

Costing of the Sierra Leone National Strategic Plan for TB 2016-2020

Introduction

The Government of Sierra Leone established the National Leprosy Control Programme in 1973 with support from the German Leprosy Relief Association (GLRA). In 1990, Tuberculosis was integrated in the programme and thus rebranded as the National Leprosy and Tuberculosis Control Programme (NLTCP). The programme introduced and implemented the Directly Observed Treatment (DOTS) strategy which is one of the basis of Tuberculosis Control and it is currently implemented in 170 DOTS centres nationwide.

A draft National Strategic Plan (NSP) was used in informing the Transitional Funding Mechanism (TFM) for 2014-2015 and the Simplified Application Process Request 2016/17(SAP). An in-depth epidemiological analysis has been conducted by WHO as part of the SAP. Evidence based NSPs are key advocacy, fund raising, implementation and monitoring guidance tools for proper implementation of a programme.

It was as a result of the above that the National Tuberculosis and Leprosy Control Programme requested technical assistance for the development of a Comprehensive NSP 2016-2020, an operational plan and an M&E plan. All the mentioned documents have been developed but had not been costed until now. A request for technical assistance was put forth to cost the newly developed operational 2016 – 2020 which corresponds to the national TB and Leprosy Strategic Plan 2016 -2020.

Methods

The costing of this plan was done by Dr Andrew Siroka, a health economist with the Global TB Programme of the World Health Organization. Andrew worked with both the WHO country office and members of the Sierra Leone NLTCP to cost this plan. The costing was based on goals, activities, and sub-activities from three national documents: 1) the National Strategic plan, 2) The Operating plan, and 3) the Monitoring and Evaluation plan. The NLTCP provided the level of intervention coverages, as well as the drug regimens and diagnostic algorithm specific to Sierra Leone. The costs of drugs are built into the OneHealth Tool from the Global Drug Facility (GDF) and it was confirmed that these are the prices paid in Sierra Leone.

The impact of the plan on TB burden was estimated using the TIME Impact model developed by the London School of Hygiene and Tropical Medicine. The calibration of this tool to fit Sierra Leone's epidemic was done, in conjunction with Andrew, by Matt Hamilton of Avenir Health.

Both the costing and impact were done using the OneHealth Tool version 4.5. The OneHealth Tool (OHT) is a tool that was developed by the Interagency Working Group on Costing (WHO, WB, UNICEF, UNFPA, UNNAIDS) together with Futures Institute in the USA. This tool was developed in response to response by countries at the World Health Assembly. The aim of the tool is to provide a joint platform for costing of all disease programmes and health system requirements so as to reduce the 'tool burden' on countries for costing. Its additional advantages are that it provides a platform that allows ongoing interaction between planning and costing. It is also able to provide estimates of the likely return on investment in the health system in terms of the likely effect of investment on maternal mortality rate, infant mortality rates, deaths averted and the gain in life years.

This tool uses a bottom-up ("ingredients") costing approach. This approach identifies the inputs necessary for an activity or service. Once the inputs are identified, the quantities of the inputs are determined. Unit costs for each input are imputed to the inputs and a total cost for the input is determined according to the equation:

$$\text{cost of services} = \text{number of service} * \text{unit cost of the service}$$

Where the number of services required in the tool are determined using the formula:

$$\text{number of services} = \text{target population} * \text{population in need} * \text{coverage}$$

Costs within the tool are broken into two main categories: intervention costs and programme costs. Intervention costs directly scale up with the number of patients receiving a service, such as the cost of microscopy for diagnosis. Programme costs are less linked to the exact number of patients and often represent expenses that would be incurred independent of the exact level of TB burden. Examples of programme costs are the salaries of NLTCP staff and the cost of meetings and trainings. All trainings that lasted one full day or more were assumed to cost US\$ 150 per trainee per day to cover travel, food, and per diem. Smaller meetings that do not require per diems were costed at US\$ 7 per day per participant.

Costs were determined in both local currency (Leones) and in US dollars and the exchange rate used was 7000 SLL to 1 USD. Costs were adjusted for a 2% annual inflation of US dollars and intervention coverages were interpolated using an “S-shaped” curve. Both intervention and programme costs can be explored in more detail by using the OneHealth projection file.

Total costs

Table 1. Total costs for TB programme 2016-2020, US\$

	2016	2017	2018	2019	2020	Total
Intervention costs	\$744 910	\$870 029	\$949 380	\$1 426 226	\$1 599 984	\$5 590 530
Programme costs	\$3 041 043	\$3 067 629	\$4 109 023	\$4 591 975	\$5 942 326	\$20 751 996
Total costs	\$3 785 953	\$3 937 658	\$5 058 403	\$6 018 201	\$7 542 310	\$26 342 526

The total cost of this national strategic plan is estimated at US \$26.3 million over the period 2016-2020. Costs increase each year as the interventions scale up ambitiously (see Annex 1) from US\$3.8 million in 2016 to \$7.5 million in 2020. 21% of total costs are intervention costs and the remaining 79% of total costs are programme costs. Major cost drivers are microscopy, second-line drug treatment, the expansion of Gene Xpert, training, staff, and diagnostic centre expansion/refurbishment.

Intervention costs

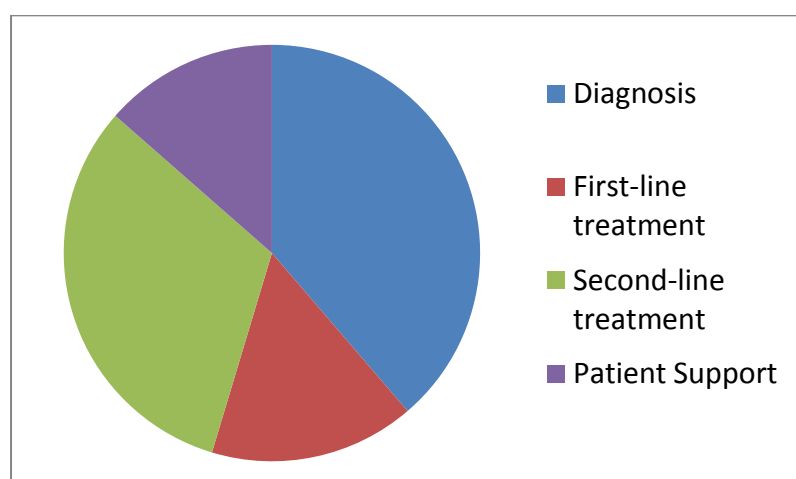
Table 2. Intervention costs 2016-2020, US\$

	2016	2017	2018	2019	2020
Microscopy	\$162 773	\$160 106	\$235 302	\$313 620	\$343 534
Culture	\$0	\$2 275	\$9 735	\$17 492	\$20 256
DST	\$0	\$1 775	\$7 594	\$13 645	\$15 802
Xpert (molecular)	\$33 176	\$64 162	\$163 704	\$265 994	\$301 832
TB x-rays	\$3 736	\$3 811	\$3 887	\$3 965	\$4 044
First-line TB treatment	\$166 742	\$170 942	\$177 180	\$183 599	\$188 189
MDR TB treatment	\$0	\$80 869	\$345 991	\$621 686	\$719 938
Other	\$378 483	\$386 089	\$5 987	\$6 226	\$6 388
Total	\$744 910	\$870 029	\$949 380	\$1 426 226	\$1 599 984

The intervention costs alone increase from US\$ 744 910 in 2016 to almost US\$ 1.6 million in 2020. The introduction of drug-susceptibility testing (DST), expansion of Gene Xpert, and the treatment of MDR-TB are the major improvements outlined in the national strategic plan and largely explain this increase. There were an estimated 432 MDR-TB cases in the country in 2015 and none of them are receiving second-line drug treatment due to limited diagnostic capacity. In order to address this gap, Gene Xpert machines must be acquired (shown as a programme cost) and staff must be trained on how to use them. With this scale up in MDR-TB treatment, the accompanying cost would account for almost half (43.6%) of all intervention costs by 2020. The large share of this cost is due to the price of second-line drugs, with the regimen costing on average US\$ 1 125 per patient, compared with US\$12.65 for first-line treatment. This second-line drug cost regimen assumes the majority of patients will be treated with a short regimen. Details of the exact regimen and proportion of second-line patients receiving each are available in the accompanying OneHealth Tool projection file.

The “Other” category above is primarily composed of patient support. Sierra Leone currently offers 100% of TB patients nutritional support, in the form of food packages, during their intensive phase of treatment. This programme, run through a partnership with the World Food Programme, costs the NLTCP US\$ 29.83 per patient but will not continue after 2017. The category also includes some costs for TB/HIV collaborative activities although the HIV programme covers the cost of both IPT and CPT and thus these costs were excluded from this costing. Figure 1 shows the breakdown of intervention costs by broad programme area for the period 2016-2020.

Figure 1. Breakdown of intervention costs into programmatic areas



Programme costs

Table 3. Programme costs 2016-2020, US\$

	2016	2017	2018	2019	2020	Total
Programme-Specific Human Resources	\$608 868	\$1 032 309	\$1 059 198	\$1 086 749	\$1 114 979	\$4 902 103
Training	\$496 600	\$523 974	\$1 031 505	\$1 143 823	\$678 793	\$3 874 695
Supervision	\$3 951	\$4 772	\$6 060	\$6 158	\$4 431	\$25 373
Monitoring and Evaluation	\$8 000	\$18 870	\$16 646	\$16 979	\$2 186 513	\$2 247 009
Infrastructure and Equipment	\$1 646 114	\$1 272 066	\$1 156 521	\$1 195 970	\$1 243 194	\$6 513 865
Transport	\$15 600	\$149 634	\$110 595	\$61 975	\$65 487	\$403 290
Communication, Media & Outreach	\$6 600	\$4 488	\$58 887	\$75 346	\$4 763	\$150 083
General Programme Management	\$7 010	\$7 150	\$12 495	\$7 439	\$7 588	\$41 682
Other	\$248 300	\$54 366	\$657 117	\$997 536	\$636 578	\$2 593 897
Total	\$3 041 043	\$3 067 629	\$4 109 023	\$4 591 975	\$5 942 326	\$20 751 996

A core component of the national strategic plan is training. There are ambitious plans in place to train staff at all levels of TB care, including partners in HIV, education, and the private sector. Lab staff will be trained on new techniques (Gene Xpert, DST, and culture), and a special emphasis will be made to train community health workers on childhood TB and MDR-TB. There will also be an increase in the number of staff members of the NLTCP, including the recruitment of an epidemiologist and two technical officers.

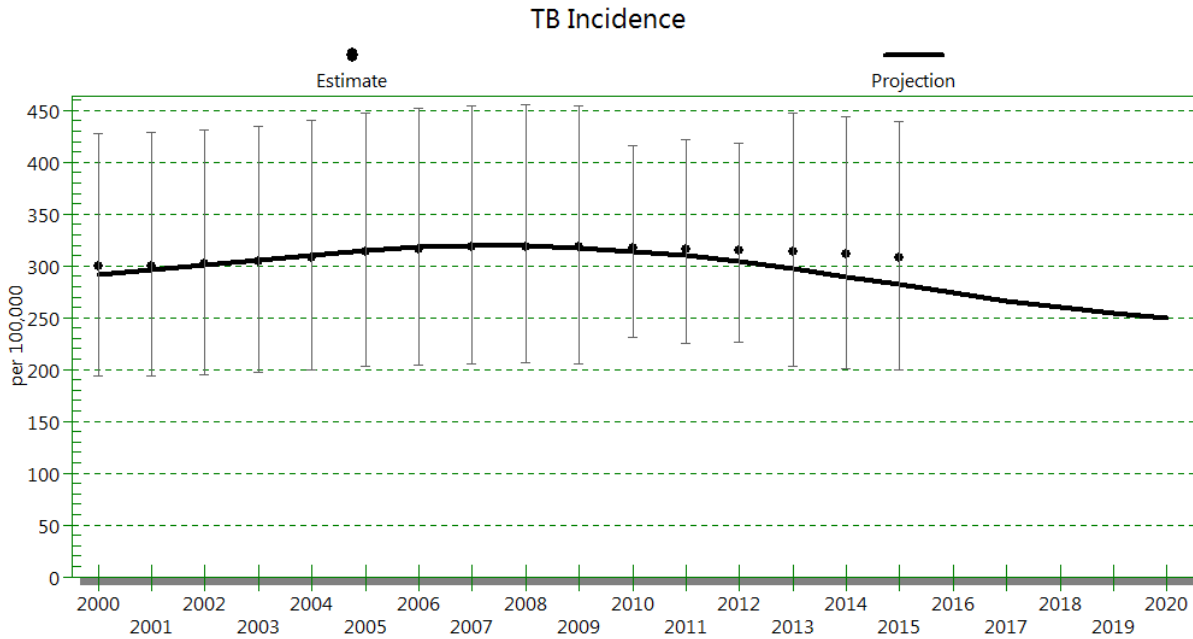
The plan also includes the establishment of 30 new laboratories and the renovation of 170 existing diagnostic centres. Overall improvements to infrastructure and equipment account for almost one third of total programme costs at US\$ 6.5 million over the five year timeframe.

The reason for the large jump in monitoring and evaluation costs in 2020 is the planning of Sierra Leone's first national TB prevalence survey for that year. This survey is estimated to cost US\$ 2 million excluding technical assistance, which is a conservative estimate based on other surveys previously done in Africa. Lastly, the NLTCP plans to acquire 3 new vehicles and 28 new motorbikes by 2020.

Impact

The TIME model predicts a 19% decline in incidence by 2020, compared to the 2015 level (308/100,000 to 249/100,000). This is nearly in line with End TB strategy milestone of a 20% decrease in incidence by 2020. Further calibration would be needed to get more precise estimates for trends in notification, prevalence, mortality etc.

Figure 2. TB incidence per 100,000 as estimated by the TIME impact model



Annex 1. Intervention coverages*

Intervention	2016	2020
TB diagnosis: Microscopy		
Diagnosis microscopy: Passive TB case finding	99	89
Diagnosis microscopy: Active TB case finding	0	100
Diagnosis microscopy: Household contact tracing	0	100
Diagnosis microscopy: HIV positive cases	100	0
TB diagnosis: Culture		
Monitoring culture: Test to monitor second-line treatment for RR-/MDR-TB	0	100
TB diagnosis: Culture and DST		
Drugs susceptibility testing for second line TB drugs	0	100
TB diagnosis: Xpert (molecular)		
Initial diagnosis Xpert: Presumptive TB cases	2	10
Initial diagnosis Xpert: HIV+ cases	10	100
Initial diagnosis Xpert: Child cases	0	5
Initial diagnosis Xpert: Extra pulmonary	0	100
RR-Diagnosis Xpert: Resistance testing for new smear positive cases	0	10
RR-Diagnosis Xpert: Resistance testing for previously treated	0	100
First-line TB treatment		
First-line TB treatment: Initial treatment	95	100
CPT therapy for HIV+ TB cases	68	100
MDR and XDR TB		
Second-line treatment	0	100
XDR treatment	0	100
Collaborative TB and HIV/AIDS interventions		
HIV testing and counseling for TB patients	95	100

*Table only shows interventions that undergo a change in coverage during the 2016-2020 timeframe.

Annex 2. Detailed intervention costing, US\$

Intervention	2016	2017	2018	2019	2020
TB diagnosis: Microscopy					
Diagnosis microscopy: Passive TB case finding	129 630	104 505	102 445	100 260	100 914
Diagnosis microscopy: Active TB case finding	0	12 736	54 492	97 912	113 386
Diagnosis microscopy: Household contact tracing	0	11 326	48 532	87 341	101 295
Diagnosis microscopy: HIV positive cases	7 332	5 212	2 980	715	0
Monitoring microscopy: Test to monitor first-line drug treatment, new bacteriologically confirmed cases	23 569	24 040	24 521	25 012	25 512
Monitoring microscopy: Test to monitor first-line drug treatment, previously treated cases	2 242	2 287	2 333	2 380	2 427
TB diagnosis: Culture					
Monitoring culture: Test to monitor second-line treatment for RR-/MDR-TB	0	2 275	9 735	17 492	20 256
TB diagnosis: Culture and DST					
Drugs susceptibility testing for second line TB drugs	0	1 775	7 594	13 645	15 802
TB diagnosis: Xpert (molecular)					
Initial diagnosis Xpert: Presumptive TB cases	25 393	38 251	79 257	121 889	137 432
Initial diagnosis Xpert: HIV+ cases	7 783	15 915	41 678	67 257	75 407
Initial diagnosis Xpert: Extra pulmonary	0	8 205	35 104	63 075	73 044
RR-Diagnosis Xpert: Resistance testing for new smear positive cases	0	1 046	4 473	8 038	9 308
RR-Diagnosis Xpert: Resistance testing for previously treated	0	746	3 192	5 735	6 641
TB x-rays					
Screening X-rays: Passive TB case finding	3 736	3 811	3 887	3 965	4 044
First-line TB treatment					
First-line TB treatment: Initial treatment	135 199	138 769	144 363	150 126	154 046
First-line TB treatment: Previously treated	31 543	32 173	32 817	33 473	34 143
MDR and XDR TB					
Second-line treatment	0	93 116	398 388	715 833	828 965
XDR treatment	0	31 194	133 463	239 810	277 710
TB patient support					
Patient support for new cases	345 193	352 097	359 139	366 321	373 648
Patient support for previously treated cases	15 840	16 157	16 480	16 809	17 145
Patient support for MDR and XDR cases	11 844	12 081	12 322	12 569	12 820
Collaborative TB and HIV/AIDS interventions					
HIV testing and counseling for TB patients	5 607	5 755	5 987	6 226	6 388
Total	744 910	913 470	1 523 180	2 155 883	2 390 334