in programme planning and design, service delivery, and monitoring, as well as in information, education, support to patients and their families, research, and advocacy. To this end, a strong coalition that includes all stakeholders needs to be built. Such a coalition of partners can assist people in both accessing high-quality care and in demanding high-quality services. A national coalition can also help drive greater action on the determinants of the tuberculosis epidemic.

Protection and promotion of human rights, ethics and equity

33. Policies and strategies for the design of the overall national tuberculosis response, and the delivery of tuberculosis care and prevention, have to explicitly address human rights, ethics and equity. Access to high-quality tuberculosis care is an important element of the right to health. This strategy is built on a rights-based approach that ensures protection of human rights and promotion of rights-enhancing policies and interventions. These include engagement of affected persons and communities in facilitating implementation of all pillars and components of the draft strategy with special attention to key affected populations.

34. Tuberculosis care and prevention pose ethical dilemmas. National tuberculosis programmes should acknowledge and address these with due respect to relevant ethical values. These may include, for example, the conflict between the public interest in preventing disease transmission and patients’ rights to demand a supportive care environment or refuse treatment; the response to the stigmatization attached to the disease and the discrimination against those affected; the lengthy treatment and the challenges of adherence to treatment; ensuring patient-centred service provision and balancing the risk

of infection to health care workers; the care to be offered when there are not effective treatment options; and setting of priorities for research and for delivery of interventions. Ways to address these dilemmas should be guided by globally recognized principles and values, should be sensitive to local values and traditions, and should be informed by debates among all stakeholders.

35. The draft strategy aims to promote equity through identification of the risks, needs and demands of those affected, to enable equal opportunities to prevent disease transmission, equal access to diagnosis and treatment services, and equal access to means to prevent associated social impacts and catastrophic economic costs. The process through which to meet the targets, and achieve the goals of the strategy will be better served by applying a rights-based approach, developing and maintaining the highest ethical standards in every action taken, and ensuring that inequities are progressively reduced and eliminated.

Adaptation of the strategy at country level, with global collaboration

36. No global strategy can apply similarly to all settings across or within countries. The tuberculosis strategy will have to be adapted to diverse country settings, based on a comprehensive national strategic plan. Prioritization of interventions should be undertaken based on local contexts, needs and capacities. A sound knowledge of country-specific disease epidemiology will be essential, including mapping of people at a greater risk, understanding of socioeconomic contexts of vulnerable populations, and a grasp of health system context including underserved areas. Adoption of the global strategy should be immediately followed by its national adaptation and development of clear guidance on how the different components of the strategy could be implemented, based on local evidence when possible.

37. In a globalized world, diseases like tuberculosis can spread far and wide via international travel and trade. Tackling tuberculosis effectively requires close collaboration among countries. Effective intercountry collaboration also requires global coordination and support to enable adherence to the International Health Regulations (2005) and ensure health security. Countries within a region can benefit from regional collaboration. Migration within and between countries poses challenges and addressing them will require in-country coordination and cross-border collaboration. Global coordination is also essential for mobilizing resources for tuberculosis care and prevention from diverse multilateral, bilateral and domestic sources. WHO's global tuberculosis report, which annually provides an overview of the status of the tuberculosis epidemic and implementation of global strategies, demonstrates and symbolizes the benefits of close collaboration and global coordination.

PILLAR ONE: INTEGRATED, PATIENT-CENTRED CARE AND PREVENTION

38. *Strengthening and expansion of core functions of tuberculosis programmes.* Pillar one comprises patient-centred interventions required for tuberculosis care and prevention. The national tuberculosis programme, or equivalent, needs to engage and coordinate closely with other public health programmes, social support programmes, public and private health care providers, nongovernmental and civil society organizations, communities and patient associations in order to help ensure provision of high-quality, integrated, patient-centred tuberculosis care and prevention across the health system. Pillar one is meant to help countries to progress from previous strategies and to embrace new strategies and technologies for providing universal access to drug susceptibility testing; to expand services to manage tuberculosis among children; to provide additional outreach services to underserved and vulnerable populations; and to embark on systematic screening and preventive treatment of relevant high-risk groups – all in partnership with relevant stakeholders. Use

of innovative information and communication technologies for health (eHealth and mHealth) could particularly help to improve tuberculosis care provision including logistics and surveillance.

Early diagnosis of tuberculosis including universal drug susceptibility testing, and systematic screening of contacts and high-risk groups

39. ***Ensure early detection of tuberculosis.*** Currently an estimated two thirds of global incident tuberculosis cases are notified to national tuberculosis control programmes and reported to WHO. Ensuring universal access to early and accurate diagnosis of tuberculosis will require the strengthening and expansion of a network of diagnostic facilities with easy access to new molecular tests; information and education to prompt people with symptoms of tuberculosis to seek care; engagement of all care providers in service delivery; the abolition of barriers that people encounter in seeking care; and systematic screening in selected high-risk groups. Although the current most frequently used test for tuberculosis – sputum-smear microscopy – is a low-cost option providing specific diagnosis, it significantly lacks sensitivity. As a result, health services miss many tuberculosis patients or identify them only at advanced stages of the disease. Screening for symptoms alone may not suffice; additional screening tools such as a chest radiograph may facilitate referral for diagnosis of bacteriologically negative tuberculosis, extrapulmonary tuberculosis and tuberculosis in children.

40. ***Detect all cases of drug-resistant tuberculosis.*** Diagnosis of drug resistance remains a particular challenge for laboratory systems in many low- and middle-income countries. Capacity to diagnose drug-resistant tuberculosis is limited in most places where it is sorely needed. Only a fraction of the estimated cases of multidrug-resistant tuberculosis receive a laboratory test to confirm their disease. Adequate capacity to diagnose all cases of drug-resistant tuberculosis is essential to make further progress in global tuberculosis care and control.

41. ***Roll out new diagnostics.*** Wide introduction of new molecular diagnostic testing platforms will allow early and accurate diagnosis of tuberculosis and drug resistance. It could help diagnose less advanced forms of tuberculosis and facilitate early treatment, contributing potentially to decreased disease transmission, reduced case fatality, and prevention of adverse sequelae of the disease. Introduction of the new molecular diagnostics will require change of diagnostic policies and training at all levels. More sensitive and rapid diagnostics will increase the number of reliably diagnosed patients. The new realities of the additional workload will mean lining up additional human and financial resources.

42. ***Implement systematic screening for tuberculosis among selected high-risk groups.*** The burden of undetected tuberculosis is large in many settings, especially in high-risk groups. There can be long delays in diagnosing tuberculosis and initiating the appropriate treatment among people with poor access to health services. Many people with active tuberculosis do not experience typical symptoms in the early stages of the disease. These individuals may not seek care early enough and may not be identified for testing for tuberculosis if they do. Mapping of high-risk groups and carefully planned systematic screening for active disease among them may improve early case detection. Early detection helps reduce the risks of tuberculosis transmission, poor treatment outcomes, undesirable health sequelae, and adverse social and economic consequences of the disease. Contacts of people with tuberculosis, especially children aged five years or less, people living with HIV, and workers exposed to silica dust should always be screened for active tuberculosis. Other risk-groups should be identified and prioritized for possible screening based on national and local tuberculosis epidemiology, health system capacity, resource availability, and the feasibility of reaching the identified risk-groups. A screening strategy should be monitored and assessed continuously, to inform a re-prioritization of risk groups, re-adaptation of screening approaches, and discontinuation of screening if indicated. Screening

strategies should follow established ethical principles for infectious disease screening, should protect human rights, and minimize the risk of discomfort, pain, stigma and discrimination.

Treatment of all people with tuberculosis including drug-resistant tuberculosis, and patient support

43. ***Treat all forms of drug-susceptible tuberculosis.*** The new draft tuberculosis strategy will aim to ensure provision of services for early diagnosis and proper treatment of all forms of tuberculosis affecting people of all ages. New policies incorporating molecular diagnostics will help to strengthen management of smear-negative pulmonary tuberculosis and extrapulmonary tuberculosis as well as tuberculosis among children. Key affected populations and risk groups with suboptimal treatment uptake or treatment success will need to be given priority attention in order to accelerate the decline in case fatality required in order to reach the ambitious targets for reductions in tuberculosis mortality.

44. ***Treat all cases of drug-resistant tuberculosis.*** Resistance to medicines poses a major threat to global progress in tuberculosis care and prevention. Globally, about 4% of new tuberculosis patients and about 20% of patients receiving retreatment have multidrug-resistant tuberculosis. Providing universal access to services for drug-resistant tuberculosis will require a rapid scale up of laboratory services and programmatic management. New models of delivering patient-centred treatment will need to be devised and customized to diverse settings and contexts. Ambulatory services should be given preference over hospitalization, which should be limited to severe cases. Expansion of services for management of drug-resistant tuberculosis will require bold policies and investments to abolish health system bottlenecks that impede progress.

45. ***Strengthen capacity to manage drug-resistant cases.*** The proportion of drug-resistant tuberculosis patients successfully completing treatment varies substantially between countries and averaged 48% globally in 2012. Currently available treatment regimens for drug-resistant tuberculosis remain unsatisfactory in terms of duration, safety, effectiveness and cost. New safer, affordable and more effective medicines allowing treatment regimens that are shorter in duration and easier to administer are key to improving treatment outcomes. Linkages with existing pharmacovigilance mechanisms will contribute to promoting safer use and management of medicines. Interventions to improve quality of life for patients while enabling adherence to treatment include management of adverse drug reactions and events; access to comprehensive palliative and end-of-life care; measures to alleviate stigmatization and discrimination; and social support and protection. Importantly, all care providers managing drug-resistant tuberculosis should have access to continued training and education, enabling them to align their practices with international standards.

46. ***Address tuberculosis among children.*** With an estimated 500 000 cases and 74 000 deaths occurring annually, tuberculosis is an important cause of morbidity and mortality among children. In countries with a high prevalence of tuberculosis, women of childbearing age also carry a heavy burden of the disease. Maternal tuberculosis associated with HIV is a risk factor for transmission of tuberculosis to the infant and is associated with premature delivery, low birth-weight of neonates, and higher maternal and infant mortality. National tuberculosis programmes need to address systematically the challenges of caring for children with tuberculosis, and child contacts of adult tuberculosis patients. These may include, for instance, developing and using child-friendly formulation of medicines, and family-centred mechanisms for enabling adherence to treatment.

47. ***Integrate tuberculosis care within maternal and child health services.*** Proper management of tuberculosis among children will require development of affordable and sensitive diagnostic tests that are not based on sputum specimens. Tuberculosis care should be integrated within maternal and child

health services to enable provision of comprehensive care at the community level. An integrated family-based approach to tuberculosis care would help remove access barriers, reduce delays in diagnosis and improve management of tuberculosis in women and children.

48. ***Build patient-centred support into the management of tuberculosis.*** Patient-centred care and support, sensitive and responsive to patients' educational, emotional and material needs, is fundamental to the new draft global tuberculosis strategy. Supportive treatment supervision by treatment partners is essential; it helps patients to take their medication regularly and to complete treatment, thus facilitating their cure and preventing the development of drug resistance. Supervision must be carried out in a context-specific and patient-sensitive manner. Patient-centred supervision and support must also help identify and address factors that may lead to treatment interruption. It must help to alleviate stigmatization and discrimination. Patient support needs to extend beyond health facilities to patients' homes, families, workplaces and communities. Treatment and support must also extend beyond cure to address any sequelae associated with tuberculosis. Examples of patient-centred support include providing treatment partners trained by health services and acceptable to the patient; access to social protection, use of information and communication technology for providing information, education and incentives to patients; and the setting up of mechanisms for patient and peer groups to exchange information and experiences.

Collaborative tuberculosis/HIV activities; and management of comorbidities

49. ***Expand collaboration with HIV programmes.*** The overall goal of collaborative tuberculosis/HIV activities is to decrease the burden of tuberculosis and HIV infection in people at risk of or affected by both diseases. HIV-associated tuberculosis accounts for about one quarter of all tuberculosis deaths and a quarter of all deaths due to AIDS. The vast majority of these cases and deaths are in the African and South-East Asia regions. All tuberculosis patients living with HIV should receive antiretroviral treatment. Integrated tuberculosis and HIV service delivery has been shown to increase the likelihood that a tuberculosis patient will receive antiretroviral treatment, shorten the time to treatment initiation, and reduce mortality by almost 40%.

50. ***Integrate tuberculosis and HIV services.*** Although there has been an encouraging global scale-up of collaborative tuberculosis/HIV activities, the overall coverage of services remains low. Further, the level and rate of progress vary substantially among countries. There remains a mismatch between the coverage of HIV testing for tuberculosis patients and that of antiretroviral treatment, co-trimoxazole preventive treatment, and HIV prevention. Reducing delays in diagnosis, using new diagnostic tools and instituting prompt treatment can improve health outcomes among people living with HIV. Tuberculosis and HIV care should be further integrated with services for maternal and child health and prevention of mother-to-child transmission of HIV in high-burden settings.

51. ***Co-manage tuberculosis comorbidities and noncommunicable diseases.*** Several noncommunicable diseases and other health conditions including diabetes mellitus, undernutrition, silicosis, as well as smoking, harmful alcohol and drug use, and a range of immune-compromising disorders and treatments are risk factors for tuberculosis. Presence of comorbidities may complicate tuberculosis management and result in poor treatment outcomes. Conversely, tuberculosis may worsen or complicate management of other diseases. Therefore, as a part of basic and coordinated clinical management, people diagnosed with tuberculosis should be routinely assessed for relevant comorbidities. WHO's *Practical Approach to Lung Health*¹ is an example of promoting tuberculosis

¹ Document WHO/HTM/TB/2008.410; WHO/NMH/CHP/CPM/08.02.

care as an integral part of management of respiratory illnesses. The local situation should determine which comorbidities should be systematically screened for among people with active tuberculosis. A national collaborative framework can help integrated management of noncommunicable diseases and communicable diseases including tuberculosis.

Preventive treatment of persons at high risk; and vaccination against tuberculosis

52. *Expand preventive treatment of people with a high risk of tuberculosis.* Latent tuberculosis infection is diagnosed by a tuberculin skin test or interferon- γ release assay. However, these tests cannot predict which persons will develop active tuberculosis disease. Isoniazid preventive therapy is currently recommended for the treatment of latent tuberculosis infection among people living with HIV and children under five years of age who are contacts of patients with tuberculosis. It has a proven preventive effect but severe side effects can occur, especially among the elderly. Although regimens with similar efficacy and shorter duration have been studied, more evidence on efficacy and safety are needed. More studies are also required to assess the effectiveness and feasibility of undertaking preventive treatment among other high-risk groups such as, for example, people in congregate settings like prisons and workplaces, health care workers, recent converters of a test of infection, and miners exposed to silica dust. Management of latent tuberculosis infection in people with a high risk of developing active tuberculosis could be an essential component of tuberculosis elimination, particularly in low tuberculosis-incidence countries.

53. *Continue BCG vaccination in high-prevalence countries.* BCG (Bacillus Calmette-Guerin) vaccination prevents disseminated disease including tuberculosis, meningitis and miliary tuberculosis, which are associated with high mortality in infants and young children. However, its preventive efficacy against pulmonary tuberculosis, which varies among populations, is only about 50%. Until new and more effective vaccines become available, BCG vaccination soon after birth should continue for all infants except for those persons with HIV living in high tuberculosis prevalence settings.

PILLAR TWO: BOLD POLICIES AND SUPPORTIVE SYSTEMS

54. *Sharing of responsibilities.* The second pillar encompasses strategic actions that will enable implementation of the components under pillar one through sharing of responsibilities. These include actions by and beyond national tuberculosis programmes, from across ministries and departments. Such actions address medical and non-medical needs of those ill with tuberculosis and also help to prevent tuberculosis. This will require a well-resourced, organized and coordinated health system with government stewardship backed up by supportive health policies and regulations as well as broader social and development policies. National tuberculosis programmes, their partners and those overseeing the programmes need to engage actively in the setting of broader social and economic development agenda. Similarly, leaders in development must recognize tuberculosis as being among the social concerns that deserve priority attention.

55. *Social determinants of tuberculosis.* Pillar two further includes actions beyond the health sector that can help to prevent tuberculosis by addressing underlying social determinants. Proposed interventions include reducing poverty, ensuring food security, and improving living and working conditions as well as interventions to address direct risk factors such as tobacco control, reduction of harmful alcohol use, and diabetes care and prevention. Tuberculosis prevention will also require actions on the part of governments in order to help to reduce vulnerabilities and risks among people most susceptible to the disease.

56. ***Multidisciplinary and multisectoral approach.*** The implementation of pillar two components demands a multidisciplinary and multisectoral approach. Accountability for pillar two will rest not only with health ministries, but also other ministries including finance, labour, social welfare, housing, mining and agriculture. Eliciting actions from across diverse ministries will require commitment and stewardship from the highest levels of government. This should translate into ensuring adequate resources and accountability for optimal and integrated clinical care; protection from catastrophic economic burden due to the disease; social interventions aimed at reducing vulnerability to the disease; and protection and promotion of human rights.

Political commitment with adequate resources for tuberculosis care and prevention

57. ***Develop ambitious national strategic plans.*** Scaling up and sustaining interventions for tuberculosis care and prevention will require high-level political commitment along with adequate financial and human resources. Continuous training and supervision of personnel are fundamental to sustain significantly expanded activities for tuberculosis care and prevention. Central coordination under government stewardship is essential. This must lead to, as a first step, development of a national strategic plan embedded in a national health sector plan, taking into account tuberculosis epidemiology, health system structure and functions including procurement and supply systems, resource availability, regulatory policies, links with social services, migrant populations and cross-border collaboration, the role of communities, civil society organizations and the private sector, and coordination with all stakeholders. A national strategic plan should be ambitious and comprehensive, and incorporate five distinct sub-plans: a core plan, a budget plan, a monitoring and evaluation plan, an operational plan and a technical assistance plan.

58. ***Mobilize adequate resources.*** The expansion of tuberculosis care and prevention across and beyond the health sector will be possible only if adequate funding is secured. The national strategic plan should be properly budgeted with clear identification of gaps in finances. A well-budgeted plan should facilitate resource mobilization from diverse international and national sources for full implementation of the plan. In most low- and middle-income countries, the currently available resources are inadequate or sufficient only for modestly ambitious plans. Coordinated efforts are required to mobilize additional resources to fund truly ambitious national strategic plans with a progressive increase in domestic funding.

Engagement of communities, civil society organizations, and all public and private care providers

59. ***Engage communities and civil society.*** A robust response to end the tuberculosis epidemic will require the establishment of lasting partnerships across the health and social sectors and between the health sector and communities. Informed community members can identify people with suspected tuberculosis, refer them for diagnosis, provide support during treatment and help to alleviate stigmatization and discrimination. Civil society organizations have specific capacities and tuberculosis programmes can benefit from harnessing them. Their competencies include reaching out to vulnerable groups, mobilizing communities, channelling information, helping to create demand for care, framing effective delivery models and addressing determinants of the tuberculosis epidemic. National tuberculosis programmes should reach out to civil society organizations not currently engaged in tuberculosis care, encourage them to integrate community-based tuberculosis care into their work, and widen the network of facilities engaged in tuberculosis care and prevention. Civil society should also be engaged in policy development and planning as well as periodic monitoring of programme implementation.

60. **Scale up public–private mix approaches and promote *International Standards for Tuberculosis Care*.** In many countries, tuberculosis care is delivered by diverse private care providers. These providers include pharmacists, formal and informal practitioners and nongovernmental and faith-based organizations, as well as corporate health facilities. Several public sector providers outside the purview of national tuberculosis programmes also provide tuberculosis care. These include, inter alia, large public hospitals, social security organizations, prison health services and military health services. Leaving a large proportion of care providers out of an organized response to tuberculosis control has contributed to stagnating case notification, inappropriate tuberculosis management, and irrational use of tuberculosis medicines leading to the spread of drug-resistant tuberculosis. National tuberculosis programmes will have to scale up country-specific public–private mix approaches already working well in many countries. To this effect, close collaboration with health professionals’ associations will be essential. The *International Standards for Tuberculosis Care*, other tools and guidelines developed by WHO as well as modern information and communication technology platforms can be used effectively for this purpose.

Universal health coverage policy, and regulatory frameworks for case notification, vital registration, quality and rational use of medicines, and infection control

61. **Move with urgency to universal health coverage.** Universal health coverage, defined as, “the situation where all people are able to use the quality health services that they need and do not suffer financial hardship paying for them” is fundamental for effective tuberculosis care and prevention. Universal health coverage is achieved through adequate, fair and sustainable prepayment financing of health care with full geographical coverage, combined with effective service quality assurance and monitoring and evaluation. For tuberculosis specifically, this implies: (a) expanding access to the full range of high-quality services recommended in this strategy, as part of general health services; (b) expanding the coverage, including costs of consultations and testing, medicines, follow-up tests and all expenditures associated with staying in complete curative or preventive treatment; and (c) expanding access to services for all in need, especially vulnerable groups faced with the most barriers and worst outcomes.

62. **Strengthen regulatory frameworks.** National policy and regulatory frameworks for health care financing and access, quality-assured production and use of medicines and diagnostics, quality-assured health services, infection control, vital registration and disease surveillance systems are powerful levers that are essential for effective tuberculosis care and prevention. In countries with a high tuberculosis burden, these frameworks need to be urgently strengthened and enforced. The draft strategy calls for improvements in several areas outlined below.

63. **Enforce mandatory notification of tuberculosis cases.** Many tuberculosis cases are not notified, especially those managed by private care providers that are not linked to national tuberculosis programmes. Under-notification of cases hampers disease surveillance, contact investigation, outbreak management, and infection control. An effectively enforced infectious disease law, or equivalent, that includes compulsory notification of tuberculosis cases by all health care providers, is essential.

64. **Ensure recording of tuberculosis deaths within vital registration.** Most countries with a high burden of tuberculosis do not have comprehensive vital registration systems and the quality of information about the number of deaths due to tuberculosis is often inadequate. An effective vital registration system has to be in place to ensure that each death due to tuberculosis is properly recorded.

65. **Regulate the production, quality and use of tuberculosis diagnostics and medicines.** Poor quality tuberculosis medicines put patients at great risk. Irrational prescription of treatment regimens leads to poor treatment outcomes and may cause drug resistance. Use of inappropriate diagnostics such as serological tests leads to inaccurate diagnosis. Regulation and adequate resources for enforcement are required for the registration, importation and manufacturing of medical products. There should be regulation of how medical products are subsidized and a determination of which types of health professional are authorized to prescribe or dispense tuberculosis medicines.

66. **Undertake comprehensive infection control measures.** Appropriate regulation is required to ensure effective infection control in health care services and other settings where the risk of disease transmission is high. Managerial, administrative, environmental and personal measures for infection control should be part of infection disease law, and regulations related to construction and organization of health facilities.

Social protection, poverty alleviation and actions on other determinants of tuberculosis

67. **Relieve the economic burden related with tuberculosis.** A large proportion of people with tuberculosis face a catastrophic economic burden related to the direct and indirect costs of illness and health care. Adverse social consequences may include stigmatization and social isolation, interruption of studies, loss of employment, or divorce. The negative consequences often extend to the family of the persons ill with tuberculosis. Even when tuberculosis diagnosis and treatment is offered free of charge, social protection measures are needed to alleviate the burden of income loss and non-medical costs of seeking and staying in care.

68. **Expand coverage of social protection.** Social protection should cover the needs associated with tuberculosis such as: (a) schemes for compensating the financial burden associated with illness such as sickness insurance, disability pension, social welfare payments, other cash transfers, vouchers or food packages; (b) legislation to protect people with tuberculosis from discrimination such as expulsion from workplaces, educational or health institutions, transport systems or housing; and (c) instruments to protect and promote human rights, including addressing stigma and discrimination, with special attention to gender, ethnicity, and protection of vulnerable groups. These instruments should include capacity-building for affected communities to be able to express their needs and protect their rights, and to call to account those who impinge on human rights, as well as those who are responsible for protecting those rights.

69. **Address poverty and related risk factors.** Poverty is a powerful determinant of tuberculosis. Crowded and poorly ventilated living and working environments often associated with poverty constitute direct risk factors for tuberculosis transmission. Undernutrition is an important risk factor for developing active disease. Poverty is also associated with poor general health knowledge and a lack of empowerment to act on health knowledge, which leads to risk of exposure to several tuberculosis risk factors. Poverty alleviation reduces the risk of tuberculosis transmission and the risk of progression from infection to disease. It also helps to improve access to health services and adherence to recommended treatment.

70. **Pursue “health-in-all-policies” approaches.** Actions on the determinants of ill health through “health-in-all-policies” approaches will immensely benefit tuberculosis care and prevention. Such actions include, for example: (a) pursuing overarching poverty reduction strategies and expanding social protection; (b) improving living and working conditions and reducing food insecurity; (c) addressing the health issues of migrants and strengthening cross-border collaboration; (d) involving diverse stakeholders, including tuberculosis affected communities, in mapping the likely local social

determinants of tuberculosis; and (e) preventing direct risk factors for tuberculosis, including smoking and harmful use of alcohol and drugs, and promoting healthy diets, as well as proper clinical care for medical conditions that increase the risk of tuberculosis, such as diabetes.

PILLAR THREE: INTENSIFIED RESEARCH AND INNOVATION

71. ***Enhancing investments in research.*** Progress in global tuberculosis control is constrained not only by the lack of new tools to better detect, treat or prevent tuberculosis but also by the weaknesses of health systems in delivering optimal diagnosis and treatment with existing tools. Ending the tuberculosis epidemic will require substantial investments in the development of novel diagnostic, treatment and prevention tools, and for ensuring their accessibility and optimal uptake in countries alongside better and wider use of existing technologies. This will be possible only through increased investments and effective engagement of partners, the research community and country tuberculosis programmes.

72. ***Embarking on research for tuberculosis elimination.*** Revolutionary new technology and service delivery models are needed to achieve tuberculosis elimination. This will require an intensification of research, from fundamental research to drive innovations for improved diagnostics, medicines and vaccines, to operational and health systems research to improve current programmatic performance and introduce novel strategies and interventions based on new tools. To highlight the need for reinvigorated tuberculosis research and catalyse further efforts, an International Roadmap for Tuberculosis Research has been developed. The road map outlines priority areas for future scientific investment across the research continuum. It provides a framework for outcome-oriented research. A mapping of the efforts carried out in the various research areas will also be necessary, so as to follow up on progress made. Embarking on research for tuberculosis elimination will require a multi-dimensional approach informed by stakeholders including scientists, public health experts, tuberculosis programme managers, financial partners, policy-makers and civil society representatives. Guided by clinical and programmatic needs, such an approach should not only help undertake public health oriented research for the development of new tools and strategies but also facilitate their seamless integration into ongoing programmes. It is important that tuberculosis becomes a key domain of investigation within national health research agendas.

Discovery, development and rapid uptake of new tools, interventions and strategies

73. ***Develop a point-of-care rapid diagnostic test for tuberculosis.*** Since 2007, several new tests and diagnostic approaches have been endorsed by WHO, including: liquid culture with rapid speciation as the reference standard for bacteriological confirmation; molecular line probe assays for rapid detection of multidrug-resistant tuberculosis; non-commercial culture and drug-susceptibility testing methods; light-emitting diode fluorescence microscopes; and a molecular test for rapid and simultaneous diagnosis of tuberculosis and rifampicin-resistant tuberculosis. However, an accurate and rapid point-of-care test that is usable in field conditions is still missing. This requires greater investments in biomarker research, and overcoming difficulties in transforming sophisticated laboratory technologies into robust, accurate and affordable point-of-care platforms.

74. ***Develop new drugs and regimens for the treatment of all forms of tuberculosis.*** The pipeline of new drugs has expanded substantially over the last decade. There are nearly a dozen new or repurposed tuberculosis drugs under clinical investigation. Bedaquiline, the first new tuberculosis drug for decades, was approved in 2013 by WHO for the treatment of multidrug-resistant tuberculosis. A second new drug, delamanid, also for the treatment of multidrug-resistant tuberculosis, is in the process of review by WHO. Novel regimens, including new or repurposed medicines and adjuvant and

supportive therapies, are being investigated and early results appear promising. In order for further progress to be made, investments are required in both research and capacity-building to implement trials in accordance with international standards, and to identify means of shortening the duration of tuberculosis medicines trials.

75. ***Enhance research to detect and treat latent infection.*** Globally, more than 2000 million people are estimated to be infected with *Mycobacterium tuberculosis*, but only 5% to 15% of those infected will develop active disease during their lifetime. Ending the tuberculosis epidemic will require eliminating this pool of infection. Research is needed to develop new diagnostic tests to identify people with latent tuberculosis infection who are likely to develop tuberculosis disease. Further, treatment strategies that could be safely used to prevent development of tuberculosis in latently infected persons will also need to be identified. These strategies should include new medicines or combinations as well as interventions to identify and mitigate risk factors for progression. Further research will be required to investigate the impact and safety of targeted and mass preventive strategies.

76. ***Aim for an effective vaccine against tuberculosis.*** The century-old BCG vaccine is useful to protect against severe forms of tuberculosis in infants and young children but has limited efficacy against other forms of tuberculosis. Much progress has been made in the development of new vaccines; currently there are 12 vaccine candidates in clinical trials. More research and investments are required to address a series of major scientific challenges and identify priorities for future tuberculosis vaccine research. A post-exposure vaccine that prevents the disease in latently infected individuals will be essential to eliminating tuberculosis in the foreseeable future.

Research to optimize implementation and impact; and promote innovations

77. ***Invest in applied research.*** Investments in fundamental research need to be complemented with those for applied research that supports rapid adoption, adaptation, and implementation of evidence-based policies. Research aimed at improving understanding of the challenges and developing interventions that result in improved policies, better design and implementation of health systems and more efficient methods of service delivery is critical to produce evidence for improving current strategies and introducing new tools. Research is also needed to identify and address bottlenecks to implementation of existing and new policies, and to provide evidence from the perspective of patients as well as from health systems.

78. ***Use research to inform and improve implementation.*** Most innovations cannot be translated into effective local action without careful planning and adaptation, and partnership with stakeholders. In addition to routine surveillance, well-planned and well-conducted research is required to assess national and local epidemiological and health system situations, socio-behavioural aspects of health care seeking, adherence to treatment, stigmatization and discrimination, and to evaluate different implementation models.

79. ***Create a research-enabling environment.*** Fostering better and more relevant operational, health system and social science research will help implementation and contribute to the development of national and global policies. For this purpose, good systems for research prioritization, planning and implementation need to be in place at country level. Indicators to measure progress should include investments in outcomes as well as in the impact of research activities. A broad-based, concerted effort is needed to develop research capacity, allocate appropriate resources, and encourage stakeholders to work together. An enabling environment for performing programme-based research and translating results into policy and practice is necessary to achieving the full potential of tuberculosis programmes.

ADAPTING AND IMPLEMENTING THE STRATEGY

Initiating and sustaining strategic dialogue

80. ***Engage all stakeholders in strategy adoption and adaptation.*** A first step in adapting and implementing the strategy would be for Member States to hold inclusive national consultations with a wide range of stakeholders, including communities most affected by tuberculosis, in order to consider, adopt and prepare for adaptation of the strategy. Blanket application of a global strategy could be inappropriate if it does not adequately respond to an assessment of local needs that is derived from the nature of the tuberculosis epidemic, the health system context, the social and economic development agenda and the expressed demands of the populations at risk. Furthermore, it must build on the capacities of health systems and those of partners.

81. ***Use a multidisciplinary approach.*** A meaningful implementation of this strategy will demand the involvement of many actors and their sharing of responsibilities. The scope of existing tuberculosis advisory panels will need to be expanded beyond clinical, epidemiological and public health expertise. It will need to include a wider range of capacities from civil society and from the fields of finance and development policy, human rights, social protection, regulation, health technology assessment, the social sciences, and communications. The work to adapt the new global tuberculosis strategy to national contexts may be an adjunct to overall national health strategic planning, but will need a significant and specific effort.

82. ***Prepare to develop new strategic plans.*** Countries follow different development planning cycles. Existing strategic and operational plans may need to be modified building on any new approaches. Detailed national strategic plans are also essential to mobilize funding from domestic and international sources. Development of new national strategic plans or modifications to existing ones should take into consideration the recommended framework of the new draft strategy.

Epidemiological and health systems mapping

83. ***Undertake a detailed epidemiological and health system context assessment.*** A prerequisite for adoption of the strategy and preparation for its adaptation will be a detailed assessment of the national epidemiological and health system situation. Proper mapping should provide important information such as population groups most affected by the disease and most at risk of developing it; age and sex characteristics and trends; prevalence of different forms of tuberculosis and dominant comorbidities, including HIV, undernutrition, diabetes, tobacco use, and alcohol misuse; important subnational and urban–rural variations; distribution and types of care providers; available social protection schemes and their current and potential linkages for the benefit of tuberculosis care and prevention.

84. ***Collect and use data to improve systems mapping.*** Some of the information for context assessment can be derived from routine reporting and, in some countries, from national or regional tuberculosis prevalence survey results. Other required information may have to be obtained from review of periodic national programme evaluations, field assessments and local quantitative and qualitative studies. For this purpose, countries need to build capacities in order to establish an information system that monitors the characteristics of the tuberculosis epidemic, and make appropriate use of the data generated from the system at all levels.

MEASURING PROGRESS AND IMPACT

85. Target setting and monitoring of progress in implementing each component of the global strategy are essential. Monitoring should be done routinely using standardized methods based on data with documented quality. Table 2 provides examples of the indicators that can be used to monitor progress in implementing different components and subcomponents of this strategy. The main indicators of disease burden are incidence, prevalence and mortality. Given the overarching 2025 targets of the draft strategy, particular attention to measurement of trends in mortality and incidence is required.

86. Mortality data are critical in order to enable prioritization of public health interventions and the measurement of progress made in disease control and the overall health of the population, including health inequalities. A robust national vital registration system that includes recording of data on causes of death is essential for measurement of trends in mortality due to tuberculosis. Vital registration data can also be used to identify subgroups of the population that have higher mortality over case-notification ratios, thereby allowing targeting of interventions. The quality of these data is documented globally by WHO¹ and statistical methods can be used to account for incomplete coverage or miscoding. Countries that already have vital registration systems need to ensure that data are of sufficient quality. Those without such systems need to introduce them. An interim solution being adopted by an increasing number of countries is the introduction of a sample vital registration system.

87. Globally, incidence is estimated to be declining slowly, at a rate of about 2% per year. The 2025 and 2050 targets mean that, in the post-2015 period, great attention will need to be given to measuring how fast incidence is falling. In high-income countries with high-performance tuberculosis surveillance and health systems, case notification systems capture all, or almost all, incident cases. However, in other countries, routine case notifications provide biased data due to under-diagnosis (cases not diagnosed) and under-reporting (cases diagnosed by health practitioners but not reported to public health authorities). In such settings, inventory studies and capture–recapture modelling may be used to estimate tuberculosis incidence.

88. Accurate measurement of trends in tuberculosis incidence requires the performance of tuberculosis surveillance systems to be strengthened so that they cover all providers of health care and minimize the level of under-reporting. WHO has developed a tuberculosis surveillance checklist, the “standards and benchmarks for tuberculosis surveillance and vital registration systems”, to assess a national surveillance system’s ability to measure tuberculosis cases accurately. The checklist defines 10 surveillance standards that must be met in order for notification and vital registration data to be considered as a direct measurement of tuberculosis incidence and tuberculosis mortality, respectively. Countries that meet all standards can be certified as having an appropriate surveillance system. The WHO checklist should be used to improve tuberculosis surveillance progressively towards the ultimate goal of measuring trends in tuberculosis cases directly from notification data in all countries.

89. Tuberculosis prevalence is a very useful indicator of the tuberculosis disease burden. It is directly measurable through population-based surveys.² Prevalence surveys also provide information

¹ Mathers CD, Fat DM, Inoue M, Rao C, Lopez AD. Counting the dead and what they died from: an assessment of the global status of cause of death data. *Bulletin of the World Health Organization*. 2005;83(3):171-7.

² World Health Organization. Tuberculosis prevalence surveys: a handbook. Geneva 2011. http://www.who.int/tb/advisory_bodies/impact_measurement_taskforce/resources_documents/thelimebook/en/index.html.

that is useful for policy improvements, in particular those related to access to health and to tuberculosis diagnosis. Measurement of tuberculosis prevalence using nationwide surveys is not feasible everywhere. Nationwide prevalence surveys are important for high-burden settings and will be especially relevant and useful for direct measurement of impact in countries that implemented a repeat or baseline survey around 2015. The WHO Task Force on TB Impact Measurement has set criteria for prioritization of prevalence surveys at country level and works with countries and other partners to support implementation and analysis of surveys. The Task Force closely monitors the implementation of all surveys to ensure international comparability through the use of WHO-recommended methods and standards. The Task Force also assesses progress towards prevalence reduction targets.

Table 2. Illustrative list of key global indicators for the draft post-2015 global tuberculosis strategy

COMPONENT	ILLUSTRATIVE INDICATORS
PILLAR ONE: INTEGRATED, PATIENT-CENTRED CARE AND PREVENTION	
A. Early diagnosis	% of people with suspected tuberculosis tested using WHO recommended rapid diagnostics % of all tuberculosis patients for whom results of drug susceptibility testing were available % of eligible index cases of tuberculosis for which contact investigations were undertaken
B. Treatment	Tuberculosis treatment success rate % of patients with drug-resistant tuberculosis enrolled on second-line treatment
C. TB/HIV and co-morbidities	% of tuberculosis patients screened for HIV % of HIV-positive tuberculosis patients on antiretroviral therapy
D. Preventive treatment	% of eligible people living with HIV and children aged under-five who are contacts of tuberculosis patients being treated for latent tuberculosis infection
PILLAR TWO: BOLD POLICIES AND SUPPORTIVE SYSTEMS	
A. Government commitment	% of annual budget defined in tuberculosis national strategic plans that is funded
B. Engagement of communities and providers	% of diagnosed tuberculosis cases that were notified
C. Universal health coverage and regulatory frameworks	% of population without catastrophic health expenditures % of countries with a certified tuberculosis surveillance system
D. Social protection, social determinants	% of affected families facing catastrophic costs due to tuberculosis % of population without undernutrition
PILLAR THREE: INTENSIFIED RESEARCH AND INNOVATION	
A. Discovery	% of desirable number of candidates in the pipelines of new diagnostics, drugs and vaccines for tuberculosis
B. Implementation	% of countries introducing and scaling-up new diagnostics, drugs or vaccines

THE ROLE OF THE WHO SECRETARIAT

90. The WHO Secretariat, at all levels of the Organization, will provide support to Member States in reviewing, adopting, adapting and implementing their post-2015 tuberculosis strategies, building on the framework provided in the draft strategy. WHO will draw on its comparative advantages in areas of the core functions outlined below and use its Strategic and Technical Advisory Group for Tuberculosis and regional advisory bodies, as well as the Organization's governing bodies, in order to guide, support and evaluate its work.

91. WHO will continue its policy and norms-setting work, building on a range of available and future guidance documents on tuberculosis. The Secretariat will provide the strategic guidance and tools needed for adaptation and implementation of the strategy in diverse country settings. These tools will need to be iterated as further evidence on effective approaches and best practices becomes available. Periodic guidance will be needed on the use of new tuberculosis diagnostics, medicines susceptibility testing methods, and new treatment regimens as they become available. WHO will work with partners to stimulate further evidence generation and policy recommendations on how national tuberculosis programmes can engage in the development agenda to address social determinants of tuberculosis.

92. To enable this strategy to have a rapid impact and to support Member States, the Secretariat will pursue its core function of technical support coordination. It will continue to stimulate contributions from partners, at global, national and local levels. The tuberculosis technical assistance mechanism (TBTEAM) managed by WHO helps to facilitate and mobilize financing for technical assistance by partnering with major development agencies. The gaps in technical expertise among supporting agencies will need to be filled by collaborating with experts working in global health disciplines beyond tuberculosis, and by drawing more young collaborators into the field.

93. WHO will continue to strengthen its stewardship role in generating global demand for research, prioritizing among tuberculosis research needs, and supporting with partners the effective conduct of research to inform global and national strategy and policy design and implementation. This will entail further work with basic scientists, epidemiologists, social scientists, innovators in the public, private and academic communities, as well as affected populations. It will also mean that national tuberculosis programmes need to work with academic partners and associated research institutions, research-focused public partnerships and public-private partnerships.

94. WHO will foster effective partnerships to support the work proposed under the three pillars of the new draft strategy. This work in partnership aims to support Member States in achieving universal access to tuberculosis care and prevention and in reaching out to vulnerable populations and communities most affected by the tuberculosis epidemic worldwide. WHO will work with the Stop TB Partnership, and will seek out new partnerships that can leverage effective commitment and innovation in the non-health sector driven elements of the strategy.

95. The launch of the Stop TB Strategy 2006–2015 by WHO led to its swift translation into a comprehensive, costed global plan of action by the Stop TB Partnership that is hosted and administered by WHO. Similarly for the draft post-2015 global tuberculosis strategy, WHO will actively support the development of a global investment plan by the Stop TB Partnership, outlining activities and defining financing requirements to meet the ambitious targets while achieving the stated milestones on the way. WHO will work closely with the Stop TB Partnership and will contribute to preparing the global action and investment plan to guide post-2015 efforts for tuberculosis care and prevention by providing the required strategic, scientific and technical input.

ACTION BY THE HEALTH ASSEMBLY

96. The Health Assembly is invited to consider and adopt the draft resolution recommended by the Executive Board in resolution EB134.R4.

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Global strategy and targets for tuberculosis prevention, care and control after 2015

The Sixty-seventh World Health Assembly,

Having considered the report on the draft global strategy and targets for tuberculosis prevention, care and control after 2015;¹

Acknowledging the progress made towards the achievement of Millennium Development Goal 6 (Combat HIV/AIDS, malaria and other diseases) for 2015 following the United Nations Millennium Declaration and related 2015 tuberculosis targets, through the adoption of the DOTS strategy, the Stop TB Strategy and the Global Plan to Stop TB 2006–2015, as well as the financing of national plans based on those frameworks, as called for, inter alia, in resolution WHA60.19 on tuberculosis control;

Concerned by the persisting gaps and the uneven progress made towards current targets, and in addition that some regions, Member States, communities and vulnerable groups require specific strategies and support to accelerate progress in preventing disease and deaths, and to expand access to needed interventions and new tools;

Further concerned that even with significant progress, an estimated three million people who contract tuberculosis each year will not have their disease detected or will not receive appropriate care and treatment;

Cognizant of the serious economic and social consequences of tuberculosis and of the burden borne by many of those affected when seeking care and adhering to tuberculosis treatment;

Considering resolution WHA62.15 on prevention and control of multidrug-resistant tuberculosis and extensively drug-resistant tuberculosis, and its appeal for action; aware that the response to the crisis to date has been insufficient despite the introduction of new rapid diagnostic tests and efforts to scale up disease management; aware also that the vast majority of those in need still lack access to high-quality prevention, treatment and care services; and alarmed at the grave individual and public health risks posed by multidrug-resistant tuberculosis;

Aware that HIV coinfection is the main reason for the failure to meet tuberculosis control targets in high-HIV prevalence settings and that tuberculosis is a major cause of deaths among people living with HIV, and recognizing the need for substantially enhanced joint action in addressing the dual epidemics of tuberculosis and HIV/AIDS through increasing integration of primary care services in order to improve access to care;

¹ Document A67/11.

Recognizing that further progress on tuberculosis and other health priorities identified in the United Nations Millennium Declaration must be made in the decades beyond 2015, and that progress on all of those priorities requires overall commitment to health system strengthening and progress towards universal health coverage;

Acknowledging that progress against tuberculosis depends on action within and beyond the health sector in order to address the social and economic determinants of disease, including expansion of social protection and overall poverty reduction;

Guided by resolution WHA61.17 on the health of migrants and its appeal for action, and recognizing the need for increased collaboration between high- and low-incidence countries and regions in strengthening tuberculosis monitoring and control mechanisms, including with regard to the growing mobility of labour;

Noting the need for increased investment in accelerated implementation of innovations at country level as well as in the research and development of new tools for tuberculosis care and prevention that are essential for the elimination of tuberculosis,

1. ADOPTS the global strategy and targets for tuberculosis prevention, care and control after 2015 with:

- (1) its bold vision of a world without tuberculosis, and its targets of ending the global tuberculosis epidemic by 2035 through a reduction in tuberculosis deaths by 95% and in tuberculosis incidence by 90% (or to fewer than 10 tuberculosis cases per 100 000 population), and elimination of associated catastrophic costs for tuberculosis-affected households;
- (2) its associated milestones for 2020, 2025 and 2030;
- (3) its principles addressing: government stewardship and accountability; coalition-building with affected communities and civil society; equity, human rights and ethics; and adaptation to fit the needs of each epidemiological, socioeconomic and health system context;
- (4) its three pillars of: integrated, patient-centred care and prevention; bold policies and supportive systems; and intensified research and innovation;

2. URGES all Member States:¹

- (1) to adapt the strategy in line with national priorities and specificities;
- (2) to implement, monitor and evaluate the strategy's proposed tuberculosis-specific health sector and multisectoral actions with high-level commitment and adequate financing, taking into account the local settings;
- (3) to seek, with the full engagement of a wide range of stakeholders, to prevent the persistence of high incidence rates of tuberculosis within specific communities or geographical settings;

¹ And, where applicable, regional economic integration organizations.

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3. INVITES international, regional, national and local partners from within and beyond the health sector to engage in, and support, the implementation of the strategy;
4. REQUESTS the Director-General:
- (1) to provide guidance to Member States on how to adapt and operationalize the strategy, including the promotion of cross-border collaboration to address the needs of vulnerable communities, including migrant populations, and the threats posed by drug resistance;
 - (2) to coordinate and contribute to the implementation of the post-2015 global tuberculosis strategy, working with Member States, the Global Fund to Fight AIDS, Tuberculosis and Malaria, UNITAID and other global and regional financing institutions, as well as all constituencies of the Stop TB Partnership and the additional multisectoral partners required to achieve the goal and objectives of the strategy;
 - (3) to further develop and update global normative and policy guidance on tuberculosis prevention, care and control, as new evidence is gathered and innovations are developed, adding to the tools and strategic approaches that are available for ending the global epidemic and moving far more rapidly towards tuberculosis elimination;
 - (4) to support Member States upon request in the adaptation and implementation of the strategy, as well as in the development of nationally appropriate indicators, milestones and targets to contribute to local and global achievement of the 2035 target;
 - (5) to monitor the implementation of the strategy, and evaluate impact in terms of progress towards set milestones and targets;
 - (6) to promote the research and knowledge generation required to end the global tuberculosis epidemic and eliminate tuberculosis, including accelerated discovery and development of new or improved diagnostics, treatment and preventive tools, in particular efficient vaccines, and the stimulation of the uptake of resulting innovations;
 - (7) to promote equitable access to new tools and medical products for the prevention, diagnosis, and treatment of tuberculosis and multidrug-resistant tuberculosis as they become available;
 - (8) to work with the Stop TB Partnership, including active support of the development of the global investment plan, and, where appropriate, seeking out new partners who can leverage effective commitment and innovation within and beyond the health sector in order to implement the strategy effectively;
 - (9) to report on the progress achieved to the Seventieth and Seventy-third World Health Assemblies, and at regular intervals thereafter, through the Executive Board.

Sixth plenary meeting, 21 May 2014
A67/VR/6

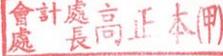
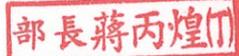
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附錄三、中長程個案計畫自評檢核表（含性別影響評估表）

檢視項目	內容重點 (內容是否依下列原則撰擬)	主辦機關		主管機關		備註
		是	否	是	否	
1、計畫書格式	(1)計畫內容應包括項目是否均已填列(「行政院所屬各機關中長程個案計畫編審要點」(以下簡稱編審要點)第5點、第12點)	✓		✓		本計畫非屬新興重大公共建設計畫
	(2)延續性計畫是否辦理前期計畫執行成效評估,並提出總結評估報告(編審要點第5點、第13點)	✓		✓		
	(3)是否依據「跨域增值公共建設財務規劃方案」之精神提具相關財務策略規劃檢核表?並依據各類審查作業規定提具相關書件		✓		✓	
2、民間參與可行性評估	是否填寫「促參預評估檢核表」評估(依「公共建設促參預評估機制」)		✓		✓	本計畫非屬新興重大公共建設計畫
3、經濟及財務效益評估	(1)是否研提選擇及替代方案之成本效益分析報告(「預算法」第34條)	✓		✓		
	(2)是否研提完整財務計畫	✓		✓		
4、財源籌措及資金運用	(1)經費需求合理性(經費估算依據如單價、數量等計算內容)	✓		✓		本計畫非屬新興重大公共建設計畫,故未進行(2)、(5)及(6)內容之描述
	(2)資金籌措:依「跨域增值公共建設財務規劃方案」精神,將影響區域進行整合規劃,並將外部效益內部化		✓		✓	
	(3)經費負擔原則: a.中央主辦計畫:中央主管相關法令規定 b.補助型計畫:中央對直轄市及縣(市)政府補助辦法、依「跨域增值公共建設財務規劃方案」之精神所擬訂各類審查及補助規定	✓		✓		
	(4)年度預算之安排及能量估算:所需經費能否於中程歲出概算額度內容納加以檢討,如無法納編者,應檢討調減一定比率之舊有經費支應;如仍有不敷,須檢附以前年度預算執行、檢討不經濟支出及自行檢討調整結果等經費審查之相關文件	✓		✓		
	(5)經資比 1:2(「政府公共建設計畫先期作業實施要點」第2點)		✓		✓	
	(6)屬具自償性者,是否透過基金協助資金調度		✓		✓	
	(7)屬具自償性者,是否透過基金協助資金調度		✓		✓	
5、人力運用	(1)能否運用現有人力辦理	✓		✓		
	(2)擬請增人力者,是否檢附下列資料: a.現有人力運用情形 b.計畫結束後,請增人力之處理原則 c.請增人力之類別及進用方式 d.請增人力之經費來源	✓		✓		

檢視項目	內容重點 (內容是否依下列原則撰擬)	主辦機關		主管機關		備註
		是	否	是	否	
6、營運管理計畫	是否具務實及合理性(或能否落實營運)		V		✓	不適用
7、土地取得	(1)能否優先使用公有閒置土地房舍		V		✓	不適用
	(2)屬補助型計畫，補助方式是否符合規定(中央對直轄市及縣(市)政府補助辦法第10條)		V		✓	
	(3)計畫中是否涉及徵收或區段徵收特定農業區之農牧用地		V		✓	
	(4)是否符合土地徵收條例第3條之1及土地徵收條例施行細則第2條之1規定		V		✓	
	(5)若涉及原住民族保留地開發利用者，是否依原住民族基本法第21條規定辦理		V		✓	
8、風險評估	是否對計畫內容進行風險評估	V		✓		
9、環境影響分析(環境政策評估)	是否須辦理環境影響評估		V		✓	本計畫非環境政策，不適用
10、性別影響評估	是否填具性別影響評估檢視表	V		✓		
11、涉及空間規劃者	是否檢附計畫範圍具座標之向量圖檔		V		✓	本計畫未涉及空間規劃，不適用
12、涉及政府辦公廳舍興建購置者	是否納入積極活化閒置資產及引進民間資源共同開發之理念		V		✓	本計畫未涉及興建工程，不適用
13、跨機關協商	(1)涉及跨部會或地方權責及財務分攤，是否進行跨機關協商		V		✓	本計畫未與其他部會財務分攤，不適用
	(2)是否檢附相關協商文書資料		V		✓	
14、依碳中和概念優先選列節能減碳指標	(1)是否以二氧化碳之減量為節能減碳指標，並設定減量目標		V		✓	本計畫未涉及建築、採購，不適用
	(2)是否規劃採用綠建築或其他節能減碳措施		V		✓	
	(3)是否檢附相關說明文件		V		✓	
15、資通安全防護規劃	資訊系統是否辦理資通安全防護規劃	V		✓		

主辦機關核章：承辦人  單位主管  首長 

主管部會核章：研考主管  會計主管  首長 

中長程個案計畫性別影響評估檢視表

【第一部分】：本部分由機關人員填寫

填表日期： 103 年 10 月 17 日			
填表人姓名：陳佩伶		職稱：護理師	身份： <input checked="" type="checkbox"/> 業務單位人員
電話：23959825#3798		e-mail：peiling@cdc.gov.tw	<input type="checkbox"/> 非業務單位人員， (請說明：_____)
填 表 說 明			
一、行政院所屬各機關之中長程個案計畫除因物價調整而需修正計畫經費，或僅計畫期程變更外，皆應填具本表。			
二、「主管機關」欄請填列中央二級主管機關，「主辦機關」欄請填列提案機關(單位)。			
三、建議各單位於計畫研擬初期，即徵詢性別平等專家學者或各部會性別平等專案小組之意見；計畫研擬完成後，應併同本表送請民間性別平等專家學者進行程序參與，參酌其意見修正計畫內容，並填寫「拾、評估結果」後通知程序參與者。			
壹、計畫名稱	我國加入 WHO 2035 消除結核第一期計畫		
貳、主管機關	衛生福利部疾病管制署	主辦機關(單位)	衛生福利部疾病管制署愛滋及結核病組
參、計畫內容涉及領域：	勾選(可複選)		
3-1 權力、決策、影響力領域			
3-2 就業、經濟、福利領域			
3-3 人口、婚姻、家庭領域			
3-4 教育、文化、媒體領域			
3-5 人身安全、司法領域			
3-6 健康、醫療、照顧領域	V		
3-7 環境、能源、科技領域			
3-8 其他(勾選「其他」欄位者，請簡述計畫涉及領域)			
肆、問題與需求評估			
項 目	說 明		備 註

<p>4-1 計畫之現況問題與需求概述</p>	<p>一、計畫現況問題</p> <p>(一)結核病防治為全球重視之重要課題</p> <p>世界會衛生大會(WHA)於 2014 年 5 月通過世界衛生組織(WHO)提出之「Global strategy and targets for tuberculosis prevention, care and control after 2015」,以「終止全球結核病的流行」為未來努力目標,並以「零死亡、零個案、零負擔」為願景。</p> <p>(二)我國結核病防治成效緩慢,仍須迎頭趕上國際腳步</p> <p>我國於 2006 年(民國 95 年)WHO 宣示減半目標後,同步提出「結核病十年減半全民動員計畫」,每年疫情雖持續穩定下降,惟囿於防治經費逐年縮減之影響,針對國際間較新穎的防治策略或檢驗技術,難以積極引入推展,致無法提供更快速的介入措施,及早進行疫情防堵,進而造成結核病下降幅度受限,策略推行之邊際效益亦無法得到有效彰顯。這一點可自我國於世界經濟論壇(WEF)公布之全球結核病發生率負擔值排名位居 72 名之變動情形得到驗證,也警醒我們須有更充足及穩定的資源投入結核病防治工作,才能跟得上國際間之發展腳步。</p> <p>(三)鄰近結核病高負擔國家疫情對我國之衝擊</p> <p>據 WHO 最新公布之統計資料指出,全球共計 22 個結核病高負擔國家中,位於亞洲的國家包括:柬埔寨、中國、印度、印尼、緬甸、菲律賓、泰國及越南等 8 國,其中,除泰國外,其他國家亦同時為全球多重抗藥性結核病之高負擔國家。這些國家與我國交流密切且頻繁,泰國、菲律賓、印尼及越南亦為我國外籍勞工的主要輸入國。</p> <p>二、計畫需求概述</p> <p>(一) 全球化的發展及與各國交通往來之便捷,我國與鄰近結核病高負擔國家,透過開放觀光、外勞引進、新移民及經商等往來密切之因素影響下,需有更積極妥善的監測與管理機制,以加速個案發現及落實治療,亦須採取更全面性及積極主動的介入措施,以突破目前防治工作的瓶頸,以保障民眾健康。</p> <p>(二) 臺灣外籍勞工主要來自東南亞等國家,而留境治療政策已有改變,感染結核病之丙類外籍勞工已可留在臺灣接受治療;再者,來自中國及東南亞國家之外籍配偶融入臺灣成為新移民亦逐漸增加,倘在臺灣診斷為結核病並接受治療,亦可獲得醫療費用之補助。</p>	<p>簡要說明計畫之現況問題與需求。</p>
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<p>4-2 和本計畫相關之性別統計與性別分析</p>	<p>一、疫情監測部分</p> <p>(一)我國結核病整體發生情形</p> <ol style="list-style-type: none"> 1. 2012 年核病新案數分為 12,338 人(每 10 萬人口 53.0 人)。以 2005 年當基底值計算發生數(率)變動幅度，2005-2012 年發生數下降 25.1%，發生率下降 26.8%。 2. 就性別而言，2012 年核病男性發生數(率)均高於女性，男性為女性 2.3 倍。 3. 2012 年塗片陽性新案數而言，塗陽新案數佔所有新案的 38.4%，塗陽男性個案發生率高於女性 2.8 倍。 4. 2012 年地域分布情形，山地鄉結核病發生率為 193.3 人(每 10 萬人口)。男性發生率為 250.0 人(每 10 萬人口)，女性為 129.4 人(每 10 萬人口)。 <p>(二) 我國結核病死亡監測</p> <ol style="list-style-type: none"> 1. 2012 年結核病死亡數為 626 人(每 10 萬人口 2.7 人)。以 2005 年當比較基底值，2005-2012 年死亡數及死亡率分別下降 35.5% 及 37.0%。 2. 以性別而言，2012 年結核病男性死亡 479 人(每 10 萬人口 4.1 人)，女性死亡 147(每 10 萬人口 1.3 人)，男性死亡數(率)高於女性，約為 3 倍。 3. 地域分布情形，山地鄉結核病死亡率為每十萬人口 8.0 人(死亡數 16 人)，明顯大於全台平均值。在性別部分，男性死亡率為每十萬人口 12.3 人(死亡數 13 人)，女性為每十萬人口 3.2 人(死亡數 3 人)。 <p>(三) 結核病境外人士發生監測</p> <p>統計資料顯示，國內通報為結核病確診之外籍人士，自 2008 年 449 例至 2013 年達 777 例逐年增加。但新移民部分，自 2008 年的 138 例個案減少至 2013 年的 96 例。惟新住民入臺後結核病發生率為國人之 1.7~7.3 倍，與新住民主要來自結核病或多重抗藥性結核病高負擔之中國或東南亞地區國家有關。</p> <p>(四) 結核病個案治療結果分析</p> <ol style="list-style-type: none"> 1. 我國整體結核病個案治療結果分析，2011 年結核病新案世代 12 個月追蹤治療成功率 72.7%，追蹤後死亡 19.6%，失敗 0.8%，失落 2.3%，轉出 0.0%，未結案 4.7%。 2. 就性別而言，2011 年女性結核病個案之追蹤治療成功比率均高於男性，男性結核病新案的治療成功比率為 71.2%，女性為 76.1%；而男性痰塗片陽性個案治療成功比率為 68.6%，女性為 75.4%。 <p>(五) 結核病合併 HIV</p> <p>2011 年結核病新案中 HIV 佔所有結核病個案 0.8%，其中 15-49 歲結核病新案中 HIV 為 2.1%。男性多於女性，個案年齡分布以 25-54 歲為多。</p>	<ol style="list-style-type: none"> 1. 透過相關資料庫、圖書等各種途徑蒐集既有的性別統計與性別分析。 2. 性別統計與性別分析應儘量顧及不同性別、性傾向及性別認同者之年齡、族群、地區等面向。
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	<p>二、防疫資源運用情形</p> <p>(一)主動發現 X 光巡檢</p> <p>針對山地鄉、經濟弱勢、結核病個案接觸者等高發病風險族群，進行胸部 X 光篩檢服務，統計 102 年累計共提供 146,101 人次之男性民眾及 155,389 人次之女性民眾接受檢查。</p> <p>(二)結核病個案醫療補助費用</p> <p>不分性別，依實際需求平均每年補助列管結核病患、接觸者檢查及潛伏結核感染治療之部分負擔，約新臺幣 1 億 6 千萬元(25 萬人次)。</p>	
<p>4-3 建議未來需要強化與本計畫相關的性別統計與性別分析及其方法</p>	<p>目前已就各類結核病防治成果數值進行性別分析，並公布於「台灣結核病防治年報」。本署未來亦將結核病流行病學之各類分析資料公布於「結核病在台灣」網站，並持續擴增各類數據性別分析結果，提供各級防疫/學術人員查詢運用，俾利本署監測國內性別疫情統計及其資源運用之情形，據以調整未來防治策略與強化防治對象之參考。</p>	<p>說明需要強化的性別統計類別及方法，包括由業務單位釐清性別統計的定義及範圍，向主計單位建議分析項目或編列經費委託調查，並提出確保執行的方法。</p>
<p>伍、計畫目標概述(併同敘明性別目標)</p>	<p>響應 WHO，大幅降低整體結核病新案發生率，以提升國際結核病發生率排名，並發揮濟弱扶傾之精神，協助友邦國家結核病防治工作，改善我國之國際形象。</p>	
<p>陸、性別參與情形或改善方法(計畫於研擬、決策、發展、執行之過程中，不同性別者之參與機制，如計畫相關組織或機制，性別比例是否達 1/3)</p>	<p>本署透過邀集結核病診治、檢驗、公共衛生、新聞媒體及法律等領域之專家學者，成立傳染病防治諮詢會-結核病防治組，針對疑似個案及其他診療相關問題提供處理建議，並協助對本計畫提供審議建議。</p> <p>目前傳染病防治諮詢會-結核病防治組委員，設置 19 位委員，其中女性委員計有 7 位(7/19；37%)，符合女性委員比例須達 1/3 以上之規定。</p>	

柒、受益對象

- 若 7-1 至 7-3 任一指標評定「是」者，應繼續填列「捌、評估內容」8-1 至 8-9 及「第二部分－程序參與」；如 7-1 至 7-3 皆評定為「否」者，則免填「捌、評估內容」8-1 至 8-9，逕填寫「第二部分－程序參與」，惟若經程序參與後，10-5「計畫與性別關聯之程度」評定為「有關」者，則需修正第一部分「柒、受益對象」7-1 至 7-3，並補填列「捌、評估內容」8-1 至 8-9。
- 本項不論評定結果為「是」或「否」，皆需填寫評定原因，應有量化或質化說明，不得僅列示「無涉性別」、「與性別無關」或「性別一律平等」。

項 目	評定結果 (請勾選)		評定原因	備 註
	是	否		
7-1 以特定性別、性傾向或性別認同者為受益對象		V	本計畫於防治策略及預算配置時，係依全民防疫及健康為考量，對男性及女性之各類需求與配置相同，並無再針對特定性別不足與不利之處投入較多之情事。	如受益對象以男性或女性為主，或以同性戀、異性戀或雙性戀為主，或個人自認屬於男性或女性者，請評定為「是」。
7-2 受益對象無區別，但計畫內容涉及一般社會認知既存的性別偏見，或統計資料顯示性別比例差距過大者		V	一般社會認知所存在之歧視感、標籤化，係針對疾病本身，非涉及性別。	如受益對象雖未限於特定性別人口群，但計畫內容涉及性別偏見、性別比例差距或隔離等之可能性者，請評定為「是」。
7-3 公共建設之空間規劃與工程設計涉及對不同性別、性傾向或性別認同者權益相關者		V	本案無涉及公共建設之空間規劃與工程設計。	如公共建設之空間規劃與工程設計涉及不同性別、性傾向或性別認同者使用便利及合理性、區位安全性，或消除空間死角，或考慮特殊使用需求者之可能性者，請評定為「是」。

捌、評估內容

(一)資源與過程

項 目	說 明	備 註
8-1 經費配置：計畫如何編列或調整預算配置，以回應性別需求與達成性別目標	不需填寫	說明該計畫所編列經費如何針對性別差異，回應性別需求。
8-2 執行策略：計畫如何縮小不同性別、性傾向或性別認同者差異之迫切性與需求性	不需填寫	計畫如何設計執行策略，以回應性別需求與達成性別目標。

8-3 宣導傳播 ：計畫宣導方式如何顧及弱勢性別資訊獲取能力或使用習慣之差異	不需填寫	說明傳佈訊息給目標對象所採用的方式，是否針對不同背景的目標對象採取不同傳播方法的設計。
8-4 性別友善措施 ：搭配其他對不同性別、性傾向或性別認同者之友善措施或方案	不需填寫	說明計畫之性別友善措施或方案。

(二)效益評估

項 目	說 明	備 註
8-5 落實法規政策 ：計畫符合相關法規政策之情形	不需填寫	說明計畫如何落實憲法、法律、性別平等政策綱領、性別主流化政策及CEDAW 之基本精神，可參考行政院性別平等會網站 (http://www.gec.ey.gov.tw/)。
8-6 預防或消除性別隔離 ：計畫如何預防或消除性別隔離	不需填寫	說明計畫如何預防或消除傳統文化對不同性別、性傾向或性別認同者之限制或僵化期待。
8-7 平等取得社會資源 ：計畫如何提升平等獲取社會資源機會	不需填寫	說明計畫如何提供不同性別、性傾向或性別認同者平等機會獲取社會資源，提升其參與社會及公共事務之機會。
8-8 空間與工程效益 ：軟硬體的公共空間之空間規劃與工程設計，在空間使用性、安全性、友善性上之具體效益	不需填寫	1.使用性：兼顧不同生理差異所產生的不同需求。 2.安全性：消除空間死角、相關安全設施。 3.友善性：兼顧性別、性傾向或性別認同者之特殊使用需求。
8-9 設立考核指標與機制 ：計畫如何設立性別敏感指標，並且透過制度化的機制，以便監督計畫的影響程度	不需填寫	1.為衡量性別目標達成情形，計畫如何訂定相關預期績效指標及評估基準(績效指標，後續請依「行政院所屬各機關個案計畫管制評核作業要點」納入年度管制作業計畫評核)。 2.說明性別敏感指標，並考量不同性別、性傾向或性別認同者之年齡、族群、地區等面向。

玖、評估結果：請填表人依據性別平等專家學者意見之檢視意見提出綜合說明，包括對「第二部分、程序參與」主要意見參採情形、採納意見之計畫調整情形、無法採納意見之理由或替代規劃等。

<p>9-1 評估結果之綜合說明</p>	<p>本計畫係以我國結核病防治方案進行整體性規劃，無針對特定性別對象提供不同之照護與服務。依據過去分析資料顯示，我國結核病患者其中男性與女性並無性別差異。據此，整體指標亦以全國之結核病新案發生率、治療成功率及遭感染之接觸者接受潛伏結核感染治療比率等項目，作為國家整體性防治成效之監測。本計畫整體內容雖無就性別設定不同之防治策略，惟對於新住民或其他較弱勢、高風險之對象，將加強早期發現/限制發病與社會扶助等策略，確保提供更完善之醫療及照護服務。</p>	
<p>9-2 參採情形</p>	<p>9-2-1 說明採納意見後之計畫調整</p>	<p>針對委員建議新住民入臺後結核病發生率為國人之 1.7~7.3 倍，宜進一步研究分析是否與就醫障礙、經濟因素、資源利用等因素有關，而提供確實的處置與協助。此部分，目前於計畫內容已有相關規劃，說明如下：</p> <ol style="list-style-type: none"> 1. P68「甲、多元人口，機器對接防疫關鍵資訊」一節，將強化外籍及新住民等高危險族群之管理異常偵測及警示；導入社會人口統計資訊，讓防治規劃方向更貼近地方或不同族群個別特性；並整合社會救助資源，協助轉介個案接受扶助，以減少就醫及經濟障礙。此部分將可進行系統性之監測，可協助基層工作人員，針對特定族群提供較完整之社會福利之需求評估及後續轉介機制。 2. P48「戊、外籍人士入境篩檢」一節，已規劃將檢討我國對於外籍人士(含新住民)之篩檢項目及後續預防發病(如潛伏結核感染治療)等配套策略。另藉衛生教育宣導，提升外籍人士結核病症狀自我監測與及早就醫之概念，以利後續各類照護服務及早介入。 <p>未來亦將持續就委員建議，蒐集及評估相關資訊，以利後續政策之規畫推動，保障新住民福祉。</p>
	<p>9-2-2 說明未參採之理由或替代規劃</p>	
<p>9-3 通知程序參與之專家學者本計畫的評估結果： 已於 103 年 10 月 20 日將「評估結果」通知程序參與者審閱</p>		

- * 請機關填表人於填完「第一部分」第壹項至第捌項後，由民間性別平等專家學者進行「第二部分－程序參與」項目，完成「第二部分－程序參與」後，再由機關填表人依據「第二部分－程序參與」之主要意見，續填「第一部分－玖、評估結果」。
- * 「第二部分－程序參與」之 10-5「計畫與性別關聯之程度」經性別平等專家學者評定為「有關」者，請機關填表人依據其檢視意見填列「第一部分－玖、評估結果」9-1 至 9-3；若經評定為「無關」者，則 9-1 至 9-3 免填。
- * 若以上有 1 項未完成，表示計畫案在研擬時未考量性別，應退回主管(辦)機關重新辦理。

【第二部分－程序參與】：本部分由民間性別平等專家學者填寫

拾、程序參與：若採用書面意見的方式，至少應徵詢 1 位以上民間性別平等專家學者意見；民間專家學者資料可至台灣國家婦女館網站參閱 (http://www.taiwanwomencenter.org.tw/)。			
(一)基本資料			
10-1 程序參與期程或時間	103 年 10 月 20 日至 103 年 10 月 20 日		
10-2 參與者姓名、職稱、服務單位及其專長領域	王秀紅、教授兼院長、高雄醫學大學護理學院 婦女健康、高齡長期照護、性別政策、衛生政策		
10-3 參與方式	<input type="checkbox"/> 計畫研商會議 <input type="checkbox"/> 性別平等專案小組 <input checked="" type="checkbox"/> 書面意見		
10-4 業務單位所提供之資料	相關統計資料	計畫書	計畫書涵納其他初評結果
	<input checked="" type="checkbox"/> 有 <input checked="" type="checkbox"/> 很完整 <input type="checkbox"/> 可更完整 <input type="checkbox"/> 現有資料不足須設法補足 <input type="checkbox"/> 無 <input type="checkbox"/> 應可設法找尋 <input type="checkbox"/> 現狀與未來皆有困難	<input type="checkbox"/> 有，且具性別目標 <input checked="" type="checkbox"/> 有，但無性別目標 <input type="checkbox"/> 無	<input checked="" type="checkbox"/> 有，已很完整 <input type="checkbox"/> 有，但仍有改善空間 <input type="checkbox"/> 無
10-5 計畫與性別關聯之程度	<input type="checkbox"/> 有關 <input checked="" type="checkbox"/> 無關 (若性別平等專家學者認為第一部分「柒、受益對象」7-1 至 7-3 任一指標應評定為「是」者，則勾選「有關」；若 7-1 至 7-3 均評定「否」者，則勾選「無關」)。		
(二)主要意見：就前述各項(問題與需求評估、性別目標、參與機制之設計、資源投入及效益評估)說明之合宜性提出檢視意見，並提供綜合意見。			
10-6 問題與需求評估說明之合宜性	合宜		
10-7 性別目標說明之合宜性	無性別目標		
10-8 性別參與情形或改善方法之合宜性	合宜		
10-9 受益對象之合宜性	合宜		
10-10 資源與過程說明之合宜性	合宜		
10-11 效益評估說明之合宜性	合宜		

<p>10-12 綜合性檢視意見</p>	<ol style="list-style-type: none"> 1. 目前疾管署已就各類結核病防治成果數值進行性別分析，並公布於「台灣結核病防治年報」，未來亦將結核病流行病學之各類分析資料公布於「結核病在台灣」網站，並持續擴增各類數據性別分析結果，提供各級防疫/學術人員查詢運用。此舉甚佳，有利國內疫情之性別統計及資源運用，並強化政策之推動。 2. 有關惟新住民入臺後結核病發生率為國人之 1.7~7.3 倍，除了與新住民主要來自結核病或多重抗藥性結核病高負擔之中國或東南亞地區國家有關外，因為此族群大都為社會經濟弱勢者，宜進一步研究分析是否與就醫障礙、經濟因素、資源利用等因素有關，而提供確實的處置與協助。 3. 疾管署邀集結核病診治、檢驗、公共衛生、新聞媒體及法律等領域之專家學者，成立傳染病防治諮詢會-結核病防治組，且委員人數單一性別比例達三分之一以上，符合規定。
<p>(三)參與時機及方式之合宜性：合宜</p>	
<p>本人同意恪遵保密義務，未經部會同意不得逕自對外公開所評估之計畫草案。 (簽章，簽名或打字皆可) 王秀紅 </p>	

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