Estimating the cost of the TB Global Plan

Methods and preliminary results

Carel Pretorius
Avenir Health

Buenos Aires, 2 September 2015

Stop TB Partnership, Global Fund, WHO GTB, USAID, Avenir Health, Global Plan Task Force

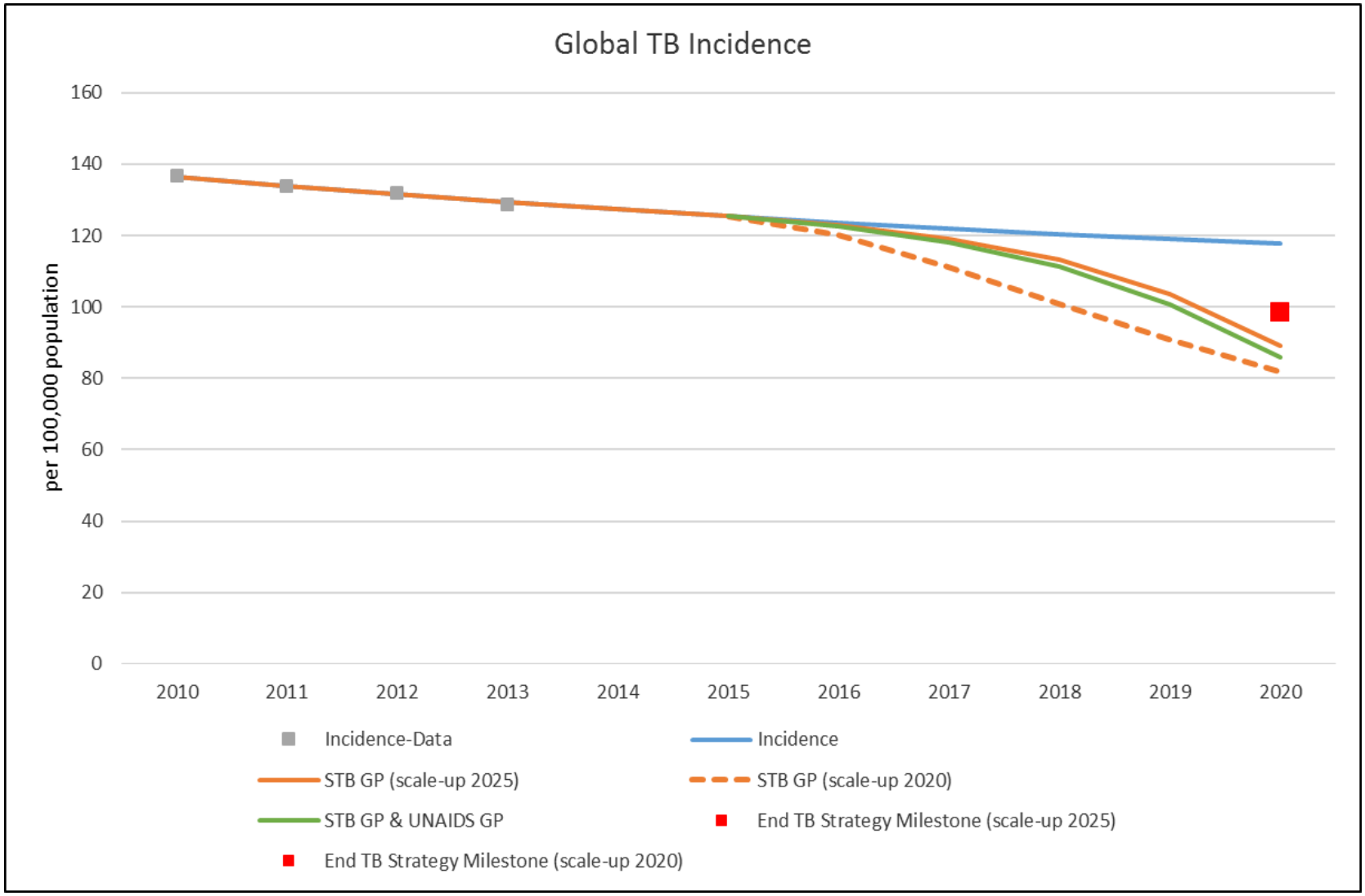
Overview

- Methods for estimating impact of GP
- Methods for costing the implementation of GP
- Reducing societal burden (DALYs averted)
- Return on investment (monetize healthy life years)
- The cost of inaction of delaying the development and deployment of new tools

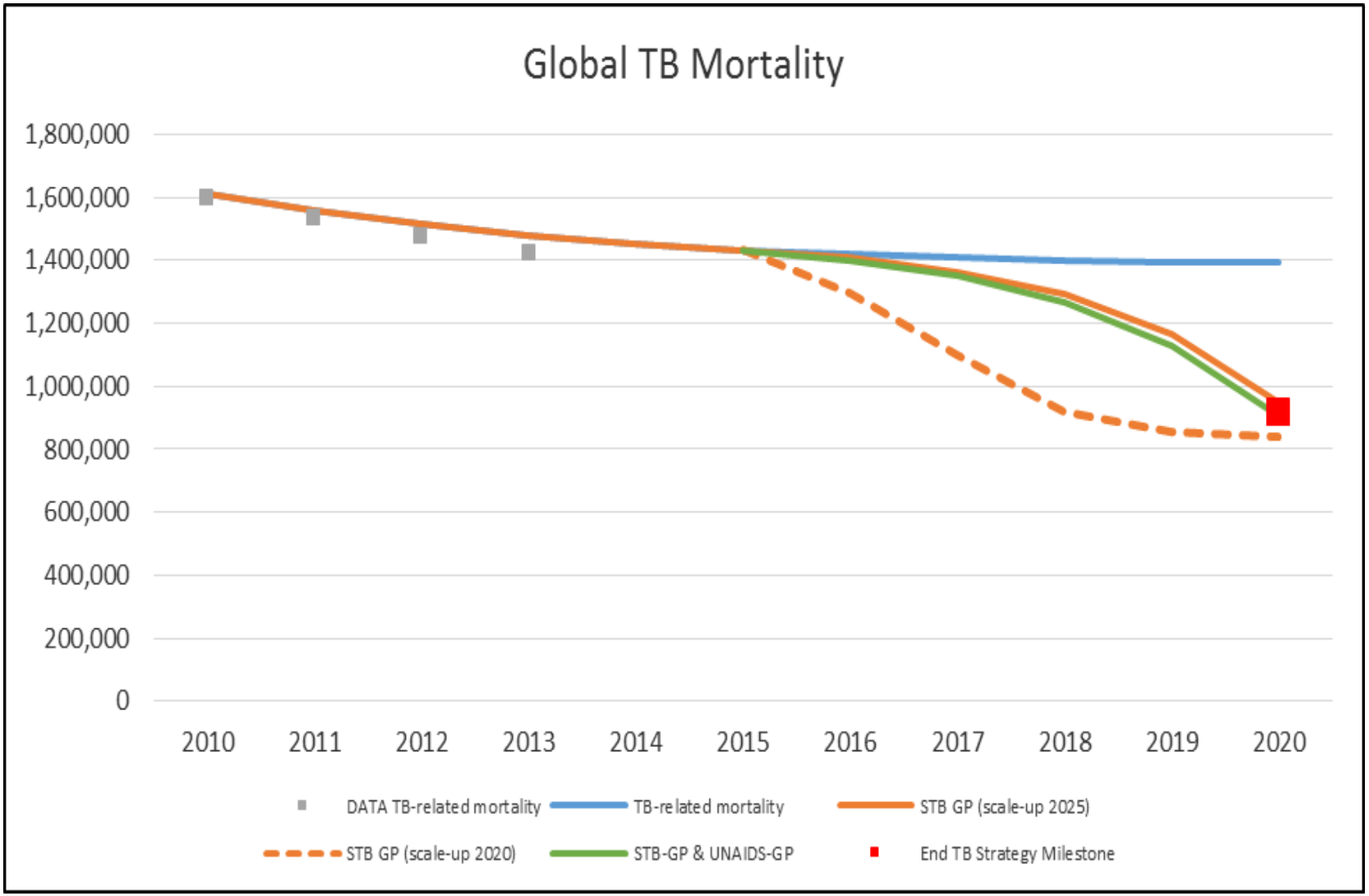
Estimating the impact of GP

- Used the TB Impact Model and Estimates (TIME) to estimate the impact of the GP, under two scale-up patterns, by 2025 and by 2020
- First 90 modeled as probability treating on average 90% of all cases before they die or recover without treatment.
- First prepared statistical trends through GTB burden estimates to produce baseline burden trends
- Then prepared burden reduction trends for 9 selected countries (Brazil, Belarus, China, DRC, India, Indonesia, Nigeria, Russia, South Africa)
- These 9 countries represented 50% of the global TB burden
- Used the statistical relationship between these 9 countries and the remaining countries in order to extrapolate impact to the remaining countries
- Update the GTB baseline trends

Impact of GP on TB incidence



Impact of GP on TB mortality



Epidemiological cost of inaction

Cumulative Impact for period 2015-2020	GP scale-up 2025		GP scale-up 2020	
	Cases Averted	TB Deaths Averted	Cases Averted	TB Deaths Averted
Fragile State, Weak Systems	265,838	73	728,572	174
Low Burden, Strong Systems	70,118	6	184,942	14
Moderate Burden, Middle Income	221,421	24	585,332	57
High Burden, Pvt Sector	963,963	174	2,700,435	447
High MDR burden, Centralized Care	95,141	19	256,834	52
High TB-HIV, SADEC	328,312	135	879,770	303
High TB-HIV, outside SADEC	569,755	208	1,505,103	492
China	407,083	33	948,892	60
India	1,125,976	159	3,032,560	405
Global (thousands)	**4,047,607**	**831**	**10,822,441**	**2,003**

DALYs averted

Cumulative Impact for period 2015-2020	GP scale-up 2025	GP scale-up 2020
	DALYs Averted	DALYs Averted
Fragile State, Weak Systems	4,736	11,275
Low Burden, Strong Systems	83	212
Moderate Burden, Middle Income	1,338	3,178
High Burden, Pvt Sector	10,684	27,417
High MDR burden, Centralized Care	907	2,479
High TB-HIV, SADEC	7,843	17,608
High TB-HIV, outside SADEC	13,119	30,986
China	1,961	3,530
India	10,637	27,031
Global (thousands)	**51,310**	**123,715**

Estimating the cost of the Global Plan

- Two costing approaches were combined to develop cost estimates for the GP
- **First method:** Unit costs are derived from GTB financing data (expenditures in 2013 and budget for 2014)
- **Second method:** Workshop held for nine countries to derive unit costs for programs that include new approaches
- **Total Cost = [Direct Costs] + [Program Support] + [Health System utilization costs]**

Predominantly Direct Costs

- Cost categories that comprise predominantly direct cost elements: FL, SL, LABS and HIV-TB
- These estimates are full costs and generally include Procurements and Distribution costs (i.e. Health Systems cost), which are also estimated in the GP report
- These unit costs are multiplied with denominators from the burden impact study.

Program Support Costs

- We obtained estimates for Program Management, Staff, Operational Research, PAL, PPM, ACSM, Surveys, and so on and combined them into a single unit cost. Using total notifications as denominator.
- MDR case management is separately handled with MDR cases as denominator

Unit Costs	Description	UC in 2008	UC in 2013	Annual Growth Rate
PS-Budget	PS Unit Costs from Budget	404.7	504.4	4.6%
PS-Exp	PS Unit Costs from Expenditure	127.7	219.6	12.0%
Budget-FL	FDL Unit Cost from Expenditure	38.2	50.2	5.3%
Budget-SL	SLD Unit Cost from Expenditure	1,012.8	5,219.7	41.6%
Budget-MDRMGT	MDR management UC from Expenditure	903.7	4,472.2	42.0%
Budget-Lab	Average LAB Unit Cost from Expenditure	35.4	64.7	7.9%
Budget-HIV	HIV Unit Cost from Expenditure (excludes ART)	19.3	33.8	13.8%
Exp-FL	FDL Unit Cost from Expenditure	23.9	26.9	5.5%
Exp-SL	SLD Unit Cost from Expenditure	733.0	4,036.9	43.8%
Exp-MDRMGT	MDR management UC from Expenditure	771.2	4,566.4	43.2%
Exp-Lab	Average LAB Unit Cost from Expenditure	8.4	18.6	14.5%
Exp-HIV	HIV Unit Cost from Expenditure (excludes ART)	10.0	3.9	0.0%

TIME dependency in unit costs

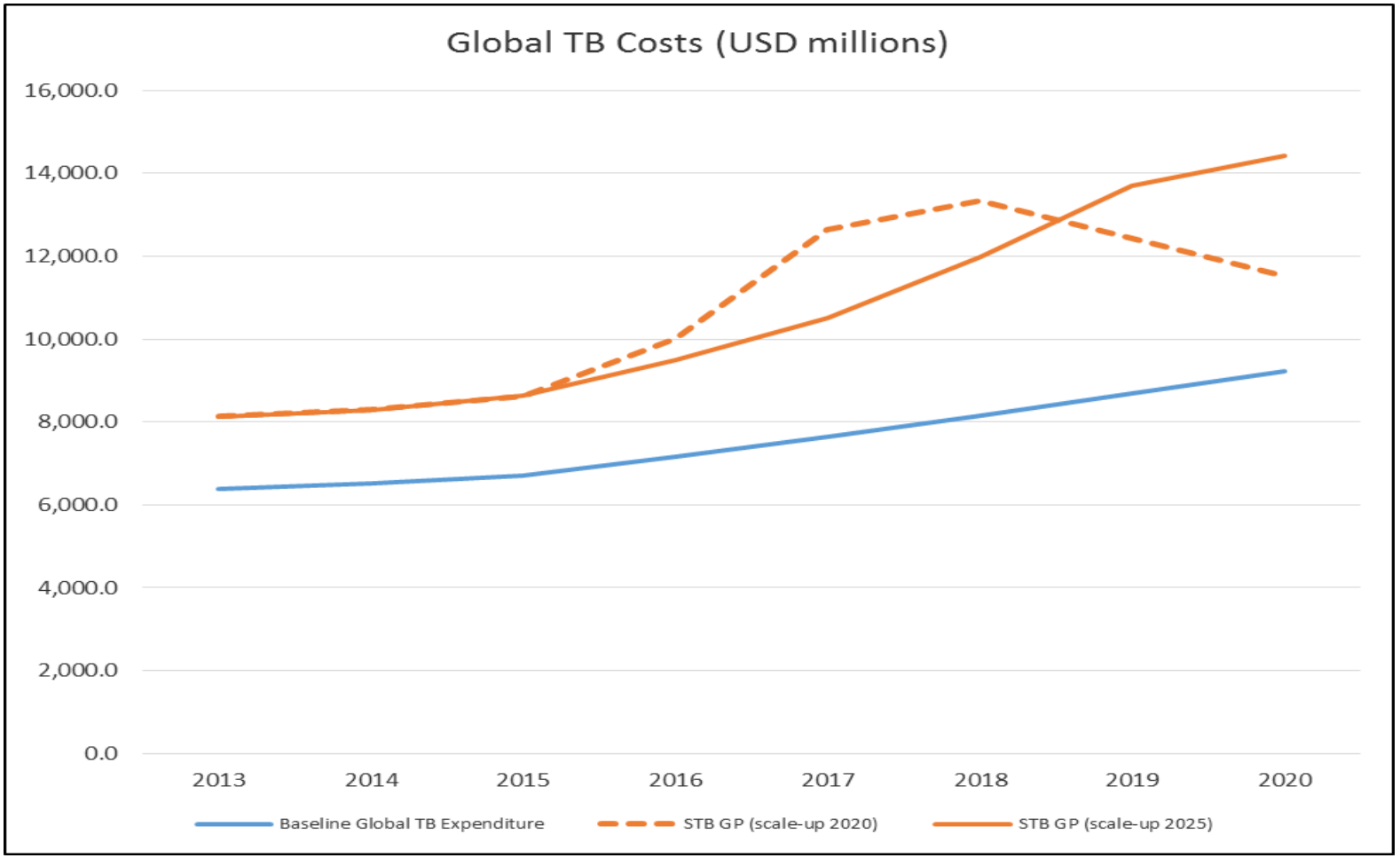
- We assume that UCs will grow at 10% per year in 2015 declining linearly to 5% annual growth in 2025, based on the assumptions that:
- 10% annual growth rate in PSC is impossible to sustain for ten years and more.
- Eventually, expenditures will respond to program designs as reflected in budgets and it will drop to a level no higher than base year Budgeted increase in UCs of 5% .

Health System utilization costs

- On top of Direct Costs and Program Support Costs we added HS cost, consisting of:
- Hospitalization and ambulatory costs for non-MDR and MDR cases
- Estimates are derived from the WHO Choice database

	Non-MDR	MDR
Global **Median**	**154.0**	**2718**

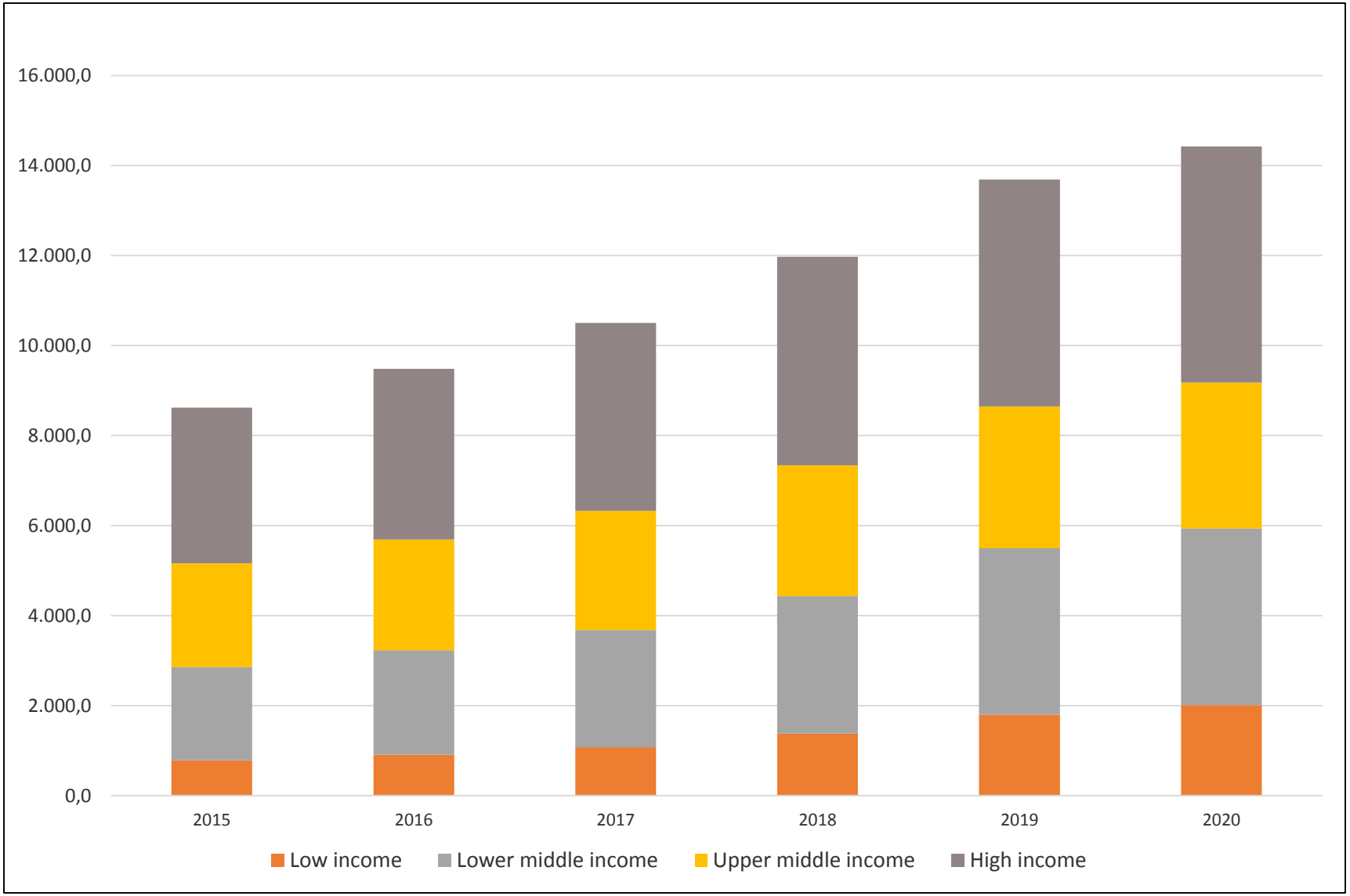
Estimated cost of the Global Plan



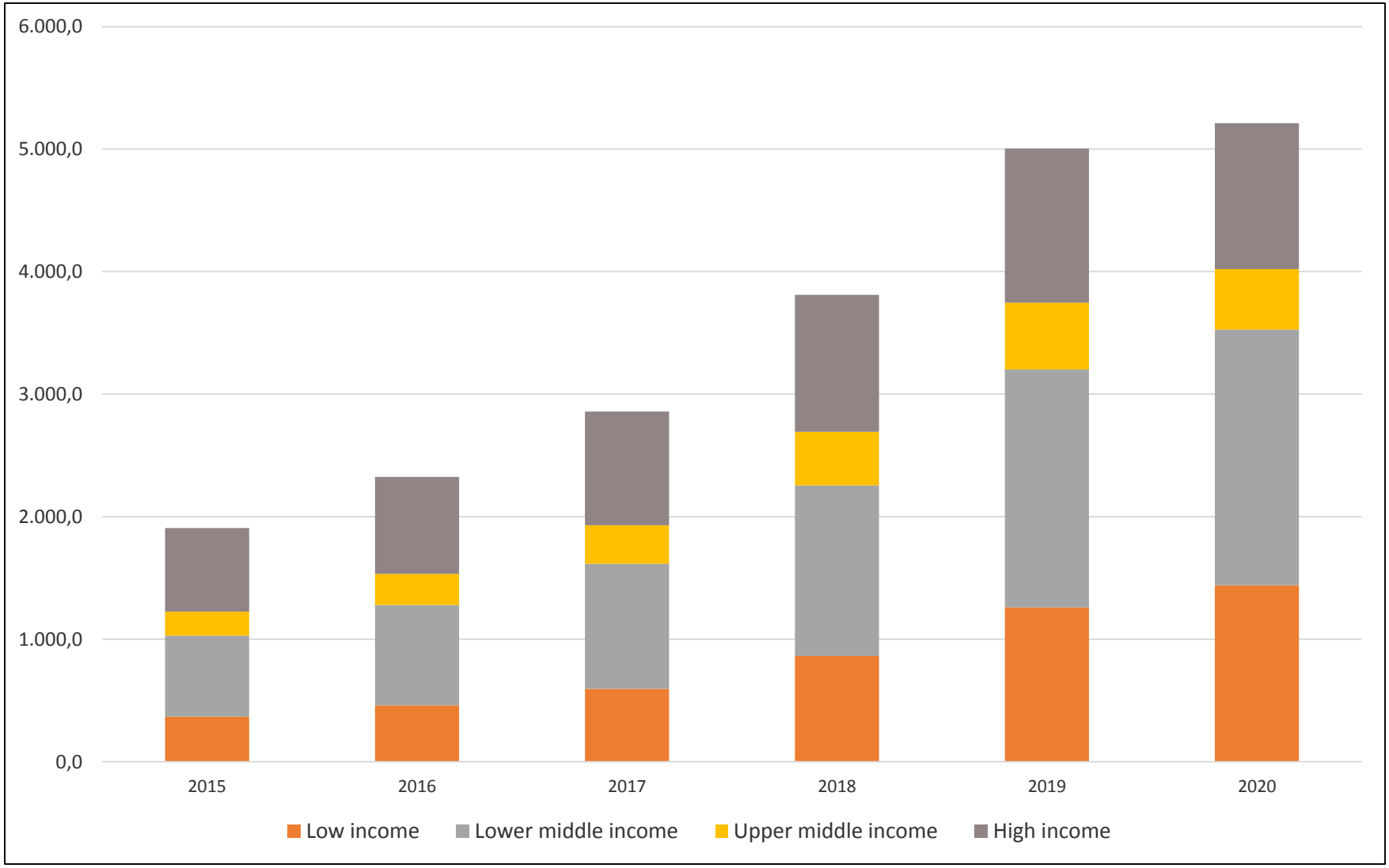
Total resource requirements when scaling up Global Plan by 2025							
Cost Category	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**Total**
Program Support (excl. MDR-MGMT)	**4.30**	**4.76**	**5.21**	**5.72**	**6.13**	**6.06**	**32.19**
MDR case management	0.84	0.97	1.20	1.59	2.13	2.55	9.28
Predominantly Direct Costs	**1.31**	**1.48**	**1.68**	**2.00**	**2.40**	**2.55**	**11.43**
First-line Drugs	0.27	0.30	0.34	0.38	0.42	0.40	2.11
Second-line Drugs	0.30	0.35	0.44	0.62	0.86	1.04	3.62
LAB	0.50	0.56	0.61	0.69	0.78	0.76	3.90
HIV-TB collaboration	0.24	0.26	0.29	0.32	0.35	0.34	1.79
Health Systems Costs	**2.17**	**2.26**	**2.41**	**2.66**	**3.03**	**3.26**	**15.79**
FL hospt. and umbltry. care	1.35	1.39	1.45	1.51	1.57	1.64	8.91
SL hospt. and umbltry. care	0.49	0.48	0.47	0.46	0.45	0.43	2.79
Procurement and Distribution	**0.33**	**0.39**	**0.49**	**0.70**	**1.01**	**1.19**	**4.10**
First-line Drugs	0.10	0.11	0.12	0.13	0.14	0.14	0.73
Second-line Drugs	0.16	0.20	0.29	0.47	0.75	0.94	2.81
LABS	0.07	0.08	0.09	0.10	0.11	0.11	0.56
Total (USD billions)	**8.62**	**9.48**	**10.50**	**11.97**	**13.69**	**14.42**	**68.70**

Total resource requirements when scaling up Global Plan by 2020							
Cost Category	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**Total**
Program Support (excl. MDR-MGMT)	**4.40**	**4.92**	**5.55**	**5.34**	**4.68**	**4.13**	**29.01**
MDR case management	0.81	1.09	1.92	2.42	2.43	2.35	11.03
Predominantly Direct Costs	**1.34**	**1.60**	**2.23**	**2.39**	**2.17**	**1.95**	**11.68**
First-line Drugs	0.28	0.32	0.39	0.37	0.30	0.25	1.91
Second-line Drugs	0.30	0.41	0.79	1.02	1.01	0.96	4.49
LAB	0.52	0.60	0.73	0.69	0.58	0.50	3.62
HIV-TB collaboration	0.24	0.27	0.32	0.31	0.27	0.24	1.66
Health Systems Costs	**2.22**	**2.40**	**2.93**	**3.19**	**3.15**	**3.09**	**16.97**
FL hospt. and umbltry. care	1.39	1.44	1.50	1.56	1.63	1.70	9.23
SL hospt. and umbltry. care	0.50	0.49	0.48	0.47	0.46	0.45	2.87
Procurement and Distribution	**0.32**	**0.46**	**0.94**	**1.15**	**1.06**	**0.94**	**4.87**
First-line Drugs	0.10	0.11	0.14	0.13	0.11	0.09	0.68
Second-line Drugs	0.15	0.26	0.70	0.92	0.87	0.77	3.68
LABS	0.07	0.09	0.10	0.10	0.08	0.07	0.52
Total (USD billions)	**8.76**	**10.02**	**12.63**	**13.33**	**12.43**	**11.52**	**68.69**

Cost of the Global Plan by Income Status (USD millions)



Funding Gap of Global Plan by Income Status (USD millions)



Funding Gap of Global Plan by Income Status (USD millions)

Funding Gap by Income Status	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**Total**
Low income	366.6	460.7	595.1	864.4	1,260.4	1,440.9	**4,988.2**
Lower middle income	661.3	819.1	1,020.7	1,389.6	1,940.6	2,086.3	**7,917.6**
Upper middle income	196.3	253.2	315.2	439.3	545.9	493.3	**2,243.1**
High income	682.0	791.7	926.9	1,117.4	1,257.3	1,191.2	**5,966.5**
Total	**1,906.2**	**2,324.6**	**2,857.9**	**3,810.6**	**5,004.2**	**5,211.8**	**21,115.3**

Return on investment

- Basic idea is to monetize a year of life gained, and then
- E.g. if $630 is associated with 1/10000 extra mortality risk, then averting a death is worth USD 6.3 million.
- Unit is called Value of Statistical Life. It is an estimated average contribution to GDP for a standardized change in mortality risk expressed as multiple of GDP per capita
- We are using an existing method that was used in special publication of the Lancet Commission to estimate **Global Health 2035: a world converging within a generation**
- A 3% annual discount rate is applied to all DALYs

VLY table for modeled countries

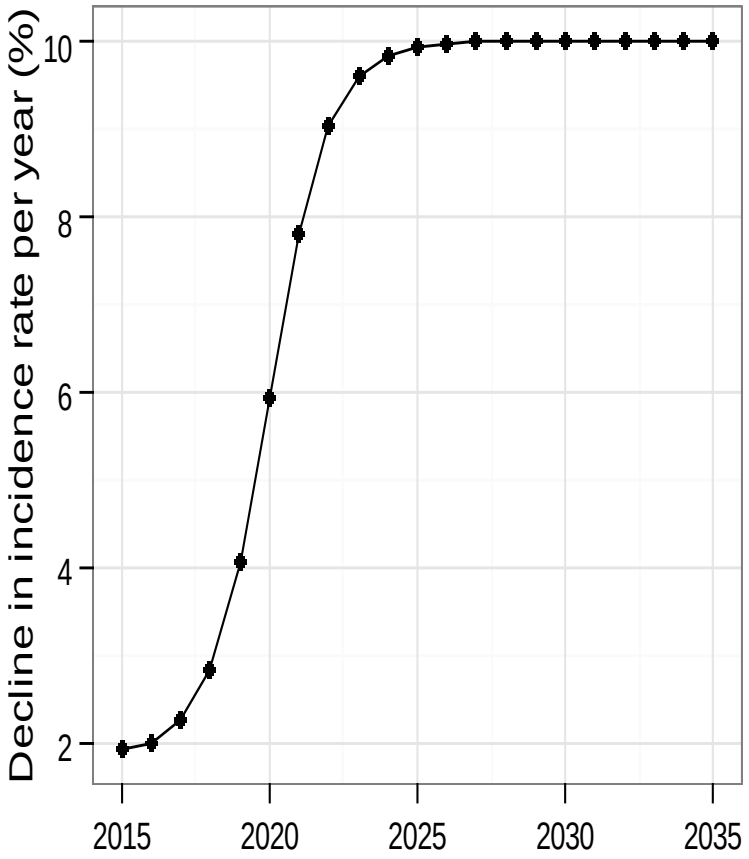
Country	VLY as multiple of GDP per capita
Afghanistan	4.2
Belarus	1.7
Brazil	2.0
China	2.2
DRC	5.2
India	3.2
Indonesia	2.5
Kazakhstan	2.6
Nigeria	6.0
South Africa	6.5
Uganda	5.4
UK	1.4

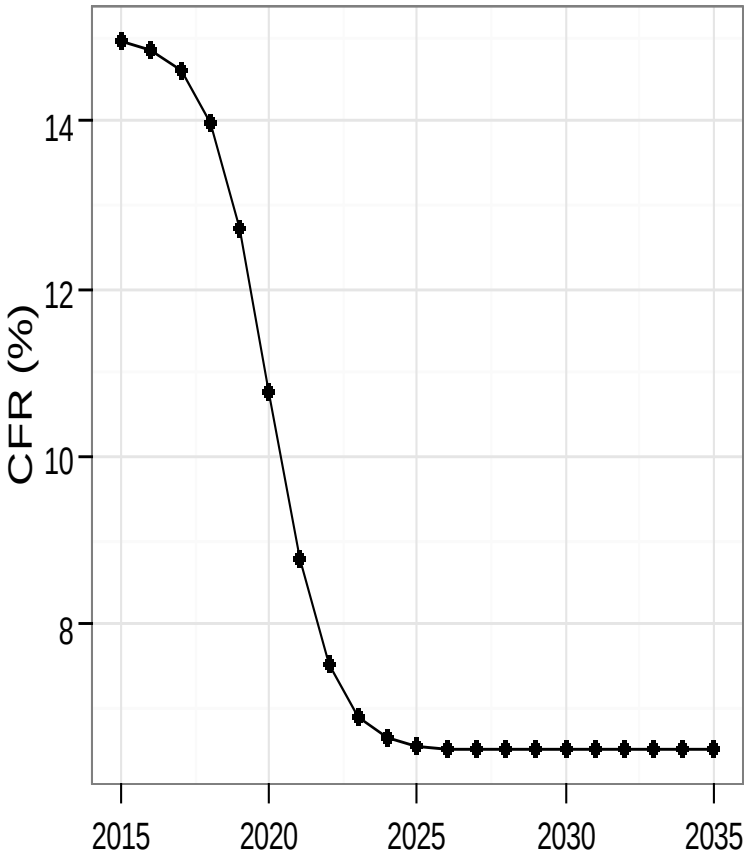
Return on Investment estimates

By Country Group	GNI per capita 2013 (AVG)	ROI for GP 2025 scale-up	ROI for GP 2020 scale-up
Fragile State, Weak Systems	817	706	1,680
Low Burden, Strong Systems	40,894	3,031	7,791
Moderate Burden, Middle Income	8,189	16,226	41,167
High Burden, Private Sector	2,361	60,506	158,522
High MDR burden, Centralized Care	9,406	14,996	41,035
High TB-HIV, SADEC	3,177	185,351	407,157
High TB-HIV, outside SADEC	1,535	159,297	363,959
China	6,740	29,243	52,632
India	1,560	52,906	134,452
Total (USD millions)	**11,031**	**522,263**	**1,208,395**

ROI: 1 dollar investment yields: *25* *57*

Impact acceleration in the End TB Strategy





Cost of delaying investment in new tools, assumptions

- Key assumptions:
  - Epidemiological impact at 2020 will continue through 2030.
  - Five years after the investment in new tools begins, the decline in incidence and mortality will increase steadily and to a degree sufficient to achieve 2030 milestones.
  - Health utility losses from TB are assumed to scale with TB mortality, and a standardized conversion is made of 41 DALYs averted per TB death (from GBD).
  - A 3% annual discount rate is applied to all costs and DALYs.

Cost of delaying investment in new tools, consequences

- By 2030, a five-year delay in investment for new tools is estimated to result in:
  - 8.4 million additional TB cases
  - 1.4 million additional TB deaths
  - 9.8 million DALYs suffered (56.1 million without discounting)
  - USD 5.3 billion in additional costs for TB treatment (USD 7.5 billion without discounting)
  - USD 180 billion in lost productivity (USD 318 billion without discounting), valuing each DALY at per-capita GNI
- Cost of failing to invest in new tools during 2016-2020:
  - USD 185 billion

The end

- . Thank you