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**CHALLENGE TB**

FINAL REPORT - ANNEXES

**CHALLENGE TB**

## ANNEX 1 – COUNTRY-SPECIFIC HIGH LEVEL RESULTS

Table 1

Country	2014					2018				
	Estimated Incident Cases	Number of New and Relapse Cases	Treatment Coverage %	Number of Successfully Treated DS TB	*Treatment Success Rate DS TB %	Estimated Incident Cases	Number of New and Relapse Cases	Treatment Coverage %	Number of Successfully Treated DS TB	**Treatment Success Rate DS TB %
Afghanistan	189	31746	50	42288	93	189	48420	69	42288	93
Bangladesh	221	191166	56	227305	94	221	267143	75	227305	94
Botswana	385	6019	75	5781	79	275	3650	59	5781	79
Burma	411	138352	64	121224	89	338	137972	76	121224	89
Cambodia	384	43059	73	40119	95	302	28620	58	40119	95
DR Congo	325	115795	48	97862	90	321	169748	63	97862	90
Ethiopia	207	119592	59	41480	96	151	113613	69	41480	96
India	223	1609547	56	1266429	89	199	1994000	74	1266429	89
Indonesia	329	322806	38	360661	94	316	563879	67	360661	94
Kazakhstan	91	15244	97	7826	91	68	12832	100	7826	91
Kyrgyzstan	126	6390	87	5063	91	116	6338	87	5063	91
Malawi	218	16267	46	15849	86	181	15632	48	15849	86
Mozambique	551	57773	40	74572	90	551	92381	57	74572	90
Namibia	674	9114	59	7955	87	524	7808	61	7955	87
Nigeria	219	86464	22	87643	87	219	103921	24	87643	87
South Sudan	146	8335	54	7504	82	146	14603	91	7504	82
Tajikistan	91	5807	77	4845	91	84	5726	75	4845	91
Tanzania	327	61571	38	61409	91	253	74692	53	61409	91
Turkmenistan	58	2537	80	2369	91	46	2157	80	2369	91
Ukraine	94	31701	74	21922	83	80	26512	75	21922	83
Uzbekistan	82	18345	73	14457	89	70	16413	72	14457	89
Viet Nam	205	100349	53	94468	93	182	99658	57	94468	93
Zambia	406	37931	61	34938	90	346	35071	58	34938	90
Zimbabwe	278	29653	78	30764	83	210	25204	83	30764	83

\*2013 Cohort

\*\*2017 Cohort

Table 2

Country	2014						2018					
	Estimated TB Deaths	Estimated TB/HIV Deaths	Estimated TB/HIV Incident Cases	# TB/HIV Patients on ART	% TB/HIV Patients on ART (TB_ART)	% TB Patients Tested for HIV (TB_STAT)	Estimated TB Deaths	Estimated TB/HIV Deaths	Estimated TB/HIV Incident Cases	# TB/HIV Patients on ART	% TB/HIV Patients on ART (TB_ART)	% TB Patients Tested for HIV (TB_STAT)
Afghanistan	14000	130	0.88	3	-	39%	11000	98	0.87	3	43%	53%
Bangladesh	71000	250	0.42	82	100%	0%	47000	190	0.45	63	94%	1%
Botswana	1600	1200	230	2099	78%	91%	1800	1200	148	1600	99%	82%
Burma	41000	7900	45	3034	36%	65%	25000	3700	29	7464	71%	89%
Cambodia	3900	520	10	680	98%	84%	3400	380	6.5	580	100%	94%
DR Congo	64000	16000	48	4776	67%	50%	53000	10000	37	8481	87%	61%
Ethiopia	43000	7300	20	6848	39%	77%	27000	2200	7	4393	91%	92%
India	485000	27000	9.5	40925	90%	67%	449000	9700	6.8	44080	90%	72%
Indonesia	107000	6000	9.5	757	26%	11%	98000	5300	7.9	4082	40%	37%
Kazakhstan	1100	57	3.7	275	76%	99%	480	48	4	689	96%	95%
Kyrgyzstan	580	39	3.9	194	51%	96%	430	35	3.4	132	71%	100%
Malawi	13000	8700	117	7959	92%	101%	11000	7000	88	7444	99%	99%
Mozambique	56000	38000	289	27417	81%	99%	43000	22000	197	31440	96%	99%
Namibia	4000	2400	296	3480	84%	98%	3100	1500	182	2675	97%	102%
Nigeria	152000	46000	42	11141	75%	100%	157000	32000	27	11032	87%	100%
South Sudan	3700	790	19	616	62%	79%	1200	250	18	1471	93%	90%
Tajikistan	830	49	2.6	-	80%	95%	820	76	3.4	178	78%	97%
Tanzania	59000	29000	114	17063	83%	93%	39000	16000	71	20337	98%	99%
Turkmenistan	810	140	13	-	-	-	750	130	11	-	-	-
Ukraine	7900	2100	18	3911	56%	99%	5700	2000	18	4806	79%	99%
Uzbekistan	2300	230	2.9	409	45%	80%	2000	270	3.1	612	83%	100%
Viet Nam	19000	4000	11	3065	73%	79%	13000	2200	6.2	2705	93%	85%
Zambia	18000	13000	247	15897	73%	95%	18000	13000	205	18421	91%	97%
Zimbabwe	7100	5700	188	12924	86%	96%	4600	3500	130	13636	91%	96%

Table 3

Country	2014						2018					
	Number of RR-/MDR-TB Patients Diagnosed	Number of RR-/MDR-TB Patients Started on Treatment	RR/MDR SL-DST	*Number of RR-/MDR-TB Patients Successfully Treated	**RR-/MDR-TB Patients Treatment Success Rate	DST Coverage	Number of RR-/MDR-TB Patients Diagnosed	Number of RR-/MDR-TB Patients Started on Treatment	RR/MDR SL-DST	*** Number of RR-/MDR-TB Patients Successfully Treated	**** RR-/MDR-TB Patients Treatment Success Rate	DST Coverage
Afghanistan	88	88	1	27	71%	0%	452	317	253	95	62%	22%
Bangladesh	994	945	250	364	72%	7%	1228	1147	853	715	78%	16%
Botswana	41	43	0	44	70%	0%	86	86	0	85	78%	1%
Burma	3495	1537	43	351	79%	8%	3479	2650	927	1994	79%	39%
Cambodia	110	105	0	87	79%	2%	128	128	125	65	64%	1%
DR Congo	442	405	6	86	64%	1%	765	690	328	548	86%	10%
Ethiopia	503	557	113	224	83%	2%	741	741	360	509	72%	22%
India	25748	24073	8976	6433	46%	1%	58347	46569	38236	15872	48%	42%
Indonesia	1812	1284	895	235	54%	0%	9038	4194	2526	913	48%	57%
Kazakhstan	5877	6851	6237	5265	73%	84%	4869	4336	4384	4979	80%	82%
Kyrgyzstan	1267	1157	235	486	63%	-	1685	1246	924	655	53%	50%
Malawi	106	64	0	12	63%	0%	126	99	1	34	59%	-
Mozambique	544	482	195	60	28%	2%	1158	1086	472	423	50%	41%
Namibia	350	310	-	142	68%	-	323	301	200	248	71%	59%
Nigeria	798	423	-	96	62%	-	2275	1895	1895	963	77%	53%
South Sudan	3	0	0	-	-	0%	53	28	-	0	-	0%
Tajikistan	902	799	418	351	66%	48%	904	727	490	440	65%	73%
Tanzania	516	143	70	33	73%	16%	449	409	62	127	80%	26%
Turkmenistan	209	210	-	-	-	2%	549	549	-	303	54%	58%
Ukraine	7735	7452	9397	1909	34%	53%	6547	7427	6547	3590	49%	63%
Uzbekistan	3844	3663	1978	737	49%	79%	2238	2238	1745	1140	57%	86%
Viet Nam	2198	1532	150	503	71%	3%	3126	3110	1922	1662	68%	44%
Zambia	-	-	0	27	27%	-	627	506	150	96	71%	52%
Zimbabwe	412	381	95	175	75%	-	406	381	-	276	57%	48%

\*2012 Cohort

\*\*2012 Cohort

\*\*\*2016 Cohort

\*\*\*\*2016 Cohort

DST coverage - % of new TB cases tested for RR-/MDR-TB, among all notified new cases (pulmonary and extrapulmonary, bac confirmed plus clinically diagnosed)

Table 4

Country	2015	2018	2015	2016	2017	2018	Jun-19	2015	2018
	RR/MDR SL-DST 2015	RR/MDR SL-DST 2018	Number of GeneXpert Machines					% Tested using a WHO- recommended rapid diagnostic	% Tested using a WHO- recommended rapid diagnostic
Afghanistan	1	253	1	4	11	47	47		24%
Bangladesh	250	853	39	39	39	209	209		18%
Botswana	0	0	33	33	33	36	36		32%
Burma	43	927	48	66	73	92	95	22%	42%
Cambodia	0	125	38	75	75	75	75		
DR Congo	6	328	33	47	93	134	155	10%	7%
Ethiopia	113	360	97	110	156	314	314	6%	
India	8976	38236	0	0	1135	1135	1135		50%
Indonesia	895	2526	62	138	520	635	815		12%
Kazakhstan	6237	4384	0	0	56	59	59	83%	89%
Kyrgyzstan	235	924	0	16	24	24	24	21%	62%
Malawi	0	1	0	51	54	83	83	6%	
Mozambique	195	472	38	59	72	103	108	7%	41%
Namibia	-	200	0	32	50	50	50		60%
Nigeria	-	1895	201	318	390	394	394	58%	54%
South Sudan	0	-	2	2	2	0	0	2%	1%
Tajikistan	418	490	15	15	15	46	46		74%
Tanzania	70	62	66	72	93	213	217		18%
Turkmenistan	-	-	0	0	0	8	8		75%
Ukraine	9397	6547	53	54	59	81	111	77%	
Uzbekistan	1978	1745	33	33	33	56	56		88%
Viet Nam	150	1922	70	92	157	174	174	11%	20%
Zambia	0	150	55	69	135	210	210	100%	46%
Zimbabwe	95	-	106	118	129	134	140		87%

Table 5

Country	Number of Patients Started on BDQ						Number of Patients Started on DLM						Number of Patients Started on STR						Number of Patients Started on BDQ+DLM					
	2014	2015	2016	2017	2018	Jun-19	2014	2015	2016	2017	2018	Jun-19	2014	2015	2016	2017	2018	Jun-19	2014	2015	2016	2017	2018	Jun-19
Afghanistan	0	0	0	5	14	4	0	0	0	6	7	1	0	0	0	23	19	5	0	0	0	0	3	0
Bangladesh	3	3	39	104	52	16	0	0	4	63	23	12	230	200	168	495	839	170	0	0	0	0	0	0
Botswana	2	2	0	0	13	7	0	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0
Burma	0	0	12	11	143	137	0	0	7	9	4	1	0	0	0	15	313	206	0	0	0	5	17	29
Cambodia	0	0	0	2	17	14	0	0	0	0	0	2	0	0	0	10	99	46	0	0	0	0	0	0
DR Congo	0	2	15	23	15	19	0	0	0	0	0	0	449	456	639	838	690	325	0	0	0	0	7	1
EA Region	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ethiopia	0	0	16	31	53	44	0	0	11	19	17	9	0	0	0	0	251	90	0	0	5	10	15	6
India	0	0	226	753	2831	312	0	0	0	81	38	65	0	0	0	69	16488	0	0	0	0	0	0	0
Indonesia	0	21	48	160	332	314	0	0	0	0	29	47	0	0	0	232	2137	1356	0	0	0	0	0	0
Kazakhstan	0	0	0	0	144	43	0	0	0	0	13	2	0	0	0	0	115	4	0	0	0	0	56	31
Kyrgyzstan	0	0	0	144	334	115	0	0	0	6	17	3	0	0	0	119	175	72	0	0	0	0	1	1
Malawi	0	0	0	0	17	0	0	0	0	0	0	0	0	0	0	0	39	0	0	0	0	0	7	0
Mozambique	0	1	16	93	42	1	0	0	4	6	18	1	0	4	65	88	15	11	0	0	3	17	31	5
Namibia	0	0	14	22	55	23	0	0	0	1	8	5	0	0	0	3	106	78	0	0	1	0	10	4
Nigeria	0	0	0	20	95	24	0	0	0	0	13	12	0	0	0	325	1784	484	0	0	0	0	0	0
South Sudan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14	0	0	0	0	0	0	0	0
Tajikistan	0	4	23	65	158	106	0	0	4	15	15	8	0	0	1	77	96	39	0	1	0	4	7	1
Tanzania	0	1	0	3	37	38	0	0	0	0	4	3	0	0	0	0	209	190	0	0	0	0	0	0
Turkmenistan	0	0	0	22	0	0	0	0	0	38	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ukraine	0	0	0	46	136	918	0	0	0	0	0	1	0	0	0	29	224	0	0	0	0	26	115	
Uzbekistan	0	0	60	127	166	247	0	0	0	0	7	0	104	27	0	22	108	119	0	0	0	0	0	0
Vietnam	0	3	96	0	53	29	0	0	0	0	0	0	0	0	99	83	1000	845	0	0	0	0	0	0
Zambia	0	0	0	0	12	52	0	0	0	0	1	0	0	0	0	31	334	139	0	0	0	0	0	0
Zimbabwe	0	0	0	5	24	0	0	0	0	0	7	0	0	0	0	5	5	0	0	0	0	0	0	0
<b>Total</b>	<b>5</b>	<b>37</b>	<b>565</b>	<b>1636</b>	<b>4743</b>	<b>2463</b>	<b>0</b>	<b>0</b>	<b>30</b>	<b>244</b>	<b>221</b>	<b>178</b>	<b>783</b>	<b>687</b>	<b>972</b>	<b>2449</b>	<b>24851</b>	<b>4403</b>	<b>0</b>	<b>1</b>	<b>9</b>	<b>36</b>	<b>180</b>	<b>193</b>

ANNEX 2 – M&E FRAMEWORK FOR THE PROJECT

CTB project M&E framework was aligned with the U.S. Government’s (USG) strategy to prevent and care for TB (Figure 1). The project had three objectives, each with several focus areas of interventions (11 sub-objectives) (Figure 1). The reportable indicators, tools, and processes were in line with WHO/NTP TB tools including the top 10 priority indicators.

FIGURE 1: USG STRATEGIC FRAMEWORK FOR TB

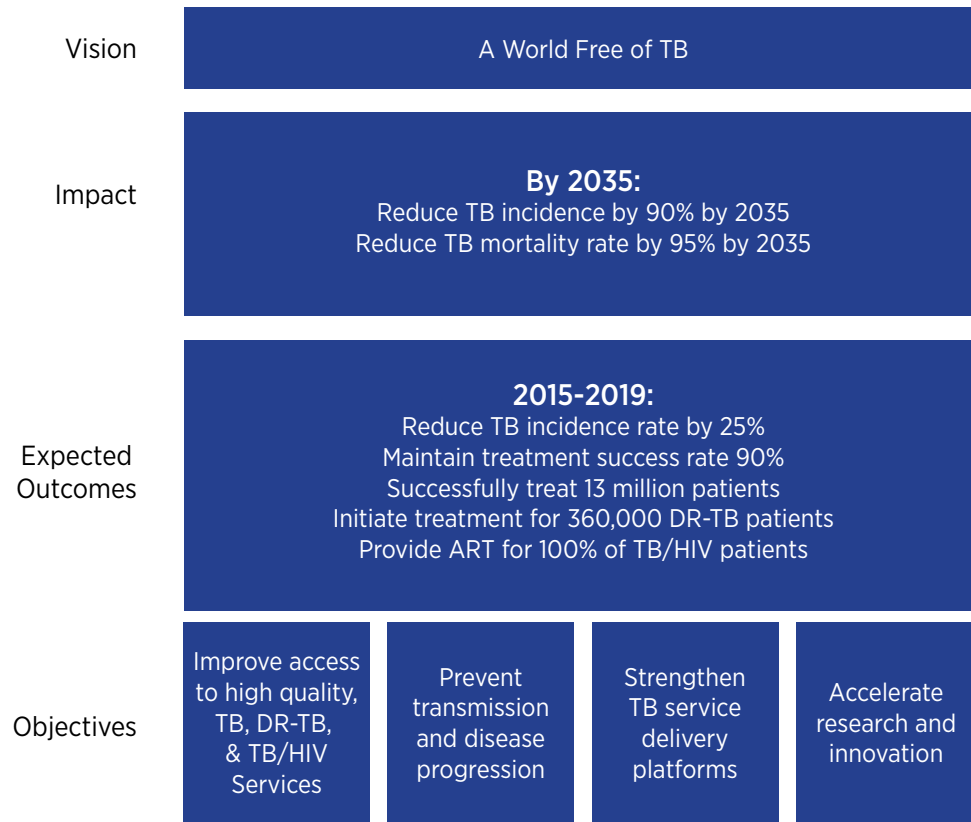


TABLE 6: LIST OF CTB OBJECTIVES AND SUB-OBJECTIVES

<b>Objective 1</b> Improved access to high-quality patient-centered TB, DR-TB & TB/HIV services by:	Sub-objective 1	Improving the enabling environment of health system
	Sub-objective 2	Ensuring a comprehensive, high quality diagnostic network
	Sub-objective 3	Strengthening patient-centered care and treatment
<b>Objective 2</b> Prevent transmission and disease progression by:	Sub-objective 4	Targeted screening for active TB
	Sub-objective 5	Implementing infection control measures
	Sub-objective 6	Managing latent TB infection (LTBI)
<b>Objective 3</b> Strengthen TB service delivery platforms by:	Sub-objective 7	Enhancing political commitment and leadership
	Sub-objective 8	Building comprehensive partnerships and in-formed community engagement
	Sub-objective 9	Strengthening drug and commodity management systems
	Sub-objective 10	Ensuring quality data, surveillance and monitoring & evaluation
	Sub-objective 11	Supporting human resource development

The M&E framework included 150 indicators including core/mandatory indicators<sup>1</sup>, a summary of which per sub-objective is presented in Table 7 below.

TABLE 7: LIST OF CTB OBJECTIVES AND SUB-OBJECTIVES

#	Sub-objective	Total # of indicators	Indicators by level	
			Output/Outcome	Process
1	Enabling Environment	12	8	4
2	Comprehensive, high quality diagnostics	28	17	11
3	Patient-centered care and treatment	38	26	12
4	Targeted screening for active TB	9	7	2
5	Infection Control	11	6	5
6	Management of latent TB infection	14	8	6
7	Political Commitment and leadership	7	3	4
8	Partnerships & Community Involvement	7	2	5
9	Drug and commodity management systems	8	4	4
10	Quality data, surveillance and M&E	11	3	8
11	Human resource development	5	1	4
	<b>TOTAL</b>	<b>150</b>	<b>85</b>	<b>65</b>

<sup>1</sup>Core indicators were included in the core sections of CTB country Data Collection Tool for routine quarterly/annual reporting, which also included mandatory indicators, i.e., the indicators all CTB countries were required to report on despite CTB investment level/status.



Results on all CTB indicators were generated through the existing NTP M&E tools without creating a parallel reporting tools or systems.

## **CTB PROJECT INFORMATION INVENTORY**

Quantitative and narrative information collected through the routine monitoring process of the CTB project was available/reported in the following format:

- Quarterly Monitoring Report/Annual Report (QMR/AR)
- Each quarter all countries developed a “Quarterly Monitoring Report” (QMR), including: a narrative report (i.e. description of activities implemented with difficulties faced), data collection tool (i.e. Excel File), in addition to a financial report. Subsequently, the PMU used these reports to develop a Global QMR for CTB.
- Data collection tool (quantitative)
- An individual data collections tool was issued to each country for each quarter, this provided a platform for countries to report on their activities over the previous quarter and monitor progress against SMART achievements.
- CTB M&E Database (quantitative)
- The CTB M&E Database was used to store all data collected through the individual country data collection tools. This Database was interrogated for the purposes of conducting comparative analysis, routine and ad hoc reporting.
- Annual Workplans/CTB Finance Database
- Sumatra Financial System
- Operations Research Data
- Success Stories
- Short-term Technical Assistance (STTA) Database
- Trip Reports
- Technical Briefs
- Implementation Briefs
- Sub-Awardee Database
- External sources: e.g., WHO Global TB Data and Report.

## **M&E DATABASE MANAGEMENT**

### **DEVELOPMENT & PROVISION**

Since the start of the project, a basic database was maintained. With the introduction of CTB country Data Collection Tools (DCTs), an inventory Excel Database was created, containing the core indicators from the DCTs. In September 2018, a SQL database was created for more robust data management and use, which was maintained by the M&E team for the duration of the project. The M&E team responsibility was to retain up-to-date records and manage changes where required.

### **DATABASE STRUCTURE**

The Database is housed on an SQL Server, a development database is hosted on Microsoft Azure, and a production database is hosted on KNCV internal SQL Server. The database comprises multiple tables linked by a unique identifier (Primary Key), such as country code and reporting period identifier. Table 8 provides a list of tables in the M&E database along with the number of variables per table. The database consists of 18 individual tables which relate to the major thematic areas of the program, laboratory and diagnostics; case notifications, treatment by specific drug/regimen; treatment outcomes; health care workers; child IPT; stockouts and programmatic indicators.

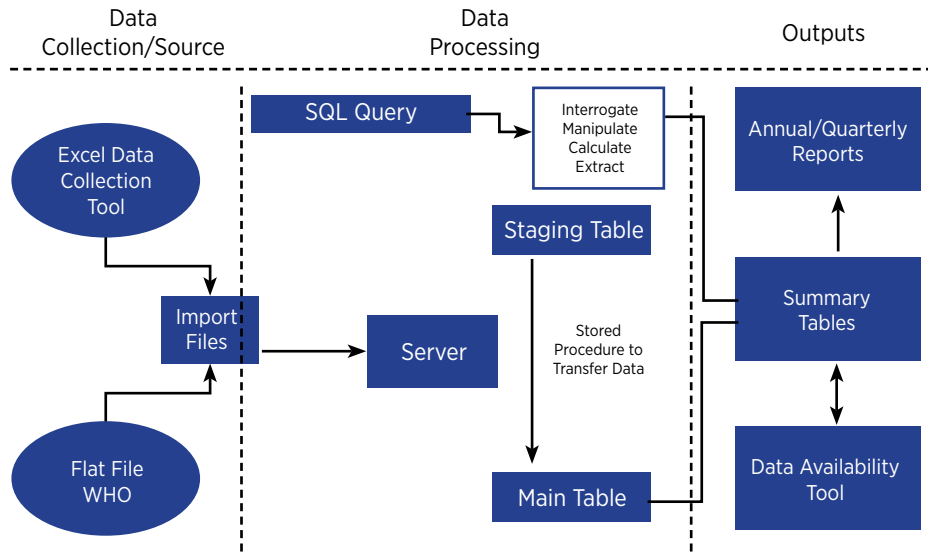
TABLE 8. LIST OF TABLES IN THE M&amp;E DATABASE

#	Table	# of variables
1	Master	179
2	Population	5
3	Investment	3
4	Lab and Diagnostic	21
5	Lab MDR	12
6	Case Notifications	25
7	Case Notifications MDR	9
8	Treatment Outcome	8
9	Treatment MDR	6
10	Treatment MDR STR	12
11	Treatment MDR BDQ	12
12	Treatment MDR DLM	12
13	Treatment MDR BDQ+DLM	12
14	Health Care Workers	4
15	HCWs Training	22
16	Child IPT	2
17	Stock Outs	4
18	Policy, Budget, & Research	10

#### DATA PROCESSING

The data flow model illustrates how data is processed (Figure 2). CTB country DCTs and WHO data files are uploaded to the database. DCT data is initially loaded to a staging table, a stored procedure is executed to transfer data into the main tables. SQL queries are used to interrogate the database for the purposes of manipulating data to derive calculations and for extraction to summary tables from which annual and quarterly reports are compiled.

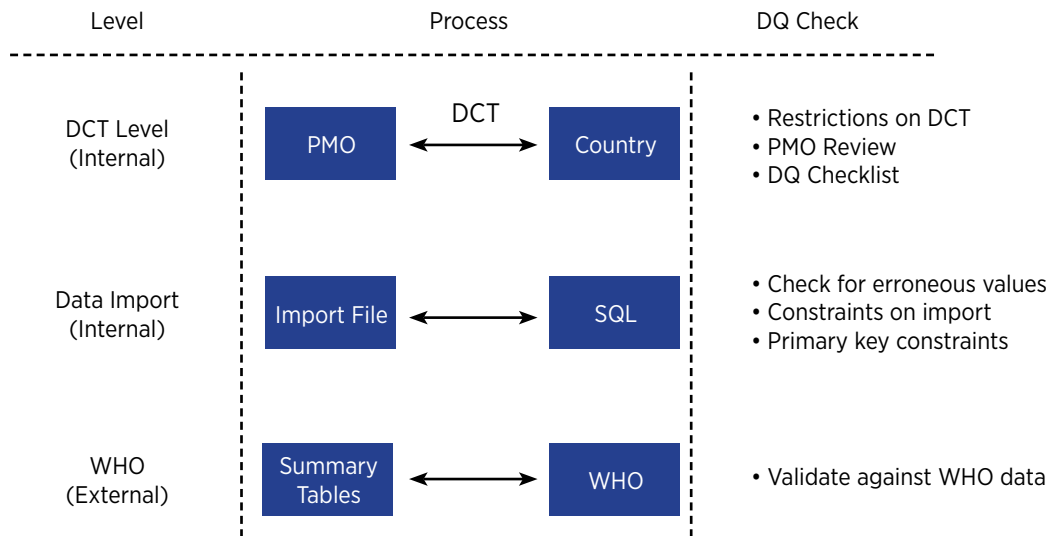
FIGURE 2. DATA PROCESS FLOW



### DATA VALIDATION & QUALITY ASSURANCE

A data management (including quality check) flowchart is in Figure 3.

FIGURE 3. DATA VALIDATION AND QUALITY ASSURANCE



## QUALITY ASSURANCE

The PMU M&E team members reviewed the DCT of all CTB countries. The review was done based on a data quality check list. This detailed process checked all data values entered into the DCT along with comments provided by the country, to ensure that data is complete, up to date and aligned with the quarterly/annual narrative report. In addition, data for specific indicators were compared to WHO data on an annual basis and highlighted when significant differences raised. This provided a good opportunity for the country to cross-check data with the NTP to evaluate which data is more accurate. Feedback was provided to the country for correction and/or clarification of data quality issues. A revised version of the DCT was reviewed and signed off by the PMU M&E team. Data files were then imported to the database, which provided another layer of validation, assessing data completeness, validity and uniqueness of records.

## DATA VALIDATION

Once data was imported to the M&E database, subsets of data were selected for further analysis. The data was manipulated to transform fields on which calculations would be derived into a numeric format. This data was used to construct M&E indicators which were presented as summary tables along with visualizations of the data. WHO data was also stored in the M&E database from which annual data can be extracted for summary tables. Both CTB and WHO data sets were presented in summary tables and validated against each other to check for variations in results.

FIGURE 4. CHART OF DATA MANAGEMENT FLOW

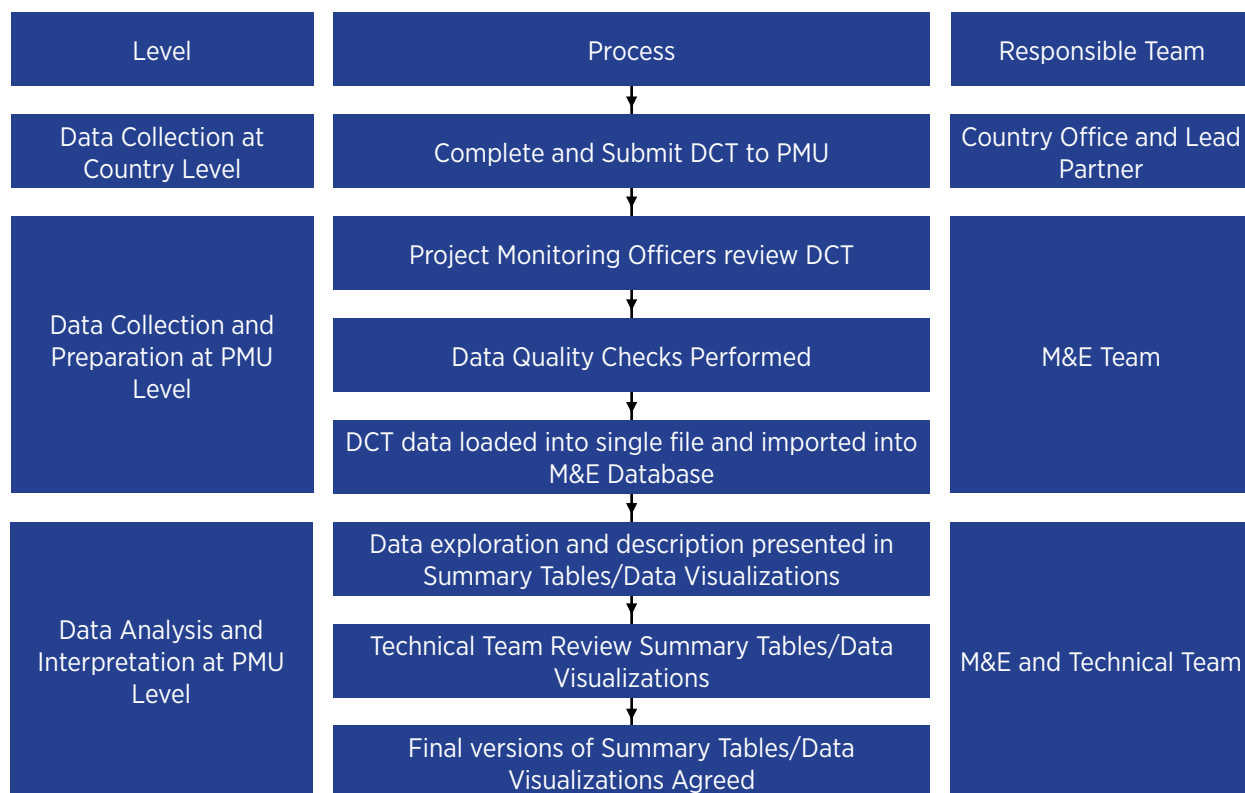
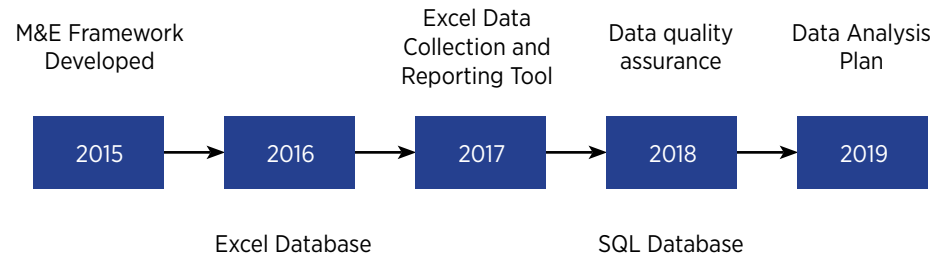


Figure 5 depicts all major steps that were taken to develop and continually improve CTB M&E data collection, reporting and analysis system:

FIGURE 5. CTB M&E IMPROVEMENT PROCESS OVER TIME



## ANALYSIS PLANS

### OBJECTIVES OF MAIN ROUTINE QUANTITATIVE ANALYSIS OF CTB M&E DATABASE

The main focus of general routine analysis that was done for CTB Global Final Report is on the achievements of CTB key priority interventions in all supported countries, including case-finding, treatment, and care; Xpert scale-up; the programmatic management of drug resistant TB (PMDT) and new drugs and regimens (ND&R); and TB/HIV. The objective of this analysis was to describe trends (e.g. increase/decrease over time and place, as applicable and possible) for the aforementioned CTB indicators per country (i.e. CTB area and/or national, as applicable) or globally (i.e. for all CTB countries combined), by using routinely collected data for CTB project.

In the CTB global final report, country-specific national results for all high level population/patient level indicators are reported based on the latest WHO 2019 data (Tables 1-5, Annex 1). Data trends are based on calendar years, with 2014 as the baseline. CTB geographic area results for 2015-2019 are reported based on NTP data collected through CTB. Quantitative analysis was done by using Microsoft Excel and R (R core Team 2017).

Alongside the quantitative results, selected country-specific examples and case studies are provided in each thematic area, such as TB/HIV, to illustrate particular achievements, lessons learned, and challenges. When needed, the quantitative analysis was complemented by qualitative analysis, for which the narrative sources (e.g., country end-of-project reports) were coded for information to provide important contextual data to inform the quantitative data, e.g., for description of activities implemented across the CTB projects as well as for additional emerging themes as they appeared during analysis. Narrative sources were analyzed using QDA MINER LITE v2.0.5 software and Microsoft Excel.

## FURTHER ANALYSIS FOR CTB FINAL REPORT

In this CTB global final report, we provided a further deeper exploratory data analysis of the selected CTB key priority interventions.

The purpose of further analysis was to generate “possible evidence” of effectiveness of country-tailored package approach (i.e., simultaneous implementation of various combination of the following key interventions: contact investigations (CI), childhood TB , community referrals, active case-finding (ACF)/intensified case-finding (ICF) among key population groups, hospital engagement/ICF through FAST) in selected CTB countries in terms of the main outcome – DS/DR case-finding. In this analysis, province- or district- level notification and population data for each quarter of CTB was used to derive the notification rate per 100,000 (and the respective 95% confidence intervals) which was compared between CTB and non-CTB areas. In general, interventions supported by the NTP, GF, or other donors were equally implemented in both CTB and non-CTB areas; therefore, any differences in case notification rates observed between these areas could be due to the CTB package of interventions. This analysis was conducted across all years of CTB in order to elicit lessons for the benefit of more successful strategies for TB case finding in the future. This additional analysis employed data visualization in order to elucidate inference from data that is otherwise opaque in tabular analysis.

Criteria for including CTB countries in the deeper analysis for each key intervention include: (1) Having invested in/implemented a key intervention for at least four years between Year 1 and Year 5 (i.e. during 2015-2019); and (2) availability of high quality case notification results data (i.e. complete and accurate) for both CTB and non-CTB areas for the same period of time. We used contextual analysis to seek explanations for good performance. Note that the exploratory data analysis was mindful of the possibility of post-hoc explanations arising from the multitude of relationships explored. We judiciously employed subject area knowledge to make inferences that are generalizable and useful to others.



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