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The Cost of Scaling Up TB Services in Indonesia

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msh Management Sciences for Health

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Abstract

Indonesia has made great strides in expanding Tuberculosis (TB) control over the last few years, with significant assistance from donors, such as the Global Fund against Acquired Immune Deficiency Syndrome (AIDS), TB and Malaria (GFATM) and the United States Agency for International Development (USAID). While there are presently substantial external funds for the Human Immunodeficiency Virus (HIV)/AIDS, TB and Malaria health programs, these are likely to diminish greatly over the coming years. The government is developing an exit strategy which aims to eliminate dependency on these grants and which focuses on increasing government budget allocations, generating revenue from insurance and corporate social responsibility financing, and improving cost-effectiveness and efficiency.

Projections of service delivery costs at both national and sub-national levels are essential for this strategy to be successful. To develop such cost projections for TB services a tool was developed and was used in Central Java, a province with around 32 million people. The data collected was then used to estimate the costs for the whole country.

The results indicate that the approximate cost of the resources needed for the country to reach its targets of treating 364,963 TB cases and 1,692 Multi-Drug Resistant Tuberculosis (MDR-TB) cases in 2014 would be USD 100 million and this figure would rise to $118 million (excluding inflation) in 2016 as the targets increase.

Based on the above figures the average cost per TB case treated in 2014 would be USD 228 and the average cost for an MDR-TB patient who starts treatment in 2014 would be USD 10,027. The average cost per capita would be 41 US cents which can be compared with the economic burden of TB in Indonesia, which is around USD 8 per capita, indicating that investment in TB detection and treatment is worthwhile.

The costs are based largely on the use of standard prices, as well as some budget figures that were obtained from a small sample of districts and facilities in Central Java. They represent the estimated operating resources required to provide good quality services. They only cover service delivery and district management costs including indirect costs, and do not include any additional costs related to TB/HIV. The costs provided by this study are probably underestimates of the total resources required to achieve the National Tuberculosis Control Program's (NTP) treatment targets. However, those targets are quite ambitious, especially for MDR-TB, and from that respect the costs could be overestimates. Due to these factors and the small sample of districts and facilities that was used for a few of the costs the results should, be regarded as indicative and more suited for policy and planning purposes rather than for detailed budgeting.

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Key Words
TB, MDR-TB, costing, scale-up, Global Fund, exit strategy.

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ACRONYMS

AIDS	Acquired Immune Deficiency Syndrome
ATM	HIV/AIDS, Tuberculosis, and Malaria
DOTS	Directly Observed Therapy, Short-course *(the Internationally Recommended Standard for Tuberculosis Control)*
FDC	Fixed Dose Combination
GFATM	Global Fund to Fight AIDS, TB and Malaria
HBC	High TB Burden Country
HIV	Human Immunodeficiency Virus
HR	Human Resources
ISTC	International Standards for Tuberculosis Care
KNCV	*Koninklijke Nederlandse Centrale Vereniging tot bestrijding der Tuberculosis*
M&E	Monitoring and Evaluation
MDR-TB	Multi-Drug Resistant Tuberculosis
MOH	Ministry of Health
MSH	Management Sciences for Health
MT-NDP	Medium Term National Development Plan
NTP	National Tuberculosis Control Program
TB	Tuberculosis
TB CARE I	Tuberculosis CARE I Program
TBCTA	Tuberculosis Coalition for Technical Assistance
USAID	United States Agency for International Development
WHO	World Health Organization
XDR-TB	Extremely Drug-Resistant Tuberculosis

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RINGKASAN EKSEKUTIF (Bahasa Indonesia)

Indonesia merupakan salah satu negara dengan beban TB terbesar di dunia, yang dikarenakan oleh besarnya jumlah penduduk Indonesia yang mencapai lebih dari 240 juta jiwa. Beban ekonomi yang ditanggung oleh negara sangat signifikan – USD 2 milyar terkait dengan jumlah orang yang terinfeksi TB setiap tahunnya. Meskipun menghadapi banyak tantangan, Indonesia telah melakukan kemajuan besar dalam menanggulangi TB. Berbagai upaya Telah dilakukan oleh Program Pengendalian Tuberculosis Nasional, Kementerian Kesehatan (NTP) dan dengan dukungan dari para donor, terutama Global Fund against AIDS, TB and Malaria (GFATM) dan *United States Agency for International Development*(USAID).

Dukungan dana dari Donor, bagaimanapun diperkirakan akan berkurang pada beberapa tahun mendatang akibat dari membaiknya ekonomi Indonesia. Namun disisi lain diperlukan perhatian yang besar bahwa hal ini menjadi hambatan atau bahkan akan mengalami kemunduran, jika tidak tersedia dana yang adekuat. Oleh sebab itu Pemerintah Indonesia tengah mengembangkan *exit strategi* jangka panjang yang bertujuan untuk mengeliminasi ketergantungan terhadap dana donor dan fokus untuk meningkatkan alokasi-alokasi anggaran pemerintah, mengembangkan pendapatan dari asuransi dan pembiayaan tanggung jawab sosial perusahaan (*corporate social responsibility*/CSR) serta meningkatkan efektifitas biaya (*cost effectiveness*) dan efisiensi.

Dalam rangka memfasilitasi pengembangan dan implementasi *exit strategy* untuk TB, diperlukan pemahaman yang lebih baik terhadap biaya yang terjadi saat ini dan yang akan datang, sehingga kebutuhan dana domestik dapat disediakan serta dapat diidentifikasikannya area-area dimana efisiensi dan efektivitas biaya kemungkinan bisa tercapai.

Untuk mendukung NTP dalam menganalisa dan memproyeksikan biaya, telah dikembangkan sebuah alat penghitungan biaya yang sederhana, mudah digunakan (*user friendly*) untuk digunakan oleh pengelola program ditingkat nasional, provinsi dan kabupaten/ kota. Alat tersebut dikembangkan atas permintaan dari NTP yang disebabkan oleh tidak tersedianya alat yang cocok untuk dipergunakan di provinsi dan kabupaten, dan alat tersebut telah di uji cobakan di Provinsi Jawa Tengah, provinsi yang cukup besar dengan jumlah penduduk sebesar 32 juta jiwa. Model ini kemudian digunakan untuk mengestimasi biaya proyeksi untuk seluruh wilayah di Indonesia.

Asumsi-asumsi yang digunakan dalam alat ini adalah berdasarkan jumlah aktual dari pelayanan yang disediakan pada tahun 2011, 2012, dan 2013 dan target pada pada tahun-tahun berikutnya. Harga dan biaya satuan (*unit cost*) didasarkan pada data pengeluaran sebenarnya dari beberapa sample fasiltas kesehatan, dinas kesehatan kabupaten dengan menggunakan biaya normatif.

Berdasarkan data yang telah diambil, insidensi TB akan berkurang secara bertahap setiap tahunnya, sedangkan angka temuan akan terus bertambah. Efek dari perubahan ini menjadi minimal dengan meningkatnya jumlah penduduk dan hasilnya akan diproyeksikan meningkat dalam hal jumlah penanganan kasus dari 321.411 pada tahun 2011, 364.963 pada tahun 2014, dan 411.403 pada tahun 2016. NTP memperkirakan jumlah kasus baru MDR-TB turun setiap tahunnya, sementra angka deteksi

dan pengobatan kasus akan meningkat, yang diproyeksikan dari 255 pada tahun 2011 menjadi 1.692 pada tahun 2014 dan 2.640 in 2016.

Berdasarkan atas asumsi-asumsi terhadap insidensi dan pengobatan ini, perkiraan biaya rutin dibutuhkan negara untuk mencapai targetnya pada tahun 2014 adalah USD 100 juta (tidak termasuk inflasi) (USD 83 juta untuk kasus TB dan USD 17 juta untuk kasus MDR-TB). Hal ini akan meningkat menjadi total USD 118 juta pada tahun 2016 (tidak termasuk inflasi), (USD 92 juta untuk kasus TB dan USD 26 juta untuk kasus MDR-TB). Harus dicatat bahwa angka ini tidak sesuai dengan angka tahun anggaran karena mereka memasukkan seluruh biaya pengobatan MDR-TB untuk pasien yang memulai pengobatan setiap tahun dan biaya ini sebenarnya timbul selama tiga tahun anggaran.

Dalam hal komponen biaya program pada tahun 2014, USD 42 juta (43%) akan diperlukan untuk pelayanan, USD 23 juta (23%) untuk diagnosis dan USD 22 juta (18%) untuk obat. Biaya pendukung pasien MDR-TB dimasukkan didalam angka pelayanan yang berjumlah total USD 3,4 juta untuk pasien MDR-TB yang memulai pengobatan pada tahun 2014 dan akan meningkat menjadi USD 5,4 juta per pasien yang memeulai pengobatan pada tahun 2016. Sebagai catatan bahwa ini juga muncul dalam 24 bulan.

Angka diatas termasuk biaya tidak langsung yang besarnya sekitar 31% dari total biaya pada tahun 2014. Dalam hal total biaya langsung dan tidak langsung, 56% berada di tingkat puskesmas, 34% di rumah sakit dan 10% di dinas kesehatan kabupaten/ kota.

Biaya rata-rata untuk deteksi, diagnosis dan pengobatan seorang pasien TB yang memulai pengobatan pada tahun 2014 adalah USD 228, biaya rata-rata per kasus yang berhasil diobati sebesar USD 253 dan biaya rata-rata per kasus sembuh sebesar USD 272. Biaya rata-rata pasien TB-MDR yang memulai prngobatan pada tahun 2014 sebesar USD 10.027 dan biaya rata-rata per kasus yang berhasil diobati sebesar US$ 13.370 dan biaya rata-rata untuk pasien yang berhasil disembuhkan adalah USD 14.325. Biaya rata-rata pengobatan MDR-TB jauh lebih tinggi daripada biaya ratarata TB, terutama karena durasi pengobatan yang lebih lama dari 24 bulan dan biaya obat-obatan yang lebih tinggi.

Biaya rata-rata perkapita pada tahun 2014 adalah 41 sen USD, tergantung kepada total jumlah penduduk. Angka ini dapat dibandingkan dengan beban ekonomi TB di Indonesia, yang lebih dari USD 8 perkapita, mengindikasikan bahwa investasi dalam deteksi dan pengobatan TB sangat berharga.
Angka diatas termasuk biaya tidak langsung yang besarnya sekitar 29% dati total biaya pada tahun 2013.

Angka diatas tidak termasuk biaya deteksi kasus aktif, hanya penelusuran kontak, karena ini tidak dilakukan di provinsi. Hasil ini mengindikasikan bahwa hanya sekitar 1% atau 2% dari sumberdaya yang dialokasikan untuk deteksi kasus dan mengingat tingginya biaya untuk diagnosis dan pengobatan MDR-TB, perlu perhatian untuk meningkatakan pengeluaran diarea ini, terutama untuk deteksi kasus MDR-TB.

Total biaya sebagian besar berdasar pada penggunaan harga standard, demikian juga dengan angka anggaran yang diambil dari fasilitas sampel. Sebagian besar mempresentasikan biaya estimasi dari

sumberdaya yang diperlukan untuk memberikan layanan dengan kualitas bagus untuk target jumlah orang dengan TB dan MDR-TB.

Angka ini hanya meliputi biaya pemberi layanan dan tidak memperhitungkan biaya tambahan yang terkait dengan TB anak, TB/HIV atau XDR-TB. Juga tidak memasukkan biaya kapital, biaya program di provinsi dan nasional, biaya enabler pasien atau biaya pasien dan kemungkinan juga tidak memasukkan semua biaya operasional dan administrasi. Sehubungan dengan hal ini dan juga dengan adanya keterbatasan lainnya, biaya yang disajikan dalam study ini kemungkinan lebih rendah dari estiamsi total sumberdaya yang diperlukan untuk mencapai target pengobatan NTP. Namun, target-target tersebut cukup ambisius, terutama untuk MDR-TB, dan mengingat hal tersebut, biaya-biaya bisa diatas estimasi. Oleh sebab itu, hasil-hasil ini dianggap sebagai indikatif dan lebih cocok untuk keperluan kebijakan dan perencanaan, bukan untuk penganggaran secara rinci.

EXECUTIVE SUMMARY (English version)

Indonesia is one of countries with the largest TB burden in the world, largely due to Indonesia's population of more than 240 million people. The economic burden of TB to the country is significant – for example over 2 billion USD for the people who developed active TB in 2011. Acknowledging the burden, Indonesia has made great progress in combatting TB, thanks largely to the efforts of the National Tuberculosis Control Program (NTP) and with considerable assistance from donors, primarily the Global Fund against AIDS, TB and Malaria (GFATM) and the United States Agency for International Development (USAID).

Donor funding is, however, expected to diminish over the coming years due to improvements in the Indonesian economy and there are concerns that progress in tackling TB can be hampered, or even reversed, if adequate funding is not provided. The Government of Indonesia is, therefore, developing a long-term exit strategy which aims to eliminate dependency on donor funding and focuses on increasing government budget allocations, generating revenue from insurance and corporate social responsibility financing and improving cost-effectiveness and efficiency of TB services.

To facilitate the development and implementation of the exit strategy for TB, it is necessary to have a good understanding of the cost of current and future services at all levels so that the necessary domestic funding can be provided and areas can be identified where greater efficiency and cost-effectiveness might be achieved.

To assist the NTP to analyze and project service delivery costs, a simple, user-friendly costing tool was developed for use by national, district and provincial program managers. The tool was developed at the request of the NTP because there was no existing tool suitable for sub-national levels, and it was tested in Central Java, a large province with 32 million people. The resulting model was then used to estimate the projected costs for the whole country.

The assumptions used in the tool were based on actual numbers of services provided in 2011, 2012 and 2013 and targets for following years. Prices and unit costs were based on actual expenditure data from a small sample of facilities and district offices and on normative costs.

The national targets assume that the incidence rates for TB will reduce slightly each year and the treatment rates will increase slightly. The net effect of these will be offset somewhat by population increases and the result will be a projected increase in the number of treated cases from 321,411 in 2011 to 364,963 in 2014 and 411,403 in 2016. The NTP expects the numbers of new MDR-TB cases to decline each year and expects detection and treatment levels to rise, resulting in a projected increase in the number of treated cases from 255 in 2011 to 1,692 in 2014 and 2,640 in 2016.

Based on these incidence and treatment assumptions the approximate cost of the recurrent resources needed for the country to reach its TB and MDR-TB targets in 2014 would be USD 100 million (excluding inflation) (USD 83 million for TB cases and USD 17 million for MDR-TB cases). This would increase to a total of USD 118 million in 2016 (excluding inflation), (USD 92 million for TB cases and USD 26 million for

MDR-TB cases). It should be noted that these figures would not match with budget year figures since they include the full costs of MDR-TB treatment for patients who start treatment each year and these costs are actually incurred over three budget years.

In terms of program components for 2014 cases, USD 42 million (43%) would be needed for treatment monitoring, USD 23 million (23%) for diagnosis and USD 22 million (18%) for treatment. MDR-TB patient enabler costs are included in treatment monitoring figures amounting to a total of USD 3.4 million for MDR-TB patients who started treatment in 2014 and would rise to a total of USD 5.4 million for patients who start treatment in 2016. Note that these are also incurred over 24 months.

The above figures include indirect costs which come to around 31% of total costs in 2014. In terms of total direct and indirect costs, 56% would be managed at the health center level, 34% at the hospital level and 10% at the district health office level.

The average unit cost of detecting, diagnosing and treating a TB patient who started treated in 2014 would be USD 228, the average cost per case successfully treated would be USD 253 and the average cost per case cured would be USD 272. The average unit cost for an MDR-TB patient who started treated in 2014 would be USD 10,027, the average cost per case successfully treated would be USD 13,370 and the average cost per patient cured would be USD 14,325. The unit cost of treating MDR-TB is much higher than the unit cost of TB, primarily because of the longer treatment period of 24 months and the higher cost of medicines.

The average cost per capita in 2014 would be 41 US cents, based on the total population. This figure can be compared with the economic burden of TB in Indonesia, which is over USD 8 per capita, indicating that investment in detecting and treating TB is worthwhile.

These figures do not include the cost of active case detection, only contact tracing, since this is not carried out in the province. The results indicate that around 1% or 2% of the resources are allocated to case detection and, given the high cost of diagnosing and treating TB and MDR-TB, this should be reviewed to see if it is sufficient.

The total costs are based largely on the use of standard prices, as well as some budget figures that were obtained from a small sample of districts and facilities in Central Java. They, therefore, mainly represent the estimated cost of the resources required to provide good quality services to the target numbers of persons with TB and MDR-TB.

The figures only cover provider costs and do not take into account any additional costs related to childhood TB, TB/HIV or Extremely Drug-Resistant Tuberculosis (XDR-TB). They also do not include capital costs, provincial and national program costs, community and civic society organization costs, or patient costs and they probably do not include all operating and administrative costs. Due to these factors and other limitations, the costs provided by this study are probably underestimates of the total resources required to achieve the NTP's treatment targets. However, those targets are quite ambitious,

especially for MDR-TB, and from that respect the costs could be overestimates. Due to these factors and the small sample of districts and facilities that was used for a few of the costs the results should, be regarded as indicative and more suited for policy and planning purposes rather than for detailed budgeting.

The tool has already been used for projecting costs in Central Java and will be useful to all provinces and districts for advocating for resources, allocating resources effectively and using them efficiently, and for comparing performance across provinces and districts. The NTP's proposal to make the tool an official MSH tool and to train national researchers as trainers to roll it out is worthy of support.

1. INTRODUCTION

With an estimated 370 to 540 thousand TB cases in 2010, Indonesia is one of the countries with the largest TB burden in the world.[1] This is largely due to Indonesia's sizeable population of more than 240 million people. TB prevalence in Indonesia is estimated at 289 per 100,000 people and the country has been designated by the World Health Organization as one of twenty-two High TB Burden Countries (HBCs). In additional to first-line TB there is a growing problem of Multi-Drug Resistant-TB (MDR-TB), comprising approximately 2% of all new TB cases and 17% of retreatment TB cases. TB has a high impact on society, as well as on families - the economic burden relating to persons who develop active TB each year is estimated at around USD 2 billion[2], which comes to 0.25% of the GDP of around USD 800 billion.[3]

The high TB burden and difficulties of geographic access in Indonesia have posed significant challenges to controlling TB. Out of the existing 482 districts in Indonesia, 138 are officially recognized by the government as underserved districts, mostly in remote areas. Other access challenges exist among the urban poor. Decentralization was implemented in 2001, and this had a large impact on the national health system. Districts were given full discretion in prioritizing sectors for development. In some cases, there has been low commitment from local governments towards health funding in general, and TB in particular, resulting in sub-optimal implementation of Directly Observed Therapy, Short-course (DOTS) and inadequate human resources (HR).[4] Other major challenges relate to MDR-TB, where a high defaulter rate and the irrational use of second-line drugs have contributed to increased numbers of cases.

Despite these challenges, Indonesia has also made great progress in combatting TB. Treatment protocols, according to international standards (ISTC), have been rolled out nationally, including diagnosis and treatment of MDR-TB in five provincial hospitals. Specific guidelines have been developed for internal and external linkages between hospitals, clinics and DOTS providers; as well as for TB-HIV. The use of fixed dose combination drugs (FDCs) has been expanded to all provinces. Cutting edge diagnostic technology, such as GeneXpert for MDR-TB, has recently become available in some sites.

Indonesia's progress in expanding TB control over the last few years was made through the commendable efforts of the National Tuberculosis Control Program (NTP), with considerable assistance from donors, primarily the Global Fund against AIDS, TB and Malaria (GFATM) and the United States Agency for International Development (USAID). The World Health Organization (WHO) TB World Report estimates that, in 2012, 74% of TB control program funding was supplied by the GFATM, with 26% coming from domestic sources. These findings are particularly significant when compared with other

[1] Global tuberculosis control: WHO report 2011. Available at: http://www.who.int/tb/publications/global_report/en/
[2] Collins, D., F. Hafidz and C. Suraratdecha. 2013.The Economic Burden of Tuberculosis in Indonesia. TB CARE I - Management Sciences for Health.
[3] 2011 per World Bank.
[4] WHO Indonesia Country TB Profile. Available at: http://www.searo.who.int/en/Section10/Section2097/Section2100_14798.htm

high TB burden countries. For example, the proportion of funding from domestic sources in India, China and South Africa for TB control is 62%, 69% and 100%, respectively.

While there are presently substantial Global Fund grants for the HIV/AIDS, TB and Malaria programs, improvements in the Indonesian economy mean that these grants are likely to diminish over the next few years. The government is developing a long-term exit strategy which aims to eliminate dependency on these grants and which focuses on increasing government budget allocations, generating revenue from insurance and corporate social responsibility financing, and improving cost-effectiveness and efficiency of TB services.[5]

To facilitate the development and implementation of the exit strategy for TB, it is necessary to have a good understanding of the cost of current and future services at all levels so that the necessary domestic funding can be provided and areas can be identified where greater efficiency and cost-effectiveness might be achieved.

To assist the NTP to analyze and project service delivery costs, a simple, user-friendly costing tool was developed for use by national, district and provincial program managers. The tool was developed at the request of the NTP because there was no existing tool suitable for sub-national levels, and it was tested in Central Java, a large province with 32 million people.

2. METHODOLOGY

Costing model

The TB program costs were modeled using a tool developed in Microsoft Excel, called the TB Services Costing Tool[6]. The tool was developed for use by program managers and was designed to be as simple and user-friendly as possible. This means that some of the assumptions and relationships were deliberately somewhat simplistic. The tool was tested in Central Java and those results can be found in a separate report[7].

Some elements of the WHO TB Planning and Budgeting Tool[8] were incorporated into the tool. The new tool analyzes program costs based on the national TB treatment algorithm, which comprises the following components: Case Finding, Diagnosis, Treatment, Treatment Monitoring, and Other TB Program Activities (which includes activities such as TB-related meetings and trainings). The algorithm was developed following the ISTC (International Standards of TB Care).[9]

[5] Collins, D and A. Parihatin. 2011. *Indonesia National Tuberculosis Program: Planning for Financial Sustainability*. Management Sciences for Health. USAID/TB CARE I.
[6] The tool used for Central Java was Version, 1.1. That version was modified for the national study and was named Version 1.2.
[7] The Cost of Scaling Up TB Services in Central Java, Indonesia, MSH, September, 2012.
[8] This WHO tool was tested previously at the district level but was deemed by the MOH to be not appropriate for use at provincial or district levels as it contains a lot of program cost elements that are not relevant at that level.
[9] Tuberculosis Coalition for Technical Assistance (TBCTA). International Standards for Tuberculosis Care (ISTC). The Hague: Tuberculosis Coalition for Technical Assistance, 2006.

The tool has space for 10 years of data. Ideally the first 3 years should be used for actual numbers of treatments and costs and the remaining years for projections. The user can, however, select fewer actual and fewer projected years.

It produces total TB program costs, cost per case treated and cured, cost per program element, and cost per resource type (staff, medicines etc.). Results can be shown with or without inflation.

It uses several key inputs, including:

- Population data
- Epidemiological, notification and treatment assumptions
- Numbers of districts managing TB programs
- Numbers of facilities and communities treating TB
- Types of staff and amounts of time required
- Quantities of consultations and tests
- Quantities of medicines and laboratory reagents
- Salaries and prices of medicines, reagents etc.
- Indirect costs

The tool uses a bottom-up approach (also known as micro-costing). This is done by determining first the standard costs associated with each component of the TB treatment algorithm. For example, the cost of diagnosing TB using sputum smear is based on the recurrent costs of the labor and reagents required for analyzing one sputum smear. This unit cost is then multiplied by the total number of expected sputum smears needed. Prevention and promotion, case detection and supervision and management costs are based on the numbers of facilities and staff that provide TB services.

The total direct TB diagnosis and treatment costs (medicines, tests, clinical staff salaries, treatment monitoring costs, etc.) are multiplied by the number of TB cases treated to arrive at a total direct cost. Thus, the higher the case detection rate, the greater the number of TB cases that will be treated, and so the total direct costs will increase. Indirect costs relating specifically to TB, such as management, supervision and meetings, are entered separately and do not increase with numbers of patients. Overall indirect costs for district offices and facilities are allocated as a percentage of total direct costs and, thus, increase in proportion to the direct costs.

The costs relate to the diagnosis and treatment of the patients who start treatment each year. In the case of TB, where treatment takes 6 months, this means that, on average, the costs of diagnosis and treatment for patients who start treatment in a year add up to the total costs incurred in one budget year. The costs of treating MDR-TB patients are, however, different. MDR-TB patients should be under intensive treatment for 6 months and then a minimum of 18 months for continuation treatment. Continuation treatment could extent to 24 months where cases are chronic with extensive pulmonary damage. For simplicity 24 months was used in the tool, which may result in a slight under-estimation of the cost. Since MDR-TB treatment takes a minimum of 24 months, the total costs of MDR-TB treatment

are spread over three budget years[10]. For example, for an MDR-TB patient who is diagnosed and starts treatment half way through 2013, roughly 6 months costs would be incurred in 2013, 12 months costs would be incurred in 2014 and 6 months costs would be incurred in 2015 (assuming 24 months treatment). However, also in 2013, 12 months costs would be incurred for patients who started treatment in 2012 and 6 months costs would be incurred for patients who started treatment half way through 2011. So for MDR-TB cases the full treatment costs for one cohort of MDR-TB cases who start treatment in a year are shown under that year in the model but those costs are actually incurred over three budget years.

The tool estimates recurrent costs only, since these match with annual government budgets and they can also be projected automatically based on key assumptions, like numbers of treatments. Capital costs can be added separately if required. This first version of the tool does not take into account any additional costs related to TB/HIV and XDR-TB services[11]. MDR-TB patient enabler costs can be included in tool but the there is no section for costs incurred by patients.

Our normal practice would be to test the model with actual expenditure data. It is not currently feasible, however, to compile total actual TB expenditure because the information is fragmented between the different levels of government and between the government and donors, and the data is not aggregated at provincial or national levels. This may be feasible in future if National Health Accounts are fully implemented.

The tool does not have any automated links between treatment or cure rates and incidence rates. In other words there is no automatic reduction in the incidence rate based on an increase in the number of people treated and cured. Changes in incidence rates are, therefore, based on the judgment of the TB program managers.

Standard treatment, price and cost inputs

The figures used in the model reflect public sector costs and do not take into account any additional private sector costs. The TB diagnosis and treatment costs used standard drug, supply, and laboratory reagent prices provided by KNCV and the TB-CARE I Project in Indonesia (see Annex 1 for the calculation methods). Additional cost and budget data were collected from a sample of facilities and district health offices (see Annex 2) – primarily for non-treatment and other TB activities, such as contract tracing, supervision, meetings and refresher trainings. Central Java uses only passive case detection, i.e. contact tracing, and it was assumed that the same happens nationally, so no costs were included for active case

[10] The next version of the tool will include an analysis by budget year.
[11] The number of cases used in the tool includes childhood cases but, for simplicity, uses the same drug quantities and costs for childhood cases as for adult cases.

detection[12]. The estimation of some costs is based on numbers of district offices and facilities and these are shown in Annex 3.

The base year for the cost projections was 2011 because that is the year for which most of the price and budget data were available. Inflation was not taken into account in this costing since the main purpose was to show the impact of policy decisions on projected costs, which is harder to see in years further into the future as inflation has a greater effect.

3. TREATMENT ASSUMPTIONS

The assumptions for incidence and numbers of cases treated are shown in Table 1. The population of Indonesia was estimated at 236 million people in 2011 (based on Indonesia's 2010 census[13]). With an average growth rate of 1% per year, the population is expected to grow to 250 million by 2016.[14]

The incidence rate of 187 per 100,000 people for 2011 is based on the figure reported by the NTP. The incidence rates for 2012 and 2013 are a mixture of actual figures and targets and the figures for 2014 and onwards are based on NTP targets, which assume a slight reduction each year. The total number of expected new TB cases rises slightly from 442,928 in 2013 to 444,014 in 2016 because the projected decline in incidence is slightly outweighed by population growth.

In 2011, the actual number of TB cases treated was 321,411.[15] Based on that figure, the Case Detection Rate (CDR) was 72.7% and the case notification rate (CNR) was 136 per 100,000[16]. The treatment figures for the following years are based on the NTP's targeted increases in the CDR, for example, to 82.3% for 2013 and 92.7% in 2016. These translate to treatment target of 364,063 new cases in 2013 rising to 411,403 in 2016.The proportion of new TB cases deemed to be smear-positive cases is based on the NTP figure for 2011 and the breakdown across the other types of case is based on WHO figures.

The treatment success rate and cure rate were 90.3% and 83.7%, respectively, in 2011 and the figures for the following years are based on the NTP's assumption that these figures will be around 90.0% and 83.7%, respectively.

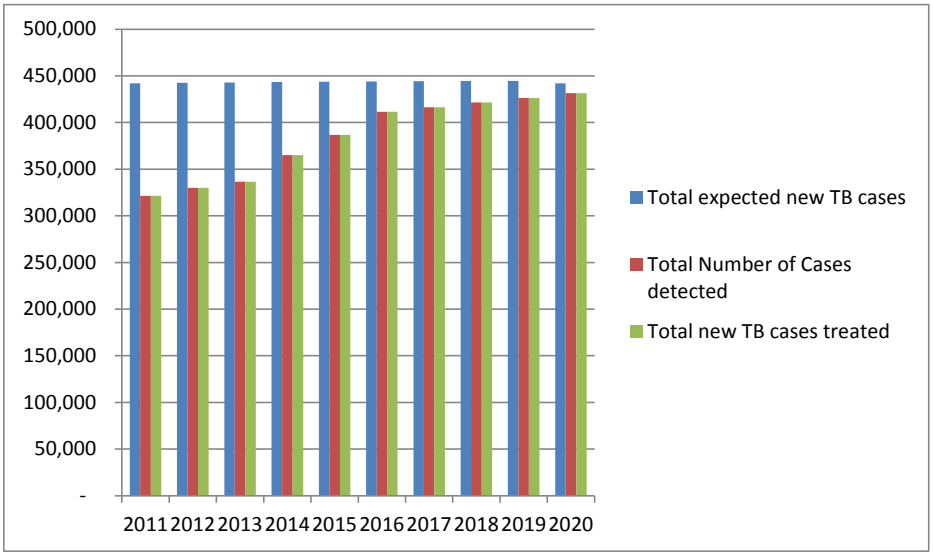
[12] The cost of contract tracing are based on information that each district health office makes an overage of 12 visits per year and each health centre makes an average of 20 visits per year.
[13] Hasil Sensus Penduduk 2010, Data Agregat per Provinsi (Indonesian Census Data by Province); Badan Pusat Statistik. Available at: http://dds.bps.go.id/eng/
[14] For simplicity only the figures for 2011 to 2016 are shown in the tables and the cost graphs, whereas the figures for 2011 through 2020 are shown in the treatment graphs.
[15] We assumed that the relapsed cases are included as part of the total numbers of cases detected which may be incorrect. Also we did not have the figures for the actual numbers of relapsed cases that were retreated and we used the WHO rate instead.
[16] There are no figures for cases notified other than the numbers of cases that start treatment. The numbers of cases notified and cases treated are, therefore, the same and there are no data that show how many cases are detected through diagnosis who do not start treatment.

Table 1: TB Incidence and treatment figures, Indonesia, 2011 – 2016

	ACTUAL	ACTUAL	TARGET	TARGET	TARGET	TARGET
	2011	2012	2013	2014	2015	2016
Total Population of National (million)	236	239	242	244	247	250
Target for change in incidence rate		*-1.07%*	*-1.08%*	*-1.09%*	*-1.10%*	*-1.12%*
TB Incidence Rate (per 100,000 population)	187	185	183	181	179	177
Total expected new TB cases	**441,940**	**442,459**	**442,928**	**443,345**	**443,707**	**444,014**
Target rate of change in CNR		1.5%	0.7%	7.2%	4.7%	5.1%
Case Notification Rate - all cases (per 100,000 population)	136	138	139	149	156	164
Case Notification Rate - smear-positive cases (per 100,000 population)	83	84	85	86	88	89
TB Case Detection Rate	*72.7%*	*74.6%*	*76.0%*	*82.3%*	*87.2%*	*92.7%*
Total Number of Cases detected	**321,411**	**330,051**	**336,432**	**364,963**	**386,694**	**411,403**
Percentage of CNR for new smear-positive cases	*61.0%*	*60.9%*	*61.2%*	*57.7%*	*56.4%*	*54.3%*
Percentage of CNR for new smear-negative cases	*33.1%*	*33.2%*	*32.9%*	*36.4%*	*37.7%*	*39.8%*
Percentage of CNR for new extrapulmonary cases	*3.8%*	*3.8%*	*3.8%*	*3.8%*	*3.8%*	*3.8%*
Percentage of CNR for relapse cases	*1.4%*	*1.4%*	*1.4%*	*1.4%*	*1.4%*	*1.4%*
Percentage of CNR for other	*0.7%*	*0.7%*	*0.7%*	*0.7%*	*0.7%*	*0.7%*
Total new pulmonary smear-positive cases treated	196,155	200,901	205,732	210,650	218,135	223,261
Total new pulmonary smear-negative cases treated	106,292	109,677	110,851	132,780	145,744	163,869
Total new extra-pulmonary cases treated	12,214	12,542	12,784	13,869	14,694	15,633
Total new relapse cases treated	4,500	4,621	4,710	5,109	5,414	5,760
Total new other cases treated	2,250	2,310	2,355	2,555	2,707	2,880
Total new TB cases treated	**321,411**	**330,051**	**336,432**	**364,963**	**386,694**	**411,403**
Estimated % TB treatment success rate	90.3%	90.2%	90.0%	90.0%	90.0%	90.0%
Estimated % TB cure rate	83.7%	83.7%	83.7%	83.7%	83.7%	83.7%
Estimated number of TB cases treated successfully	290,234	297,706	302,789	328,467	348,025	370,263
Estimated number of TB cases cured	**269,021**	**276,253**	**281,593**	**305,474**	**323,663**	**344,344**

The projected number of existing TB cases and cases treated are also shown in Figure 1, in this case through 2020. With targeted declines in incidence and increases in treatment rates the gap between the two would narrow considerably by 2020.

Figure 1: Targets for TB Cases Expected, Detected and Treated, Indonesia, 2011 – 2020[17]



[17] Whereas the tables only show the results through 2016 for ease of reading, the figures show the results through 2020.

The number of expected MDR-TB cases was estimated by using the national NTP rate of 1.9% of new cases plus 12.0% of retreatment cases (relapse cases) (Table 2).[18] In this case the number of new smear positive cases is the number of total expected new TB cases times the percent expected to be smear positive (for 2011 that is 441,940 times 61%). The actual number of cases notified and treated were used for 2011 and 2012, estimated numbers were used for 2013 and numbers 2014 – 2021 are based on the NTP Case Notification targets.[19]

The number of new MDR-TB cases is expected to decline from 5,665 in 2011 to 5,269 in 2016. This decline is mainly due to predicted falls in the numbers of new smear-positive cases. The number of patients starting MDR-TB treatment is expected to grow from 436 in 2012 to 2,640 in 2016 (Table 2 and Figure 2) and to approximately 5,473 in 2020 (Figure 2), mainly due to targeted increases in case detection. Of the 2,640 patients treated in 2016 an estimated 1,980 (75%) would be treated successfully (treatment completed) and 1,848 (70%) would be cured.

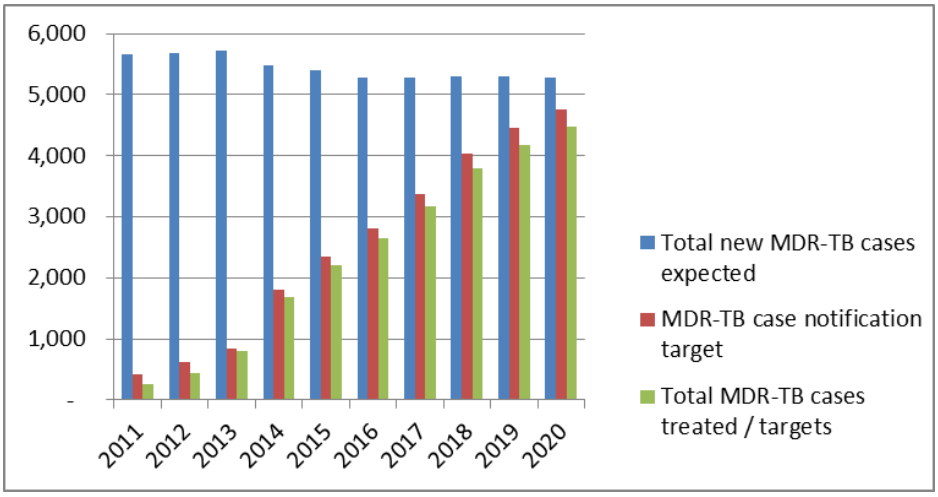
Table 2: MDR-TB treatment projections, Indonesia, 2011 – 2016

	2011	2012	2013	2014	2015	2016
Total new TB cases smear positive	269,713	269,323	270,855	255,890	250,296	240,959
Estimated % of MDR-TB cases among new cases	1.9%	1.9%	1.9%	1.9%	1.9%	1.9%
Total MDR-TB cases among new TB cases	5,125	5,117	5,146	4,862	4,756	4,578
Total new re-treatment cases treated	4,500	4,621	4,710	5,109	5,414	5,760
Estimated % of MDR-TB cases among retreatment cases	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%
Total MDR-TB cases among retreatment TB cases	540	554	565	613	650	691
Total new MDR-TB cases expected	5,665	5,672	5,711	5,475	5,405	5,269
Target CNR %		11%	15%	33%	43%	53%
MDR-TB case notification target	**410**	**610**	**840**	**1,800**	**2,340**	**2,808**
% of notified cases treated	62%	71%	94%	94%	94%	94%
Total MDR-TB cases treated / targets	**255**	**436**	**790**	**1,692**	**2,200**	**2,640**
Rate of change in CNR target			81.1%	114.3%	30.0%	20%
Estimated % MTB-TB treatment success rate	70.0%	70.0%	70.0%	75.0%	75.0%	75.0%
Estimated % MDR-TB cure rate	65.0%	65.0%	65.0%	70.0%	70.0%	70.0%
Estimated number of MDR-TB cases treated successfully	179	305	553	1,269	1,650	1,980
Estimated number of MDR-TB cases cured	166	283	513	1,184	1,540	1,848

The projections through 2020 indicate a further significant narrowing of the gap if the targets are met (Figure 2).

[18] WHO Tuberculosis Report, 2013. WHO.
[19] Note that the target for 2014 represents a significant increase from previous years.

Figure 2: MDR-TB treatment projections – Indonesia, 2011 – 2020



4. RESULTS

Based on the above assumptions, the approximate total cost of recurrent resources required to detect and treat TB and MDR-TB for the country in 2014 would be USD 100 million (excluding inflation). This is comprised of USD 83 million for TB cases and USD 17 million USD for MDR-TB cases. By 2016 with higher treatment targets, a total of USD 118 million (excluding inflation) would be required, comprised of USD 92 million for TB cases and USD 26 million for MDR-TB cases. The increase in cost is largely due to the projected increases in the number of MDR-TB cases treated. It should be noted that these figures are not total annual costs since they include the full costs of MDR-TB treatment which are spread over three budget years.

Table 3: Total TB Services Costs[a], Indonesia, 2011 – 2016 (USD)

	2011	2012	2013	2014	2015	2016
Total Service Delivery Costs	77,492,758	81,015,778	85,738,311	100,148,218	109,384,351	118,517,316
Total Costs - TB	74,869,068	76,521,110	77,733,383	83,182,077	87,340,619	92,074,671
Total Costs - MDR-TB	2,623,690	4,494,669	8,004,928	16,966,141	22,043,731	26,442,645

[a] These are the average costs for patients who start treatment in each year. In the case of MDR-TB treatment costs fall into three budget years.

The cost by algorithm component is shown in Table 4 and Figure 3. The highest cost components of the TB treatment algorithm in 2014 would be treatment monitoring at USD 42 million (43%) with diagnosis next at USD 23 million (23%) and treatment (TB medicines) third at USD 22 million (22%). Treatment

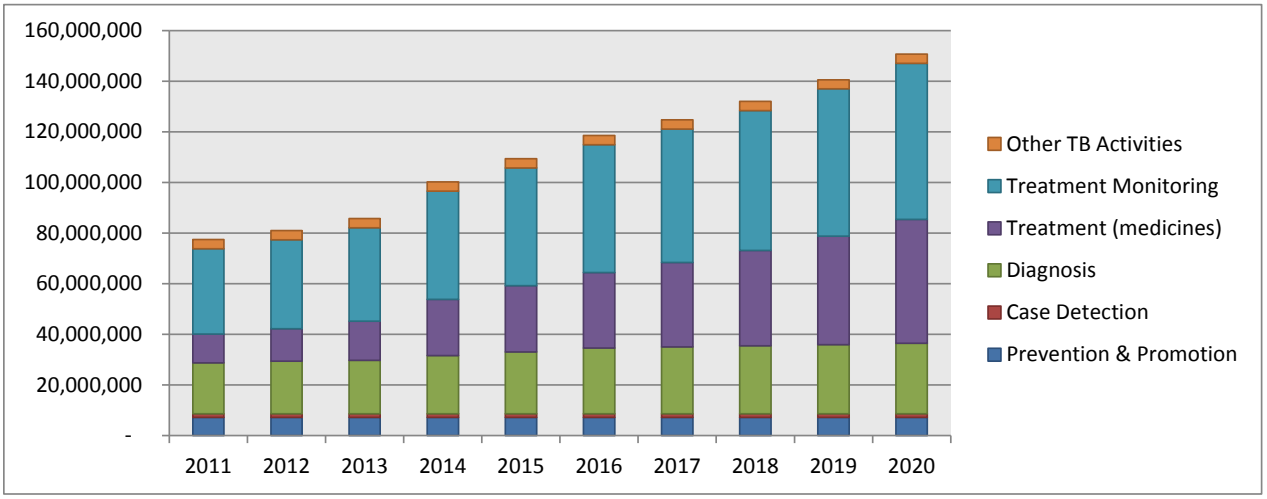
monitoring for TB patients includes DOTS surveillance, follow-up smears and inpatient costs for an estimated 10% of the patients. It is notable that 1% or 2% of the resources go to case detection[20].

Table 4: Total TB service costs by algorithm component[c], Indonesia, 2011 – 2016 (USD)

	2011	2012	2013	2014	2015	2016
Prevention & Promotion	7,197,479	7,197,479	7,197,479	7,197,479	7,197,479	7,197,479
% Prevention & Promotion	9%	9%	8%	7%	7%	6%
Case Detection	1,454,256	1,454,256	1,454,256	1,454,256	1,454,256	1,454,256
% Case Detection	2%	2%	2%	1%	1%	1%
Diagnosis	20,084,668	20,701,935	21,135,725	22,981,573	24,399,219	25,979,482
% Diagnosis	26%	26%	25%	23%	22%	22%
Treatment (medicines)	11,429,220	12,874,507	15,379,113	22,142,955	26,120,216	29,745,629
% Treatment	15%	16%	18%	22%	24%	25%
Treatment Monitoring	33,685,428	35,145,894	36,930,031	42,730,248	46,571,474	50,498,763
% Treatment Monitoring	43%	43%	43%	43%	43%	43%
Other TB Activities	3,641,707	3,641,707	3,641,707	3,641,707	3,641,707	3,641,707
% Other TB Activities	5%	4%	4%	4%	3%	3%
TOTAL	**77,492,758**	**81,015,778**	**85,738,311**	**100,148,218**	**109,384,351**	**118,517,316**

[c] The costs for MDR-TB treatment and treatment monitoring cover the whole treatment and fall into three budget years.

Figure 3: Total TB service costs by algorithm component[b], Indonesia, 2011 – 2020 (USD)



[b] These are the average costs for patients who start treatment in each year. In the case of MDR-TB treatment costs fall into three budget years.

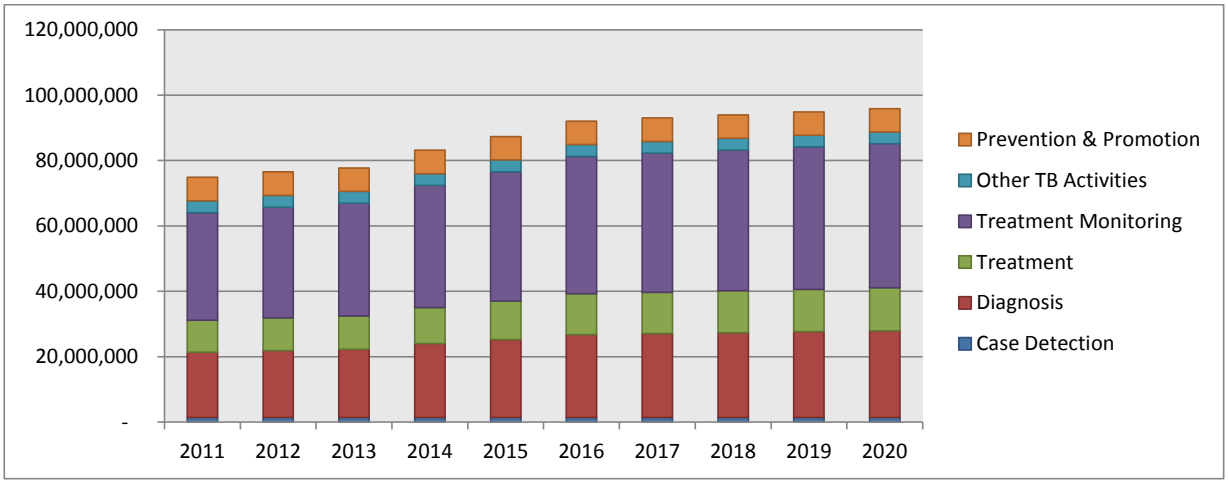
[20] As mentioned previously, case detection in Indonesia comprises contact tracing solely; active case detection is not routinely practiced.

The highest cost element for first-line TB in 2014 would be treatment monitoring at USD 37 million (45%), followed by diagnosis at USD 22 million (27%) and then treatment (medicines) at USD 11 million (13%) (Table 5 and Figure 4).

Table 5: Total costs for First Line TB cases by Algorithm Component, Indonesia, 2011 – 2016 (USD)[21]

	2011	2012	2013	2014	2015	2016
Prevention & Promotion	7,191,774	7,187,984	7,180,627	7,164,265	7,156,770	7,151,596
% Prevention & Promotion	10%	9%	9%	9%	8%	8%
Case Detection	1,453,103	1,452,337	1,450,851	1,447,545	1,446,031	1,444,985
% Case Detection	1.9%	1.9%	1.9%	1.7%	1.7%	1.6%
Diagnosis	19,955,377	20,471,649	20,852,925	22,557,725	23,856,206	25,332,601
% Diagnosis	27%	27%	27%	27%	27%	28%
Treatment	9,762,789	10,025,236	10,219,057	11,085,692	11,745,774	12,496,299
% Treatment	13%	13%	13%	13%	13%	14%
Treatment Monitoring	32,867,206	33,747,001	34,396,744	37,301,948	39,514,729	42,030,700
% Treatment Monitoring	44%	44%	44%	45%	45%	46%
Other TB Activities	3,638,820	3,636,902	3,633,180	3,624,901	3,621,109	3,618,491
% Other TB Activities	5%	5%	5%	4%	4%	4%
TOTAL	**74,869,068**	**76,521,110**	**77,733,383**	**83,182,077**	**87,340,619**	**92,074,671**

Figure 4: Total costs for First-Line TB cases by Algorithm Component, Indonesia, 2011 – 2020 (USD)



The highest cost element for MDR-TB in 2014 would be treatment (medicines) at USD 11.0 million (65%), followed by treatment monitoring at USD 5.4 million (32%) and then diagnosis at USD 423 thousand (2%) (Table 5 and Figure 4). The cost for MDR-TB treatment monitoring includes the cost of

[21] Note that the costs of Prevention & Promotion, Case Detection, and Other TB Activities decrease over time for First-Line TB and increase over time for MDR-TB. This is because these costs are treated as fixed and a greater proportion of them are allocated to MDR-TB as the direct MDR-TB costs increase over time.

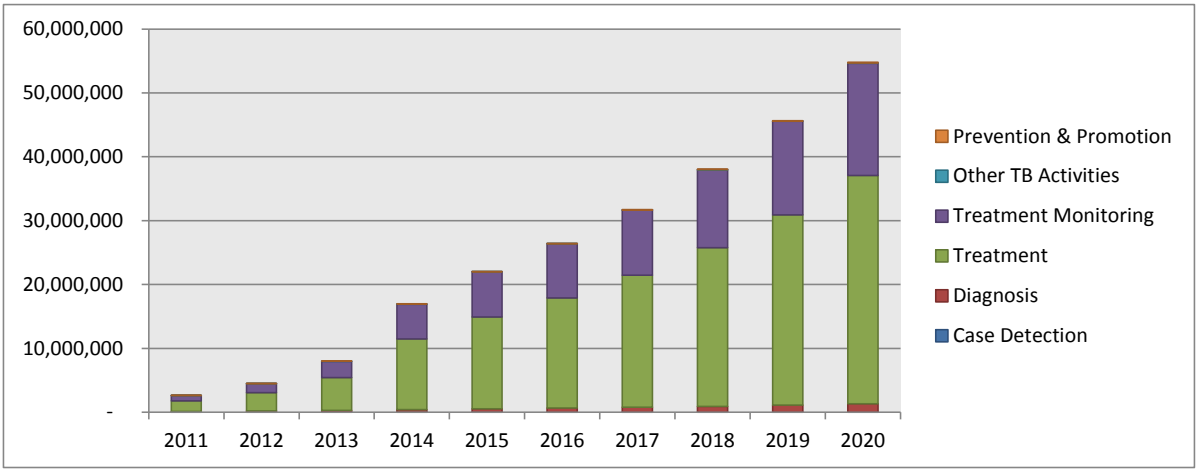
patient enablers, which based on USD 42 per month for 24 months, would come to a total of USD 3.4 million for patients who start treatment in 2014 and would rise to USD 5.4 million for patients who start treatment in 2016.

Table 6: MDR-TB service Costs by Algorithm Component[c], Indonesia, 2011 – 2016 (USD)

	2011	2012	2013	2014	2015	2016
Prevention & Promotion	5,706	9,495	16,853	33,214	40,709	45,884
% Prevention & Promotion	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%
Case Detection	1,153	1,919	3,405	6,711	8,225	9,271
% Case Detection	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Diagnosis	129,291	230,286	282,800	423,848	543,013	646,881
% Diagnosis	5%	5%	4%	2%	2%	2%
Treatment	1,666,431	2,849,271	5,160,056	11,057,263	14,374,442	17,249,330
% Treatment	63.5%	63.4%	64.5%	65.2%	65.2%	65.2%
Treatment Monitoring	818,222	1,398,893	2,533,286	5,428,300	7,056,745	8,468,064
% Treatment Monitoring	31.2%	31.1%	31.6%	32.0%	32.0%	32.0%
Other TB Activities	2,887	4,804	8,527	16,805	20,598	23,216
% Other TB Activities	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%
TOTAL	2,623,690	4,494,669	8,004,928	16,966,141	22,043,731	26,442,645

[c] The costs for MDR-TB treatment and treatment monitoring cover the whole treatment and fall into three budget years.

Figure 5: MDR-TB service Costs by Algorithm Component[d], Indonesia, 2011 – 2020 (USD)



d The costs for MDR-TB treatment and treatment monitoring cover the whole treatment and fall into three budget years.

The above figures include indirect costs (operating and administrating costs) for each level of service. In 2014 these indirect costs would come to 31% of total costs (Table 7)[22] [23]. This figure increases slightly over the years as more MDR-TB services are provided since the hospital component of MDR-TB carries a

[22] This includes an assumption that indirect costs at district health office level are 25% of direct costs which is a rough estimate.
[23] To simplify these estimates we assumed that all first-line diagnoses and treatments were carried out at the health centre level and all MDR-TB diagnoses and treatment were carried out at the hospital level.

higher indirect cost. These figures may be understated since an analysis of DHA figures from 36 districts in 2010 indicated that 41% of total district health budgets were made up of support costs[24].

Table 7: Direct and Indirect Cost be Service Level, Indonesia, 2011 – 2016 (USD)

	2011	2012	2013	2014	2015	2016
Total direct DHO cost	6,605,491	6,605,491	6,605,491	6,605,491	6,605,491	6,605,491
Total direct Health Centre cost	38,736,620	39,690,636	40,424,719	43,615,918	46,022,402	48,740,192
Total direct Hospital cost	11,165,036	12,326,768	14,201,987	19,368,649	22,469,526	25,338,386
Total direct costs	**56,507,148**	**58,622,896**	**61,232,197**	**69,590,058**	**75,097,419**	**80,684,069**
Total indirect DHO cost	1,651,373	1,651,373	1,651,373	1,651,373	1,651,373	1,651,373
Total indirect Health Centre cost	7,610,826	7,798,267	7,942,497	8,569,492	9,042,309	9,576,290
Total indirect Hospital cost	11,723,412	12,943,243	14,912,244	20,337,295	23,593,251	26,605,585
Total indirect costs	**20,985,610**	**22,392,883**	**24,506,113**	**30,558,160**	**34,286,932**	**37,833,248**
Total costs	**77,492,758**	**81,015,778**	**85,738,311**	**100,148,218**	**109,384,351**	**118,517,316**
Indirect cost as % of direct cost	37%	38%	40%	44%	46%	47%
Indirect cost as % of total cost	27%	28%	29%	31%	31%	32%

The major part of the direct costs would be incurred at the health center level - 47% in 2013, followed by 17% at the hospital level and 8% at the district health office level (Table 8)[25]. Due to the higher level of indirect costs at the hospital level, the major part of indirect costs would be incurred at that level – 17%. In terms of total direct and indirect costs, 56% would be at the health center level, 34% at the hospital level and 10% at the district health office level.

Table 8: Incurred costs by service level for 2013 shown as figures and percentages, Indonesia (USD)

	2013	2013
Total direct DHO cost	6,605,491	8%
Total direct Health Centre cost	40,424,719	47%
Total direct Hospital cost	14,201,987	17%
Total direct costs	**61,232,197**	71%
Total indirect DHO cost	1,651,373	2%
Total indirect Health Centre cost	7,942,497	9%
Total indirect Hospital cost	14,912,244	17%
Total indirect costs	**24,506,113**	29%
Total costs	**85,738,311**	100%

[24] Source - unpublished data collected and analyzed by the authors.
[25] In this case "incurred" refers to the use of resources, which is different from the procurement of resources.

The average unit cost of detecting, diagnosing and treating a TB patient who started treated in 2014 would be USD 228, the average cost per case successfully treated would be USD 253 and the average cost per case cured would be USD 272 (Table 9)[26] [27]. The average unit cost for an MDR-TB patient who started treated in 2014 would be USD 10,027, the average cost per case successfully treated would be USD 13,370 and the average cost per patient cured would be USD 14,325. The unit cost of treating MDR-TB is much higher than the unit cost of TB, primarily because of the longer treatment period of 24 months and the higher cost of medicines.

The average cost of USD 258 per first-line TB patient successfully treated in 2011 falls a little below the middle of the range of USD 100 to USD 500 identified by WHO for most high-burden countries[28][29]. The cost per patient treated for MDR-TB of USD 10,289 in 2011 can be compared with 2005 estimates for four countries[30]. These costs were USD 10,880 in Estonia, USD 2,423 in Peru, USD 3,613 in the Philippines and USD 14,657 in Tomsk. The figures for Estonia and Tomsk are high because patients stay in hospital for extended periods. The figure for Peru was considered on the low side as the regimen was deemed suboptimal. The figure of USD 3,613 for the Philippines could provide the most relevant comparison but the figure was from 2005 and diagnosis and treatment protocols as well as resources prices would have changed since then. Note also that the figures from this study include indirect costs which may not be included in the figures in the studies from other countries. More in—depth analysis would be needed to make meaningful comparisons[31].

The average cost per capita in 2014 would be 41 US cents, based on the total population. This figure can be compared with the economic burden of TB in Indonesia, which is over USD 8 per capita[32], indicating that investment in TB detection and treatment is worthwhile.

[26] It was assumed that the treatment success and cure rates apply to all types of first-line TB treatment.
[27] The average cost per case successfully treated and per case cured can be used as a simple measure of cost-effectiveness. For example, the cost will be lower if fewer patients default or die during treatment.
[28] Global Tuberculosis Report, 2012, WHO.
[29] Accurate comparisons are difficult since the bases for the figures may be different, for example including or excluding the cost of treating TB/HIV or indirect costs.
[30] A Systematic Review of the Cost and Cost Effectiveness of Treatment for Multidrug-Resistant Tuberculosis. Fitzpatrick and Floyd, 2012.
[31] Comparisons of costs across countries should be treated with caution since they may use different methods and cost elements and key resources, such as medicine prices and salaries, can differ significantly.
[32] Collins et al. The Economic Burden of Tuberculosis in Indonesia, 2012.

Table 9: Total TB and MDR-TB Cost per Case and per Capita, Indonesia, 2011 – 2016 (USD)[33]

	2011	2012	2013	2014	2015	2016
Cost per TB case that started treatment - TB	233	232	231	228	226	224
Cost per TB case successfully treated	258	257	257	253	251	249
Cost per TB case cured	278	277	276	272	270	267
Cost per MDR-TB case that started treatment – TB	10,289	10,309	10,138	10,027	10,022	10,018
Cost per MDR-TB case successfully treated	14,699	14,727	14,483	13,370	13,362	13,357
Cost per MDR-TB case cured	15,829	15,860	15,597	14,325	14,317	14,311
First-Line TB Cost per Capita	0.32	0.32	0.32	0.34	0.35	0.37
MDR-TB Cost per Capita	0.01	0.02	0.03	0.07	0.09	0.11
Total TB and MDR-TB Cost per Capita	0.33	0.34	0.35	0.41	0.44	0.47

5. FINDINGS

The national targets assume that the incidence rates for TB will reduce slightly each year and the treatment rates will increase slightly. The net effect of these will be offset somewhat by population increases and the result will be a projected increase in the number of treated cases from 321,411 in 2011 to 411,403 in 2016 and to 431,509 in 2020. The NTP expects the number of new MDR-TB cases to decline each year and expects detection and treatment levels to rise, resulting in a projected increase in the number of treated cases from 255 in 2011 to 2,640 in 2016 and to 5,473 in 2020.

Based on these incidences and treatment assumptions, the approximate cost of the recurrent resources needed for the country to reach its TB and MDR-TB targets in 2014 would be USD 100 million (excluding inflation) (USD 83million for TB cases and USD 17 million for MDR-TB cases). This would increase to a total of USD 118 million in 2016 (excluding inflation), (USD 92 million for TB cases and USD 26 million for MDR-TB cases). It should be noted that these figures would not match with budget year figures since they include the full costs of MDR-TB treatment for patient who start treatment each year and these costs are actually incurred over three budget years.

In terms of program components for 2014 cases, USD 42 million (43%) would be needed for treatment monitoring, USD 23 million (23%) for diagnosis and USD 22 million (18%) for treatment. MDR-TB patient enabler costs are included in treatment monitoring figures amounting to a total of USD 3.4 million for MDR-TB patients who started treatment in 2014 and would rise to a total of 5.4 million USD for patients who start treatment in 2016. Note that these are also incurred over 24 months.

[33] Some figures do not appear to add correctly, which is due to rounding.

The above figures include indirect costs which come to around 31% of total costs in 2014. In terms of total direct and indirect costs, 56% would be at the health center level, 34% at the hospital level and 10% at the district health office level.

The average unit cost of detecting, diagnosing and treating a TB patient who started treatment in 2014 would be USD 228, the average cost per case successfully treated would be USD 253 and the average cost per case cured would be USD 272. The average unit cost for an MDR-TB patient who started treated in 2014 would be USD 10,027, the average cost per case successfully treated would be USD 13,370 and the average cost per patient cured would be USD 14,325. The unit cost of treating MDR-TB is much higher than the unit cost of TB, primarily because of the longer treatment period of 24 months and the higher cost of medicines.

The average cost per capita in 2014 would be 41 US cents, based on the total population. This figure can be compared with the economic burden of TB in Indonesia, which is around USD 8 per capita, indicating that investment in detecting and treating TB is worthwhile.

These figures do not include the cost of active case detection, only contact tracing, since this is not carried out in the province from where the data were collected. The results indicate that only around 1% or 2% of the resources are allocated to case detection and, given the high cost of diagnosing and treating TB and MDR-TB, this rate of spending should be reviewed to see if more should be done, especially for MDR-TB case detection.

The total costs are based largely on the use of standard prices, as well as some budget figures that were obtained from the sample of facilities. They, therefore, mainly represent the estimated cost of the resources required to provide good quality services to the target numbers of persons with TB and MDR-TB.

The figures only cover provider costs and do not take into account additional costs related to childhood TB, TB/HIV or XDR-TB. They also do not include capital costs, provincial and national program costs, or patient enablers or patient costs and they probably do not include all operating and administrative costs. Due to these and other limitations, the costs provided by this study are probably underestimates of the total resources required to achieve the NTP's treatment targets. However, those targets are quite ambitious, especially for MDR-TB, and from that respect the costs could be overestimates. The results should, therefore, be regarded as indicative and more suited for policy and planning purposes rather than for detailed budgeting.

The figures produced by this model cannot be directly compared with the figures used in the WHO Planning and Budgeting Tool budget prepared in 2013 because the methodology is different for some components, some of the program elements were not included in this costing, and more up-to-date treatment targets were used in this model. These figures could not also be directly compared with the GF ATM Phase 2 TB budget for similar reasons.

6. LIMITATIONS

The tool was developed for use by program managers and was designed to be simple and user friendly. It does not include relationships between some variables, such as the impact of incentives on cure rates. It does not have components for:

- Provincial management and supervision costs or any share of national program costs
- Capital costs or depreciation or any initial development or training costs
- TB/HIV costs
- XDR-TB costs
- Childhood TB
- Incentives for laboratory staff
- Patient costs
- Community and civil society organization support costs

Some of these may be added in a later version of the tool.

In addition, the results do not include the cost of active case detection, apart from contact tracing.

The tool and model assume that all services are provided by the public sector and the costs do not, therefore, take into account any additional private sector costs.

Finally some of the cost estimates were obtained from the small sample of district and facility managers used in the Central Java costing study. These cost findings should therefore be treated as indicative and although they can be used for planning they should be used for setting budgets without reviewing the cost components.

7. FUTURE ACTIONS

The model provides a useful and easy way to predict future costs over several in a transparent way based on key assumptions such as case notification and treatment rates. This data can be used in determining how funds will be raised and allocated and can serve as a basis for assessing cost-effectiveness and efficiency.

There are several future actions that the provincial and national MOH and TB program managers can take:

- Additional research should be conducted to get better estimates of some of the costs, such as prevention and promotion and indirect costs.
- The results indicate that only around 1% or 2% of the resources are allocated to case detection and this should be reviewed to see if those resources are sufficient for successful TB and MDR-TB case detection.

- The tool can be expanded to cover additional costs, such as for community and civil society organization support, and for the detection and treatment of XDR-TB, TB/HIV and childhood TB.
- The NTP should roll out the tool for use in all provinces and districts. This will enable TB and health managers to advocate more effectively for resources. Managers can also compare costs across provinces and districts which will provide some useful information on performance and repeating the costing each year will show changes in performance over time.
- The best way to roll out the tool is, as proposed by the NTP, to have it adopted as an official MOH tool, to train local researchers in its use, and to have those researches train provincial and district managers.

ANNEXES

Annex 1: Cost calculation methods

Type of cost	Price/Rate	Quantity (actual for 2011, target for 2012-2021)
Specific district TB promotion	Budget estimate per facility	Number of facilities
TB incentives	Budgeted incentive for one person per facility	Number of facilities
District health promotion – TB share	District health promotion budget	% relating to TB and number of districts
Case detection (contact tracing incentives)	Budget	Number of visits
Diagnosis consultation	Fee	Number of consultations
Smear	Who TB costing for Indonesia	Number of smears
X-ray	Actual cost per private practitioner	Number of X-rays
Lab and X-ray technicians	Average salary	Percent of time spent on TB service
GeneXpert and culture tests	Estimated cost (KNCV)	Number of tests
GeneXpert maintenance	Estimated cost - other country studies	Number of tests per machine
TB medicines	Local prices	Number of cases treated
Drug procurement and management	% of medicines costs	NA
DOTS treatment consultation	Average actual salary plus incentive	Number of consultations
Non-TB medicines and other supplies and oxygen	Average actual costs	Number of inpatient days (standard)
Inpatient doctor and nurse labor	Average actual costs	Number of inpatient days (standard)
Inpatient accommodation	Average actual costs	Number of inpatient days (standard)
District health office supervision	Budgets	Numbers of facilities, staff, meetings
Health center - training and meetings	Budgets	Number of training events and meetings
Indirect health center and hospital costs	A previous study	Applied as a % to direct costs
Indirect district health office costs	Estimate	Applied as a % to direct costs

Annex 2: Number of Public Facilities that Provide TB Services

	Total Number	Providing TB Diagnosis	Providing TB - DOTS	Providing TB Hospitalization	Providing MDR-TB Diagnosis	Providing MDR-TB DOTS	Providing MDR-TB Hospitalization
Number of Provincial / Referral Hospitals	89	89	89	89	5	5	5
Number of District Hospitals	535	535	535	535	-	-	-
Number of Lung Clinics		-	-	-	-	-	-
Number of Puskesmas	9,321	9,321	9,321	9,321	-	10	-
Number of Communities		-	-	-	-	-	-

Annex 3: References

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