TECHNICAL ANNEX: MODELLING RESOURCE MOBILIZATION SCENARIOS

This document describes a resource availability model which estimates the resources that could be available for funding priority RMNCAH-N interventions in 50 countries between 2017 and 2030 - with or without the efforts of the combined GFF Partnership.

The rest of this document describes the model's methodology, assumptions, data sources and results.

1. METHODOLOGY

1.1. CONCEPT

The resource mobilisation model was built to assess the scale of resources that could be mobilised to fund increased coverage of priority RMNCAH-N interventions with and without the combined contributions of the GFF Partnership. The difference in available resources between a scenario with the GFF and a scenario without it can be interpreted as the resource impact of the GFF model, and can be translated into health impacts through a second (separate) modelling exercise.

There are several ways in which the GFF Partnership intends to affect change, and which the resource mobilisation model attempts to capture, including:

- influencing the share of domestic government expenditure allocated to health and the share of health budgets allocated to priority RMNCAH-N interventions;

- influencing the scale of external resources aligned around country investment cases (of which a proportion is assumed to be incremental - in the sense that it would not otherwise be allocated to scaling-up these interventions); and

- generating allocative and technical efficiency gains through greater alignment and coordination of health financing.

There is a trade-off in any modelling exercise between being simple and being comprehensive. The model attempts to capture the most important channels of influence, but does not distinguish between every one of the GFF's planned activities. For example, private sector engagement is not modelled independently, but could create change through any of the three channels listed above.

The model attempts to capture the dynamics of other results of interest as well, such as the prevalence of out-of-pocket payments for priority RMNCAH-N interventions.
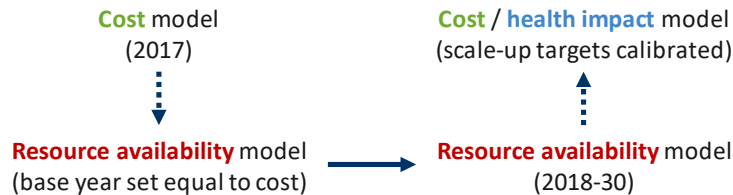
Model inputs use the most reliable, granular data sources available. This means using country-level data when it exists or, if not, using regional and/or income group level data instead. The model is intended to generate results at the aggregate level (country-level results are not reported) though country-level results are used to sense check each assumption and ensure that they produce realistic dynamics.

There are several points where accurate input data was not available. Where assumptions required judgement, consideration was given to find the most justifiable point within a plausible range. In light of the inherent uncertainty in this type of modelling exercise, two sets of assumptions - conservative and ambitious - were used to generate a range of results.

> **Box 1: How does the resource availability model relate to cost and health impact?**
>
> The resource availability model described in this document is one of two models developed to inform the GFF's first replenishment. The cost and health impacts of achieving specified coverage rates for the priority RMNCAH-N interventions were modelled using LiST. The two models are separate but run scenarios and assumptions which are broadly consistent with one another.
>
> Resource availability in the base year (2017) is set equal to funding the cost of current coverage. For each year after 2017, the cost / health impact model is then calibrated to lie approximately within the resource envelope for the relevant scenario.
>
> **Cost** model   **Cost** / **health impact** model
> (2017)   (scale-up targets calibrated)
>
> **Resource availability** model   →   **Resource availability** model
> (base year set equal to cost)   (2018-30)

1.2.   APPROACH

2017 is defined as the baseline year, during which expenditure on the priority set of RMNCAH-N interventions is equal to the cost of providing current levels of coverage (estimated in a separate modelling exercise). 2017 expenditure is assumed to consist of the following sources of funding:

- domestic resources;

- development assistance for health;

- out of pocket payments; and

- private pre-paid.

After 2017, each source of funding is projected out to 2030. A different approach is taken to modelling each source of funding, as best matches the potential impact of the GFF Partnership and the available data. The model also captures "efficiency gains" as a separate category which is additional to the existing sources of funding.

Figure 1.1 summarises the basic concept of what the model is doing. The rest of this approach section describes how each individual resource component is modelled. See section 2 for source references.

Figure 1.1: Basic model concept
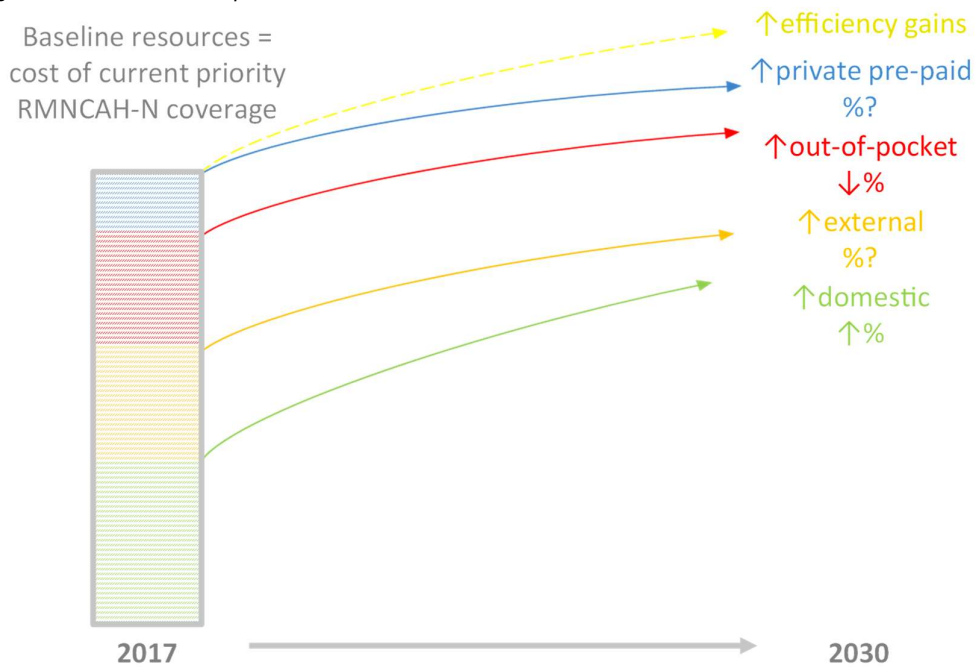
1.2.1. 2017 baseline assumptions

The actual split between each source of funding in 2017 for these particular interventions in each country is unknown, so average splits by country income groups are applied. Proportions are adapted from a source which estimates the relevant splits for general health expenditure. Given that these particular interventions are more likely to be publicly or donor-funded than general health expenditure, out-of-pocket payments are scaled downwards by half. The 50% adjustment was derived from evidence for a subset of GFF countries which suggests that about half of out-of-pocket payments are used to buy medicines/ medical supplies. The adjustment was heavily judgement-based given the absence of any better information.

Figure 1.2: 2017 baseline assumptions

	Unit	Constants	Trend	GFF conservative	GFF ambitious	Source
2017 resource envelope	$	21,784,338,900				(8)
Adjustment to % OOP in expenditure	%	50%				(7)
Split of 2017 expenditure - LMIC (post-OOP adjustment)						(4)
Domestic	%	53.1%				
Private pre-paid	%	12.4%				
Out-of-pocket	%	29.2%				
DAH	%	5.3%				
Split of 2017 expenditure - LIC (post-OOP adjustment)						(4)
Domestic	%	29.3%				
Private pre-paid	%	9.8%				
Out-of-pocket	%	20.1%				
DAH	%	40.9%				

1.2.2. Domestic resources

Domestic resource estimates are built up by multiplying GDP by the share of general government expenditure in GDP; the share of health expenditure in general government expenditure; and the share of spending on the priority set of RMNCAH-N interventions in general government health expenditure.

In 2017, each of these shares can be calculated from publicly available databases – except for the proportion of health budgets spent on the priority RMNCAH-N interventions, which is used to set cost equal to expenditure. Each of these inputs is available at the country level.

After 2017, assumptions are used to vary the two aspects of domestic resources which the GFF could claim to directly influence.

- The share of government budgets spent on health is held constant under the trend scenario (based on analysis of historic trends), and to rise under the conservative and ambitious scenarios. In the ambitious scenario, countries below the median for their income level / regional grouping are assumed to increase that share such that they would catch up by 2030, though progress tails away after their investment case period ends (halving each year). In the conservative scenario, progress finishes completely at the end of the investment period.

- The share of health budgets spent on the priority RMNCAH-N interventions is held constant under the trend scenario and increases by 1 and 2 percentage points by 2030 under the conservative and ambitious scenarios respectively. The levels of improvement were chosen to give a range of results and which were in reasonable proportion to baseline levels (c. 8%).

The future path of GDP is unknown. The model uses IMF forecasts out to 2022, then follows the approach used in Stenberg et al. (2014) to forecast GDP trajectories for each country: assuming that real growth rates will converge from their 2017-22 averages to 2% in 2070. The model is sensitive to GDP growth but, since the GFF does not aim to direct influence GDP, it is treated as exogenous for the purposes of this model. Similarly, the share of government expenditure in GDP is held constant across all scenarios.

Figure 1.3: Domestic resource growth assumptions

	Unit	Constants	Trend	GFF conservative	GFF ambitious	Source
GDP growth rates, forecast						(1)
Convergence year	year	2070				
Convergence growth rate	%	2.0%				
% GGE / GDP	text	Constant				(1)
% GGHE / GGE	text		Constant	Upwards convergence to median; during IC only	Upwards convergence to median; tapering off after IC (halving each year)	(2)
↑**% priority interventions / GGHE, 2017-30**	pp		-	1	2	(7)

1.2.3. External resources

External resource mobilisation is modelled by estimating the scale of resources that will be aligned around investment cases in each country, and assuming that a proportion of those resources would be additional relative to the counterfactual (in the sense that they would not otherwise have been allocated to this set of interventions). After the investment case period finishes, the model assumes that additional resources taper away quickly, though with some degree of sustainability.

The scale of investment case resources in each country is based on estimates from the GFF Secretariat concerning the scale of the GFF Trust Fund replenishment; how those resources will be split across countries and years (based on an allocation algorithm taking into account variables such as burden of disease, population, and income level); and the ratio of GFF Trust Fund disbursements to other sources within each investment case (excluding domestic resources to avoid double-counting). The ratios listed

in Figure 1.4 are not multipliers and should not necessarily be interpreted as causative. Higher ratios are applied in the ambitious scenario and lower ratios are applied in the conservative scenario. The rate at which investment case resources are withdrawn is also faster under the conservative scenario.

A key unknown in estimating external resource mobilisation is the extend to which resources aligned around country investment cases would be greater than what would have been available to fund the priority RMNCAH-N interventions if the investment cases and other GFF initiatives were absent. At either extreme, it could be assumed that all investment case resources are additional or that none are (e.g. funding is just re-labelled). In the absence of better information, the model considers the proportion by which costs would have to increase to reach near universal (e.g. 90%) intervention coverage. Across the whole modelling period (2017-20) this comes out at c. 28%, which is used in the ambitious scenario. The conservative scenario uses a lower proportion (c. 22%) based on the part of the period covered by country investment cases.

Figure 1.4: Development assistance for health / external growth assumptions

	Unit	Constants	Trend	GFF conservative	GFF ambitious	Source
GFF Trust Fund resources available	$	2,600,000,000				(6)
GFF Trust Fund disbursement timing						(6)
Non-IC year	%	0%				
Year 1	%	20%				
Year 2	%	20%				
Year 3	%	20%				
Year 4	%	20%				
Year 5	%	20%				
GFF Trust Fund disbursement timing (10 year IC)						(6)
Non-IC year	%	0%				
Year 1	%	10%				
Year 2	%	10%				
Year 3	%	10%				
Year 4	%	10%				
Year 5	%	10%				
Year 6	%	10%				
Year 7	%	10%				
Year 8	%	10%				
Year 9	%	10%				
Year 10	%	10%				
Ratio of GFF Trust Fund resources to other resources during investment case phase						(6)
IDA/IBRD	ratio		n/a	4.0	6.0	
External	ratio		n/a	6.0	8.0	
Private	ratio		n/a	1.0	1.5	
Adjustment to domestic expenditure for infrastructure costs which may not be included in investment case						(8)
Infra / non-infra	%	102%				
Post-Investment Case period funding						
Growth rate ("-" implies declining sustainability after IC ends)						(7)
IDA/IBRD	%		n/a	-75%	-50%	
External	%		n/a	-75%	-50%	
Private	%		n/a	-75%	-50%	
Proportion of investment case resources assumed to be incremental (relative to trend)						
GFF TF resources	%	100%				(8)
Other external resources	%		n/a	22%	28%	(8)

1.2.4. Out-of-pocket payments

Out-of-pocket sources of health expenditure are assumed to follow trend growth rates estimated in the wider literature, but are also assumed to reduce in proportion to increases in other sources of health funding. That is, a fraction of every dollar of additional funding mobilized is assumed to replace out-of-pocket spending rather than being available to scale-up coverage rates. The coefficient used to

characterise the relationship between out-of-pocket spending and other funding sources is based on CEPA analysis of estimates from the literature and could benefit from further research.

Figure 1.5: Out-of-pocket growth assumptions

	Unit	Constants	Trend	GFF conservative	GFF ambitious	Source
OOP growth rate assumption	text	Forecast from literature, by income group				(4)
OOP average annualised growth rate, 2015-30						(4)
LMIC	%	4.0%				
LIC	%	1.5%				
Elasticity of OOP w.r.t. other resources	%	-8%				(5)

1.2.5. Private pre-paid

Private pre-paid sources of health expenditure are assumed to follow trend growth rates estimated in the wider literature, and are otherwise treated as exogenous. Although the GFF may perform some activities encouraging uptake of private health insurance, they are not incorporated in this model.

Figure 1.6: Pre-paid private growth assumptions

	Unit	Constants	Trend	GFF conservative	GFF ambitious	Source
PPP growth rate assumption	text	Forecast from literature, by income group				(4)
PPP average annualised growth rate, 2015-30						(4)
LMIC	%	4.6%				
LIC	%	3.8%				

1.2.6. Efficiency gains

The "efficiency gain" label is a catch-all term to include anything which reduces the cost of achieving a given coverage rate (efficiency) or which increases the health impact that can be achieved with a given set of resources (effectiveness). For instance, improved alignment around investment cases or better prioritisation of essential interventions could both be represented as efficiency gains. The model expressed these gains as an expansion of the overall resource envelope above and beyond each individual source.

Efficiency gains are modelled at different rates of progress over different parts of the resource envelope which the GFF could claim to influence. For instance, the GFF Partnership may have large opportunities to improve alignment around investment case resources, but less around non-investment case resources and none around out-of-pocket payments. The assumptions listed in Figure 1.7 are achieved by the end of the modelling period (2030) and are not annual growth rates. They were chosen based on analysis of a WHO report suggesting that a significant proportion of resources allocated to health is wasted[1]. Consideration was given to set targets linked to <u>avoidable</u> inefficiency (as opposed to endemic waste). To provide context to these targets, companies and regulators in the non-health sectors often set efficiency challenges of 1% per annum.

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[1] http://www.who.int/whr/2010/en/

Figure 1.7: Efficiency gain assumptions

	Unit	Constants	Trend	GFF conservative	GFF ambitious	Source
Efficiency gains (achieved by 2030)						(9)
Domestic	%		0.0%	2.5%	5.0%	
Private pre-paid	%		0.0%	2.5%	5.0%	
Out-of-pocket	%		0.0%	0.0%	0.0%	
DAH	%		0.0%	2.5%	5.0%	
Investment case resources (not additive)	%		n/a	6.0%	12.0%	

1.3. INTERPRETATION

The following points should be considered when interpreting results of the resource availability model.

- The model estimates funding for a priority set of RMNCAH-N interventions only - not for all RMNCAH-N expenditure;

- The model estimates the combined impact of the GFF Partnership - including the GFF Trust Fund, Secretariat and investment cases - but does not attempt to attribute results to any single partner. It would be misleading to attribute all of the GFF Partnership's results solely to the value of the GFF Trust Fund replenishment.

1.4. LIMITATIONS

The following points should be considered when assessing the limitations of the resource availability model.

- All model results and scenarios are built on a central view of likely GDP growth. If GDP growth is higher / lower than assumed, overall progress in terms of intervention coverage rates may be better / worse than estimated.

- There are several points of uncertainty where assumptions could not be rigorously evidenced - particularly:

  o the share of investment case resources which are incremental;

  o the split of health expenditure by source in the base year (2017);

  o the scale of efficiency gains which the GFF Partnership could realise;

  o the extent to which the GFF Partnership can increase the shares of government budgets allocated to the priority set of RMNCAH-N interventions; and

  o the extent to which progress during investment case periods will be sustained thereafter.

- This model estimates the impact of the GFF Partnership on resource availability for the priority set of RMNCAH-N interventions, but does not consider the impact on other sectors. That is, it does not assess the opportunity cost of increasing RMNCAH-N funding in terms of reductions in resources available for other purposes. This would usually be assessed through a full cost-benefit analysis. Likewise, a full cost-benefit analysis would consider the profile of repayments required by loan or bond-financed expenditure over time.

2.   DATA SOURCES

Table 2.1 summarises the sources of data used as inputs to the resource model or used to justify assumptions employed.

Table 2.1: Summary of data sources used in resource model

#	Source	Input	Period	Unit
1	IMF Economic Outlook[2]	GDP, forecast, by country	2017-18	2017 US$
		GDP real growth rates, forecast, by country	2017-22	%
		General government expenditure (GGE) as % of GDP, by country	2000-22	%
		GDP, forecast, by country	2017-18	2017 US$
2	WHO NHA database[3]	General government health expenditure (GGHE) as % of GGE, by country	2000-15	%
3	IHME DAH database[4]	Direct assistance for health (DAH), by country	2000-16	2017 US$
		Est. % of DAH allocated to maternal health, by country	2000-16	%
		Est. % of DAH allocated to child health, by country	2000-16	%
4	Global Burden of Disease Health Financing Collaborator Network[5]	Split of current health expenditure by source, LIC/LMIC	2015	%
		Out-of-pocket / private pre-paid growth forecasts, LIC/LMIC	2015-30	% p.a.
5	Results for Development Institute[6]	Elasticity of out-of-pocket payments with respect to other funding sources (above trend)	-	%
6	GFF Secretariat forecasts (for modelling purposes only)	Assumed allocation of GFF Trust Fund resources, by country	2017-30	2017 US$
		Assumed investment case start / end years, by country	2017-30	2017 US$
		Ratio of GFF Trust Fund resources to other resources during investment case phase	-	ratio
7		Annual decline in investment case funding post-investment case	-	% p.a.

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[2] https://tcdata360.worldbank.org/
[3] http://apps.who.int/nha/database/Home/Index/en
[4] http://ghdx.healthdata.org/record/development-assistance-health-database-1990-2017
[5] https://doi.org/10.1016/S0140-6736(18)30697-4
[6] http://www.r4d.org/wp-content/uploads/THF-The-health-financing-transition.pdf

	CEPA assumption based on discussion with GFF Secretariat	Adjustment to split of expenditure on priority RMNCAH-N interventions by source, reducing out-of-pocket share relative to general health expenditure	-	%
8	CEPA analysis of Avenir Health cost modelling	Adjustment to domestic expenditure for infrastructure costs which may not be included in investment case	-	%
		Proportion of investment case resources assumed to be incremental (i.e. available to fund scale-up)	-	%
9	CEPA analysis of WHO World Health Report 2010[7]	Efficiency gains achievable by end of period	-	%

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[7] http://www.who.int/whr/2010/en/

3.   RESULTS

Table 3.1 summarises the resources estimated to be available to fund the priority set of RMNCAH-N interventions under "trend", "conservative" and "ambitious" model scenarios.

Table 3.1: Modelled resource availability for priority RMNCAH-N interventions under "trend", "conservative" and "ambitious" scenarios (2017 US$ billions)

Component	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	SUM
Trend scenario															
Domestic	7.6	8.0	8.3	8.7	9.1	9.5	10.0	10.5	11.0	11.5	12.0	12.6	13.2	13.8	145.9
Private pre-paid	2.0	2.0	2.1	2.2	2.3	2.4	2.5	2.6	2.8	2.9	3.0	3.1	3.3	3.4	36.8
Out-of-pocket	4.4	4.6	4.7	4.9	5.1	5.2	5.4	5.6	5.8	6.0	6.2	6.4	6.6	6.8	77.8
DAH-MCH	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	43.1
Efficiency gains	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	**17.1**	**17.7**	**18.3**	**18.9**	**19.6**	**20.3**	**21.0**	**21.8**	**22.6**	**23.4**	**24.3**	**25.2**	**26.2**	**27.1**	**303.6**
- trend	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*
Conservative scenario															
Domestic	7.6	8.1	8.6	9.4	10.3	11.3	12.3	13.4	14.5	15.4	16.4	17.4	18.4	19.5	182.7
Private pre-paid	2.0	2.0	2.1	2.2	2.3	2.4	2.5	2.6	2.8	2.9	3.0	3.1	3.3	3.4	36.8
Out-of-pocket	4.4	4.6	4.7	4.7	4.8	4.9	5.1	5.2	5.4	5.6	5.8	6.0	6.2	6.4	73.7
DAH-MCH	3.1	3.4	3.8	5.1	5.1	5.1	4.9	4.6	3.8	3.6	3.6	3.5	3.4	3.1	56.0
Efficiency gains	-	0.0	0.1	0.1	0.2	0.2	0.3	0.3	0.4	0.4	0.5	0.6	0.7	0.8	4.6
Total	**17.1**	**18.1**	**19.3**	**21.5**	**22.7**	**23.9**	**25.1**	**26.2**	**26.9**	**28.0**	**29.3**	**30.6**	**31.9**	**33.2**	**353.7**
- trend	*-*	*0.5*	*1.0*	*2.6*	*3.1*	*3.6*	*4.0*	*4.4*	*4.2*	*4.5*	*4.9*	*5.3*	*5.8*	*6.1*	*50.2*
Ambitious scenario															
Domestic	7.6	8.1	8.7	9.6	10.7	11.8	13.0	14.2	15.6	16.9	18.1	19.5	20.8	22.3	197.0
Private pre-paid	2.0	2.0	2.1	2.2	2.3	2.4	2.5	2.6	2.8	2.9	3.0	3.1	3.3	3.4	36.8
Out-of-pocket	4.4	4.5	4.6	4.6	4.7	4.8	5.0	5.1	5.3	5.5	5.6	5.8	5.9	6.1	72.0
DAH-MCH	3.1	3.6	4.1	5.7	5.7	5.7	5.6	5.3	4.4	4.0	3.9	3.7	3.6	3.3	61.6
Efficiency gains	-	0.1	0.2	0.4	0.5	0.7	0.8	1.0	1.0	1.1	1.2	1.3	1.4	1.5	11.1
Total	**17.1**	**18.3**	**19.7**	**22.6**	**24.0**	**25.5**	**26.9**	**28.2**	**29.0**	**30.3**	**31.8**	**33.4**	**35.0**	**36.6**	**378.5**
- trend	*-*	*0.7*	*1.4*	*3.7*	*4.4*	*5.2*	*5.8*	*6.4*	*6.4*	*6.8*	*7.5*	*8.2*	*8.9*	*9.5*	*75.0*