

Adaptation of WHO model list of essential medicines into national medicines lists

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Essential Medicines List (EML)

- Essential medicines: *“Some medicines are more important than others”*
- WHO model list
 - Efficacy & safety
 - Public health needs
 - Availability & costs
- Its implementation is a national responsibility
- Acute conditions vs. chronic conditions

Objectives

1. Are medicines on the model list adopted into NEMLs?
 - If yes, how long does it take?
2. Which factors contribute to this process?
 - Focus on price and regulatory pressure

Hypothesis: high-cost medicines are quickly adopted for tuberculosis and HIV, slowly for oncology and Hepatitis C

Data collection

- Identified medicines added to the WHO model list 2007-2015
- Selected basket of medicines
 - Specific disease areas
 - Core list (except for oncology)
- Selected countries
 - Language NEML, disease burden, income group, geographic region, total NEMLs
- Analyzed NEMLs for presence of medicines

Data analysis

- Inclusion of medicines over time
 - Time between addition to model list & NEML
- Characteristics
 - Medicines: international price¹ & market entry²
 - Countries: GDP per capita³, HDI (0-1)⁴, burden of disease (DALYs)⁵
- Graphic representation
 - Correlations (GDP, HDI, burden of disease)
 - Per country & medicine

¹ MSH International Medicinal Products Price Guide; ² KNMP Kennisbank; ³ the World Bank; ⁴ UN's human development index rank; ⁵ Institute of Health Metrics and Evaluation global burden of disease

Data characteristics

Basket of medicines: 40

- 2 for tuberculosis
- 11 for HIV/aids
- 19 for oncology
- 8 for hepatitis C

Selection of countries:

#	Country	Income group ¹	Geographic region ²	Latest NEML	Total NEMLs
1	Australia	High	Western pacific	2017	133
2	Bhutan	Lower middle	South-east Asia	2016	5
3	Ethiopia	Low	African	2015	4
4	India	Lower middle	South-east Asia	2015	3
5	Ireland	High	European	2017	103
6	Jordan	Lower middle	Eastern Mediterranean	2017	4
7	Lebanon	Upper middle	Eastern Mediterranean	2014	2
8	South Africa	Upper middle	African	2015	6
9	Uganda	Low	African	2016	4

¹ as classified by the World Bank; ² as classified by the WHO

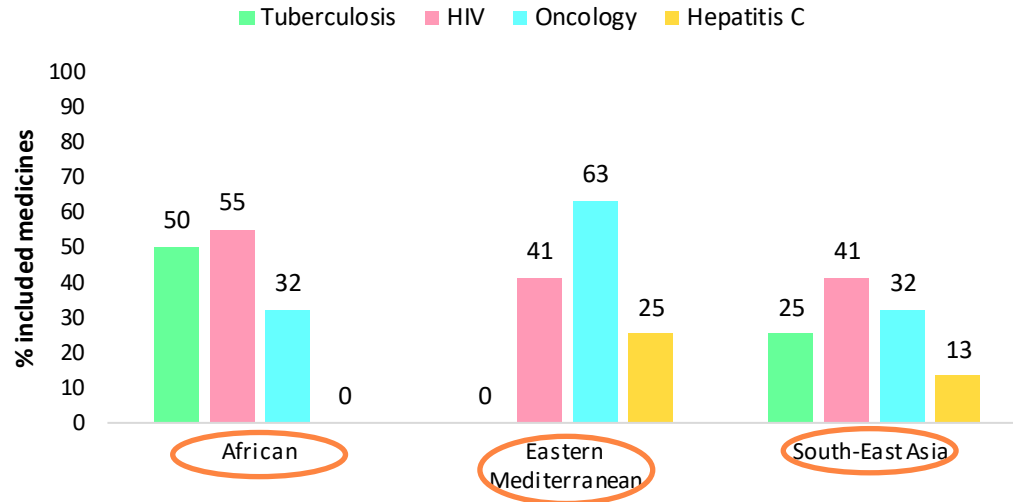
Preliminary results – overall*

Country	TB (n=2) % EMs	HIV (n=11) % EMs	Oncology (n=19) % EMs	Hepatitis C (n=8) % EMs
Overall	0 (0-50)	55 (0-82)	37 (0-89)	13 (0-50)
Australia	50	73	47	50
Bhutan	0	18	0	0
Ethiopia	0	82	32	0
India	50	64	63	25
Ireland	0	0	32	25
Jordan	0	36	89	38
Lebanon	0	45	37	13
South Africa	50	55	0	0
Uganda	50	55	58	0

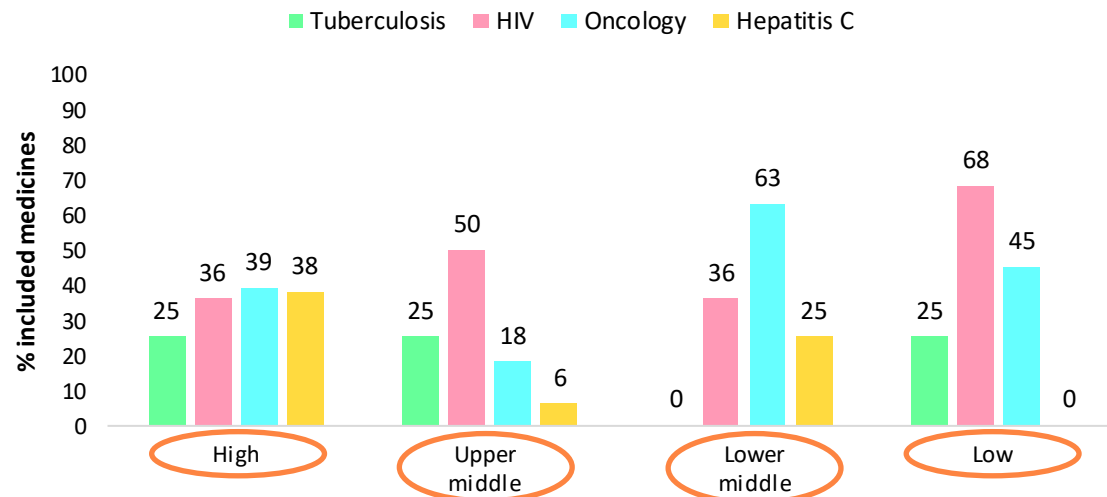
* on the final version of the NEMs

Preliminary results – groups*

Geographic regions

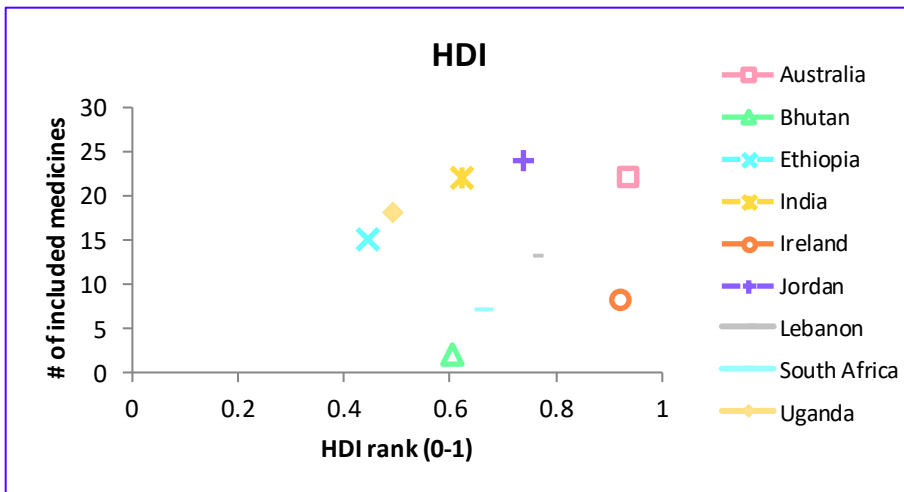
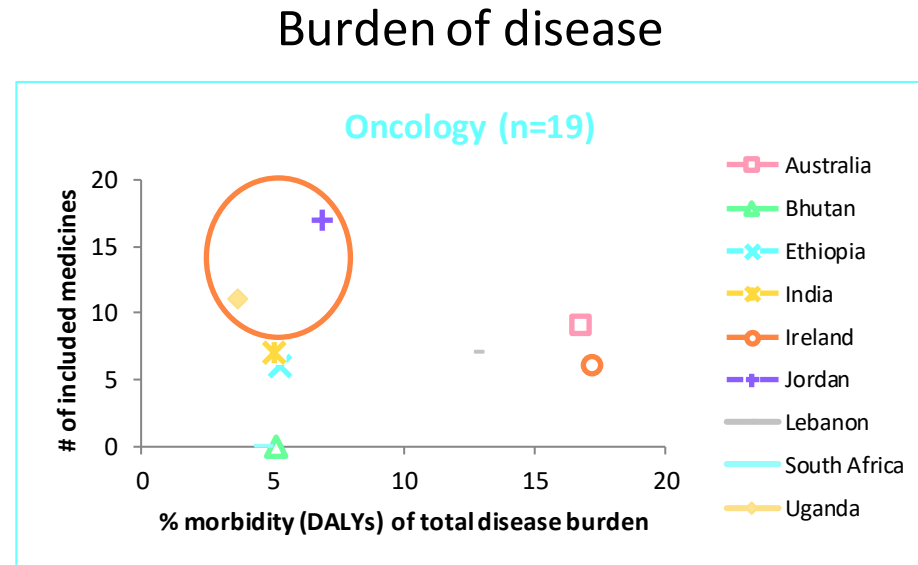
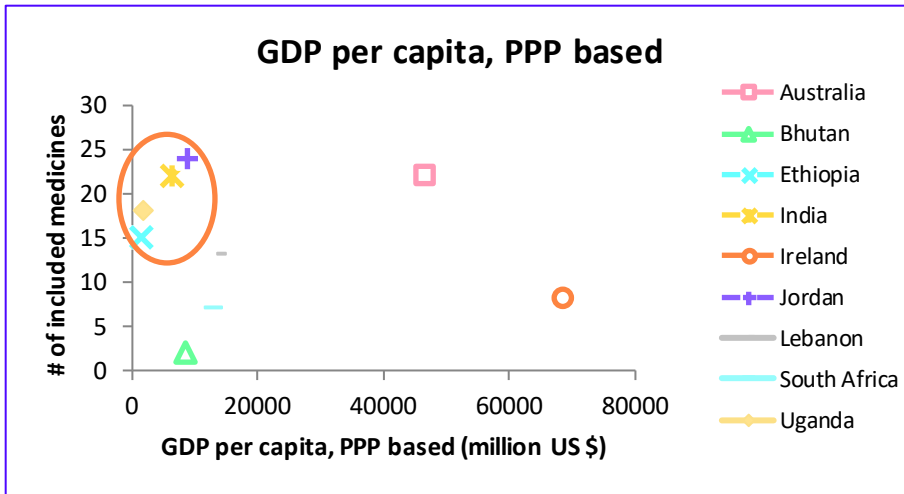


Income groups



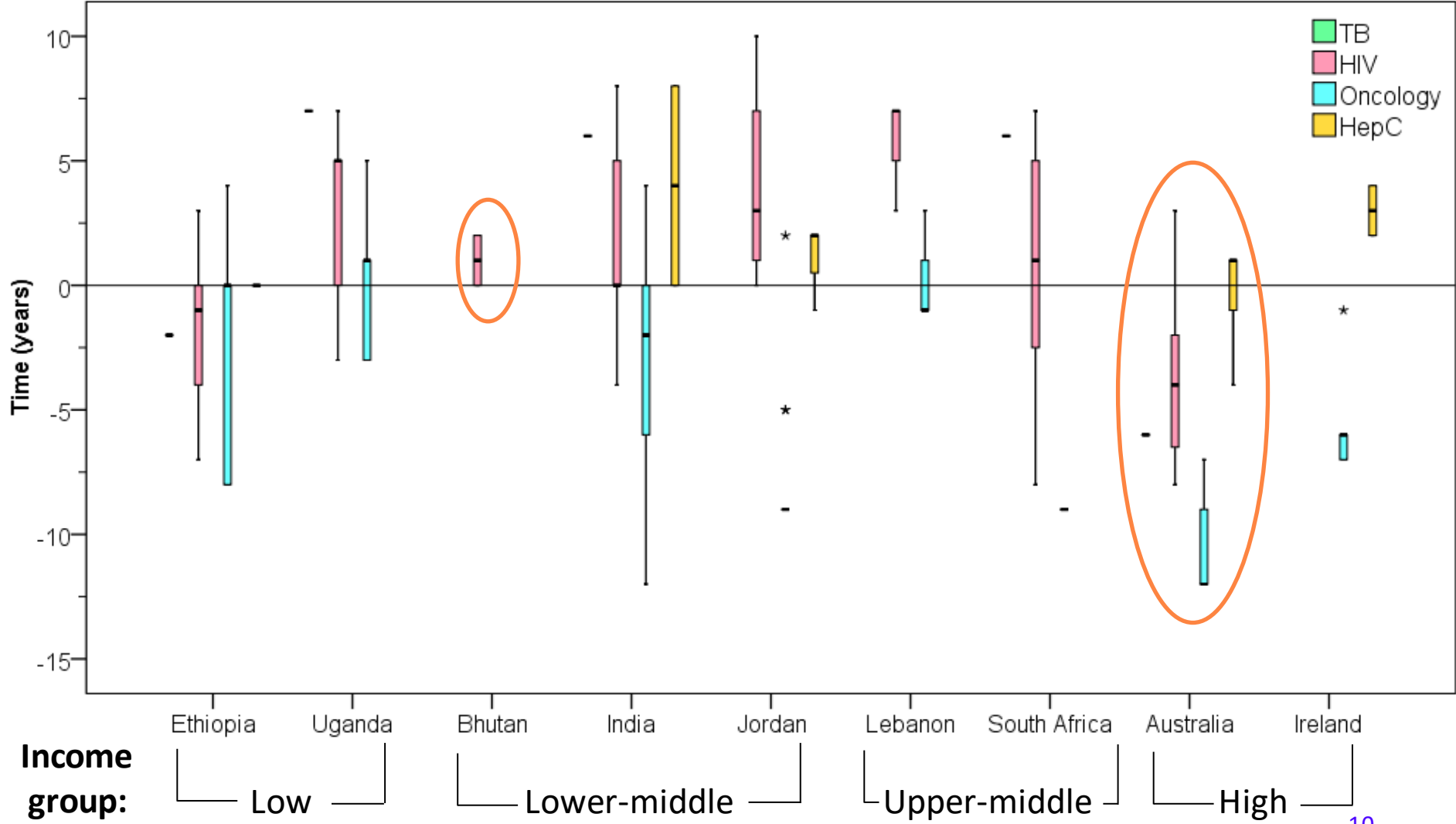
* on the final version of the NEMs

Preliminary results – correlations*

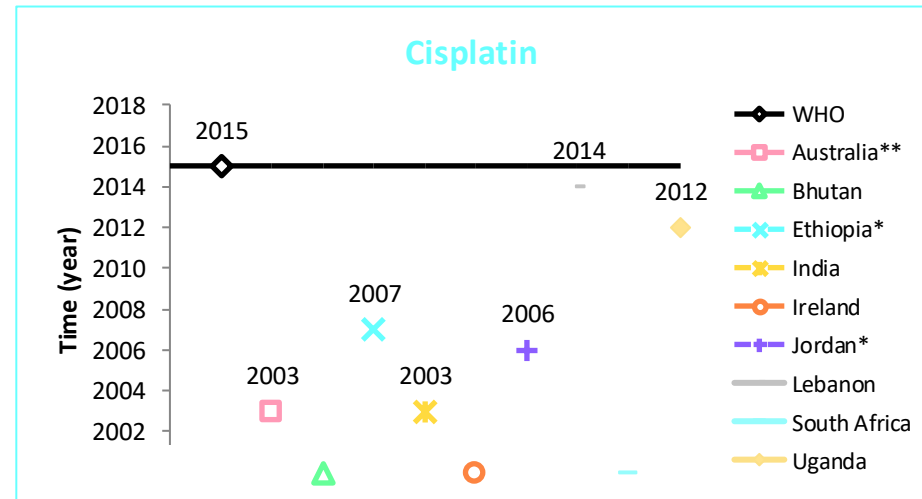
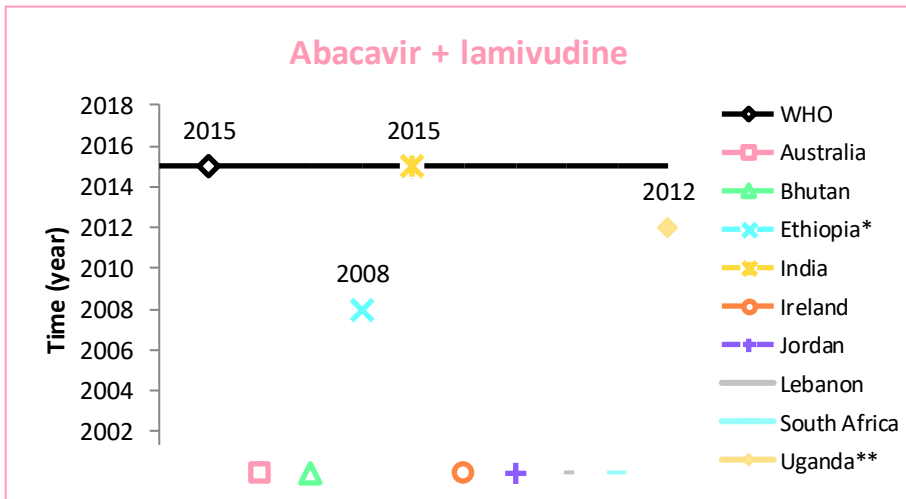
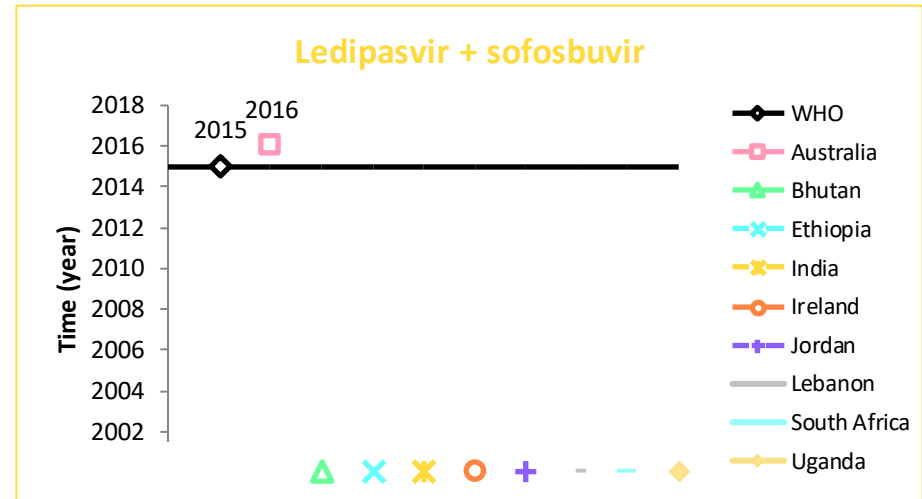
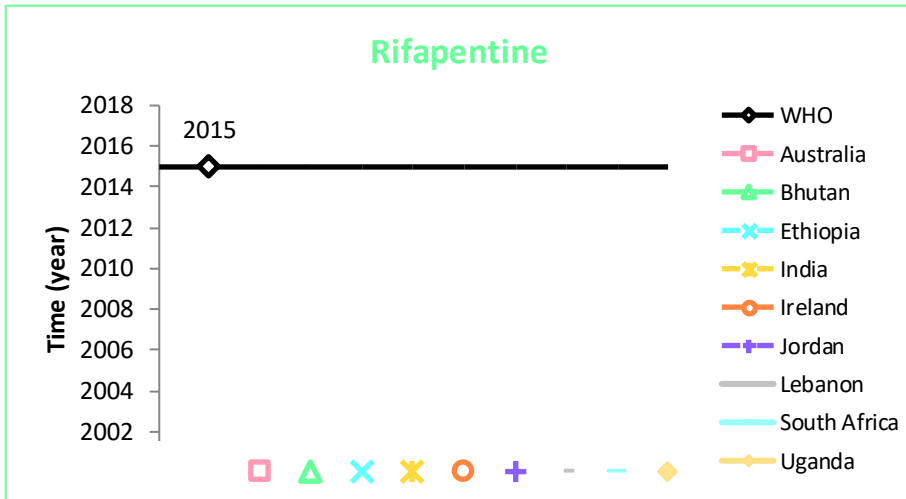


* on the final version of the NEMs

Preliminary results – countries



Preliminary results – medicines



* Left out; ** removed from NEML

Conclusions

- Most medicines were added for HIV, but the least were added for tuberculosis
- Eastern Mediterranean region & lower-middle income countries included many oncology and hepatitis C medicines
- Medicines added to the model list in 2015 were either already present on NEMs or not included

Discussion

Follow-up questions:

- Why were many oncology medicines included, even in low and lower-middle income countries?
 - Was the WHO late adding oncology medicines in 2015?
- Why was a recently added TB medicine not included?
 - Time/price/availability/regulatory status/latent or chronic condition?
- Why does the GDP or burden of disease in a country not determine its inclusion of medicines?

Next steps

- Interviews with national policy workers
- Countries
 - Double-check results Ireland
 - Include country from the Americas region
- National prices of medicines
 - Australia, Ireland, Jordan & South Africa

Acknowledgements

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Dr. Aukje Mantel

Dr. Rianne van den Ham

Prof. Dr. Fatima Suleman

F&F students!



A central blue and white globe of the Earth is surrounded by a variety of pharmaceuticals, including red and white capsules, yellow and white capsules, and white and grey tablets. Some tablets have markings like '50' and '783 PHARMACEUTICAL'. The background is a light, hazy blue.

Questions?
Suggestions?

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Basket of medicines

■ Tuberculosis ■ HIV ■ Oncology ■ Hepatitis C

- Rifabutin (2009)
- Rifapentine (2015)
- Zidovudine + lamivudine (2007)
- Zidovudine + lamivudine + nevirapine (2007)
- Efavirenz (2007)
- Emtricitabine + tenofovir (2007)
- Efavirenz + emtricitabine + tenofovir (2007)
- Lopinavir + ritonavir (2009)
- Atazanavir (2009)
- Ritonavir (2009)
- Sulfamethoxazole + trimethoprim (2011)
- Abacavir + lamivudine (2011)
- Darunavir (2011)
- Paclitaxel (2011)
- Docetaxel (2011)
- All-trans retinoic acid (2015)
- Cisplatin (2015)
- Fludarabine (powd. & tabl.) (2015)
- Bendamustine (2015)
- Imatinib (2015)
- Rituximab (2015)
- Anastrozole (2015)
- Leuprorelin (2015)
- Capecitabine (2015)
- Oxaliplatin (2015)
- Trastuzumab (2015)
- Gemcitabine (2015)
- Irinotecan (2015)
- Bicalutamide (2015)
- Vinorelbine (2015)
- Filgrastim (2015)
- Ribavirin (oral & inj.) (2007)
- Daclatasvir (2015)
- Sofosbuvir (2015)
- Dasabuvir (2015)
- Ledipasvir + sofosbuvir (2015)
- Ombitasvir + paritaprevir + ritonavir (2015)
- Simeprevir (2015)

Overall analysis - number

	Total EMs (range)	Tuberculosis (range)	HIV (range)	Oncology (range)	Hepatitis C (range)
WHO model list¹	40	2	11	19	8
Overall countries (n=9)	15 (7-24)	0 (0-1)	6 (0-9)	7 (0-17)	1 (0-4)
Australia	22	1	8	9	4
Bhutan	2	0	2	0	0
Ethiopia	15	0	9	6	0
India	22	1	7	12	2
Ireland	8	0	0	6	2
Jordan	24	0	4	17	3
Lebanon	13	0	5	7	1
South Africa	7	1	6	0	0
Uganda	18	1	6	11	0
Income groups (median)²					
High (n=2)	15 (8-22)	0.5 (0-1)	4 (0-8)	7.5 (6-9)	3 (2-4)
Upper middle (n=2)	10 (7-13)	0.5 (0-1)	5.5 (5-6)	3.5 (0-7)	0.5 (0-1)
Lower middle (n=3)	18 (2-24)	0 (0-1)	4 (2-7)	12 (0-17)	2 (0-3)
Low (n=2)	16.5 (15-18)	0.5 (0-1)	7.5 (6-9)	8.5 (6-11)	0 (0)
Geographic regions (median)³					
African (n=3)	13 (7-18)	1 (0-1)	6 (6-9)	6 (0-11)	0 (0-0)
Eastern Mediterranean (n=2)	18.5 (13-24)	0 (0)	4.5 (4-5)	12 (7-17)	2 (1-3)
European (n=1)	8 (8)	0 (0)	0 (0)	6 (6)	2 (2)
South-East Asia (n=2)	12 (2-22)	0.5 (0-1)	4.5 (2-7)	6 (0-12)	1 (0-2)
Western Pacific (n=1)	22 (22)	1 (1)	8 (8)	9 (9)	4 (4)

¹ the WHO model list of essential medicines; ² as classified by the World Bank; ³ as classified by the WHO;
EM: essential medicine

Overall analysis - percentage

Country	Tuberculosis % EMs	HIV % EMs	Oncology % EMs	Hepatitis C % EMs
Overall	0 (0-50)	55 (0-82)	37 (0-89)	13 (0-50)
Australia	50	73	47	50
Bhutan	0	18	0	0
Ethiopia	0	82	32	0
India	50	64	63	25
Ireland	0	0	32	25
Jordan	0	36	89	38
Lebanon	0	45	37	13
South Africa	50	55	0	0
Uganda	50	55	58	0
Income groups¹				
High (n=2)	25 (0-50)	36 (0-73)	39 (32-47)	38 (25-50)
Upper middle (n=2)	25 (0-50)	50 (45-55)	18 (0-37)	6 (0-13)
Lower middle (n=3)	0 (0-50)	36 (18-64)	63 (0-89)	25 (0-38)
Low (n=2)	25 (0-50)	68 (55-82)	45 (32-58)	0 (0)
Geographic regions²				
African (n=3)	50 (0-50)	55 (55-82)	32 (0-58)	0 (0)
Eastern Mediterranean (n=2)	0 (0)	41 (36-45)	63 (37-89)	25 (13-38)
European (n=1)	0 (0)	0 (0)	32 (32)	25 (25)
South-East Asia (n=2)	25 (0-50)	41 (18-64)	32 (0-63)	13 (0-25)
Western Pacific (n=1)	50 (50)	73 (73)	47 (47)	50 (50)

Bold: country with most included EMs in that disease area; (in brackets): range; ¹ as classified by the World Bank; ² as classified by the WHO; EM: essential medicine

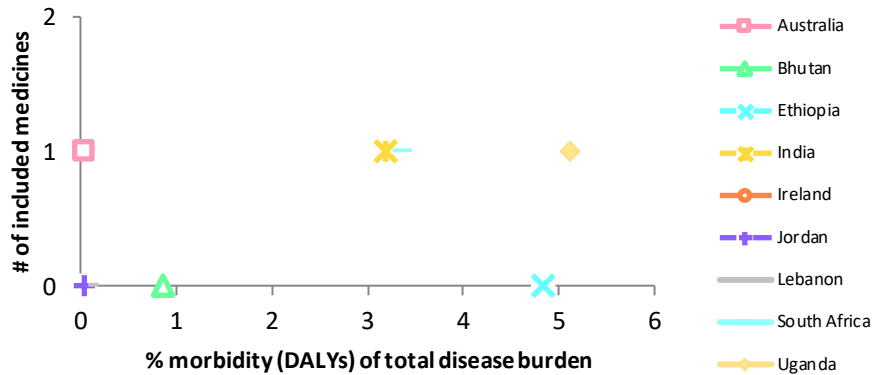
Burden of disease (DALYs) in 2016

Country	Tuberculosis ¹	% ²	HIV ¹	% ²	Oncology ¹	% ²	Hepatitis C ¹	% ²
Global	43557934.03	1.83	57575391.70	2.41	213220966.55	8.94	83725.07	0.00
Australia	1409.79	0.03	5963.06	0.11	904253.50	16.76	163.55	0.00
Bhutan	1873.77	0.86	2031.24	0.94	11093.90	5.10	12.67	0.01
Ethiopia	1842617.76	4.83	1145961.87	3.01	2011208.90	5.27	2363.76	0.01
India	14814648.74	3.18	4930488.63	1.06	23329079.97	5.01	27503.19	0.01
Ireland	600.37	0.06	861.59	0.08	179535.43	17.24	12.45	0.00
Jordan	696.79	0.04	373.37	0.02	116061.19	6.87	16.18	0.00
Lebanon	1128.55	0.09	1822.98	0.15	157650.12	12.76	10.86	0.00
South Africa	926479.50	3.37	9107378.35	33.10	1281071.29	4.66	151.00	0.00
Suriname	330.20	0.19	3118.55	1.78	14915.82	8.51	3.40	0.00
Uganda	1011081.35	5.11	2002989.48	10.11	726905.67	3.67	844.15	0.00

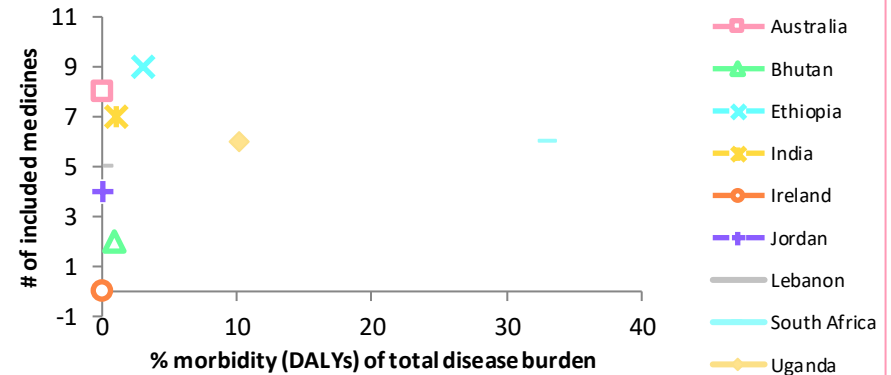
¹ number of DALYs caused by disease; ² percentage of total DALYs caused by disease

Burden of disease – correlations

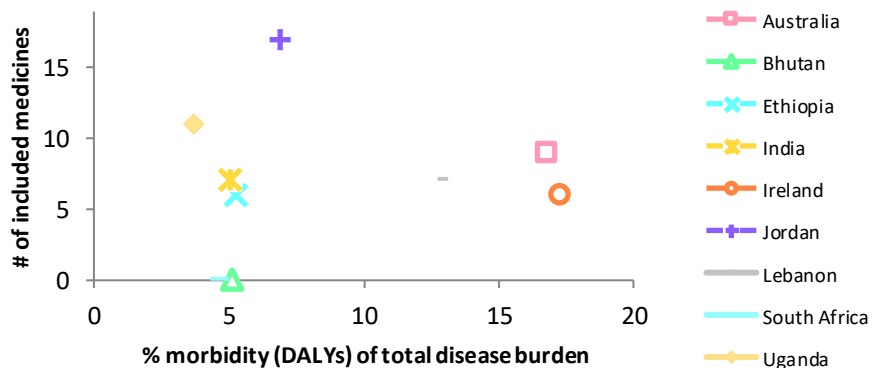
Tuberculosis



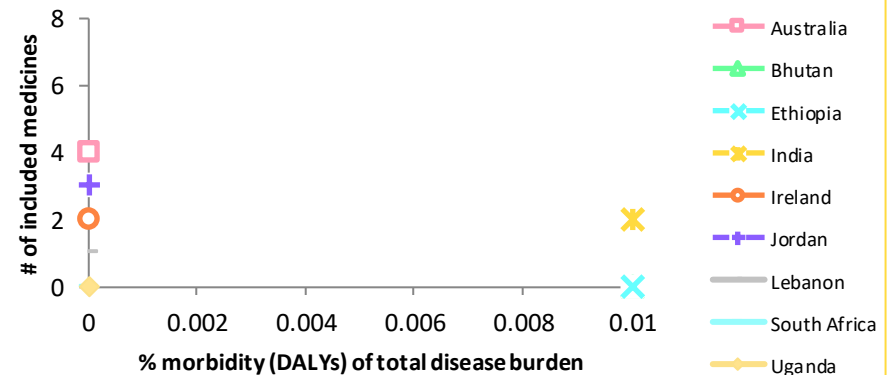
HIV



Oncology

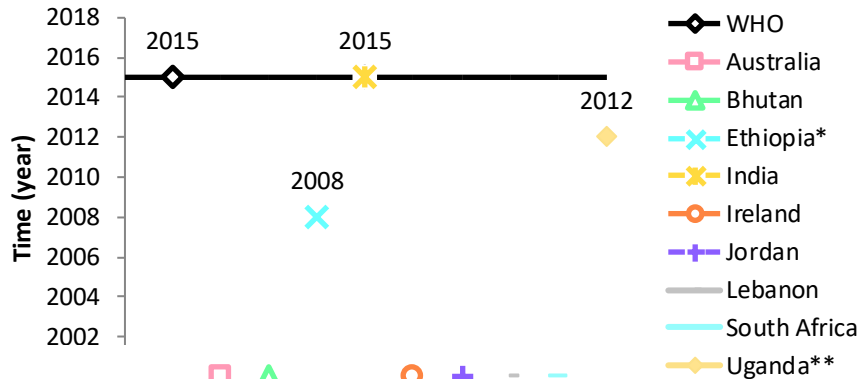


Hepatitis C

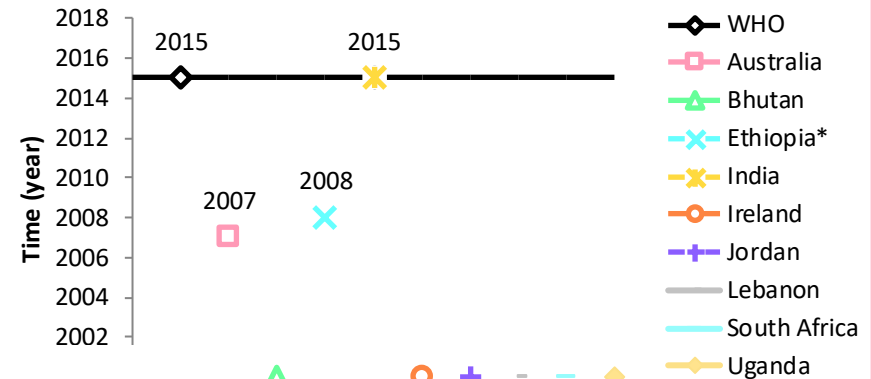


Recently added medicines (1)

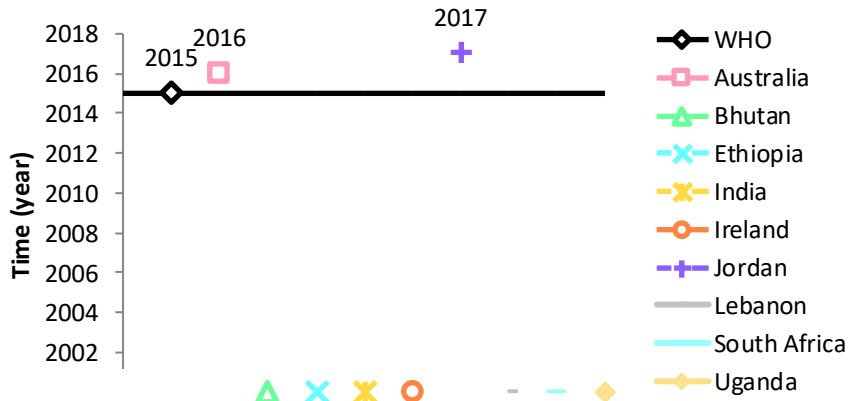
Abacavir + lamivudine



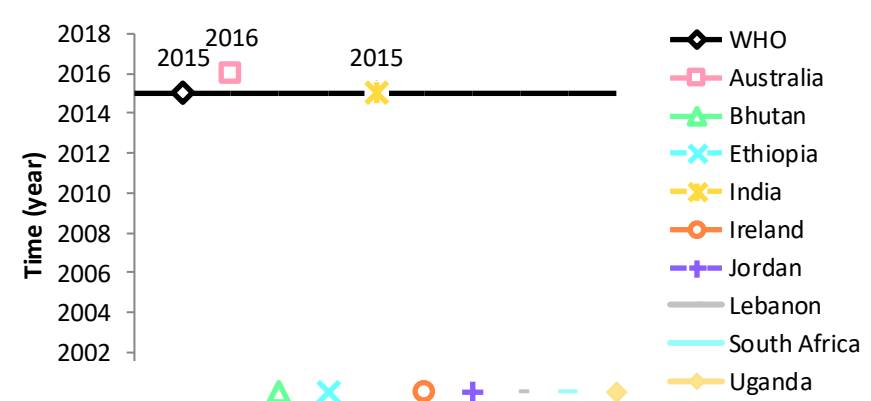
Darunavir



Daclatasvir

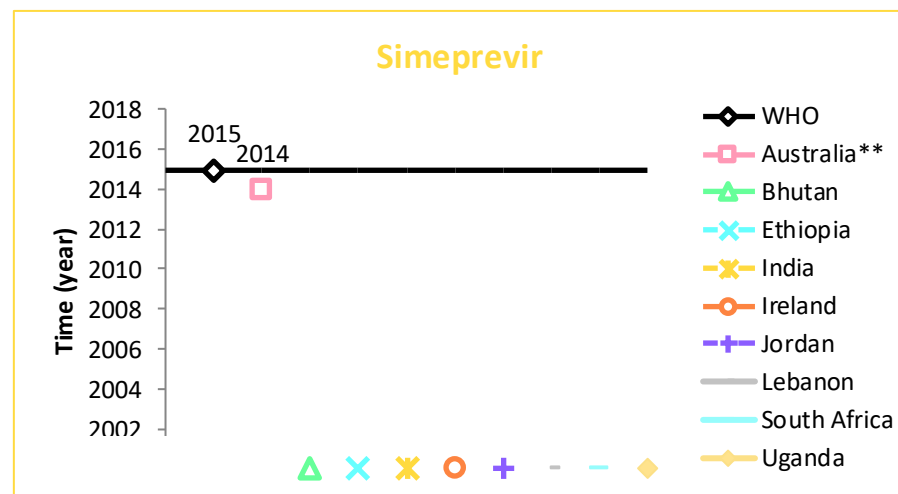
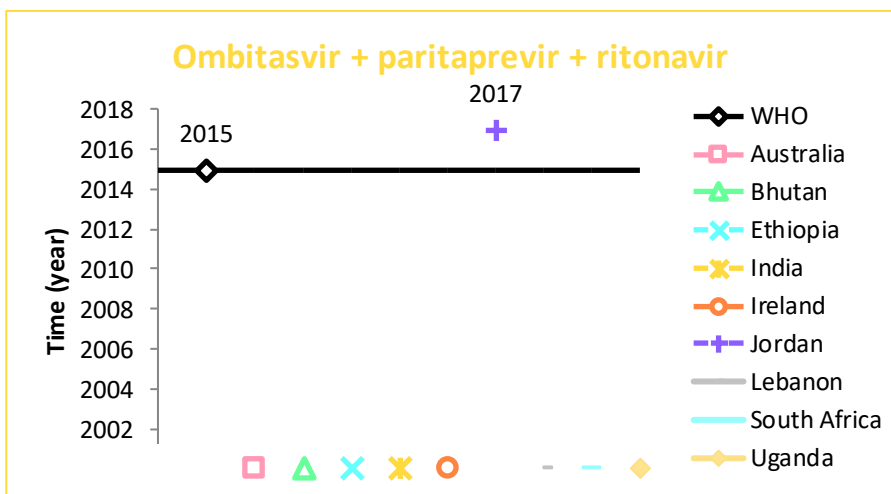
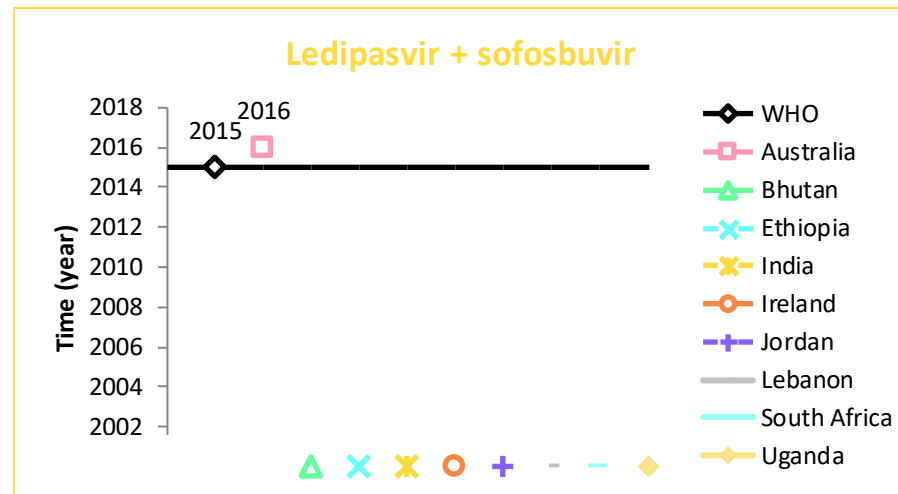
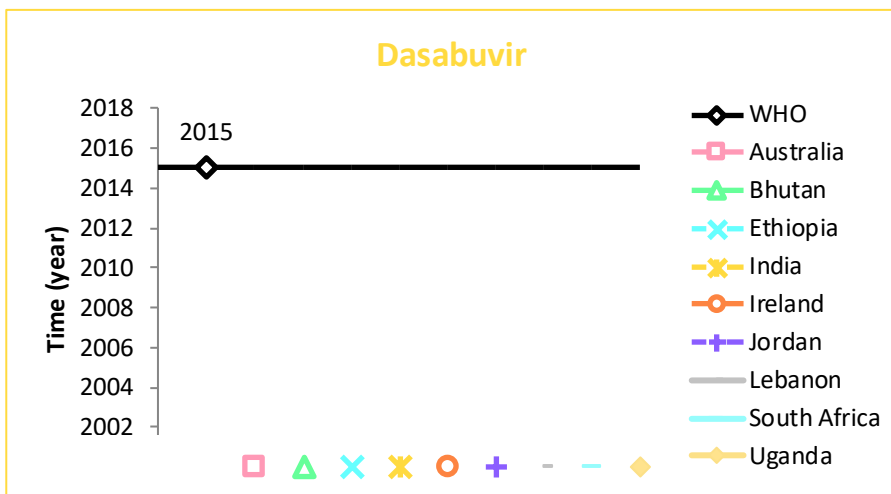


Sofosbuvir



* Left out; ** removed from NEML

Recently added medicines (2)



* Left out; ** removed from NEML