Annex B: Supplementary contextual analyses

This document provides a number of more detailed, contextual analyses as additional background to the two key questions that will inform Gavi post-2020 Strategy:

1. How will the Alliance ensure continued progress on equitable coverage in the countries that are yet to transition?
2. How can the global community engage non-Gavi countries to address growing inequities and maximise the impact of their domestic investments in immunisation?
3. How will the Alliance ensure continued progress on equitable coverage in the countries that are yet to transition?
Segmentation of countries builds on levels of immunisation barriers and C&E performance

<table>
<thead>
<tr>
<th>Axes</th>
<th>Indicators</th>
<th>Associated thresholds</th>
<th>Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Immunisation barriers</td>
<td>Vaccine uptake capacity (VUA)</td>
<td>High if &gt;= 85%, Medium if &gt;= 60%, Low if &lt; 60%</td>
<td>High/Medium/Low²</td>
</tr>
<tr>
<td></td>
<td>Institutional capacity (IC: urgent gaps)</td>
<td>High if &gt;= 80%, Medium if &gt;= 60%, Low if &lt; 60%</td>
<td>High/Medium/Low²</td>
</tr>
<tr>
<td></td>
<td>Health expenditure as % of GDP</td>
<td>High if &gt;= 4%, Medium if &gt;= 2%, Low if &lt; 2%</td>
<td>High/Medium/Low²</td>
</tr>
<tr>
<td></td>
<td>Workforce capacity (HIV and TB; percent 2015)</td>
<td>High if &gt;= 80%, Medium if &gt;= 60%, Low if &lt; 60%</td>
<td>High/Medium/Low²</td>
</tr>
<tr>
<td></td>
<td>Access (A2 between zero and admin fees)</td>
<td>Medium if &gt;= 20%, Medium if &gt;= 10%, Low if &lt; 10%</td>
<td>High/Medium/Low²</td>
</tr>
<tr>
<td></td>
<td>Human resources (HRH)</td>
<td>High if &gt;= 4%, Medium if &gt;= 3%, Low if &lt; 3%</td>
<td>High/Medium/Low²</td>
</tr>
<tr>
<td></td>
<td>Demand generation (TB, MDR-TB)</td>
<td>Medium if &gt;= 20%, Medium if &gt;= 10%, Low if &lt; 10%</td>
<td>High/Medium/Low²</td>
</tr>
<tr>
<td></td>
<td>Widespread conflicts</td>
<td>Qualitative identification across WHS, Others, GPEI, &lt;3 emergencies</td>
<td>High/Medium/Low²</td>
</tr>
</tbody>
</table>

C&E performance

- DTP3 coverage (target: >90%)
- Geographic equity (target: >90% coverage)
- Breadth of Protection (target: >90% children)

Three segments across Gavi post-2020 countries with varying levels of performance and barriers

**Post-2020 Gavi portfolio of 49 countries**

1. **Strong performers**
   - Brazil
   - Bangladesh
   - Côte d'Ivoire
   - Ghana
   - Cambodia
   - Romania

2. **Weak systems with low performance**
   - Nema
   - Chad
   - Eritrea
   - Mali
   - Pakistan
   - Comoros
   - Nigeria
   - Burundi
   - Bangladesh
   - Zambia

3. **Widespread conflicts**
   - Afghanistan
   - CAR
   - Somalia
   - South Sudan
   - Syria
   - Yemen
   - Cameroon
   - Liberia
   - Mozambique
   - Myanmar
   - Sierra Leone

**Coverage and Equity Performance**

- Low
- Medium
- High

*Includes countries eligible for the entire 2021–2035 period

Segment-wise share of under-immunized in 2035

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Initial analysis shows progress in coverage in segment 1 while challenges in segments 2 & 3

Segment-wise coverage trend 2011 / 2017 - DTP3 coverage

Targeted approaches for specific segments to be explored

Key dimensions in Gavi’s model and option space

<table>
<thead>
<tr>
<th>Objectives</th>
<th>Illustrative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capacity building / sustainability</td>
<td>Prioritise coverage</td>
</tr>
<tr>
<td>Accelerate introductions</td>
<td>Ensure sustainability of existing vaccines</td>
</tr>
<tr>
<td>Deliver through governments in country</td>
<td>Delivery through implementing partners</td>
</tr>
<tr>
<td>‘Light touch’ fiduciary risk management</td>
<td>Dedicated resources to manage risks</td>
</tr>
<tr>
<td>Retain co-financing model</td>
<td>Explore co-financing flexibilities (e.g. transition vaccines)</td>
</tr>
<tr>
<td>Restrict campaigns</td>
<td>Opportunistic campaign approach</td>
</tr>
</tbody>
</table>

1. Compounded Annual Growth Rate
Source: WHO/ICC, vaccination coverage
More deliberate focus on subnational approaches in large ‘weak system’ countries

Examples of subnational approaches

- **Target setting** – systematic disaggregation of data and objectives by subnational levels
- **Channeling of funds** – directly to regional governments
- **Vaccine introductions** – Consider introduction of vaccines in parts of countries only
- **Subnational campaigns** – Ensure campaigns targeted to specific subnational regions
- **Subnational emergencies** – Unlock specific flexibilities and operating model
- **Direct engagement and advocacy** – at subnational levels with subnational government bodies

Immunisation underpins PHC and provides a platform for UHC

- Immunisation has the **highest coverage rates** among key health interventions and has to reach **every household**
- Immunisation provides **touchpoints for a basic package of PHC interventions**
- As a preventive intervention, immunisation is one of the **best buys** in health, and therefore **essential in making PHC and UHC affordable**
- Immunisation helps remove **physical and financial barriers** to achieve Universal Health Coverage (UHC)
Opportunity to integrate vaccine programmes with other health interventions

- Pregnant women
- Infants, toddler & childhood
- 2nd year of life
- Older children
- Adolescents
- Adults & elder people

Gavi vaccines:

- HIB
- HPV
- IPV
- MenACWY
- Mumps
- Polio
- Typhoid
- Yellow fever

Supporting vaccines:

- BCG
- Hep B
- RSV
- Rabies
- Influenza

Leveraging immunization opportunities:

- Preventive care
- Nutrition
- Nutrition, growth monitoring
- Deworming
- Adolescent health
- Family planning
- Bednet distribution
- Pneumonia, diarrhoea control and cervical cancer control (linked to current portfolio)
- Non-exhaustive

Multi-sectoral approaches:

- Pneumonia, diarrhoea control and cervical cancer control (linked to current portfolio)
- Diarrhoea control & animal health (linked to VIS vaccines)

Immunisation has the highest coverage rates among key health interventions

Global coverage of UHC tracer indicators for health interventions

- Immunisation (DTP3)
- Family planning
- Sanitation
- Maternal care
- TB treatment
- HIV treatment
- Source: UHC Global monitoring report

Reaching the fifth child with immunisation can be the platform to reach every household with a basic package of PHC interventions.
Accelerated vaccine coverage could bring the world closer to achieving the U5 mortality SDG target.

Evolution of under-5 mortality (2000-2030)

- **Under 5 mortality rate (per 1,000 live births)**
  - Business as Usual
  - Accelerated Coverage

Note: Business as Usual: Normal conduct of business. Accelerated Coverage: Doubling down to improve vaccine coverage through targeted approaches to achieve near-zero U5 mortality.

Gavi is a key contributor to outbreak detection, prevention and response.

Gavi investments into epidemic VPD control (since 2015, $M)

- Total: $1,046
- RI/campaigns: $790
- Surveillance: $72
- Vaccines stockpiles: $186

1. Includes vaccine procurement (RI) and campaigns, spa and VSF for 2015-2019 period. RDF, TCA and SFA for 2015-2019 period and LRS funds for 2016-2017 vaccine procurement period.
2. Includes laboratory supplies and strategic stockpile for maintaining response capability.
4. Includes the following vaccines: IPV, DTP, HepB, HepA, Hib, MCV, MMR, etc.

% of corresponding programmatic envelope: 23%
Gavi engagement in GHS is critical as the risk of disease outbreaks continues to increase

Successes in tackling some outbreaks

<table>
<thead>
<tr>
<th>Year</th>
<th>Smallpox cases (millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1906-1929</td>
<td>1.2</td>
</tr>
<tr>
<td>1920-1940</td>
<td>9.7</td>
</tr>
<tr>
<td>1940-1960</td>
<td>8.4</td>
</tr>
<tr>
<td>1960-1980</td>
<td>4.2</td>
</tr>
<tr>
<td>1980-today</td>
<td>0</td>
</tr>
</tbody>
</table>

However, new pathogens increasingly emerging...

<table>
<thead>
<tr>
<th>Year</th>
<th>New pathogens emerging</th>
</tr>
</thead>
<tbody>
<tr>
<td>1940-1960</td>
<td>~30</td>
</tr>
<tr>
<td>1960-1980</td>
<td>~160</td>
</tr>
<tr>
<td>1980-2000</td>
<td>~170</td>
</tr>
</tbody>
</table>

... going hand in hand with new risks for outbreaks

- **New 21st century risks**
  - Altered disease patterns, e.g., due to climate change
  - Unprecedented population density incl. urbanisation
  - Globalisation and migration

- **Existing 20th century risks**
  - Weak primary healthcare
  - Low detection and response capacity
  - Others

In addition to mortality, outbreaks have a huge economic impact...

**Influenza (1918-1919) – Global:**
- No cost estimate for 1918; at this scale today, would cost **4.8% of global GDP**

**Influenza (1958) – Global:**
- Estimated cost of **3.1% of global GDP**

**Influenza (1968) – Global:**
- Estimated cost of **0.7% of global GDP**

**SARS (2003) – China and Hong Kong:**
- Estimated cost of **0.001% of global GDP**

**Ebola (2015) – Liberia, Sierra Leone and Guinea:**
- Lost **0.03% of global GDP**

**Zika (2015-2017) – Latin American & Caribbean region:**
- Lost **0.01% – 0.02% of global GDP**

Source: Press release, Estimating the global economic cost of SARS. Jang Wha Lee and Warwick J. McKibbin

> $6T

Estimated cost of 21st century global pandemics

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... and are disruptive to health systems

- >11k deaths due to Ebola itself
- 881 cases & 513 deaths of health workers during the outbreak
- ~11k additional deaths due to 50% reduction in access to healthcare services in Guinea, Liberia, and Sierra Leone


Immunisation is particularly affected, leading to risks for additional vaccine-preventable deaths

1. From routine immunisation data collected from DHIS2, covering 522 primary health care facilities
2. Full immunisation defined as per WHO recommendations for children <1 year of age: Bacille Calmette-Guérin (BCG), polio, pentavalent, measles, yellow fever and pneumococcal
Gavi Countries not well prepared to respond to potential outbreaks

JEE assessment · overview

Country breakdown

| LIC | 40  | 22 |
| LMIC | 51  | 21 |
| UMIC | 58  | 11 |
| HIC | 70  | 15 |

ReadyScore: Better prepared (~80), Work to do (~40-80), Not ready (~<40), Unknown, In progress

Source: PreventEBola.org Oct 2015  1. Annex prepared, drafted, approved and endorsed from other public health needs

Funding gaps for responding to outbreaks remain after Ebola 2014

Case study: Zika outbreak 2016

Funds (Million $)

- Requested (Feb–Jul’16) 8 (13%)
- Received 6 (13%)
- Borrowed 13 (25%)
- Gap 48 (74%)

Funds requested during 1st 6 months of the outbreak


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Overview of core pillars for outbreaks prevention/response

<table>
<thead>
<tr>
<th>JEE Score</th>
<th>Prevent</th>
<th>Detect</th>
<th>Respond</th>
</tr>
</thead>
</table>
| 2.61 | Definition of international standards / regulations (IHR) | Global reporting of public health emergencies and outbreaks | International coordination of response & communication
| | Global advocacy | | Deployment of international teams in response to outbreaks |
| | Risk communication | | |
| 2.8 | Public health risk mapping & response plans | | |
| | National risk communication: outbreak, preventive measures, engagement with affected at risk communities, partner coordination | | |
| | Activation of emergency operations, Emergency Operations Centres, operating procedures and plans, points of entry management | | |
| 4.0 | Routine immunisation | | Epidemic prone diseases: vaccines development incentives |
| | Immunisation of specific groups (e.g. health workers) | | Pandemic & deployment of stockpile vaccines |
| | | | Monitoring R0 during outbreaks |
| 3.2 | Development of predictive technology and diagnostic innovation | Coordination of support for global and regional surveillance network | Deployment of diagnostic mechanisms for rapid and correct detection during outbreaks |
| | | & surveillance capacity development | |

1 IHR: legislation, coordination & communication score taken as a proxy for global legislation.

Broad landscape of international players coming together to tackle outbreaks

1. Global legislation, coordination and advocacy
2. National coordination & communication
3. Vaccines / Immunisation
4. Diagnostic and surveillance

Non-exhaustive: Governmental management, Funding.
Various groups are supporting the International Health Regulations implementation

<table>
<thead>
<tr>
<th>Prevent</th>
<th>Detect</th>
<th>Respond</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Coordination / management of global improvement on GHS agenda</td>
<td>• 65 countries</td>
<td>• 12 NGOs</td>
</tr>
<tr>
<td>• WHO, OIE, FAO, World Bank, and 35 other international organisations</td>
<td>• WHO, OIE, FAO, ECOWAS, UNISDR, EU</td>
<td></td>
</tr>
</tbody>
</table>

- Definition of international standards / regulations
  - Obligations of countries to report any single case of 4 diseases and events involving epidemic-prone diseases of international concern
  - States Parties are required to ensure that their national health surveillance and response capacities meet certain functional requirements

- Global / Regional advocacy
  - Risk communication

- Global reporting of public health emergencies and outbreaks

- Deployment of international teams in response to outbreaks
  - International coordination of response & communication

GOARN

National coordination and communication

Ebola 2018 outbreak example (1/2)

Outbreak timelines:
- 25th April 2018: first confirmed case of Ebola in 2018 (although suspected cases emerged before)
- 8th May 2018: an Ebola outbreak is declared in the Equateur province of the DRC (52 suspected cases, 18 deaths)
- 18th May 2018: WHO calls an emergency meeting after a case of Ebola is confirmed in Mbandaka, a major city in the DRC (44 cases, 23 deaths)
- 21st May 2018: launch of the vaccination intervention (maintained until 30th June 2018)
- As of 8th July 2018, WHO has deployed 332 experts and the latest assessment concluded that the outbreak has largely been contained

Donors Pledges, USDMillions

<table>
<thead>
<tr>
<th>Donors</th>
<th>Pledges</th>
</tr>
</thead>
<tbody>
<tr>
<td>World Bank</td>
<td>58.6</td>
</tr>
<tr>
<td>World Bank (PDF)</td>
<td>15.0</td>
</tr>
<tr>
<td>USAID</td>
<td>12.0</td>
</tr>
<tr>
<td>Germany</td>
<td>8.0</td>
</tr>
<tr>
<td>Global Fund</td>
<td>2.7</td>
</tr>
<tr>
<td>Switzerland</td>
<td>5.7</td>
</tr>
<tr>
<td>France</td>
<td>2.0</td>
</tr>
<tr>
<td>Canada</td>
<td>1.0</td>
</tr>
<tr>
<td>India</td>
<td>1.0</td>
</tr>
<tr>
<td>Other</td>
<td>1.0</td>
</tr>
<tr>
<td>WHD Response plan (USD millions)</td>
<td></td>
</tr>
</tbody>
</table>

Cases and death number

<table>
<thead>
<tr>
<th>Cases and death number</th>
<th>April</th>
<th>May</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of cases</td>
<td>6</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>Deaths</td>
<td>29</td>
<td>38</td>
<td>67</td>
</tr>
<tr>
<td>Confirmed cases</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Probable cases</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No case to date</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

When political will of the international community is high, and in-country authorities are reactive and adequately coordinate the efforts, funding needs can be met rapidly and the outbreak contained.

1 As of May 25th, 2018

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National coordination and communication
– Ebola 2018 outbreak example (2/2)

Outbreak response plan
- Country rapidly reacted after the MoH has been alerted to suspected Ebola cases (investigation team deployed 2 days after notification)
- 1 USD million CFE unbonded on the very day the outbreak was declared
- Existence of a RT-PCR equipped lab in Kinshasa able to confirm cases (less than 4 days between sample collection and confirmation)
- In 25 days, DRC put together a comprehensive strategic response plan costing an exhaustive response strategy

Main organisations involved in response
- World Health Organization
- UNICEF
- CDC
- Gavi
- MONUSCO
- Additional 15 organisations

Country coordination
- Some time just in signing protocol between WHO and RTF

Extra coordination efforts were required as many international actors were eager to be involved

Surveillance

Surveillance contributes to GHS and the C&E agenda

<table>
<thead>
<tr>
<th>Surveillance use case</th>
<th>Description</th>
<th>Examples</th>
<th>Implications on C&amp;E</th>
</tr>
</thead>
<tbody>
<tr>
<td>A EPI quality assurance</td>
<td>- Disease cases and outbreaks can indicate program gaps</td>
<td>- Measles outbreaks despite declared high vaccine coverage</td>
<td>- Identify C&amp;E gaps in specific geographies and trigger action</td>
</tr>
<tr>
<td>B Outbreak detection</td>
<td>- Rapid detection of outbreaks key to rapid containment</td>
<td>- Ebola outbreak scale as a function of detection date</td>
<td>- Reduce routine immunisation disruption</td>
</tr>
<tr>
<td>C Vaccine introduction decisions</td>
<td>- Burden of disease data helps show if vaccine needed</td>
<td>- Outbreak of M&amp;R typhoid driving Pakistan introduction</td>
<td>- Support efforts to build political will and target correct areas and groups</td>
</tr>
<tr>
<td>D Vaccine effectiveness monitoring</td>
<td>- Monitor changes in effectiveness, e.g., shifts in disease causing serogroups</td>
<td>- Meningococcal serogroup monitoring showed need to change vaccine</td>
<td>- Inform vaccine formulation choices to achieve effective protection</td>
</tr>
</tbody>
</table>
**A. Measles outbreak in Vietnam revealed gaps in immunisation program performance**

Despite reported >95% coverage with 1st dose measles containing vaccine, Vietnam had large measles outbreak in 2014.

- Immunisation program was consistently missing marginalized ethnic groups.
- Coincidental infant deaths in 2012 and 2013 after pentavalent vaccination triggered loss of confidence and delays in vaccination in urban areas.
- The accumulation of unprotected urban children created conditions for measles to spread beyond marginalized ethnic groups.

**B. Surveillance is critical for rapid outbreak detection and response**

Delays in identifying outbreaks can result in delayed responses that result in larger outbreaks with greater morbidity and mortality as well as higher costs.

1. How can the global community engage non-Gavi countries to address growing inequities and maximise the impact of their domestic investments in immunisation?
Nearly 60% of children dying of VPDs in 2020 will be in LMICs

Evolution of VPD mortality (2000-2030)

In 2023 ~60% of VPD mortality coming from LMICs

Note: World Bank 2017 country classification has been applied to the whole time series

Since the 70’s the world has changed dramatically; outdated perceptions & models need to be challenged

Source: Gavi/medium (based on 1990–2015 World Bank’s GDP per capita PPP adjusted)
Since the 70’s the world has changed dramatically; outdated perceptions & models need to be challenged.

2018

Most of the world now in the ‘middle’

Key
- Colours: world regions
- Population size

People across the globe can be categorized into four income levels:

- **Vulnerable People**
  - Limited access to clean water
  - Poor access to quality healthcare
  - Vulnerable
  - $40/month, Burundi

- $25/month, Bolivia
  - Able to pay for essentials
  - Access to basic, stored food

- $738/month, China
  - Able to pay for essential goods
  - Access to modern services, infrastructure

- $2,194/month, France
  - Able to pay for essential goods
  - Access to modern services, infrastructure

34 Source: Statista.com – Dollar Street. Pritchett and Wodon

Doc 11 – Annex B: Supplementary contextual analyses
MICs will host an increasing share of vulnerable people

**Share of vulnerable people**

**2000**

In 2000, 45% of vulnerable people (~2 bn) lived in MICs

**2025**

In 2025, 70% of vulnerable people (~2.9 bn) will live in MICs

Note: World Bank 2000 country classification has been applied
Source: Gapminder.com

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MICs host almost half of the world’s refugees and IDPs

- % of Refugees by Territory of Asylum:
  - Germany (0.9M)
  - Turkey (2.9M)
  - Jordan (2.8M)
  - Lebanon (1.5M)
  - Iran (1.0M)
  - Pakistan (1.3M)
  - Uganda (0.9M)
  - Ethiopia (0.8M)

- % of Internally Displaced Persons (IDPs):
  - Colombia (7.7M)
  - Syria (7.3M)
  - Iraq (2.0M)
  - Ukraine (1.9M)
  - Congo DRC (4.3M)
  - Somalia (2.1M)
  - Yemen (2.0M)
  - Sudan (2.0M)
  - South Sudan (1.6M)
  - Nigeria (1.7M)

Note: An internally displaced person is someone who is forced to flee his or her home but who remains within his or her country’s borders. Gavi Eligible refers to Gavi 72 and Never Gavi refers to countries not part of Gavi 72.


Under-immunized in former and never Gavi MICs anticipated to grow to almost 70% by 2030

Under-immunized children (DTP3) by income grouping

- 2017:
  - HICs: 19.0%
  - Never Gavi MICs: 17.1%
  - Former Gavi MICs: 18.1%
  - Gavi Eligible: 36.4%

- 2030 Forecast:
  - HICs: 14.0%
  - Never Gavi MICs: 14.0%
  - Former Gavi MICs: 54.0%
  - Gavi Eligible: 28.0%

Top 5 Account for ~47%:
- Nigeria: 26%
- India: 18%
- Pakistan: 6%
- Indonesia: 3%
- Angola: 3%

Note: Gavi Eligible includes countries eligible in 2017 and 2030 respectively; Former Gavi countries represent the remaining of Gavi 72 that transitioned; Gavi MICs exclude Oman, Bosnia, Albania, Ukraine & Turkmenistan that received Gavi support at some point but did not undergo formal transition process. Nigeria 2030 forecast does not include expected improvement through Board-approved new transition plan. Syria assumed to become Gavi eligible in 2019.

Source: WHO/UNICEF 2011 release - DTP3 Coverage

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...despite significantly higher domestic expenditures on immunisation

![Graph showing government expenditure on routine immunization per live birth (S)].

Note: Gavi-eligible refers to Gavi T2 and Never-Gavi refers to countries not part of Gavi T2.
Source: JRF Routine Immunization Expenditures 2016

Never-Gavi MICs lagging behind on PCV and Rota introductions...

<table>
<thead>
<tr>
<th>Data as of 2018</th>
<th>PCV Introductions</th>
<th>Rota Introductions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gavi-eligible (current and former)</td>
<td>82%</td>
<td>64%</td>
</tr>
<tr>
<td>Never Gavi-eligible MICs</td>
<td>48%</td>
<td>36%</td>
</tr>
</tbody>
</table>

Note: Gavi-eligible refers to Gavi T2 and Never-Gavi refers to countries not part of Gavi T2.
Source: Vaccine Launch Database for Gavi-eligible countries; JAC/INAC View-Hub for PCV, Rota and PATH Global Overview for HPV for non-Gavi countries. Includes Phase 1 Subnational and Regional introductions. Gavi Eligible excludes Syria.
Evolution of coverage rates shows worrying trends especially in never Gavi-eligible MICs

Relatively high and variable vaccines prices appear to be a driver of MICs underperformance