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Report

Review of Health Systems Strengthening (HSS) Support

Swiss Tropical and Public Health Institute

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Abbreviations

C&E	Coverage and Equity
CEF	Country Engagement Framework
cMYP	Comprehensive Multi-Year Strategic Plan
CSO	Civil Society Organisations
EPI	Expanded Program of Immunization
GF	Global Fund
GLMM	Generalized linear mixed model
GNI	Gross National Income
GPF	Grant Performance Framework
HMIS	Health Management Information System
HSIS	Health system and immunization strengthening
HSS	Health System Strengthening
IRC	Independent Review Committee
JAR	Joint Appraisal Reports
JRF	Joint Reporting Form
KII	Key Informant Interview
LFA	Local Fund Agent
LMIC	Lower Middle Income Countries
M&E	Monitoring and Evaluation
MCH	Mother and Child Health
MoH	Ministry of Health
MOPAN	Multilateral Organisations Performance Assessment Network
NGO	Non-Governmental Organisation
OSDV	On-site data verifications
PAB	Protection at Birth
PCA	Program Capacity Assessments
PCA	Principal Component Analysis
PHC	Primary Health Care
PPP	Public Private Partnership
PSM	Procurement and Supply Management
PSR	Program Support Rationale
PUDR	Progress Update / Disbursement Request

QA	Quality Assurance
QoC	Quality of Care
RFA	Request for Proposal
RSQA	Rapid Service Quality Assessments
SARA	Service Availability and Readiness Assessment
SCIH	Swiss Centre for International Health
SCD	Supply Chain Diagnostics
SCM	Senior Country Manager
SDGs	Sustainable Development Goals
SFA	Strategic Focus Areas
Swiss TPH	Swiss Tropical and Public Health Institute
TB	Tuberculosis
UNFPA	United Nations Population Fund
VPD	Vaccine-Preventable Disease
WB	World Bank
WGI	Worldwide Governance Indicators
WHO	World Health Organization

Executive summary

Purpose of this review

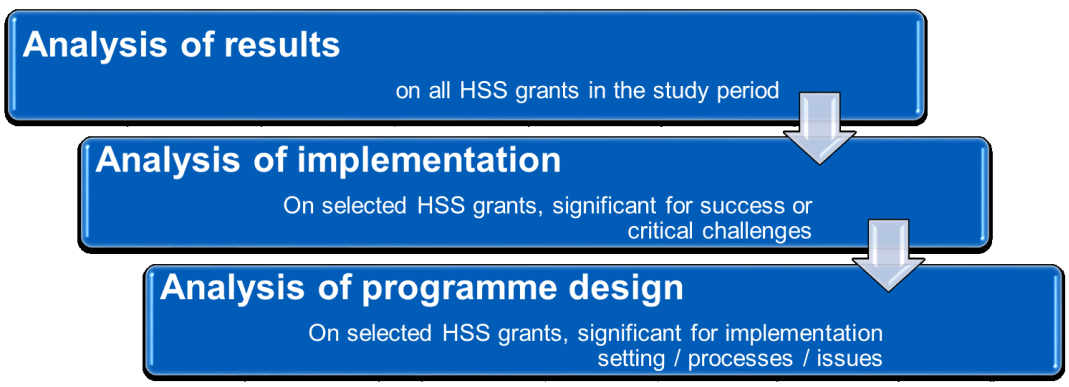
In August 2018, in the context of its on-going 2016-2020 strategy, Gavi commissioned a review of its Health Systems Strengthening (HSS) support. The instrument in question - Health Systems and Immunization Strengthening (HSIS) is specifically focused on contributing to one of Gavi's four strategic goals - the systems goal which seeks to increase the effectiveness and efficiency of immunisation delivery as an integrated part of strengthened health systems.

This review was expected to assess the availability of information to demonstrate results of Gavi HSS support, identify challenges, and to guide and inform future implementation. The first objective of the review was to show results on how Gavi's HSS support contributes to (a) increasing immunization coverage and equity; (b) strengthening of health systems to deliver integrated primary health care; and (c) improving sustainability of national immunization programs. Two further objectives were also included and consisted in identifying elements available to learn from recent experience, and establishing recommendations regarding the relevance and feasibility of future Health Systems and Immunization Strengthening (HSIS) evaluations.

Methodology

The review builds on the Theory of Change that Gavi prepared in the frame of the Full Country Evaluations. This Theory of Change shows how the immunization program interacts with wider health system factors, as well as population & context factors (demand, equity considerations, social, political and economic context) to generate sustainable change to coverage and equity across Gavi's 4 strategic goals, leading ultimately to health impact. The methodological approach of the review was based on a conceptual framework representing the factors subjacent to vaccine coverage and equity, and the relevant health system components, which is aligned with the aforementioned Theory of Change as well as WHO's conceptual framework for Social Determinants of Health, and previous reports.

The review made use of a mix of methods to answer questions along three main dimensions: Results, Implementation and Design of grants.



Questions relating to results were addressed through quantitative analysis of 77 countries and complemented with a qualitative review for 16 selected countries. Countries were selected based in on DTP3 coverage, transition stage, fragility status and grant management modality. For the quantitative analysis we calculated different statistical models using outcome variables as binomial responses in the generalized linear mixed model (GLMM) framework. The analyses used Gavi disbursements between 2000-2018, including HSS grants from 2007 onwards, as the main predictor, and coverage, equity of routine immunization, health system integration and new vaccine introductions as outcomes. The models controlled for those contextual predictors related to the health system, fragility and geographical and sociocultural context, identified by the conceptual framework as relevant for vaccine coverage and equity. The qualitative review complemented certain aspects on these results, but primarily addressed different questions about the implementation and design of HSS grants. The scope of the qualitative review included 16 grants approved by the IRC in 2014 to 2016. The selection of countries was based on DTP3 coverage, fragility status and grant management modality. The final selection was jointly agreed with Gavi. An extensive desk review has been implemented including the application of a data extraction tool, and coding of interviews with 10 key informants and HSS grant documents (i.e. proposal documents, Joint Appraisal Reports) and additional literature (e.g. Gavi Meta Review on HSS Country Evaluations).

Limitations

The scope of this review did not include an impact assessment of Gavi's HSS support. This was not requested and would indeed have been fundamentally restricted given the absence of a control group, as well as challenges to quantify HSS grant implementation or country specific factors associated with vaccine coverage and equity. This review conducted a quantitative analysis, using a plausibility study design, aimed at assessing simultaneous changes in interventions, and the coverage and equity outcomes.

The quantitative analysis relied on Gavi's annual disbursements, in the absence of actual grant implementation data; so the analysis was not informed of any potential disturbance between the reception of Gavi funds and the actual delivery of immunization services. Some relevant country context factors were not available for the period of interest, which in some cases made it necessary to use proxy variables (e.g. Country Health Expenditure to represent Health System Status).

The use of the GPF as a source of data for tracking grant performance was not possible because GPF indicators informing about grant implementation are not standardised, thus hindering a meaningful comparison across countries. Moreover, the reported results here are based on regression models, which identify associations and not causal effects.

As per the limited financial and programmatic reporting against specific activities, certain sources, e.g. HSS activity tables and proposals, have been repeatedly used by the qualitative analysis to answer the assessment questions across the spectrum of "results", "implementation" and "design". The qualitative analysis was also challenged by the absence of detailed guidance about which grant activities countries can consider as contributory to increased coverage and equity, or stronger integration with primary health care or to sustainability. Whilst a concluse approach was developed for this purpose a certain level of subjectivity has to be acknowledged. Finally, tracking the implementation of pooled funding

grants was generally not found to be possible because these funds are integrated in sector wide approaches. Interviews were solely conducted at Gavi secretariat level. Thus country perspectives are missing in this report.

Key findings of the review

OUTCOMES AND RESULTS

Coverage and equity in immunization

	MODEL OUTPUT					
PREDICTOR	DTP1 coverage	DTP3 coverage	DTP1-3 dropout	HepB3 coverage	MCV1 coverage	Pol3 coverage
HSS disbursement lagged 1 year	↑	↑	↑	↑	↑	↑
HSS disbursement lagged 2 years	↑	↑		↑		
HSS disbursement lagged 3 years	↑	↑		↑		↑
non-HSS disbursement lagged 1 year	↑	↑		↑		↑
non-HSS disbursement lagged 2 years			↑			
non-HSS disbursement lagged 3 years	↑	↑	↑	↑	↑	↑
Gross Domestic Product per capita			↑	↑		↑
Current Health Expenditure per capita				↓		
Fragile States Index	↓					
Voice and Accountability	↓	↓	↓	↓		↓
Political Stability and Absence of Violence and Terrorism	↑	↑	↑	↑	↑	↑
Government Effectiveness						↑
Regulatory Quality	↓					
Rule of Law	↑	↑				
Control of Corruption	↑			↑	↑	
Population density	↑	↑	↑	↑		↑

↑ **Increase in predictor value is associated to increased vaccine coverage (p<0.05)**

↓ **Increase in predictor value is associated to decreased vaccine coverage (p<0.05)**

- The analyses provided evidence that after controlling for other predictors including vaccine coverage in the previous year, there is a small positive[1] association between lagged Gavi HSS investments and vaccine coverage.

  This association was found consistently across all the 6 independent models implemented for vaccine coverage (DTP1, DTP3, HepB3, MCV1 and Pol3 coverage, and DTP1-3 drop-out rate[2]).

  Moreover, in the models for DTP1, DTP3 and HepB3 coverage, the association was statistically significant and increased along the time elapsed after the HSS disbursement (1 to 3 years). The association with DTP1-3 drop-out rate was also found to increase with time, but only reached statistical significance in the first year. These findings suggest that the contribution of HSS disbursements to vaccine coverage requires time to reach fruition.

- The analyses provided evidence that after controlling for other predictors there is a small but positive association between lagged Gavi non-HSS[3] investments and vaccine coverage.

  Unlike for HSS disbursements, none of the vaccine coverage outcomes had statistically significant associations for each year of lagged non-HSS investments. However, the associations were statistically significant in all 6 vaccine coverage models for non-HSS funds disbursed 3 years before (non-HSS3), and in 4 models for non-HSS funds disbursed one year before (non-HSS1).

  The association of vaccine coverage with non-HSS funds disbursed 3 years previously was stronger than with funds disbursed only one year before, with the exception of DTP1 coverage. This finding suggests that non-HSS funds also require time for their contribution to vaccine coverage to reach fruition.

- The association of vaccine coverage with HSS disbursements was stronger than the association with non_HSS funds disbursed the same year. An exception being the lag of disbursements for 3 years in the model for dropout . This finding suggests that for the same amount of money, HSS investments contribute more effectively to vaccine coverage than non-HSS investments.

- Five dimensions of state fragility ("Political Stability and Absence of Violence/Terrorism", "Voice and Accountability", "Rule of Law", "Control of Corruption"[4] and "Government Effectiveness"[5]) associated with vaccine coverage in all 6 models, after adjusting for all other predictors. Political Stability was positive[6] and significantly associated with all vaccine coverage outcomes, whilst Voice and Accountability was significant but inversely associated with 5 coverage outcomes.

[1] Increased HSS investment is associated to increased vaccine coverage

[2] As described in the methodological section, the outcome DTP1-3 dropout rate was operationalized in the analysis as the "percentage of children receiving DTP3 among those who received DTP1" (higher in stronger delivery care systems)

[3] New Vaccine Support (NVS), Vaccine Introduction Grant (VIG), Immunisation services support (*ISS*), Cold Chain Equipment Optimisation Support (CCEOP), Operational Support, Cash Support, Product Switch Grant, Graduation Grant, etc.

[4] With exception of the model for drop-out rate.

[5] With exception of the model for MCV1 coverage

[6] Stronger states tend to have higher coverage

- The quantitative analysis did not identify conclusive evidence between lagged HSS funding and fragility on vaccine coverage.
- Population density and Gross Domestic Product were positively associated to all vaccine coverage outcomes. These associations were statistically significant in 5 and 3 coverage models respectively.
- Based on the qualitative review of planned activities/objectives and planned investments there is plausible evidence that Gavi contributes to improving the coverage and equity of immunization services at country level. However, the results of the data extraction matrix points towards a more complex relationship where directly causal results cannot be easily measured and demonstrated.
- Equity was referred to in the proposals to a lesser extent than coverage. Geographical equity (hard to reach areas) was mentioned most often. The proportions of HSS budgets allocated to coverage and equity based on activities relating to coverage and equity varied substantially across countries.

Integrated primary health care

- As part of Gavi strategy, funding for integration activities is not a deliberate focus of HSS grants. Integration of immunization services, specifically with primary health care, is strongly country-driven and context specific (e.g. conditions of fragility, conflict etc.). Gavi could usefully provide greater clarity on the advantages of integration of services, as well as how it can be meaningfully measured and tracked.
- The quantitative analysis did not find any associations between HSS disbursements and Gavi's strategic indicator for integrated service delivery. This finding could be related to methodological limitations when it comes to assessing the integrative processes supported by Gavi's HSS investments.

Programmatic and financial sustainability

- HSS grants' contribution to the total expenditure in routine immunization increased from 3% to 10% between 2012 and 2016, whereas the contribution from Governments was 43% in 2012 and then remained stable in the range of 33-35% until 2016.
- Countries in the advanced transition phases (accelerated transition and fully self-financing) did not systematically increase the domestic contribution to routine immunization expenditures that exclude the cost of vaccines.
- Gavi has laid out clear expectations for countries applying for HSS support in terms of sustainability. However, the qualitative analysis of HSS grants identified only few objectives and activities that specifically addressed the various aspects of sustainability. Moreover, countries in accelerated transition or full self-financing did not give greater emphasis on aspects of sustainability when compared to countries that had still to reach this stage.

IMPLEMENTATION OF GRANTS

Contribution to Gavi's strategy

- Whereas the Grant Performance Framework includes standard high level indicators, there is no streamlined tool/data collection that would allow comparison of implementation progress of HSS grants across countries.
- Starting from the planned implementation of Gavi HSS grants, it can be confirmed that they are consistent with Gavi's strategic focus areas (SFAs).
- Gavi does not provide specific guidance to country teams on how a country's performance (programmatically or financially) should be assessed, nor about when to take action if intended results are not being realized.
- There is sufficient flexibility in the re-allocation of Gavi HSS budgets that allows countries to change planned activities and re-allocate budgets in response to programmatic requirements. Re-programming was considered as a complex and lengthy process that countries and country teams try to avoid.

Programmatic and financial sustainability

- Gavi transfers 63% of cash grants to partners, mainly because of fiduciary risk within country systems.
- The in-country utilisation of HSS funds is usually higher among partners than among governments.

Delayed or unpredictable funding

- The percentage of funds transferred as per the initial budget was 60% in the period 2014-18. The time average time between IRC approval and Gavi's first disbursement was 16.1 months and 19.9 months for 2017 and 2018 respectively.
- Gavi's Board articulated a reduced appetite for fiduciary risk which required countries to have systems in place to properly account for funds. In 2015 Gavi introduced a three line of defence model that increased the visibility of risks, especially fiduciary risk. The time taken for countries to address identified risks contributed to delays in initiating HSS grants.
- Gavi's audit and investigation department has reported weaknesses in in-country financial management systems. In cases where countries were unable to properly account for provided funds, disbursements were interrupted, and alternative funding modalities identified e.g. funding through partners. The time taken to identify and implement these alternatives contributed to delays in the flow of funds.
- HSS disbursements have scaled up significantly (the average annual amount disbursed has more than doubled after 2014) however, countries' financial systems have not developed accordingly.
- The lack of appropriate capacity in national financial systems results in low funds absorption and delays in submitting reports to Gavi. Gavi does not release additional

funds if countries have high cash balances and until they have provided the required financial reports.

Monitoring & results mechanisms

- The main mechanisms for tracking grants are the Grant Performance Framework (GPF) and Joint Appraisal Reports. Other sources commonly used are evaluations, coverage surveys and contextual information which come primarily from direct contacts with partners and implementers.
- Gavi's policies do not request a regular monitoring of operational work plans and budget consumption; and reporting or achievement rates are not linked to disbursements. However, some countries have agreed to submit programmatic and financial reports that can be as frequent as quarterly based.
- The GPF collects standardized high level indicators (core) from published sources, as well as country specific indicators (tailored) that inform about process, intermediate results and outcomes. The country-specific indicators are not standardized across Gavi's portfolio.
- Gavi does not provide guidance about how to identify when grants are off track, or how to correct course. Country teams identify performance issues and act based in their experience.
- There are concerns about the quality of the data reported in the GPF: the core indicators are based in administrative data, so potentially proceeding from a weak information system; and the absence of systematic data quality assurance.

DESIGN OF HSS GRANTS

Aligning grants to country context

- Overall, Gavi HSS support is well aligned with national comprehensive multi-year strategic plans (cMYPs) for immunization and national health strategies.
- Coordination among partners is mainly organized through a Country Coordination Committee or Coordinating Body. The strongest form of coordination is achieved through SWAps.
- Stakeholders - including CSOs - seem to be involved in proposal design and development overall, but countries should be more explicit about the role and nature of integration.

Aligning grants and Gavi's strategy

- Proposals align well with Gavi's "Vaccine and Systems" goals which aim to accelerate equitable uptake and coverage of vaccines. HSS proposals did not relate to the "sustainability goal" as well.
- Vaccination services are typically offered in an integrated manner though key informants thought this was largely a country decision where Gavi had little influence.

- Countries do have a variety of coverage and equity analysis documents, data and analysis available but do not utilize them in a consistent manner when writing proposals.
- Objectives are often focussing on geographic inequities or rephrase under-immunized populations in geographic terms, e.g. “urban poor”. Hence, objectives lack the specificity to addressing directly under-immunized population. Other equity dimensions, e.g. maternal education, gender or economic inequities were only found to be addressed with HSS grants in a small number of exceptional cases (e.g. Afghanistan).

Monitoring and evaluation

- The Grant Performance Framework does not include tailored indicators to monitor progress towards grant objectives at the process and intermediate level.
- The Grant Performance Framework is aligned with the country health sector.

Conclusion and Recommendations

The main conclusions that can be drawn in relation to the review questions about "Outcomes and Results" are that:

a. Gavi HSS support contributes to a slight **increase in immunization coverage rates,** independently of country contextual circumstances. The strength of the association increases with time from the point of HSS fund disbursement.

b. **Multiple dimensions of fragility are associated with vaccine coverage**, suggesting that stronger states tend to have higher coverage. Additionally, an inverse association was found between vaccine coverage and the indicator that relates to "Citizen Participation in selecting Government", and "Freedom of expression".

c. Overall, countries include **objectives and activities related to coverage and equity** in HSS grant design. However, **they often lack a logical framework/pathway** showing the process by which they would actually translate into better coverage and equity.

d. Gavi HSS grants do not have the capacity nor the intention **to drive the integration of PHC services,** and Gavi's contribution to HSS is highly dependent on the opportunities provided by the planning and funding of wider initiatives.

e. Gavi is **well positioned in the landscape of external financing for health** when the full weight of its total contribution is considered. On their own, HSS grants do not constitute a substantial portion of country financing for health or routine immunization.

f. HSS grants' contribution to sustainability is **constrained by the "project-cycle" logic**, which targets ~~on~~ immediate bottle-necks, rather than long term interventions for sustainable system changes across the transition phases.

The main conclusions that can be drawn in relation to the review questions about "Implementation of grants" are that:

a. The best available information about the HSS grants is included in the grant proposal and table of planned activities and are well aligned with Gavi's strategic focus areas.

   Whereas no specific guidance is available to identify immunization program under-achievement, the **country teams have sufficient flexibility** to reallocate Gavi HSS budgets in case of need.

b. Due to increased attention given to fiduciary risk a high percentage (63%) of grant funds is disbursed to partners. This **approach is not ideal for building national systems** and promoting long-term programmatic and financial sustainability.

c. During the period of reference for this review (grants approved 2014-2017), the rate at which Gavi disbursed funds to countries was lower than in the preceding period. This is related to **increased awareness of fiduciary risk**, weak financial management capacities at country level, and the scaling up of HSS disbursements.

d. Gavi has successfully implemented the Grant Performance Framework as a tool for country-specific monitoring. However, it lacks standardisation of indicators, specifically on processes and intermediate results and thus does not support a comparison across countries at these levels.

   Gavi country teams **do not receive guidance** to identify underperforming grants.

The main conclusions that can be drawn in relation to the review questions about "Design of HSS grants" are that:

a. The **design of HSS grants is country-driven** which fosters ownership and investments into country priority areas. However, it also **creates uncertainties** about the catalytic role of investments to support improvements in the health system such that they can increase coverage and equity in a sustainable way.

b. The GPF has been established as a **HSS grant implementation monitoring tool** to support country stakeholders in grant management.

Based on these key findings and conclusions the following recommendations are made:

(1) Immunization coverage and equity

To optimize the contribution to coverage and equity, it is recommended that Gavi potentiate HSS investments by:

- Requiring countries to strengthen documentation about how they will increase coverage and improve multiple dimensions of equity. The assumptions subjacent to the choice of proposed activities and the intermediate results leading to coverage and equity should be more clearly delineated in HSS proposals.
- Providing additional guidance to countries about evidence-based decision-making, using the most updated knowledge about cost effectiveness and feasibility of Health Immunization System Strengthening interventions.

(2) Integrated PHC

To enhance the effectiveness of immunization delivery service through greater integration into other primary health care services by:

- Providing further guidance to countries and country teams about the benefits and the potential opportunities to foster the integration of immunization programs with other PHC services.

(3) Sustainability of national immunization programmes

To optimize the contribution of HSS grants to the sustainability of immunization programs, through longer term planning by:

- Approaching HSS investments with a longer term perspective as it is difficult to identify or even measure health system change on a project cycle timeline.
- Encouraging the design of Gavi-funded HSS grants as a continuum across transition phases, with commitments and objectives beyond the life of grant, and in alignment with country multi-annual planning cycles.
- Adopting time bound milestones for the development of key programmatic and financial management capacities on the part of Governments.
- Refining the transition policy by adopting criteria to identify up-front countries requiring not only an extended transition, but also specific interventions to ensure sustainable management of their immunization programs after graduation.

- Fostering milestones for the domestic contribution to Routine Immunization expenditures of medium and long term milestones planning.

(4) Fragile countries

To ensure an effective contribution of HSS grants in fragile countries, through a more differentiated management by:

Providing additional guidance to countries and Gavi's secretariat for addressing health system weaknesses frequently encountered in contexts of fragility. This guidance may include topics as sub-national approaches to address imbalances in access to immunisation services, investment in commodities and operational for humanitarian and development assistance settings, and articulation of immunisation strategy during and post conflict.

(5) Information to monitor HSS results

To strengthen decision-making at the grant and portfolio level through enhanced financial and programmatic reporting of grant implementation by:

- Requiring that grant proposals identify indicators for processes and intermediate results that are linked to key objectives/activities. These links should be consistent with the theory of change adopted. Considering the currently high number of tailored indicators reported to the GPF, this improvement is unlikely to increase the reporting burden for countries.
- Engaging in a technical discussion with countries to accelerate the use of well-established standards, including but not limited to definition of indicators and data sources, predefined analytical approaches and routines to assess data quality. The adoption of standards will enable a wider discussion and cross-country learning.

1. Background and objectives

The Vaccine Alliance - Gavi is an innovative international public-private partnership created in the year 2000 with the mission to save children's lives and protect people's health by increasing equitable use of vaccines in lower-income countries. Basic immunisation coverage of DTP3 has increased in Gavi supported countries from 59% to 80% since year 2000 to 2018 (1). However in the last few years, progress on coverage appears to have slowed down for various reasons, e.g. population growth, health systems in the poorest countries may have reached their limits in terms of capacity, and the enduring challenges regarding hard-to-reach populations. In short, despite the very significant progress, one in every five children is still not being reached with a full course of vaccines.

Gavi launched Health System Strengthening (HSS) grants in 2005-06 with an aim to address general and very broadly health system gaps and follow country owned processes. This comprehensive approach was discussed around 2010, as outcomes/impact were considered as not yet evidenceable. As a consequence the frame for HSS grants became more narrow and countries had to demonstrate linkages with immunization outcomes, which in turn triggered questions whether Gavi was really supporting HSS or only immunization activities. To address these dimensions Gavi adopted, with its Strategy 2016-2020, a new inclusive acronym "HSIS" to indicate that Gavi is addressing both immunization and general HSS issues. The objective of Health Systems and Immunisation Strengthening (HSIS) support is to **contribute to sustainable improvements in equitable immunisation coverage** in Gavi-eligible countries. HSIS is especially instrumental for the **systems goal** it being one of the four strategic goals of the Gavi 2016-2020 Strategy: to increase effectiveness and efficiency of immunisation delivery as an integrated part of strengthened health systems.

Health System Strengthening (HSS) grants are the foundation of Gavi's HSIS support. The HSIS framework approved in June 2016 declared the objective of HSS grants was to sustainably and equitably address health system bottlenecks in immunisation coverage, thus contributing to the vaccine goal.

Gavi's mission is supported by four strategic goals related to vaccines, systems, sustainability and market shaping. The system goal is related more specifically to increasing effectiveness and efficiency of immunisation delivery as an integrated part of strengthened health system with three objectives:

1. Contribute to improving integrated and comprehensive immunisation delivery, programmes, including fixed (provided in health facilities), outreach and supplementary components;
2. Support improvements in supply chains, health information systems, demand generation and gender-sensitive approaches;
3. Strengthen engagement of civil society, private sector and other partners in immunisation.

Gavi's HSIS framework was approved by the Board in June 2016 and came into effect in January 2017, with the intention to help Gavi-supported countries reach every child regardless of geography, socioeconomic status, or gender-related barriers. As a core element of Gavi's 2016-2020 five year strategy, HSIS support aims to improve equity in

immunisation coverage through HSS grants, vaccine introduction grants, product switch grants and operational support for campaigns.

The investments in HSS are meant to address health system bottlenecks and help to improve immunisation coverage and equity. Gavi had therefore defined Strategic Focus Areas (SFAs) to which HSS investments are also contributing, namely:

1) Immunisation supply chains;
2) Data quality, availability and use;
3) In-country leadership, management and coordination;
4) Demand promotion;
5) In-country political will; and
6) Financial and programmatic sustainability (2)[7].

The HSS support component has been evolving since its first approval by the Board in 2006 with first disbursements being made in 2007. At the same time, Gavi is paying greater attention to monitoring and evaluation through the Grant Performance Framework (GPF) to demonstrate results. As a growing amount of evidence is available on the HSS processes and their evolution, Gavi requested this comprehensive review to assess available information to demonstrate results, pinpoint enduring challenges, and to inform and guide the further implementation of Gavi HSS support and, the relevance and/or design of an HSIS evaluation.

The review draws on the Theory of Change that Gavi prepared in the frame of the Full Country Evaluations (see Annex 7.2). This Theory of Change shows how EPI factors interact with wider health system factors, as well as population/country factors (demand, equity considerations, social, political and economic context) to generate sustainable change to coverage and equity across Gavi's 4 strategic goals, leading ultimately to health impact.

The objectives for the HSS review were set by Gavi as:

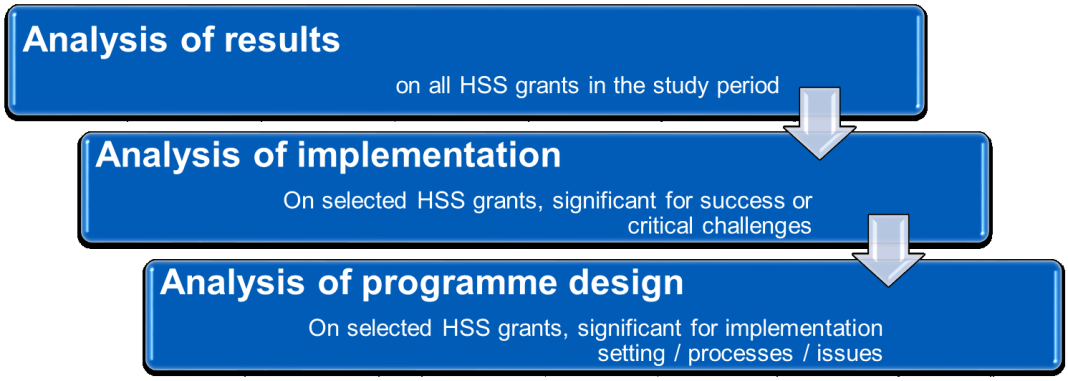
A. **Show results**: How Gavi's HSS support, in fragile and non-fragile countries, contributes to, or is on track to contribute to:
   - Increasing immunisation coverage and/or equity
   - Strengthening of health systems to deliver integrated primary health care as a platform for universal health coverage
   - Improve sustainability of national immunisation programmes (and integrated Primary Health Care (PHC) where Gavi contributes).

B. **Learn from recent experience**:
   - Identify factors contributing to successes and challenges, in fragile and non-fragile countries, to help identify key actions to further improve the contribution of HSS investments to Gavi's strategy
   - Identify factors that influence the design and implementation of HSS grants
   - Identify gaps in availability, collection and use of information to monitor HSS results and possible sources to fill the information gaps.

[7] As of March 2017, targeted investments have been made in data, supply chain and sustainability.

C. **Future HSIS evaluation:** Based on the review findings, provide recommendations on:
   - The relevance of an evaluation of Gavi's HSIS support
   - Feasibility of assessing/evaluating impact of Gavi's HSIS support (including identification of priority questions and current gaps)
   - Relevant evaluation approaches (prospective versus retrospective etc.) and methodology.

The focus of the review is on results, i.e. what has been achieved and how it is measured, across all HSS grants in the study period. Based on a subset of countries this analysis was then extended to implementation, and design of grants.



The report is structured as follows: Chapter 2 outlines the approach and methodology used for assessing the review questions and summarises limitations of the review. In chapter 3 we outline the main conclusions and findings of the review and discuss possible implications for Gavi. In Chapter 4 the body of evidence is in detail described, including the subchapters 4.1 Outcomes and results; 4.2 Implementation of grants and 4.3 Design of grants. The final Chapter 5 gives then an overview on recommendations.

2. Approach and methodology

The current review used a mix of methods to answer questions along three main dimensions as specified in the Request for Proposal (RFP) (see Annex 7.1)[8]: Results, Implementation and Design of Grants. Questions relating to 'Results' were primarily addressed through a quantitative analysis and complemented with qualitative review for 16 selected countries. Questions relating to 'Implementation and the Design of Grants' were addressed through a qualitative approach for the 16 selected countries.

In the limited areas where the focus of both methods converged, the findings between the quantitative and qualitative approaches were triangulated, thereby analysing to which extent the qualitative findings supported or helped to explain the quantitative findings. Further we indicate the confidence level of our conclusions based on a four point rating system. The overall rating indicates cumulatively which analysis type and source of information supports the conclusion: Quantitative analysis, document analysis, key informant interviews and whether this conclusion is also supported by previous findings of the meta review (3) conducted or any HSS country evaluation. So a rating of four indicates, that all analysis and sources support the conclusion. Conversely, a rating of one indicates that the conclusion is only backed up by one specific analysis or source of information.

The review was conducted in close collaboration with Gavi HSS team. Two meeting were held at the Gavi secretariat in Geneva (Kick-of workshop: 25 July 2018, Selection of countries for qualitative review: 30 August 2018). Moreover weekly exchanges on the process of the review were established from October 2018 onwards. Previously to the EAC review the draft report was circulated among Gavi secretariat (e.g. M&E unit, HSS team). Comments from Gavi secretariat and the EAC reviewers have been incorporated into this final report.

2.1. Quantitative analysis

The quantitative analysis was implemented to address the review's objective of showing how Gavi's support, in fragile and non-fragile-countries, **contributes** to:

- Increasing immunisation coverage and/or equity
- Strengthening of health systems to deliver integrated primary health care as a platform for universal health coverage

The scope of this review did not include an impact assessment of Gavi's HSS support, and we recognise that multiple restrictions render such an assessment unfeasible. These restrictions comprise; prevailing capacity constraints to quantify the relative contribution to increased vaccine coverage that various studies have shown an extensive number of factors to make. These include factors that are either intrinsic or external to health systems, at local, national and global level (4). Another key restriction is the lack of a control group: i.e. a group of countries with similar financial, programmatic and vaccine coverage that does not receive Gavi HSS support which could be compared with the countries which do.

[8] In the course of the review several data and information gaps were identified (see also Chapter 2.3) which limited the ability to review all review questions. Hence in agreement with the Gavi several modifications were introduced. For a detailed overview on modifications please refer to Annex 7.1.

In this review, a quantitative analysis was one of the sources used to assess the contribution of Gavi HSS investments. It was designed to identify evidence of associations between HSS Gavi's support and vaccine coverage and equity at national level. The methodological approach sought to quantify the strength of any such associations – isolating, as far as possible, the possible influence of other factors (so-called control predictors).

The control predictors included were chosen to represent the country status in terms of their health system, health financing and governance, as well as geographic and sociocultural context. These predictors were selected based on a previous assessments of country-level predictors of vaccination coverage and inequity (5,6); which in turn were based on the conceptual framework for Social Determinants of Health developed by WHO (7). This framework is of particular relevance for this review as it identifies both structural determinants of health inequities and intermediary determinants of equity in health (Annex 7.3). In addition to the previous findings linking governance indicators with vaccine coverage, their inclusion is also relevant because they provide a disaggregated measurement of multiple domains summarised by aggregated scores of States Fragility.

2.1.1. Data sources

The analyses were implemented based on secondary data only. The investments made by Gavi were characterised by the amounts disbursed (year-paid) during the period 2000 – 2018; including those corresponding to HSS grants (since 2007), as well as those from all other Gavi grants[9].

The analysis also made use of data on the performance of immunisation programmes and health sector and immunisation programme financing as extracted from the WHO-UNICEF estimations of national immunisation database (WUENIC), WHO estimates of neonatal anti-tetanus vaccine coverage (Protection at Birth - PAB), and the WHO Joint Reporting Form (JRF).

The outcome "vaccine coverage" was operationalised as the absolute vaccine coverage, because this field is more informative[10] than changes in vaccine coverage across years. This is an important consideration for an analysis designed to separate the impact of HSS funding from as many other factors as possible.

Data on health financing, infant mortality rate, general population and worldwide governance) indicators (WGI were obtained from the World Bank and the Fragility States Index from the Fund for Peace. Data on the population of children less than 1 year old per country was obtained from the World Population Prospects 2017. Data on ethnic, language and religious fragmentation was obtained from Alesina *et al*. (2003) (8). A detailed description of sources is found in Annex 7.4.

[9] New Vaccine Support (NVS), Vaccine Introduction Grant (VIG), mmunisation services support (ISS), Cold Chain Equipment Optimisation Support (CCEOP), Operational Support, Cash Support, Product Switch Grant, Graduation Grant, etc.

[10] Variance of absolute coverage is larger than the variance of delta of vaccine coverages

2.1.2. Measures

Coverage and/or equity of routine immunisation

- WHO/UNICEF Estimates of National Immunisation Coverage (WUENIC) of DTP1, DTP3, MCV1, HepB3 and Pol3
- Equity-Geographical: % of districts >10% DTP3-DTP1 drop-out rates and % of districts with DTP3 coverage >=80% as reported in the WHO-JRF
- Equity - Socio-economical and Gender: this information is collected through surveys with a typical lapse of 6-14 years (9). Given that the data about Gavi investments and control predictors is annually based, it was decided not to include this category in the analyses.

New vaccine introductions

- Coverage after a Vaccine Introduction Grant supporting the same antigen made the first disbursement.

Gavi Intervention

Gavi's investments were split into those corresponding to HSS grants and all the remaining non-HSS grants[11]. All the Gavi investments were operationalised in the analyses as US$ disbursed per each child less than 1 year old/ per country-year. In the absence of previous evidence about the temporal association between HSS investments and Gavi's outcomes, the quantitative analyses explored a lagged association for a period of up to three years.

Control predictors

As described above, available evidence suggests that factors related to the domains: health system, health financing, governance, and geographic and sociocultural context are associated with vaccine coverage and equity. Hence, available data for the variables representing those four domains was compiled from the literature.

Using the availability of data for less than 25% of the country-years to be analysed as the criteria of exclusion, it was not possible to include variables representing the health system status like: nurses per 1,000 people capita, physicians per 1,000 people, Universal Health Care index and coverage of antenatal care (see Annex 7.5). Infant Mortality Rate in representation of the health system was also not included because of the well-established causal association with vaccine coverage. Because of these limitations, the analyses included current health expenditure as a proxy of the health system status. Table 1 provides a complete list of included variables.

[11] New Vaccine Support (NVS), Vaccine Introduction Grant (VIG), mmunisation services support (ISS), Cold Chain Equipment Optimisation Support (CCEOP), Operational Support, Cash Support, Product Switch Grant, Graduation Grant, etc.

Table 1: Control variables included in the analyses

Thematic area	Variables
Financial System	Gross Domestic Product per capita (current US$)
Health System	Current health expenditure per capita (current US$)
Fragility	Worldwide Governance Indicators (WGI) Voice and Accountability Political Stability and Absence of Violence/Terrorism Government Effectiveness Regulatory Quality Rule of Law Control of Corruption Fragility States Index
Geographical and sociocultural context	Total Population Country land area Ethnic fragmentation Ethnicity Language Religion

The characterisation of the fragility status included 7 variables, instead of the criteria adopted by Gavi (10) to identify countries as fragile. The rationale for this decision included:

1) Gavi recognises that fragility is a global challenge, affecting all countries in different degree and dimensions; however Gavi's fragility policy has adopted an operational classification that implies a dichotomy (yes/no), so to prioritise certain countries and in doing so reduce drastically the information available about the fragility status;
2) Two of the three sources of Gavi's classification overlap with the predictors included in the analyses:
    a) Fragility States Index, which is included in this analyses
    b) OECD 2016 States of Fragility List which is built using a framework with five dimensions (Economic, Environmental, Political, Security and Societal) similar to those covered by the World Governance Indicators.
3) The third source of Gavi's fragility classification: "the World Bank harmonised list of fragile situations" has been available since 2004, and it has been built on evolving classification criteria. This analysis required an estimator of the fragility status available and comparable during all the period analysed;
4) The six World Governance Indicators cover multiple dimensions related to fragility, so potentially enabling the identification of associations with specific conditions related to fragility;
5) By contrasting the Gavi's classification[12] with the predictors included in our analysis, it was found that all countries classified as fragile by Gavi (with exception of the Solomon Islands and Papua New Guinea), were positioned in the highest quartile of the Fragility States Index distribution. Similarly, 60 to 86% of countries classified as fragile by Gavi were positioned in the highest quartile of five World Government Indicators distributions.

[12] List of countries identified as facing fragility in July 2018 - July 2019: Updated 24/07/2018

In conclusion, the seven predictors included in the analysis to represent the fragility status of countries are aligned with the Gavi's operational criteria to identify fragility; and provide important comparative advantages in the analysis, due to their availability during all the period studied, their availability as continuous variables, and by informing of multiple dimensions of fragility.

The Worldwide Governance Indicators are based on over 30 underlying data sources reporting the perceptions of governance of a large number of survey respondents and expert assessments worldwide (11), and include six broad dimensions of governance:

Voice and Accountability: Reflects perceptions of the extent to which a country's citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association, and a free media.

Political Stability and Absence of Violence/Terrorism: measures perceptions of the likelihood of political instability and/or politically-motivated violence, including terrorism.

Government Effectiveness: Reflects perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies.

Regulatory Quality: Reflects perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development.

Rule of Law: Reflects perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence.

Control of Corruption, Reflects perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests

The estimates of governance range from approximately -2.5 (weak) to 2.5 (strong) governance performance, and were available for the period 2000 to 2018, with the exception of the year 2001.

The Fragility States Index is obtained through the triangulation of quantitative data sets, content analysis and qualitative expert analysis (12). The index is obtained in a scale spanning 0 to 120 and was used as a continuous variable.

The Ethnic Fragmentation Score applied, was based on three indices for ethnicity, language and religion, which have shown different behaviour in relation to growth and government quality, and were identified as predictors of DTP3 coverage (8).

Where unavailable, the values of the control variables were imputed from the existing entries assuming a separate linear trend in each country; no imputation was performed on any other variables, except to assume zero disbursement where a lack of disbursement had not been explicitly recorded.

2.1.3. Model specification

Vaccination coverage

The coverage of DTP1, DTP3, MCV1, HepB3, Pol3 was modelled separately. As the range is bounded and discrete (0-99), they were treated as binomial responses in the generalised linear mixed model (GLMM) framework. The binomial distribution represents the total number of "successes" in a sequence of identical, independent trials, and is defined by two parameters: the total number of trials 'n', and the probability 'p' of success in each trial. In the vaccination coverage models reported here, the number of successes is taken to be the coverage indicator, 'n' is set to 100 to represent the fact that 100% of the target population could in principle be vaccinated, and 'p' is assumed to be a function of explanatory variables. This effective aggregation of the target population into 100 equally-sized groups (trials) is necessary to account for the coverage data being given up to 1 percentage point, but 'p' can be still thought of as modelling the probability of a randomly chosen child to have been vaccinated.
Year and year squared terms were derived to model a potentially non-linear global trend in coverage.
In all models, the formula for 'p' was a linear combination of predictors, controls and time variables, and the logit-transformed coverage in the previous year (to account for autocorrelation). A consequence of this design is that that each variable can influence the outcome independently of the others and that the effects of the different variables cumulate. A random effect for the country was also included to capture unexplained between-country variation. All models were fitted by maximum likelihood using the glmer routine from the lme4 package (v1.1-18) in R (v3.5.1). The default (logistic) link function was used, as the alternatives (probit and cloglog) yielded no improvements in terms of model likelihood.
Binomial models do not assume absence of heteroskedasticity, therefore they do not require corrections if this were present.

DTP dropout

The model of DTP dropout (difference between DTP1 and DTP3 coverage) follows the same framework described above, with two differences: first, DTP3 was taken as the outcome variable, with DTP1 used to set the number of trials, reflecting the constraint that it is only possible for a child to "drop out" if he or she had received the first dose of the DTP vaccine. Second, the preceding year dropout was not logit-transformed, since in the case of zero dropout (equal DTP1 and DTP3 coverages), the logit transformation is undefined.

Geographical equity (GSA_02148)

The GSA_02148 indicator was modelled analogously to the country-wide vaccination coverage, but with this time modelling the probability that a randomly selected district has 10% or less points DTP dropout (13)[13].

Interaction of HSS funding with Vaccine Introduction Grants

To investigate the relationship between HSS grants and new vaccine introductions, the DTP1 coverage model was extended with three interaction terms of the HSS1, HSS2 and HSS3 variables with the binary VIG_DTP variable, which is defined to be 1 if the country had received the DTP vaccine introduction grant and 0 otherwise. The DTP vaccine was used for this exercise because the data contained the best balance of data-points with and without VIG compared to the other candidates (HepB, MCV, Pol, HiB and PCV) in other words, the best control group.

[13] In the Joint Reporting Form this variable is originally reported as % of districts >10% DTP3-DTP1 drop-out rates. It was inverted to "%districts with 10% or less points DTP dropout" (larger is better) to facilitate the interpretation

Health system integration

Health system integration was modelled by a custom indicator HSI which was defined for the given country in the given year as the range spanned by six values: WUENIC estimates of vaccination coverage of PAB, DTP3, HepB3, HiB3 and MCV1, as well as the ante-natal care indicator. It is important to note that this takes into account only whether the six indicators have similar values, and not whether these values are low or high; thus it is possible for a country to be highly integrated in the HSI sense, but have very low vaccination coverage across the board, and vice versa. The indicator was lagged by one year to obtain a baseline value. Because the indicator is continuous, it was modelled with a mixed linear regression instead of the binomial regression described in the vaccine coverage section, but using the same predictors and random effects. The parameter estimates obtained from this model can therefore be interpreted directly as the magnitudes of effect on the dependent variable (the integration indicator), as with standard linear regression.

Model validation

As all the models are adjusted for multiple factors simultaneously, the identification of outliers influencing the model fit is not simple. Bootstrapping was used to guard against this possibility: all models except HSI were refitted 1,000 times on resampled data and the resulting coefficient estimates and confidence intervals compared to those reported here. Should any outliers or small groups of outliers drive the model fit, one would expect the bootstrapped estimates and CIs to differ significantly from the fitted ones because these outlier(s) would be absent from many of the resampled datasets.

2.2. Qualitative analysis

We selected 16 countries for a more detailed qualitative review, in particular for the questions relating to the implementation and design of grants. Initially, 27 countries with an HSS grant approved during 2014 to 2016, which had received disbursements and reported at least one indicator in the Grant Performance Framework (GPF), were identified. As per a methodological discussion with Gavi on 12 October 2018, 16 countries were included in the qualitative analysis based in on DTP3 coverage, transition stage, fragility status and grant management modality.

Table 2: Countries included in the qualitative analysis

Phase	IRC Approval Year	Country	ISO	Region
Initial self-financing	2016	Liberia	LBR	AFRO - Anglophone
Initial self-financing	2017(*)	Ethiopia	ETH	AFRO - Anglophone
Initial self-financing	2016	Malawi	MWI	AFRO - Anglophone
Initial self-financing	2014	Congo, DR	COD	AFRO-Francophone
Initial self-financing	2014	Niger	NER	AFRO-Francophone
Initial self-financing	2015/2016	Afghanistan	AFG	EMRO
Initial self-financing	2014	Korea DPR	PRK	SEARO
Initial self-financing	2016(*)	Nepal	NPL	SEARO
Preparatory transition	2015	Pakistan	PAK	EMRO
Preparatory transition	2014	Sudan	SDN	EMRO
Preparatory transition	2015	Bangladesh	BGD	SEARO
Accelerated transition	2016	India	IND	SEARO
Accelerated transition	2016	Papua New Guinea	PNG	WPRO
Full self-financing	2016	Angola	AGO	AFRO-Francophone
Full self-financing	2015	Congo, Republic of	COG	AFRO-Francophone
Full self-financing	2014	Honduras	HND	PAHO

*HSS support is provided through pooled fund as a HSS3 grant. Dates correspond to first registered disbursement

Based on the review questions data and information was extracted and coded for each of the selected countries[14]. Documents specifically analysed for all countries were:

- HSS proposals and supporting documents
- HSS activity & budget table
- Independent Review Committee (IRC) Country reports & IRC Global reports
- Joint Appraisal Reports (JAR)
- Country co-financing information sheets (latest updated version-public)
- Consolidated Approvals and Disbursements

Based on the review questions different aspects around coverage and equity, integration and sustainability were coded on the basis of the proposals and the HSS activity and budget table. The coding methodology was based on Gavi's methodology on an coverage and geographic equity assessment of four countries (14) and modified. Thereby we coded if:

[14] Ethiopia and Nepal are implementing their HSS grants through a pooled fund and Pakistan at district level. This reduced the number of countries for parts of the analysis to 13 countries.

- The activities directly mentioned targeted Coverage and Equity (C&E); or
- The description of the activity mentioned targeted C&E.

Activities that were directly oriented towards improving coverage or reducing the gradient of equity disparities, e.g. Angola “Conduct immunisation promotion and non-immunised child catch-up activities in the communities” were also coded as addressing C&E. However, many descriptions were not sufficiently detailed and thus a judgement call of the coders was required. Activities not mentioning C&E in the title of the activity or the description or not directly addressing C&E were coded as non-targeted (e.g. Malawi “Purchase the computer equipment required to ensure the development and diffusion of the electronic schedule and the other applications on the mobile phones of parents and children registered for immunisation: Server purchase and options”)[15].

The analysis is based on aggregated results of the coded activities and the assigned budgets reflecting how many activities under a budget described C&E activities. In cases where it was not fully clear whether an activity was targeted, a reasonable assessment was made based on explanations for the objective. To assess the quality of the various activities and their relation to C&E we thus further investigated: whether improved C&E was logically linked/achievable with this activity/objective; whether the activity/objective was considered sufficient to have a reasonable effect on C&E measured at national level; and if activities were directly aimed at the hard to reach or frequently excluded groups, or at reducing the gradient across populations. Further coding was done for various aspects related to the design of grants. A coding example is being provided in Annex 7.8.

The document analysis was enriched with 10 key informant interviews, held between 14 and 17 December 2018 in Geneva. Informants were purposely selected, being either staff working as country team members with one of the 16 selected countries and being available or working at the Monitoring and Evaluation or the Immunisation Financing & Sustainability team or the Financial Department. Interviews followed an interview guideline (for interview questions & interview partners; see Annex 7.6 and 7.7) and were documented and audio-taped, after oral consent participation was requested and obtained

2.3. Limitations of the review

Many review questions in the different sections of this assessment relate to investments. It is though not specified whether this should be planned, committed, disbursed or spent investments. As Gavi has as its disposal only rather limited financial and programmatic reporting against specific activities, this review faced some constraints to draw conclusions related to implementation status and thus to measure Gavi’s contribution to certain outcomes. As a result of this situation, certain sources, e.g. HSS activity tables and proposals, have been repeatedly used to answer the assessment questions across the spectrum of “results”, “implementation” and “design”. However, strictly speaking these

[15] While contribution to equity can be defined quite clearly through a targeted intervention responding to an identified inequity (targeted at underserved / under-immunised populations or geographic zones), defining contribution to coverage is less clear-cut. Indirectly, all activities - even the payment of salary top-ups of officials - could have an effect on improved performance of vaccination interventions. To make a distinction and review proposals as to their degree of orientation to coverage, the analysis made a distinction between interventions/activities with direct impact on coverage such as "mobile services to reach hard-to-reach populations" (coded "yes") and more "general activities" such as "rehabilitation of cold room", "improvement of data quality systems", etc. (coded as "no").

documents describe plans and intentions and can thus only speak with full to the design phase of grant-making.

Tracking implementation progress of pooled funding grants (Ethiopia and Nepal) is not possible because the Gavi funds are integrated with other sources, and visibility is lost. These 2 countries plus Pakistan, where a decentralised implementation takes place, have been excluded from several analyses here, because data specific to Gavi investments is not available.

Multiple dimensions of Gavi strategic focus areas (SFAs) are not routinely captured by Gavi monitoring system in a comparable way across countries. Examples where there is scope to further sharpen measurement include: integration of services, transition support, financial and programmatic sustainability, equity (beyond geographic equity), CSO involvement.

2.3.1. Limitations of the quantitative analysis

- Regression models, as those used in this analysis, identify associations and not causal effects. However, given that the analyses implemented control for a genuinely wide collection of economic, political and demographic characteristics of countries, we would like to nevertheless claim that the association between Gavi disbursements and subsequent improvements in coverage suggest consistently a signal of causal relationship.
- The analysis relied on disbursements for HSS and not actual expenditures and differences between a disbursement and actual expenditure for HSS may prevail. Actual expenses per activity, objective or strategic focus areas were not available for the analyses. The most granular available attribute of Gavi's investments is the annual disbursement per grant, and the identification of changes associated with Gavi investments require a time-series of Gavi funds registered in the downstream side of the implementation chain. The only source to identify the structure of HSS investment is the budget, which provides a multiyear total amount per activity only.
- Unpredictable and delayed funding has an impact on the ability to be transparent and achieve goals. The identified delays in absorption at country level have thus likely consequences on implementation. Interpretation of the quantitative findings should thus bear in mind that the disbursements are unlikely fully indicative.
- Either because some of Gavi supported activities are focused in specific sub-national administrative areas, or the differentiated absorption capacity of regional and local health systems, an assessment of Gavi contribution could for these investments be enriched by sub-national data. Unfortunately, data of both the expected outcomes and relevant contextual indicators across all countries benefitting from Gavi's support is only available at the country and not sub-national level (for further discussion on sub-national data please see chapter 5.2).
- Similarly, further sub-group analysis (e.g. on poverty, gender, ethnicity) require that not only detailed and reliable data is available but also that the data can be linked to financial flows, implementation activities and consequently decision making.
- Contextual indicators at the national level were not available for some of the years included in the analyses. This limitation impeded the inclusion of previously documented predictors of vaccine coverage as nurse/midwife density, government

expenditure on health, total expenditure on routine immunization, amount of government funds spent on routine immunization, out of pocket expenditure in health, the Gini coefficient or the Gender Inequality Index.

- As described above not all the variables in the data panel were initially balanced, it is containing data for all periods included in the analyses. In case the researchers judgment was that standard imputation could introduce a substantial amount of bias in a variable, this was excluded of the analyses.
- The quantitative analysis did not include socio-economic and gender equity because these outcomes are collected through surveys implemented with a lapse of a variable number of years. Hence the frequency of equity measurements is not aligned with Gavi's annual disbursements or strategic phases.
- Regarding the assessment of the contribution of Gavi HSS investments to the GPF core indicators: so far we have disregarded their inclusion in the analyses because of the short period of data available (2014-2018), in light of the findings about the time interval between disbursements and vaccine coverage.
- This report does not include the assessment of the contribution of Gavi HSS investments to the progress measured by GPF tailored indicators. The extremely high dispersion in the definition of indicators and scales of the dimensions reported, makes the thematic consolidation of indicators unpractical. Furthermore, a consolidation of achievement rates across indicators would ignore the differentiated ambition for improvement expressed by countries in the targets, what impairs the validity of a comparison across countries.

2.3.2. Limitations of the qualitative analysis

- Gavi does not provide guidance for which objectives and/or activities should be counted as contributing to C&E, sustainability (financial or programmatic) or capacity building. Within the frame of this review a coding approach was developed whereby – within the feasibility of the review – we tried to identify objectives and activities improving the above noted aspects. Whilst we applied good practices, such as a calibration excersice for the coding a certain level of subjectivity has to be acknowledged. This also because the relevant descriptions for objectives and activities in proposals are not sufficiently detailed.
- The approach for coding objectives and activities relevant for C&E has been described in chapter 2.2 but several limitations have to be noted:
    - There were substantial variations in the level of detail across proposals and supporting documents. Hence the coding and analysis process based these documents necessitated some on-going adaptations of the coding approach, e.g. some proposals did not provide explanations of activities (e.g. India) or only combined explanations (e.g. Honduras) or explanations for only part of activities (e.g. DPR Korea). In these cases, the variables related to C&E analysis are based on titles of objectives or activities only.
    - The coding related to Gavi's contribution to C&E relied on C&E directly or indirectly mentioned in the activity title or description of activities in a proposal. The later was not standardisable and required a judgement-call from the

coders, e.g. surveys, improvements in data systems. Notwithstanding, it has to be noted that in such cases proposals fall short of being explicit on how objectives and activities relate to C&E.

  - Coding for C&E and objectives and activities were initially done independently and only afterwards combined. This way it was identified that sometimes there is a discrepancy between aggregated results of activities and what the objectives describe and vice versa.

- As requested by the RFP we conducted key informant interviews (n=10) with staff at the Gavi secretariat. Interviews with other stakeholders, e.g. at country level, were not foreseen. The key informants were purposely selected, being either staff working as country team members with one of the 16 selected countries and being available or working at the Monitoring and Evaluation or the Immunisation Financing & Sustainability team or the financial department.
- Any quantitative analysis in the qualitative section, e.g. on the correlation between DTP3 coverage and investments into coverage and equity are not robust (i.e. very small sample size (n=13) and thus prone to any outlier) and thus should be interpreted with caution.
- Temporal trends cannot be established among the selected countries for a variety of reasons: per year there are very few observations and given the variations there are limited ways to stratify and analyse. As described above the multiple uses of limited information sources for answering questions on results, implementation and design further limits generalisations across time.
- Gavi measures integration though coverage levels for antenatal care and immunisation services. Beyond this, Gavi has not made explicit a unified understanding in what “integration” means, i.e. integration of service delivery though the same providers (institutions, persons). Hence this review draws strongly on the understanding of integration held by the various key informants.

3. Conclusions, Findings & Discussion

3.1. Outcomes and results

CONCLUSIONS

a. This review suggests that Gavi HSS support contributes to a slight increase in immunization coverage rates, independently of country contextual circumstances. The strength of the association increases with time from the point of HSS fund disbursement.

b. Multiple dimensions of fragility are associated with vaccine coverage, suggesting that stronger states tend to have higher coverage. Additionally, an inverse association was found between vaccine coverage and the indicator that relates to "Citizen Participation in selecting Government", and "Freedom of expression".

Overall rating	Quantitative	Document analysis	KII	Meta-review/FCE
☑☐☐☐	☑	☐	☐	☐

c. Overall, countries include objectives and activities related to coverage and equity in HSS grant design. However, they often lack a logical framework/pathway showing the process by which they would actually translate into better coverage and equity.

Overall rating	Quantitative	Document analysis	KII	Meta-review/FCE
☐☑☑☑	☐	☑	☑	☑

d. Gavi HSS grants do not have the capacity nor the intention to drive the integration of PHC services, and Gavi's contribution to HSS is highly dependent on the opportunities provided by the planning and funding of wider initiatives.

Overall rating	Quantitative	Document analysis	KII	Meta-review/FCE
☑☑☑☑	☑	☑	☑	☑

e. Gavi is well positioned in the landscape of external financing for health when the full weight of its total contribution is considered. On their own, HSS grants do not constitute a substantial portion of country financing for health or routine immunization.

Overall rating	Quantitative	Document analysis	KII	Meta-review/FCE
☑☑☑☑	☑	☑	☑	☑

f. HSS grants' contribution to sustainability is constrained by the "project-cycle" logic, often addressing immediate bottle-necks, rather than long term interventions for sustainable system changes across the transition phases.

Overall rating	Quantitative	Document analysis	KII	Meta-review/FCE
☐☑☑☑	☐	☑	☑	☑

KEY FINDINGS

Coverage and Equity in immunization

- The analyses provided evidence that after controlling for other predictors including vaccine coverage in the previous year, there is a small positive[16] association between lagged Gavi HSS investments and vaccine coverage.

  This association was found consistently across all the 6 independent models implemented for vaccine coverage (DTP1, DTP3, HepB3, MCV1 and Pol3 coverage, and DTP1-3 dropout rate[17]).

  Moreover, in the models for DTP1, DTP3 and HepB3 coverage, the association was statistically significant and increased along the time elapsed after the HSS disbursement (1 to 3 years). The association with DTP1-3 drop-out rate was also found to increase with time, but did not reach statistical significance in any year. These findings suggest that the contribution of HSS disbursements to vaccine coverage requires time to reach fruition.

- The analyses provided evidence that after controlling for other predictors there is a small but positive association between lagged Gavi non-HSS[18] investments and vaccine coverage.

  Unlike for HSS disbursements, none of the vaccine coverage outcomes had statistically significant associations for each year of lagged non-HSS investments. However, the associations were statistically significant in all 6 vaccine coverage models for non-HSS funds disbursed 3 years before (non-HSS3), and in 4 models for non-HSS funds disbursed one year before (non-HSS1).

  The association of vaccine coverage with non-HSS funds disbursed 3 years previously was stronger than with funds disbursed only one year before, with the exception of MCV1 coverage. This finding suggests that non-HSS funds also require time for their contribution to vaccine coverage to reach fruition.

[16] Increased HSS investment is associated to increased vaccine coverage

[17] As described in the methodological section, the outcome DTP1-3 dropout rate was operationalized in the analysis as the "percentage of children receiving DTP3 among those who received DTP1" (higher in stronger delivery care systems)

[18] New Vaccine Support (NVS), Vaccine Introduction Grant (VIG), Immunisation services support (*ISS*), Cold Chain Equipment Optimisation Support (CCEOP), Operational Support, Cash Support, Product Switch Grant, Graduation Grant, etc.

- The association of vaccine coverage with HSS disbursements was stronger than the association with non_HSS funds disbursed the same year. An exception being the lag of disbursements for 3 years in the model for MCV1. This finding suggests that for the same amount of money, HSS investments contribute more effectively to vaccine coverage than non-HSS investments.
- Five dimensions of state fragility ("Political Stability and Absence of Violence/Terrorism", "Voice and Accountability", "Rule of Law", "Control of Corruption"[19] and "Government Effectiveness"[20]) associated positively with vaccine coverage in all 6 models, after adjusting for all other predictors. Political Stability was positive and significantly associated with all vaccine coverage outcomes, whilst Voice and Accountability was significant but inversely associated with 5 coverage outcomes.
- The quantitative analysis did not identify conclusive evidence between lagged HSS funding and fragility on vaccine coverage.
- Population density and Gross Domestic Product were positively associated to all vaccine coverage outcomes. These associations were statistically significant in coverage models 5 and 3 respectively.
- Based on the qualitative review of planned activities/objectives and planned investments there is plausible evidence that Gavi contributes to improving the coverage and equity of immunization services at country level. However, the results of the data extraction matrix points towards a more complex relationship where directly causal results cannot be easily measured and demonstrated.
- Equity was referred to in the proposals to a lesser extent than coverage. Geographical equity (hard to reach areas) was mentioned most often. The proportions of HSS budgets allocated to coverage and equity based on activities relating to coverage and equity varied substantially across countries.

Integrated primary health care

- As part of Gavi strategy, funding for integration activities is not a deliberate focus of HSS grants. Integration of immunization services, specifically with Primary Health Care, is strongly country-driven and context specific (e.g. conditions of fragility, conflict etc.). Gavi could usefully provide greater clarity on the advantages of integration of services, as well as how it can be meaningfully measured and tracked.
- The quantitative analysis did not find any associations between HSS disbursements and Gavi's strategic indicator for integrated service delivery. This finding could be related to methodological limitations when it comes to assessing the integrative processes supported by Gavi's HSS investments.

Programmatic and financial sustainability

- HSS grants' contribution to the total expenditure in routine immunization increased from 3% to 10% between 2012 and 2016, whereas the contribution from Governments was 43% in 2012 and then remained stable in the range of 33-35% until 2016.
- Countries in the advanced transition phases (accelerated transition and fully self-financing) did not systematically increase the domestic contribution to

[19] With exception of the model for drop-out rate.

[20] With exception of the model for MCV1 coverage

routine immunization expenditures that exclude the cost of vaccines.

- Gavi has laid out clear expectations for countries applying for HSS support in terms of sustainability. However, the qualitative analysis identified only few objectives and activities in HSS grants that focused on sustainability. Moreover, countries in accelerated transition or full self-financing did not give greater emphasis on aspects of sustainability when compared to countries that had still to reach this stage.

DISCUSSION

The "annual amount disbursed" is the best proxy indicator available to characterize the Gavi's HSS contribution to countries. Therefore an ecological study was implemented to assess the contribution of HSS grants to vaccine coverage. The country-based predictors included in the analysis were chosen based in the WHO conceptual framework for determinants of health, as well as in previous studies identifying country characteristics associated to vaccine coverage

The findings of this review suggest that Gavi HSS support may have contributed to the observed increases in immunization coverage rates and/or to maintain immunization coverage. The slight and increasing positive association between disbursements and coverage after one and three years seems to reflect the time required for health systems strengthening initiatives to implement processes across partners and health system dimensions.

The association with vaccine coverage, although mild or borderline, was consistently found across multiple antigens and seemed directly related to the amount and lapse of time. On the contrary, the lack of association for neonatal tetanus vaccine, which Gavi does not support, could be considered a counterfactual. However, because of the methodological limitations inherent to this review, we cannot completely elucidate whether these findings reveal a 'true' underlying association or a systematic bias.

With regards to Gavi's support in fragile contexts, the findings of this review are complex. Implementation of well-known health strategies and technologies is known to be even more difficult in fragile and conflict-affected states than in other, equally poor but more stable countries (15). Fragile countries face even greater constraints in terms of institutional capacity, often leading to weak health systems. Also governmental institutions are likely to be limited in their ability to reach all population groups, necessitating collaborations with actors outside the governmental health system. This needs consideration when planning the type of policies and programs that can promote improved health outcomes in the short and longer term.

This review confirms the previously reported (5) association between vaccine coverage and the multiple dimensions of a state's fragility ("Political Stability and Absence of Violence/Terrorism", "Rule of Law", "Control of Corruption" and "Government Effectiveness"). An interesting finding was that "Voice and Accountability", the indicator informing about "Citizen Participation in selecting Government", and "Freedom of expression" was found to be negatively associated with vaccine coverage (less freedom is associated with higher coverage). A similar finding has been reported previously (16), suggesting that perhaps this was because "bureaucratic elites have an affinity for immunization programs and are granted more autonomy in autocracies". However we did not identify a consistently modified relationship between lagged HSS funding and the multiple dimensions of fragility.

These findings reaffirm Gavi's decision to allow flexibility in diverse aspects including the financial volume of country allocation, as well as in terms of application, monitoring, and reporting. However, the policy could be enhanced to provide guidance to country teams on how to recognize where a country stands in the continuum of transition from relief to development, and to stipulate the aspects that should be prioritised in the HSS grant design and/or implementation. That guidance may cover topics as sub-national approaches to address imbalances in access to immunisation services, investment in commodities and operational for humanitarian and development assistance settings, and articulation of immunisation strategy during and post conflict.

The quantitative analysis did not include socio-economic and gender equity because these outcomes are collected through surveys implemented with a lapse of a variable number of years. Hence the frequency of equity measurements is not aligned with Gavi's annual disbursements or strategic phases.

The association of HSS investments with geographical equity was explored in the quantitative analysis through the use of a model of the indicator "percentage of districts with drop-out rate <10%", as collected by the WHO Joint Reporting Forms. No meaningful results were obtained, so it was not possible to draw any conclusions.

In terms of equity, we could not gather consistent quantitative evidence to suggest that Gavi HSS support is increasing or reducing inequities. However we identified through the qualitative review, as for coverage, a substantial proportion of objectives that related to equity. This suggests that countries are addressing coverage and equity issues. However, from the design-stage onwards, definitions, quantifications, implementation, and monitoring of equity-promoting strategies tend to remain vague and unspecific. Geographical inequity is often present in documents (e.g. hard to reach districts/villages/islands), however, also here a detailed assessment of the additional numbers of potential beneficiaries and the extent to which they are reached, are generally missing. Only to a lesser extent, did countries clearly address under-immunized groups and thus seek to directly reduce the equity gap.

There is a growing body of relevant evidence describing i) the association between vaccination status and socio-demographic and economic factors, and ii) differences in coverage among equity categories; but much less evidence on interventions to actually impact on equity is available (17). These studies could provide Gavi an operational framework to monitor equity targeting specific subgroups and considering testing promising interventions to address inequities.

Despite the recognized on-going improvements to Gavi-processes, key informants consider there is scope to make HSS investments strategic and catalytic. For this Gavi could invest in the generation and dissemination of evidence. Interviewees described the Equitable Impact Sensitive Tool (EQUIST) supported by UNICEF as an example of such an approach.

This review was unable to acquire quantitative evidence about Gavi HSS contribution to the integration of immunization services into PHC. This finding could be related to the limited sensitivity of the indicator available to measure integration[21], that assume the combined outcomes of multiple services as the overall result of the principles and policies of the health system. However, this indicator may not inform about the potential progress at multiple levels achieved by countries.

[21] Number of Gavi-supported countries where 1) coverage levels for DTP3, MCV1, PAB, and ANC1 services are within a range of 10 percentage points, and 2) coverage levels for all four services are above 70percent

A key conclusion of the on-going debate about the effectiveness of health program integration is that both non-integrated and integrated interventions co-exist in health systems, but the purpose, nature and extent of integration varies enormously (18). Therefore the assessment of integrated care initiatives requires a conceptual framework that guides the collection of standardized and validated indicators to measure integration at the clinical, professional, organizational and systemic levels (19).

The drive towards Universal Health Coverage is gaining important momentum, and there are lessons to be learnt and built upon from the implementation of routine immunizations. The use of PHC as a platform for integrated service delivery is a clear strategy that is promoted by Gavi. The Theory of Change is that investments in comprehensive PHC have a broader effect on the entire health system, that go beyond the effect on the specific program that provides the funding and that these changes take place close to citizens. It is also at PHC level that there is growing evidence of how to "go the last mile" and reduce the number of people the health system otherwise fails to reach. Albeit the indications are that with the same level of investment, disproportionately higher efforts are needed to prioritise access to the poorest and most marginalized populations (20). Grant management modalities like the pooling funding mechanism can be an opportunity to foster more integrated planning and implementation across services. Gavi investments represent a substantial proportion of external funding to Governments, making Gavi an important player with the potential to sustainably influence health policies in countries. Whilst the relative importance of Gavi HSS disbursements out of total Gavi disbursements has been increasing again since 2012, Gavi HSS investments alone represent only a small proportion of Gavi overall investments, of external country support, or of HSS investments overall. Hence Gavi HSS investments as a "stand-alone" measure do not have the same possibilities to exert influence or fundamentally shape country health systems as Gavi as a whole. It would therefore be important for Gavi to coordinate and consolidate its in-country support so as to bring maximal influence to achieving its overarching strategic goals and the sustainability of routine immunization.

For Gavi HSS investments to gain the leverage required to bring sustainable change and improvements they should be strategic and catalytic. Specifically the latter has been challenged and Gavi has faced concerns, for instance from the IRC, that HSS investments are too often channelled into maintaining costs (e.g. salaries) without sufficient consideration of their sustainability. The findings from this review reiterate these concerns. Regardless of a countries transition status the majority of investments are going to Procurement & Supply and Service Delivery. Across the transition phases this review did not find any variation in the focus that proposals gave to sustainability-related objectives, or in the budget assigned to health financing or legal, policy and regulatory environments.

The Partnership Engagement Framework (PEF) is meant to support countries to improve their capacities. It is however, noteworthy that countries are generally not taking advantage of HSS grants to improve program and financial management capabilities. This is seen by a low turnout of capacity improvement activities in the proposals that countries submit to Gavi. Gavi conducts a Program Capacity Assessment (PCA) for every country receiving HSS funds. However the PCAs sometimes take place after countries have submitted funding proposals to Gavi. In these cases the opportunity to incorporate interventions to address any identified capacity gaps in the HSS grants is missed. For channeling funds back to governments, building financial capacities will be key. Gavi could thus consider to strategically fund building financial capacities and ally with partners for addressing this task.

In relation to the objective of "facilitating that countries prepare for sustainability", the review highlights more caveats. Countries' HSS activities are not designed to enhance political commitment at national or district level. There may be some side effects, e.g. top-ups of salaries which might increase commitment but the sustainability of these features is often questionable. Furthermore, HSS grants have not been designed to support countries to increase the amount of domestic financing that is allocated to health – and of that amount, the proportion that is allocated to delivering routine immunizations.

More generally, the use of the Gross National Income (GNI) per capita as the criteria to phase out financial and technical assistance has several limitations - as has already been recognized by Gavi (21). The transition phases are not indicative of countries overall performance and ability to maintain programmatic and financial sustainability. For instance, sudden rapid increases in the GNI are not readily followed by additional resources for health, nor, by the needed capacities. Similarly, while extreme poverty can be a consequence of fragility and vice versa, an increasing income does not fully distance countries from fragility. To address this limitation Gavi has made efforts to better tailor transition pathways while maintaining a rules-based approach, however this likely needs further attention going forward.

3.2. Implementation of grants

CONCLUSIONS

a. The best available information about the HSS grants is in the grant proposal and table of planned activities. These are well aligned with Gavi's strategic focus areas.

Whereas no specific guidance is available to identify immunization program under-achievement, the country teams have sufficient flexibility to reallocate Gavi HSS budgets in case of need.

Overall rating	Quantitative	Document analysis	KII	Meta-review/FCE
☐☑☑☑	☐	☑	☑	☑

b. Due to increased attention given to fiduciary risk a high percentage (63%) of grant funds is disbursed to partners. This approach is not ideal for building national systems and promoting long-term programmatic and financial sustainability.

Overall rating	Quantitative	Document analysis	KII	Meta-review/FCE
☐☑☑☑	☐	☑	☑	☑

c. During the period of reference for this review (grants approved 2014-2017), the rate at which Gavi disbursed funds to countries was lower than in the preceding period. This is related to increased awareness of fiduciary risk, weak financial management capacities at country level, and the scaling up of HSS

disbursements.

Overall rating	Quantitative	Document analysis	KII	Meta-review/FCE
☐☑☑☐	☐	☑	☑	☐

d. Gavi has successfully implemented the Grant Performance Framework as a tool for country-specific monitoring. However, it lacks standardisation of indicators, specifically on processes and intermediate results and thus does not support a comparison across countries at these levels.

Gavi country teams do not receive guidance to identify underperforming grants.

Overall rating	Quantitative	Document analysis	KII	Meta-review/FCE
☐☑☑☐	☐	☑	☑	☐

KEY FINDINGS

Contribution to Gavi's strategy

- Whereas the Grant Performance Framework includes standard high level indicators, there is no streamlined tool/data collection that would allow comparison of implementation progress of HSS grants across countries.
- Starting from the planned implementation of Gavi HSS grants, it can be confirmed that they are consistent with Gavi's strategic focus areas (SFAs).
- Gavi does not provide specific guidance to country teams on how a country's performance (programmatically or financially) should be assessed, nor about when to take action if intended results are not being realized.
- There is sufficient flexibility in the re-allocation of Gavi HSS budgets that allows countries to change planned activities and re-allocate budgets in response to programmatic requirements. Re-programming was considered as a complex and lengthy process that countries and country teams try to avoid.

Programmatic and financial sustainability

- Gavi transfers 63% of cash grants to partners, mainly because of fiduciary risk within country systems.
- The in-country utilisation of HSS funds is usually higher among partners than among governments.

Delayed or unpredictable funding

- The percentage of funds transferred as per the initial budget was 60% in the period 2014-18. The time average time between IRC approval and Gavi's first disbursement was 16.1 months and 19.9 months for 2017 and 2018 respectively.
- Gavi's Board articulated a reduced appetite for fiduciary risk which required countries to have systems in place to properly account for funds. In 2015 Gavi introduced a

three line of defence model that increased the visibility of risks, especially fiduciary risk. The time taken for countries to address identified risks contributed to delays in initiating HSS grants.

- Gavi's audit and investigation department has reported weaknesses in in-country financial management systems. In cases where countries were unable to properly account for provided funds, disbursements were interrupted, and alternative funding modalities identified e.g. funding through partners. The time taken to identify and implement these alternatives contributed to delays in the flow of funds.
- HSS disbursements have scaled up significantly (the average annual amount disbursed has more than doubled after 2014). However, countries' financial systems have not developed accordingly.
- The lack of appropriate capacity in national financial systems results in low funds absorption and delays in submitting reports to Gavi. Gavi does not release additional funds if countries have high cash balances and until they have provided the required financial reports.

Monitoring & results mechanisms

- The main mechanisms for tracking grants are the Grant Performance Framework (GPF) and Joint Appraisal Reports. Other sources commonly used are evaluations, coverage surveys and contextual information which come primarily from direct contacts with partners and implementers.
- Gavi's policies do not request a regular monitoring of operational work plans and budget consumption; and reporting or achievement rates are not linked to disbursements. However, some countries have agreed to submit programmatic and financial reports that can be as frequent as quarterly based.
- The GPF collects standardized high level indicators (core) from published sources, as well as country specific indicators (tailored) that inform about process, intermediate results and outcomes. The country-specific indicators are not standardized across Gavi's portfolio.
- Gavi does not provide guidance about how to identify when grants are off track, or how to correct course. Country teams identify performance issues and act based in their experience.
- There are concerns about the quality of the data reported in the GPF: the core indicators are based in administrative data, so potentially proceeding from a weak information system; and the absence of systematic data quality assurance.

DISCUSSION

Gavi's practice of increasingly channelling funding through partners and non-governmental systems, mainly to mitigate fiduciary risks, has likely consequences for country ownership and financial and programmatic sustainability. It is a practice that supports the short-term objectives of delivering on program activities rather than building more robust national systems. Conversely, partners often have strong technical capacities which can enhance in-country program delivery. For some countries this arrangement may just be only pass through wherein the Government still remains as the main implementer. However, funding through partners has the risk of not preparing countries sufficiently in program and financial management which in turn is critical for sustainability. Moreover, Gavi is yet to define matrices that trigger channelling of funds to partners or reverting back to government. Where

funds are channelled to Ministries of Health, the HSS grants are aligned to government budgeting, accountability and reporting arrangements.

The introduction of the Joint Appraisal Reports and Grant Performance Framework in 2016 denotes Gavi's willingness to strengthen grant management through better risk management. The Grant Performance Framework provides the opportunity to identify and collect key information about the progress achieved in grant implementation, and the Joint Appraisal Reports collect and discuss all information which is relevant for program management. These refinements have introduced a shift to a more country-centred grant monitoring and data analysis, with respect to the previous period.

The GPF contains a small group of core indicators, common to all countries, providing information about high level results (intermediate and outcome). The data required to monitor the grant implementation is expected to be reported to the GPF through a country specific and larger set of tailored indicators.

The tailored indicators are proposed by the country to Gavi's secretariat, so maximizing ownership and consistency with the local context. As a direct consequence of this approach, the GPF does not offer an opportunity to compare grant implementation achievements across countries. These observations were consistent with KII statements indicating that the GPF was not expected to become a source of data for comparisons across countries.

The absence of standard indicators makes it very difficult to assess the ambition of countries expressed in the targets proposed; all together imposing a formidable challenge to the identification of meaningful thresholds to declare a grant as off track. In consequence, each country team, using its experience and country knowledge, is ultimately responsible for assessing if the progress achieved was reasonable under the circumstances.

3.3. Design of HSS grants

CONCLUSIONS

a. The design of HSS grants is country-driven which fosters ownership and investments into country priority areas. However, it also creates uncertainties about the catalytic role of investments to support improvements in the health system such that they can increase coverage and equity in a sustainable way.

Overall rating	Quantitative	Document analysis	KII	Meta-review/FCE
☐☑☑☐	☐	☑	☑	☐

b. The GPF has been established as a HSS grant implementation monitoring tool to support country stakeholders in grant management.

Overall rating	Quantitative	Document analysis	KII	Meta-review/FCE
☐☑☑☐	☐	☑	☑	☐

KEY FINDINGS

Aligning grants to country context

- Overall, Gavi HSS support is well aligned with national comprehensive multi-year strategic plans (cMYPs) for immunization and national health strategies.
- Coordination among partners is mainly organized through a Country Coordination Committee or Coordinating Body. The strongest form of coordination is achieved through SWAps.
- Stakeholders - including CSOs - seem to be involved in proposal design and development overall, but countries should be more explicit about the role and nature of integration.

Aligning grants with Gavi Strategy

- Proposals align well with Gavi's "Vaccine and Systems" goals which aim to accelerate equitable uptake and coverage of vaccines. HSS proposals did not relate to the "sustainability goal" as well.
- Vaccination services are typically offered in an integrated manner though key informants thought this was largely a country decision where Gavi had little influence.
- Countries do have a variety of coverage and equity analysis documents, data and analysis available but do not utilize them in a consistent manner when writing proposals.
- Objectives are often focussing on geographic inequities or rephrase under-immunized populations in geographic terms, e.g. "urban poor". Hence, objectives lack the specificity to addressing directly under-immunized population. Other equity dimensions, e.g. maternal education, gender or economic inequities were only found to be addressed with HSS grants in a small number of exceptional cases (e.g. Afghanistan).

Monitoring and Evaluation

- The Grant Performance Framework does not include tailored indicators to monitor achievements, at the process and intermediate level, of many grant objectives.
- The Grant Performance Framework is aligned with the country health sector.

DISCUSSION

Gavi maintains the important principle of keeping countries in the driving seat when it comes to identifying the agenda and proposing where investment should be directed. The broad scope of objectives and investments of HSS grants (from design through implementation) has the advantage that countries can address what they are in need of, and what is considered as most appropriate in their context.

However, this broadness concurrently introduces some limitations and insecurities:

1) It becomes very complex for Gavi to compare the different approaches and interventions at country level and between different countries.
2) At the design stage, many grants have limitations in the description of the overarching purpose and direction of the proposed interventions. Grant proposals frequently do not delineate a plausible Theory of Change or a description of how the proposed

interventions/investments should translate into immediate “results”, and later contribute to outcome level change and impact.

Several key informants indicated that if Gavi were to take a more prescriptive approach, countries would most likely appreciate the guidance and be able to bring greater clarity to the design stage of their HSS grants with a knock-on benefit into the planning and implementation stages. This review also showed that available data is not always used in grant-making which is another aspect that tighter guidance could counter against.

At the time of application, Gavi requires countires to compile the information on all sources of funding for HSS to identify opportunities for integrantion and complementarity of HSS investments with vaccine introducctions/campaign activities and other donor funding (e.g Global Fund, Global Financing Facility and others).

There is a wealth of data in Gavi and in other sources (e.g. WHO-UNICEF Joint Reporting Form) that can potentially be used to monitor HSS results. However, we have found difficulties in identifying a body of data that can be ‘easily’ analysed to address some of the questions posed by this review. This is partially due to the fact that not all data is available for all countries and years; it is also due to the fact that some data items considered relevant may be missing (e.g. sub-national data); and there are also issues of data quality in some data sources.

The Grant Performance Framework was introduced in 2016 as an implementation reporting tool to strengthen grant management; and whereas a broader spectrum of sources to monitor and evaluate Gavi grants is available, the GPF’s particular role is to capture key grant performance indicators in a systematic and continuous way. However, although the GPF captures standard indicators, these inform high level results (outputs and outcomes) of the immunization service delivery, and not the inputs from Gavi HSS grants.

As an opportunity to gain comparability across countries, and considering that the standard indicators are collected by Gavi secretariat from published sources, the group of standard indicators could be complemented with indicators already adopted by initiatives as Health Data Collaborative or Universal Health Care, such as health service-specific availability and readiness and/or health worker density.

Whereas the GPF includes indicators that provide information about the performance of Gavi HSS supported activities, these are defined to serve the country-specific monitoring, so the adoption of standards is not a priority, which means they do not lend themselves to cross-country comparison.

Without comparability of performance results, benchmarks are not readily available and Gavi’s country teams must rely on their judgment to assess grant performance. Whereas that judgment is enhanced by contextual information, the GPF remains the main source for tracking grant implementation.

Monitoring data of budget execution by objectives or activities was not available for this review. The information source provided and used by this review as the indicator or financial implementation of HSS grants was the annual amounts of funds disbursed to countries. Whereas the approved budget is disaggregated by objectives and activities; the delays in disbursements, budget reallocations and reprogramming may impose divergences between the planned and actually executed activities.

Grant Performance Framework	
Strengths	**Weaknesses**
Country driven	Lack of standardization limit opportunities for cross learning / benchmarking
Linked to grant objectives	Despite the high number of tailored indicators, the implementation of processes is not enough monitored
Successful implantation: countries are actually reporting results	Data quality assurance is not available

In response to concerns about the lack of data validation (22), in 2017 Gavi proposed to improve the quality of immunization data and triangulate data to understand performance. Whereas the Joint Appraisals provide an opportunity to discuss data reliability, it does not require any empirical verification by itself, and so has the tendency to take on a discussion-like format with the actual implementers and partners of the reported HSS activities.

4. Body of evidence

4.1. Outcomes and results

4.1.1. Quantitative findings

In order to answer the review questions related to the contribution of Gavi HSS investments, our methodological approach has aimed to identify and measure the association between the expected results and Gavi's support, isolated of the effect from other suspected predictors, and across the countries receiving HSS grants.

In that direction, the Grant Performance Framework was initially considered as the most complete source of quantitative data about the HSS grant performance. However we identified important restrictions for that approach.

1) The number of observations: In an initial analysis we were unable to show changes related to HSS contribution in the same year of disbursement. The GPF contains data from 2014 onwards. Taking 2014 as the baseline, it only leaves 2017 as the year when the expected results would be "fully" expressed, so reducing considerably the number of observations for any quantitative analysis.

2) Time-series for core indicators available: Among the core indicators included in the GPF (Table 3), those related to outcomes are available for much longer periods from the original sources as WHO and UNICEF estimates of coverage (WUENIC) and WHO-UNICEF Joint Reporting Forms (JRF).

Table 3: Core indicators included in the GPF

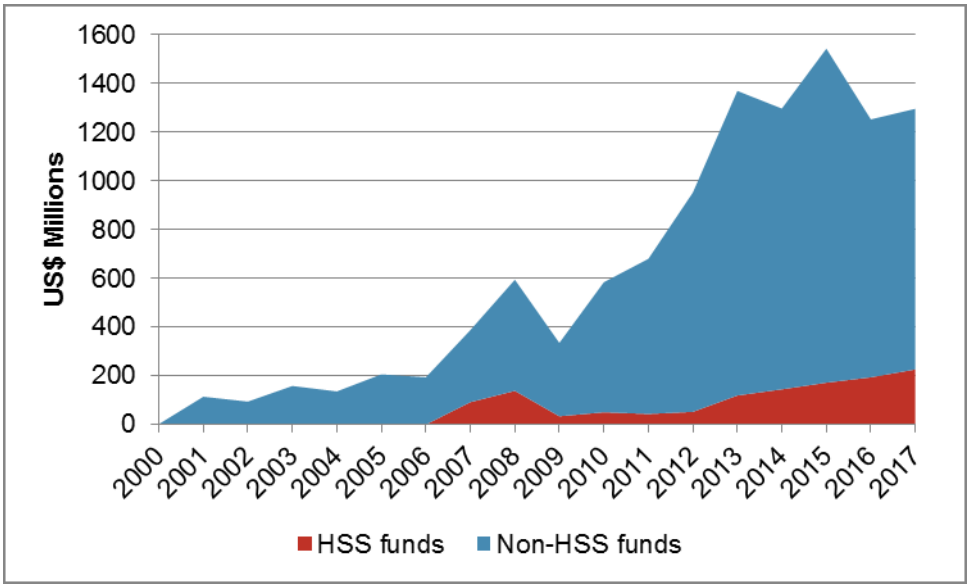
Level	Indicator
Intermediate	Number of surviving infants who received the first recommended dose of pentavalent vaccine (Penta1)
Intermediate	Number of surviving infants who received the third recommended dose of pentavalent vaccine (Penta3)
Intermediate	Number of surviving infants who received the first recommended dose of measles containing vaccine (MCV1)
Outcome	Pentavalent 3 coverage at the national level (Penta 3)
Outcome	Measles containing vaccine (first dose) coverage at the national level (MCV1)
Outcome	Drop-out rate between Penta1 and Penta3
Outcome	Percentage of districts or equivalent administrative area with Penta3 coverage greater than 95%

Level	Indicator
Outcome	Percentage of districts or equivalent administrative area with Penta3 coverage greater than 80%
Outcome	Percentage of districts or equivalent administrative area with Penta3 coverage between 50% and 80%;

3) Lack of standardization for tailored indicators: The tailored indicators included in the GPF were not suitable to compare performance across countries given the lack of standardization. 51 countries report the performance of HSS grants using 751 different tailored indicators.

Taking into consideration that figures about budget execution by grant categories, objectives or activities were not available, the annual amounts of HSS funds disbursed to countries was used as a proxy of HSS grants implementation. **Error! Reference source not found.** shows the annual disbursements from HSS grants (HSS funds), and from all other Gavi's grants (non-HSS).

Figure 1: Total amount of annual Gavi disbursements



The dataset used in the analysis comprises 1,463 country-year records (observations), covering 77 countries that since 2000 have received funds from Gavi (HSS and non-HSS). Each observation contains, for the country and year in question: WUENIC indicators, Gavi disbursements (from both the HSS and non-HSS grants), and 14 control variables describing various aspects of the country's political situation, economy and society.

Table 4: Description of variables included in the quantitative analysis

Variable	Interpretation	Group	Unit
DTP1	WUENIC estimate of DTP1 coverage	Response	% of target population
DTP3	WUENIC estimate of DTP3 coverage		% of target population
DTP dropout	Children receiving received DTP3 among those who received DTP1		% of target population
Pol3	WUENIC estimate of Pol3 coverage		% of target population
MCV1	WUENIC estimate of MCV1 coverage		% of target population
HepB3	WUENIC estimate of HepB3 coverage		% of target population
PAB	WUENIC estimate of PAB coverage		% of target population
GSA_02148	Geographical equity: DTP dropout > 10%pts		% of districts
GSA_02018	Geographical equity: DTP3 coverage > 80%		% of districts
HSS1	Total HSS disbursement 1 year prior	Gavi intervention	US$ per less than 1y child
HSS2	Total HSS disbursement 2 years prior		US$ per less than 1y child
HSS3	Total HSS disbursement 3 years prior		US$ per less than 1y child
nonHSS1	Total non-HSS disbursement 1 year prior		US$ per less than 1y child
nonHSS2	Total non-HSS disbursement 2 year prior		US$ per less than 1y child
nonHSS3	Total non-HSS disbursement 3 year prior		US$ per less than 1y child
Year	Years since 1999	Time	None
Year^2	Years since 1999, squared		None
cGDP	Gross Domestic Product per capita	Control	None (standardised variable)
cHSE	Current Health Expenditure per capita		None (standardised variable)
cFSI	Fragile States Index		None (standardised variable)
cACC	Voice and Accountability		None (standardised variable)
cSTA	Political Stability and Absence of Violence and Terrorism		None (standardised variable)
cGOV	Government Effectiveness		None (standardised variable)
cREG	Regulatory Quality		None (standardised variable)
cLAW	Rule of Law		None (standardised variable)
cCOR	Control of Corruption		None (standardised variable)
cETH	Ethnic Fragmentation		None (standardised variable)
cLANG	Linguistic Fragmentation		None (standardised variable)
cREL	Religious Fragmentation		None (standardised variable)
clogPOP	Logarithm of total population		None (standardised variable)
cDEN	Population density		None (standardised variable)

The annexes include the total amounts (US$) disbursed per year to each country by all HSS grants since 2007 and non-HSS grants since 2000 (Annex 7.9), as well as vaccine coverage rates and other key predictors included in the analyses (Annex 7.11).

The control variables were standardised to zero mean and unit variance. Applying Principal Component Analysis (PCA) to the control variables indicated that 9 principal components are needed to subsume 95% of variation between control variables, making PCA-driven data reduction unattractive, since 14 directly interpretable variables would have to be replaced with 9 less meaningful PCA scores.

Variance Inflation Factors (VIF) were computed for control variables and were all below 4.0 with a median VIF of 2.29, corresponding to 50% inflation of the standard error of a typical parameter estimate. Overall, this degree of multicolinearity was judged to be tolerable for control variables and they were used directly in all models.

Detailed tables with the fitted model's coefficient estimates, odds ratios and their confidence intervals have been included in annexes. The main findings are described below, illustrated with graphs of the plotted odd ratios.

In order to interpret the parameters obtained by the models, the odds ratio of the disbursement variables can be understood as the expected change in the outcome resulting from spending one extra dollar per child aged less than one year old. For example, in the DTP1 coverage model the odds ratio for HSS3 is 1.017. This would mean that spending one extra dollar per child in the current year on HSS programs increases by 1.7% the odds that a random child receives the first dose of the DTP vaccine three years later, provided that the values of all other variables remain unchanged. As a fuller illustration, consider a country with 60% coverage of DTP1, where Gavi begins to spend 1 extra dollar per child on HSS programs (and all other characteristics remain unchanged): The predicted change in coverage after three years would be the product of the odds ratios for HSS3, HSS2 and HSS1 due to the assumption of cumulation of individual effects. Hence the odds ratio for the combined effect is 1.017*1.010*1.008=1.035. With the baseline odds being 1.5 (60%/40%), the predicted odds of a child receiving the first dose of the DTP vaccine three years down the line increases to 1.035*1.5=1.5525, which corresponds to the coverage of 60.82% (since 1.5525=60.82/39.19).

As another example, consider the same country with 60% DTP1 coverage, but assume now that it has slipped a full standard deviation in the Control of Corruption index. The odds ratio for cCOR is 1.069, and thus the predicted coverage after the slip is 58.39% (because 1.5/1.069 = 0.5839/0.4161; this time we divide by the odds ratio since the change is negative). However, if Gavi had spent 1 extra dollar per child on HSS in the three preceding years, then the HSS and COR ratios would be combined to yield the overall odds multiplier of 1.035/1.069=0.968 and consequently the predicted coverage of 59.22% (because 0.968*1.5=0.5922/0.4078). Thus, in this case HSS funding is predicted to slow down the decline in vaccination coverage that is due to an independent factor.

For the control variables, the odds ratio refers to a difference of one standard deviation. For example, in the DTP1 coverage model, everything else being equal, a country scoring a full standard deviation higher on the Political Stability and Absence of Violence and Terrorism (cSTA) would be expected to have 9% higher odds of coverage, because the odds ratio for

cSTA is 1.09. Of course, a full standard deviation is a large difference, corresponding, in 2018, to Armenia vs. Cuba or Mauritania vs. Bolivia. The confidence intervals for the control variables are quite wide as a direct consequence of the co-linearity discussed above. This is not, however, problematic per se because the coefficients for the main variables of interest (disbursements) are estimated quite precisely (narrow CIs).

Lastly, we have the two coefficients modelling the global trend in coverage (year and year squared). They are best interpreted as follows: because the coefficient for year^2 is negative, the trend has a peak, that is the overall coverage rises until a certain point, and then falls. If the coefficient for year^2 was positive, then there would be a valley; and if year^2 were not significantly different from zero, then the trend would be linear, with the coefficient for year controlling the direction and magnitude.

Statistically significant estimates at the 0.05 level are shown in red in the figures below.

Vaccine coverage

Positive and statistically significant[22] (i.e. $p<0.05$) associations between increases in coverage of DTP1, DTP3, MCV1, HepB3 and Pol3 and **Gavi HSS investments** were identified by the models.

However, only DTP1, DTP3, and HepB3 coverages were significantly associated with the HSS disbursements made 1 year prior (HSS1), 2 years prior (HSS2) and 3 years prior (HSS3). Moreover, in their corresponding models, the odds ratios increased with the number of years elapsed since the disbursement, implying that the strength of the association 'vaccine coverage' – 'HSS disbursement' increases with time for these three vaccines. For instance in the model for DTP1 coverage (Figure 2), the disbursements one year before (HSS1) obtained an odds ratio of 1.008, the disbursements two years before (HSS2) an odds ratio of 1.010, and the disbursements three years before (HSS3) an odds ratio of 1.017.

For MCV1 coverage, the association was statistically significant with HSS funds disbursed one year earlier (HSS1) only, whereas Pol3 coverage was associated with HSS funds disbursed one and three years earlier (HSS1 and HSS3). The association of DTP1-3 drop-out for the HSS disbursements are no longer significant at the 0.05 level, but a weak association could still be claimed.

The models also identified that the coverage of DTP1, DTP3, MCV1, HepB3 and Pol3, and the DTP1-3 drop-out rate are positively associated with **Gavi disbursements of non-HSS grants**. This association of vaccine coverage with disbursements was statistically significant in 4 coverage models (DTP1, DTP3, HepB3 and Pol3) with disbursements made one year ago (non-HSS1), and with all 6 coverage models for disbursements made three years ago (non-HSS3). With exception of DTP1 coverage, the odds ratios for non-HSS3 were slightly higher than for non-HSS1. Unlike for HSS investments, no coverage model found statistically significant associations with disbursements made in all the previous three years (non-HSS1, non-HSS2, non-HSS3).

Among the control predictors, the governance indicator **"Political Stability and Absence of Violence/Terrorism"** (cSTA) was found to positively and significantly associate with all the outcomes of the coverage models.

[22] $p < 0.05$

The governance indicator "**Rule of Law**" (cLAW) was found to positively and significantly associate with DTP1 and DTP3 coverage; "**Control of Corruption**" (cCOR) with MCV1 and HepB3 coverage; and "**Government Effectiveness**" (cGOV) with Pol3 coverage. These governance indicators showed odds ratio higher than one in almost all the coverage models[23], suggesting a weak but consistent association.

The governance indicator "**Voice and Accountability**" (cACC) was negatively associated (the less freedom of expression the higher vaccine coverage) with all the coverage outcomes, and that association was significant for all models with exception of MCV1. Counter-intuitively, this finding suggest that the less freedom of speech and governmental accountability, the higher the coverage. By examining the database, it seems that these results are driven by countries with less participatory societies featuring very high estimations of vaccines coverage levels featuring very high estimations of vaccines coverage levels (e.g. Turkmenistan, Uzbekistan and China).

Population density was positively associated with all the outcomes of coverage models. With the exception of MCV1 coverage this association was statistically significant. The findings for MCV1 coverage were generally rather inconsistent in relation to their associations with Gavi disbursements and Voice and Accountability, which could simply reflect a lower level of model fit for MCV1 than for DTP1[24].

The Gross Domestic Product per capita (cGDP) was found to associate significantly w with DTP1-3 dropout, Pol3 coverage and HepB3 coverage. Moreover, in all the other coverage models, the odds ratio values for this control predictor were higher than one, suggesting a weak association across the coverage of all vaccines.

Health services expenditure per capita was found to negatively and significantly associate with HepB3 coverage (OR=0.83), which is a surprising result that is at least partially due to countries with low spending on health overall, but high HepB3 coverage (e.g. Eritrea, Bangladesh and Tanzania).

[23] With exception of cCOR for DTP1-3 dropout (OR=0.99) and cGOV for MCV1 coverage (OR= 0.98)

[24] As reference both models have the same number of observations (1106) and the same structure (binomial regression with the same predictors), but the DTP1 model has significantly lower likelihood

Figure 2: DTP1 coverage

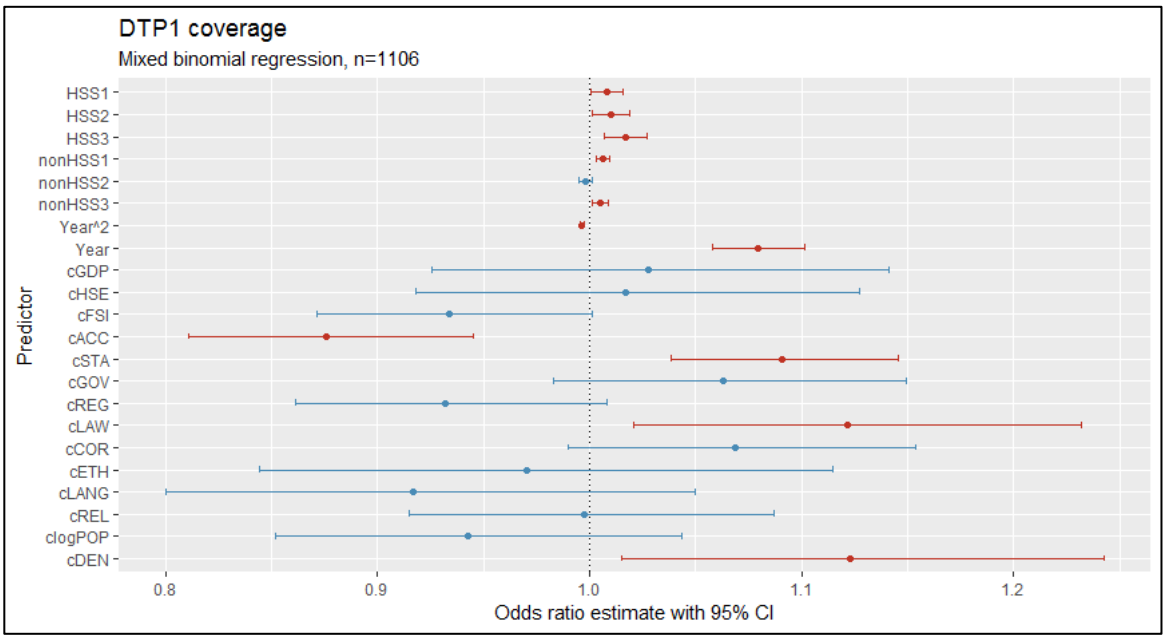


Figure 3: DTP3 coverage

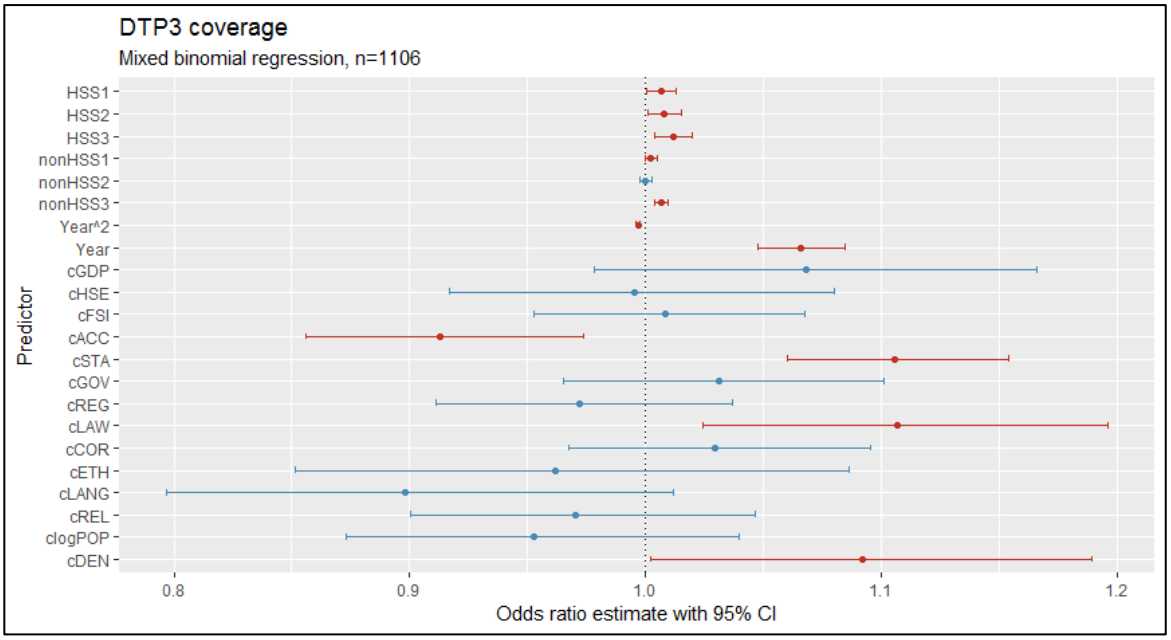


Figure 4: DTP dropout

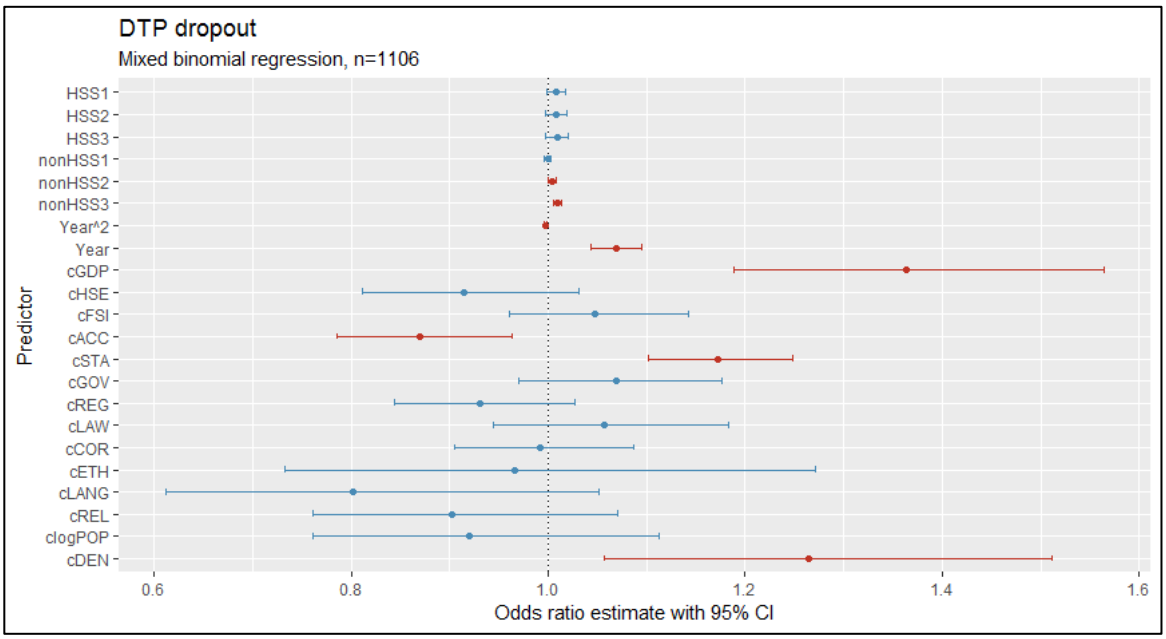


Figure 5: MCV1 coverage

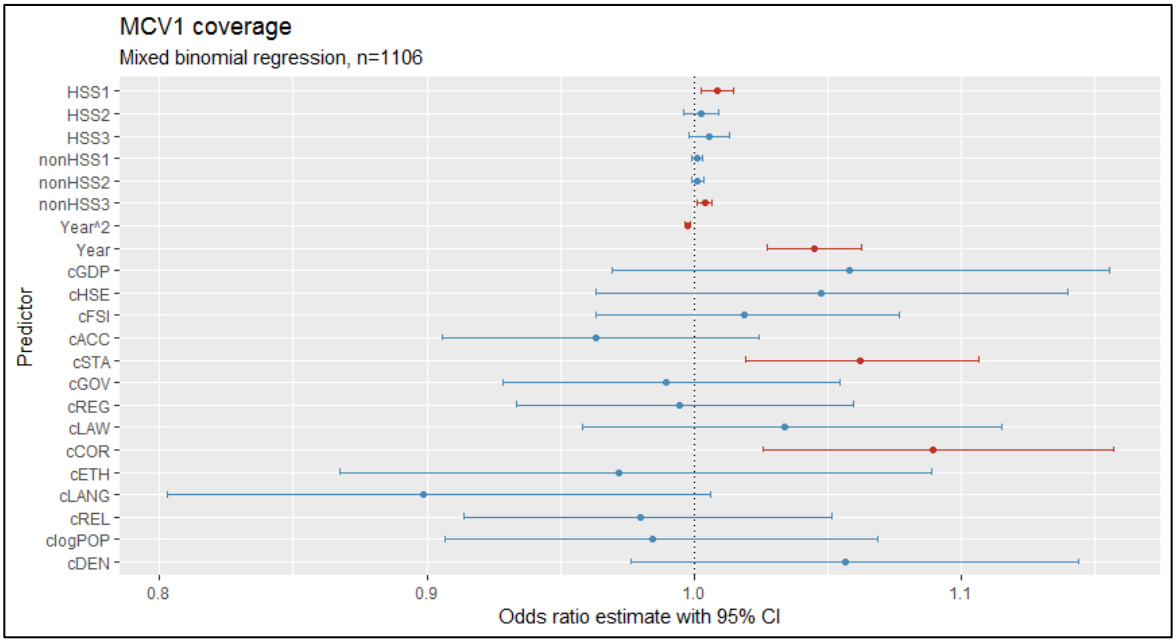


Figure 6: Pol3 coverage

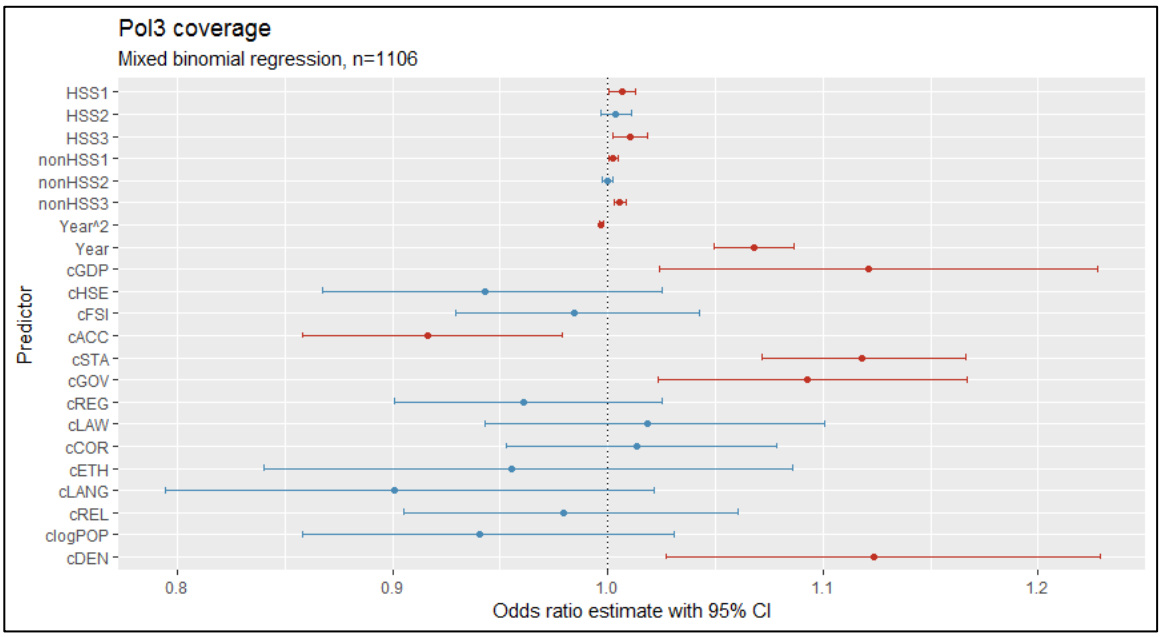
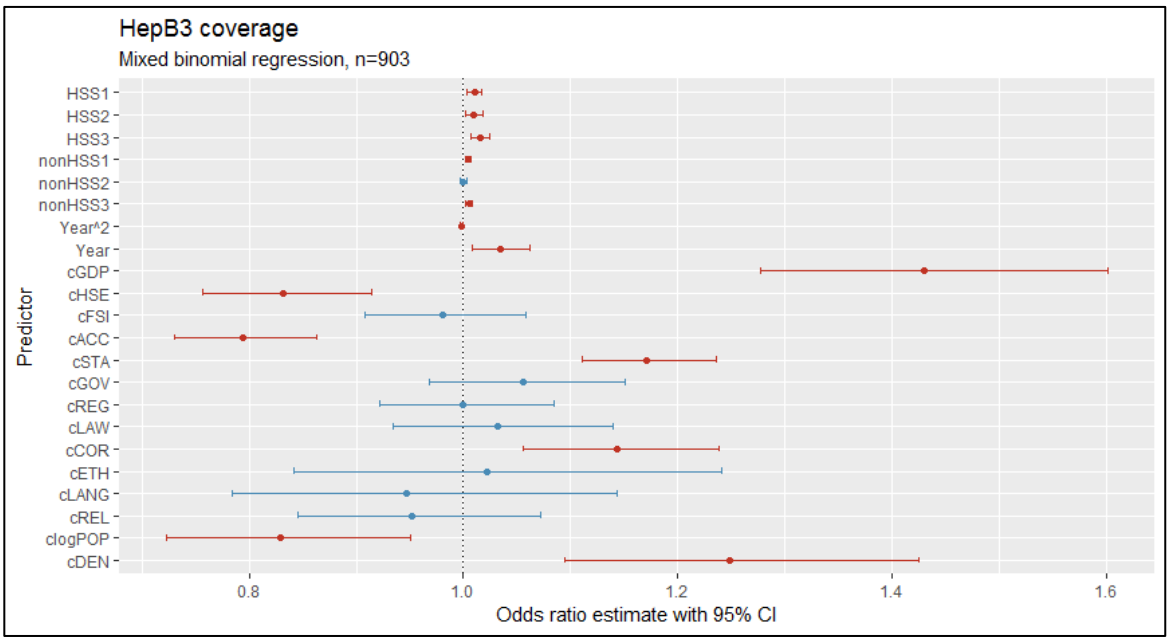


Figure 7: HepB3 coverage



Also an interaction of lagged HSS funding with the fragility indicator FSI for our six base coverage models and the DTP dropout model was tested. Based on the plots it seems that there is a possible very small effect in the case of DTP1 and DTP3 (see Figure 8 and Figure 9). This might imply that HSS grants are slightly less effective in countries with a high FSI. However results are not statistically significant. Moreover, in all seven cases, the AIC criterion indicated that the model without the interaction is slightly better. In other words: the improvement in predictive power is outweighed by the cost of adding three more predictors. The findings on whether the effect of HSS grants on coverage is modified by the countries fragility status are thus inconclusive.

Figure 8: DTP1 coverage including interaction with FSI

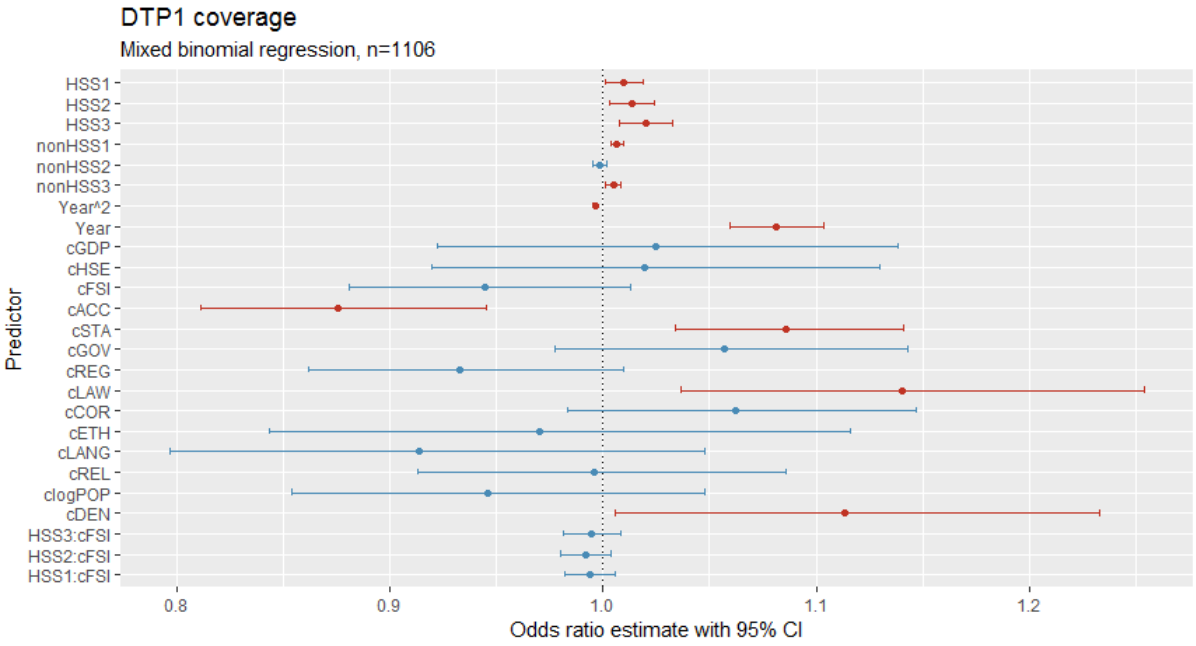
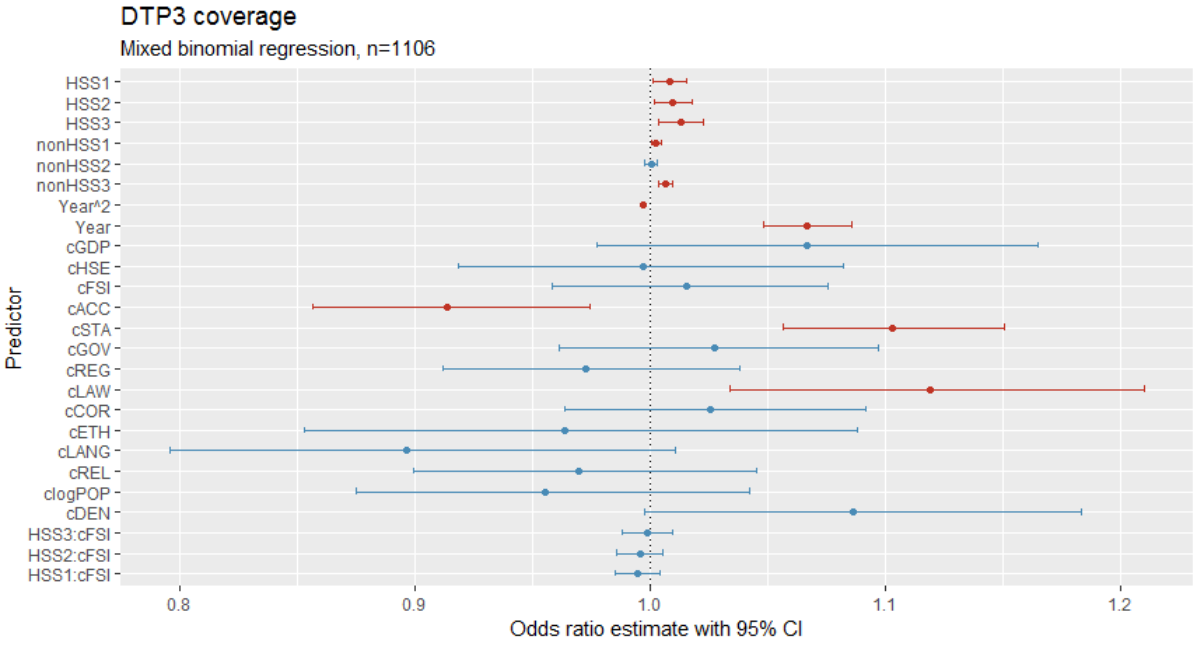


Figure 9: DTP3 coverage including interaction with FSI



Geographic equity in DTP coverage

Two indicators of geographical (in)equity in DTP coverage were analysed:

- Percent of districts with DTP3 coverage greater than 80%

This indicator showed a large, implausible transition from very low to very high values for a majority of countries in 2008 (Figure 32 in Annex 7.13), and was thus not modelled.

According to WHO this was the result of a data management issue that was solved later but not retrospectively[25].

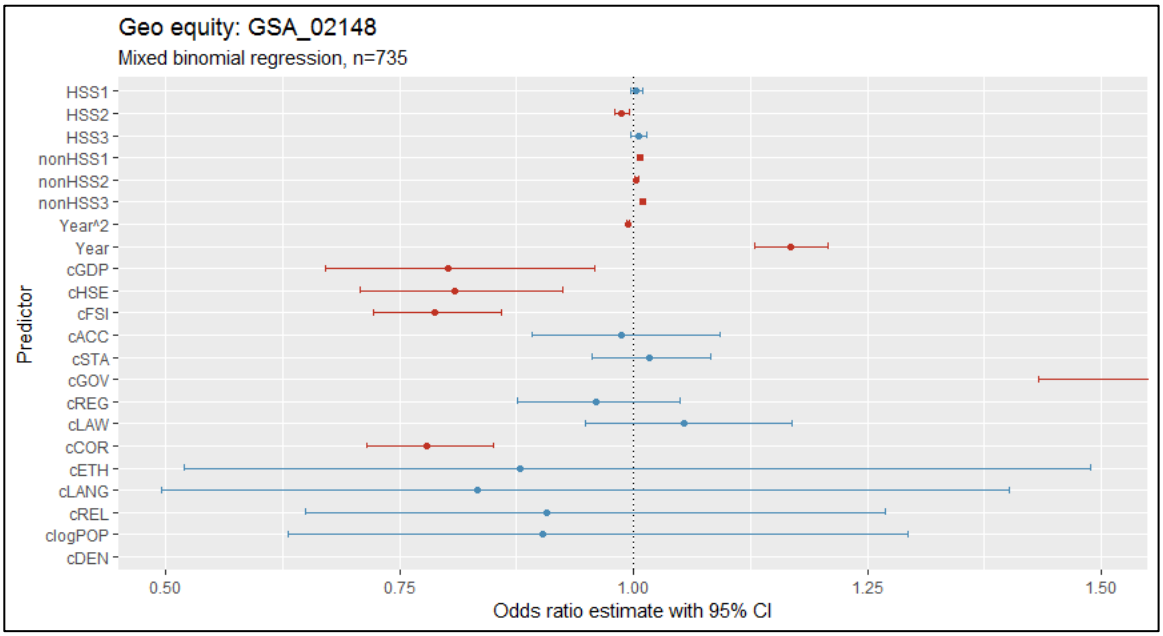
- Percent of districts with DTP dropout greater than 10 percentage points

This indicator exhibited multiple implausible peaks and valleys in the time trends for individual countries (i.e. significantly higher or lower values than in both neighbouring years), several instances of values incompatible with the corresponding country-wide DTP data (value=0 despite >10% points dropout country-wide), and one value that is impossible by definition (114, Bosnia-Herzegovina 2014). Overall, the confidence in the quality of this data and thus of the resulting model is substantially lower than for all other models. Figure 35 in Annex 7.13 illustrates the problems hereby described.

The percent of districts with DTP1-3>10% and Gavi investments was found negatively associated with HSS2; and whereas it was positively associated with all the other Gavi investments, this was statistically significant for non-HSS investments (non-HSS1, non-HSS2 and non-HSS3) only. Regarding other predictors; a significant association with Government Effectiveness (cGOV) and population density (cDEN) was found, and these showed odds ratios much higher than observed in previous models[26](1), however an unexpected negative association with Gross Domestic Product (cGDP), Health Services Expenditure (cHSE), Fragility States Index (cFSI), and Control of Corruption (cCOR) was found.

Given the issues with the outcome variable discussed above, as well as the implausible direction and magnitude of the influence of several predictors, we conclude that the associations yielded by the model are not reliable.

Figure 10: Model for percent of districts with DTP1-3 dropout >10%



[25] Personal Communication from Laure Dumolard, Strategic Information Group- EPI/IVB WHO on 10 December 2018

[26] Government Effectiveness (Cgov) obtained an odds ratio of 1.56 with 95% confidence intervals of 1.43 and 1.71, and Population density (cDEN) obtained an odds ratio of 2.24 with 95% confidence intervals of 1.68 and 2.99

HSS and vaccine introduction grants

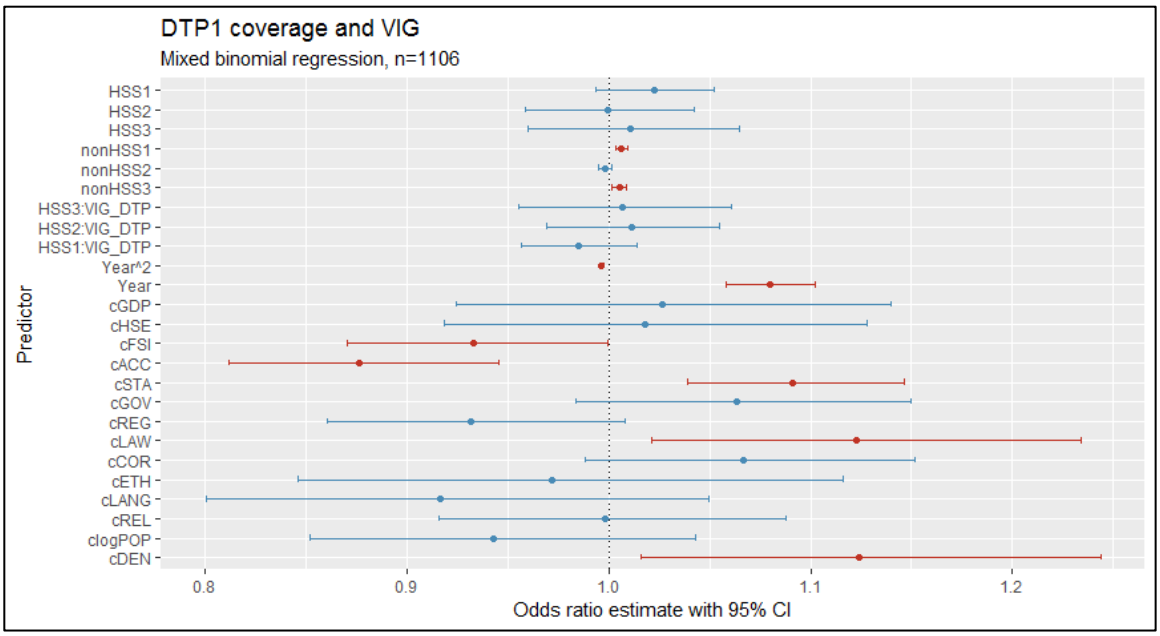
To address the review question "How do HSS investments contribute to new vaccine introductions?", the interaction between HSS investments and the presence of a VIG grant was modelled. For that purpose, the DTP1 coverage model was extended with interaction predictors related to lag investments and the presence of a Vaccine Introduction Grant: HSS1:VIG_DTP, HSS2:VIG_DTP and HSS3:VIG_DTP. Any positive association with DTP1 coverage would imply that HSS expenditure made a greater contribution to DTP1 coverage if the country had started by receiving support through a DTP Vaccine Introduction Grant than if not. However, we found that the coefficients for the three interaction predictors are not significantly different from zero, and so no such claim can be made.

Additionally, and in contrast with the DTP1 coverage model without VIG information, this model is unable to identify the baseline effect of HSS money on coverage, with all three coefficients HSS1, HSS2 and HSS2 losing significance. The reason for this behaviour is that Vaccine Introduction Grants and HSS expenditure are correlated in the sense that a country is likely to receive (a larger amount of) HSS funding if it had received a Vaccine Introduction Grant. This leads to correlation of the HSS* and HSS*:VIG variables which impedes a precise estimation of the HSS and HSS:VIG effects.

As both the model with interactions and the DTP1 model were developed from the same data, it was possible to apply a formal model selection technique to choose the better model of the two, i.e. the one that can be expected to better predict the outcome. The AIC (Akaike Information Criterion) score for the DTP1 model is marginally lower (i.e. better) than of this model, meaning that including the VIG information provides no additional predictive value.

In conclusion, the analysis have not found evidence that the joint presence of VIG grants and HSS investments contributes more to vaccine coverage than only HSS investments.

Figure 11: Interaction between DTP1 coverage and DTP vaccine introduction grant



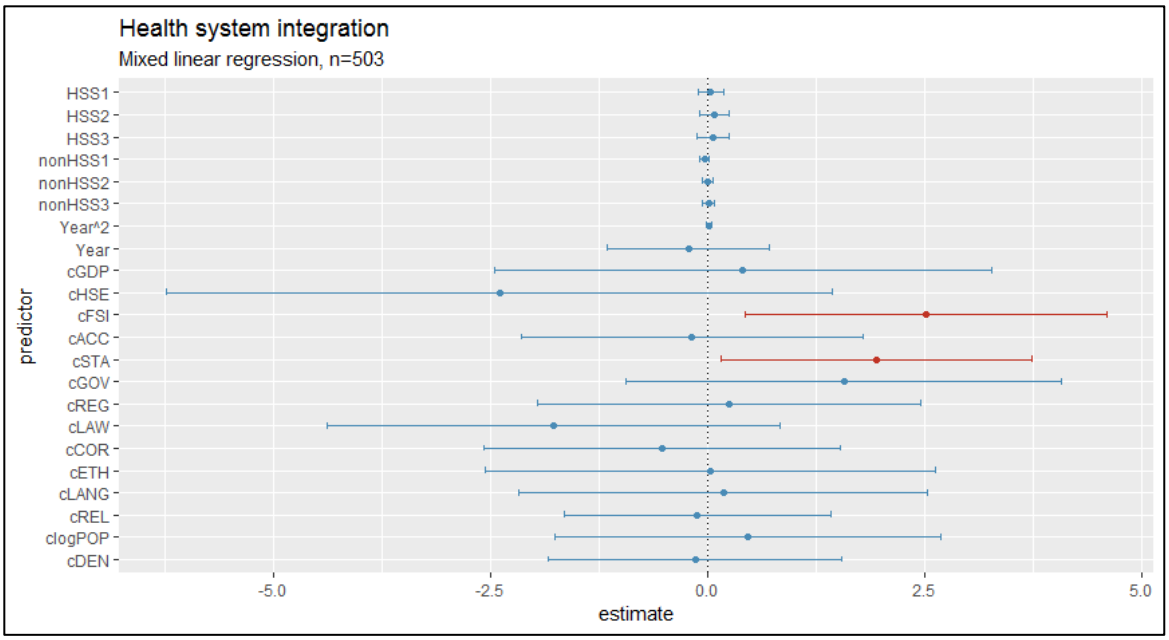
Health System Integration

To assess the Gavi's contribution to strengthening the capacity of integrated health systems to deliver immunisation, a customized indicator of integration was estimated based in the

benchmark adopted for the strategic indicator of integration[27]. No relationship between Gavi disbursements and the customized indicator for health system integration was detected.

For this customized indicator, the higher its value, the lower the integration; thus, its positive associations with both Fragility States Index (cFSI) and Political Stability and Absence of Terrorism (cSTA) were unexpected. By exploring the data, it is revealed that the relationship is driven by several stable countries with low integration (Kiribati, Laos), and unstable countries with high integration (Yemen, Afghanistan, Pakistan). By removing countries with such pattern, the relationship becomes negative, i.e. low integration is associated with a high Fragility index score and vice versa.

Figure 12: Customized Health System Integration indicator



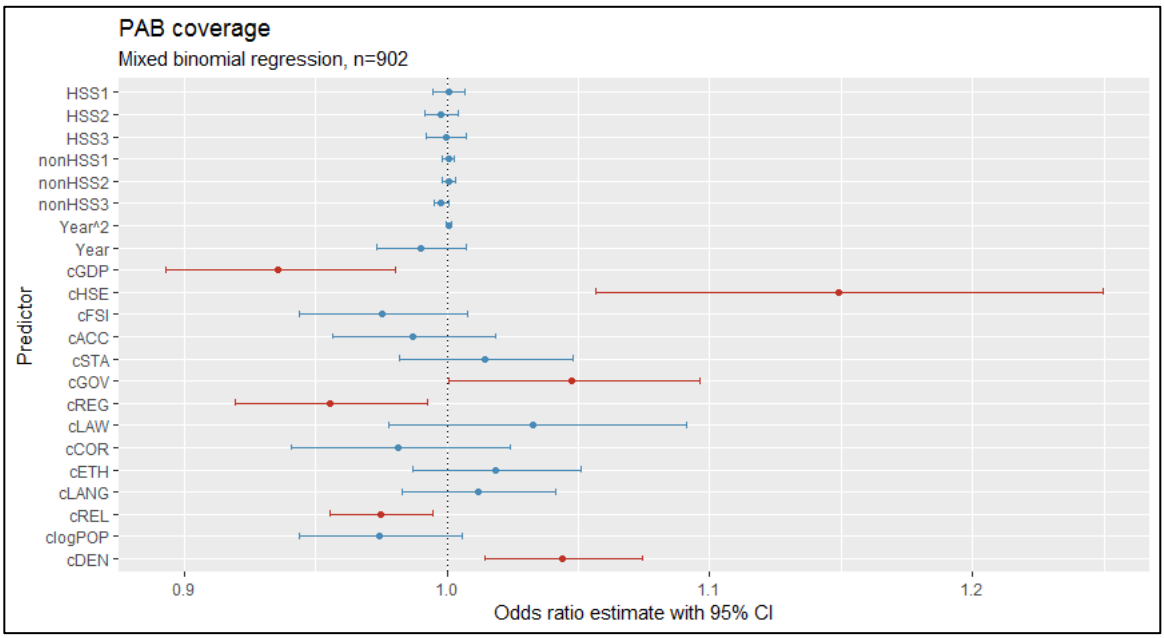
Models validation

The bootstrapped estimates and CIs, in the case of all models reported here, were in near-perfect agreement with the fitted ones which is evidence that the reported results are robust.

As a counterfactual, a coverage model was implemented for tetanus protection at birth (PAB), a vaccine not supported by Gavi. This was the only coverage model showing no association of coverage with any sort of Gavi disbursements, and the only with a positive association with health service expenditure.

[27] % countries meeting benchmark for integrated service delivery

Figure 13: Protection at birth with tetanus toxoid vaccine



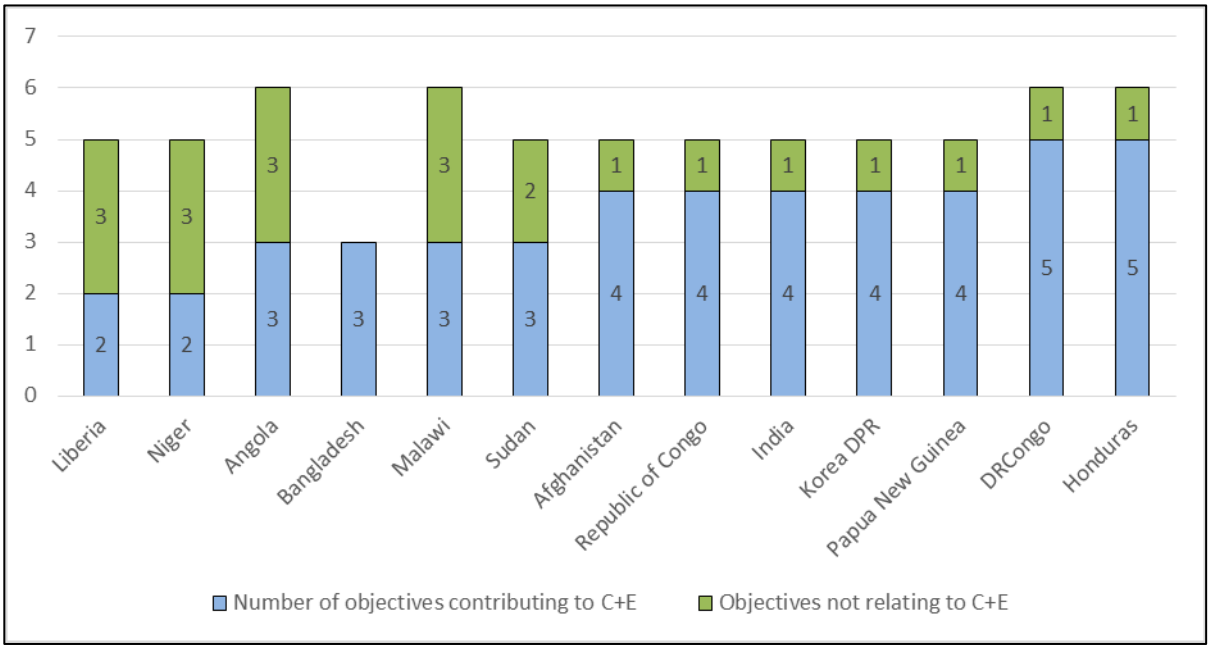
4.1.2. *Qualitative findings*

Coverage and equity

Proposals targeting coverage and equity aspects

Based on the qualitative review of the 13 countries[28], we identified that 46 of the 67 (69%) planned objectives are related to C&E (see Figure 14).

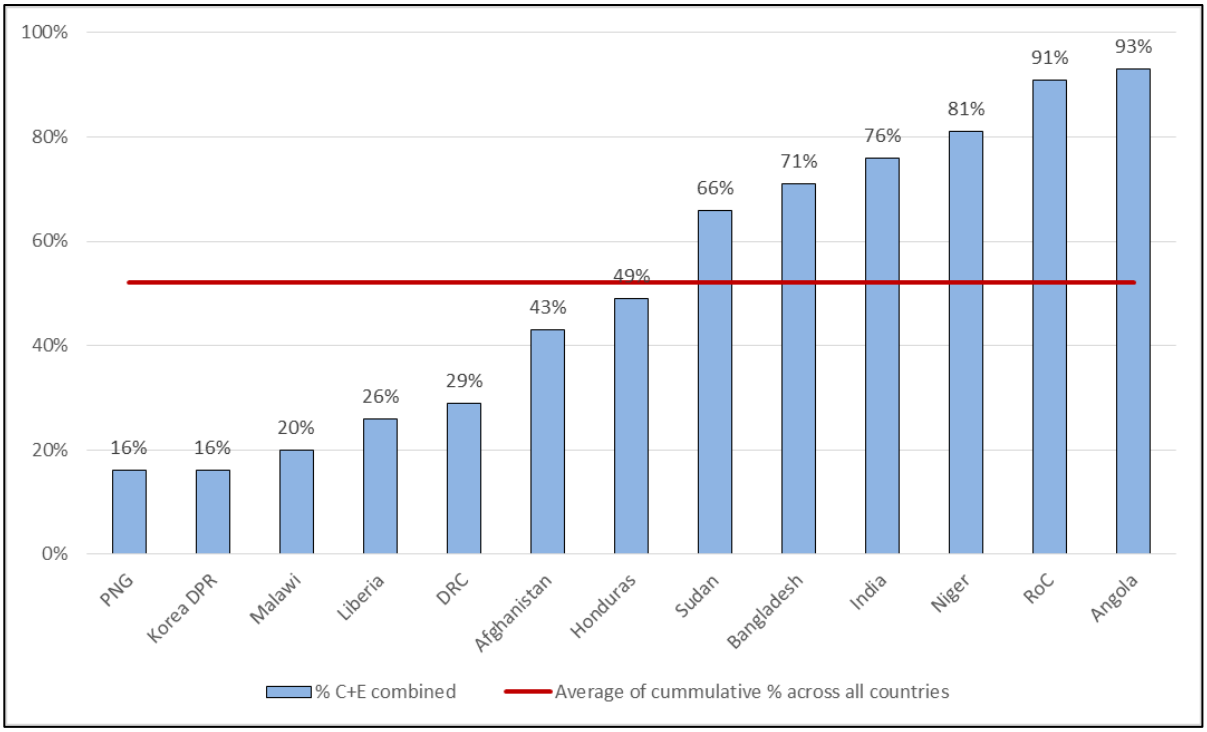
Figure 14: Overview on objectives contributing to C&E by country



[28] Ethiopia and Nepal are implementing their HSS grants through a pooled fund and Pakistan at district level. This reduced the number of countries for parts of the analysis from 16 to 13.

However, one needs to consider that not all activities subsumed under each contributing objective might also contribute to coverage (see also chapter 2.3). The budget associated with activities relating to C&E averaged 52% (see Figure 15).

Figure 15: Proportion of total HSS budget planned for C&E related activities

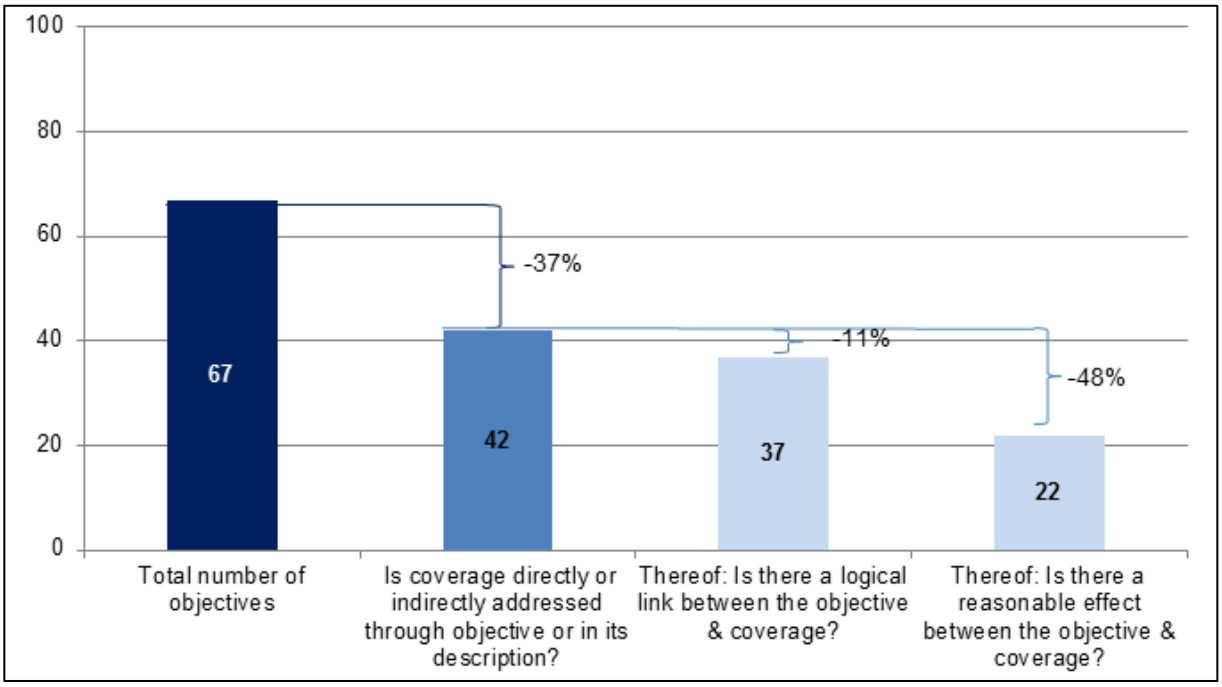


Overall the majority of objectives are contributing to coverage. We identified that 21 of the 67 planned objectives across the 13 countries directly addressed coverage aspects, while another 21 described in the proposal that their objectives aimed, or would help, to improve coverage. Hence in total 64% (42 of the 67 objectives) made a direct or indirect link to coverage.

For 88% (n=37) of the 42 objectives linked to coverage we identified a reasonable link between the proposed activities and coverage, although only 52% (n=22) thereof seemed sufficient in scale to have the potential to directly affect coverage on a national level (see Figure 16).

Example Malawi: Objective 1 “To improve access, quality and utilisation of EHP services including immunisation, with a focus on populations systematically missed due to geographical, socio-economic and cultural barriers” was considered likely to have a direct affect coverage on national level. In comparison, objective 2 “Improve the supply, quality and utilisation of data at all levels” was considered more indirect and thus unlikely to directly affect coverage at a national level.

Figure 16: Objectives related to coverage[29]



Objectives that are not considered to link with coverage are program management. Other objectives are less distinct and the coding had to be judged on how countries explained and rationalised activities, e.g. Sudan Objective 2 "To strengthen an integrated, comprehensive, efficient and sustainable Health Information System in support of an evidence-based policy and planning (see also chapter 2.2 and Annex 7.8)[30].

Examples of activities relating to coverage are DRCongo 1.2. Establishing community-based outreach by vaccinators to cover 2878 villages or Afghanistan 1.1 upgrading the 310 existing health sub-centers (HSCs) to EPI service delivery points.

Examples of activities which were not considered to contributing to coverage are for instance Bangladesh 1.1 Design and develop VPD surveillance system (web based software) to integrate into routine HMIS, pilot it and assist in software (system) modifications based on needs.

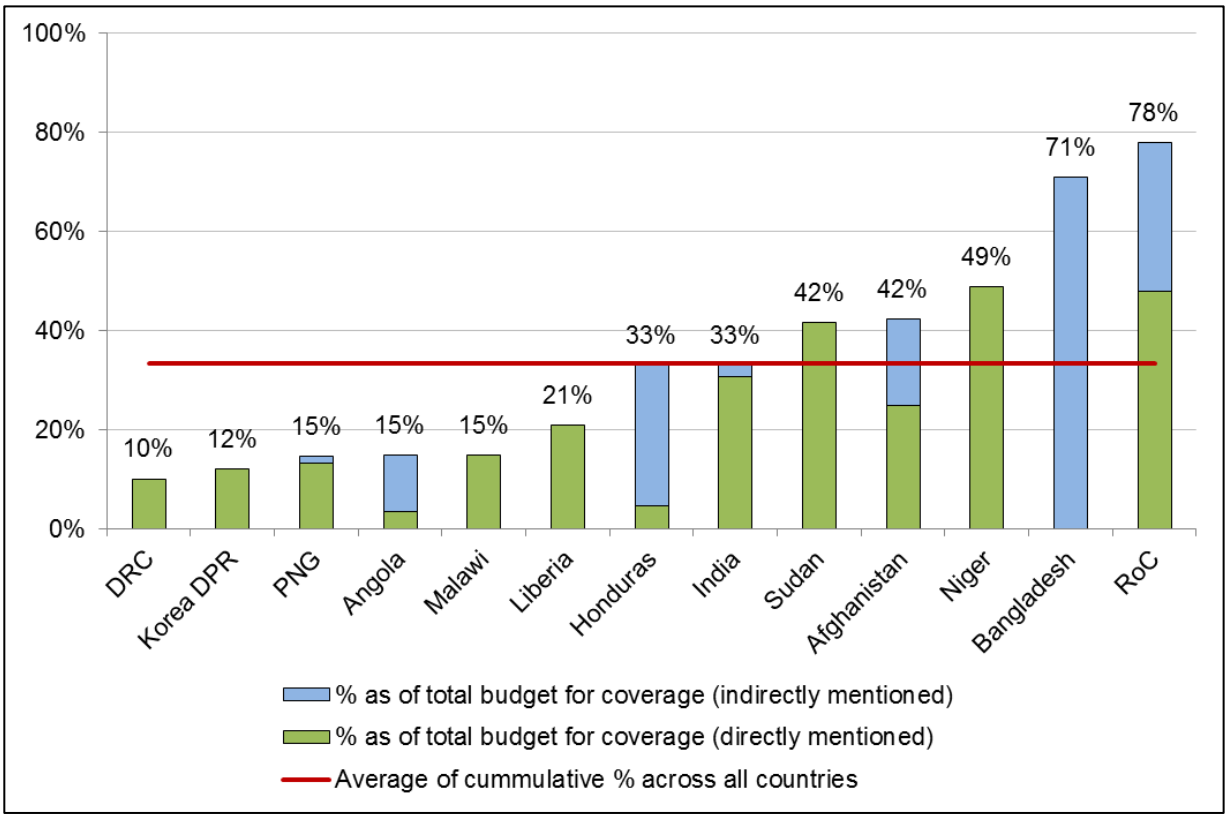
We calculated HSS contribution to coverage based on the budget of activities relating to coverage. The 13 countries spend on average 34% of the total HSS budget on activities that aim to improve coverage. Of note: not all activities described under an objective relating to coverage might be equally relevant for coverage. The budget proportion that countries invested in coverage ranged between 10% to 78% (see Figure 17).The variations did not have a systematic tendency, although we identified a positive correlation between DTP3

[29] For data on each country please refer to Annex 7.13, Table 34.

[30] Further examples for objectives are: PNG, Objective 2: Improve cold chain capacity and improve EVM scores by 10% by 2018 to ensure effective provision of vaccines; Angola, Objective 4 - Improve MINSA's institutional capacity to improve data quality and use, monitoring and assessment at all levels of the health system; Congo Republic, Objective 3. Between now and the end of the project, have at least 80% of departmental offices and health districts produce good-quality data and periodic reports, in accordance with the formats and deadlines recommended by the NHIS.

coverage and the proportion of budgets invested for coverage activities (Pearson correlation coefficient r=0.3).

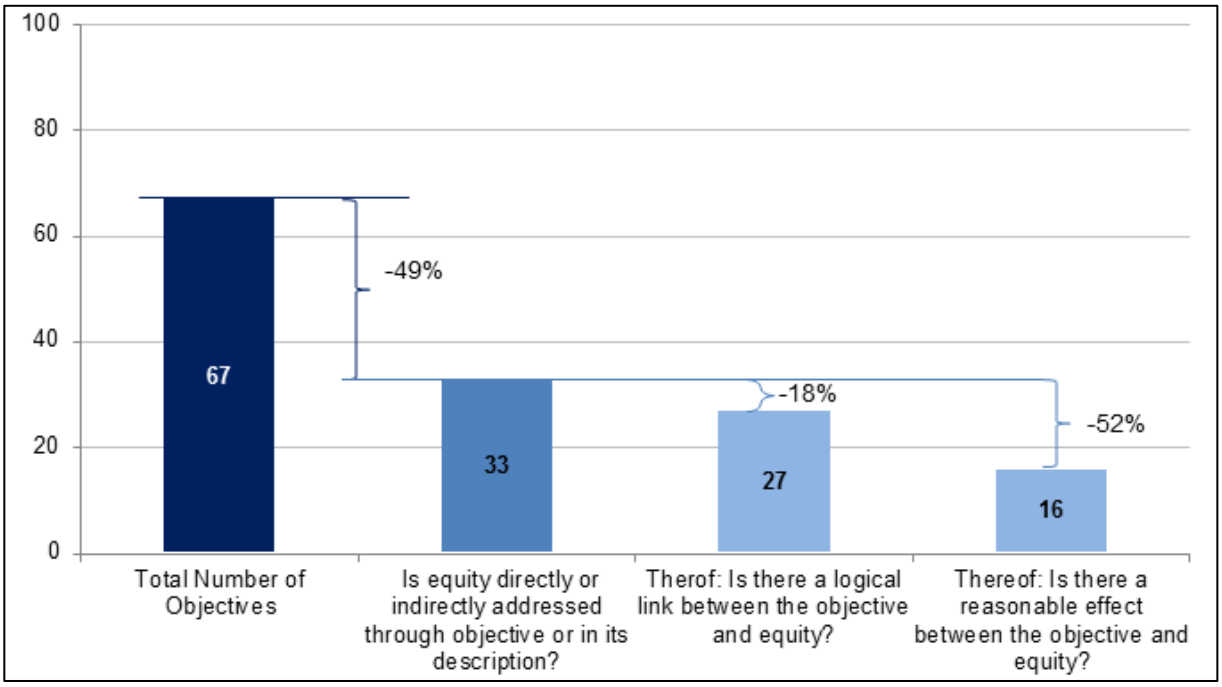
Figure 17: Proportion of total HSS budget planned for coverage related activities



Similarly, but to a lesser extent, we found 17 objectives that directly targeted aspects of equity. A further 16 objectives indicated that the objective would address equity issues but without providing greater specificity. This adds to a total of 33 (49%) objectives of the 67, making a direct or indirect link to equity.

As shown in Figure 18, we identified 27 of 33 objectives were backed by activities that were logically linked to equity and thus likely to reduce inequities. However, only 16 were sufficiently clearly outlined such that a possible effect on equity at national level would seem reasonable. Only 17 objectives directly aimed at the disadvantaged (clearly described and with plausible indications of population size), or at reducing the gradient across populations.

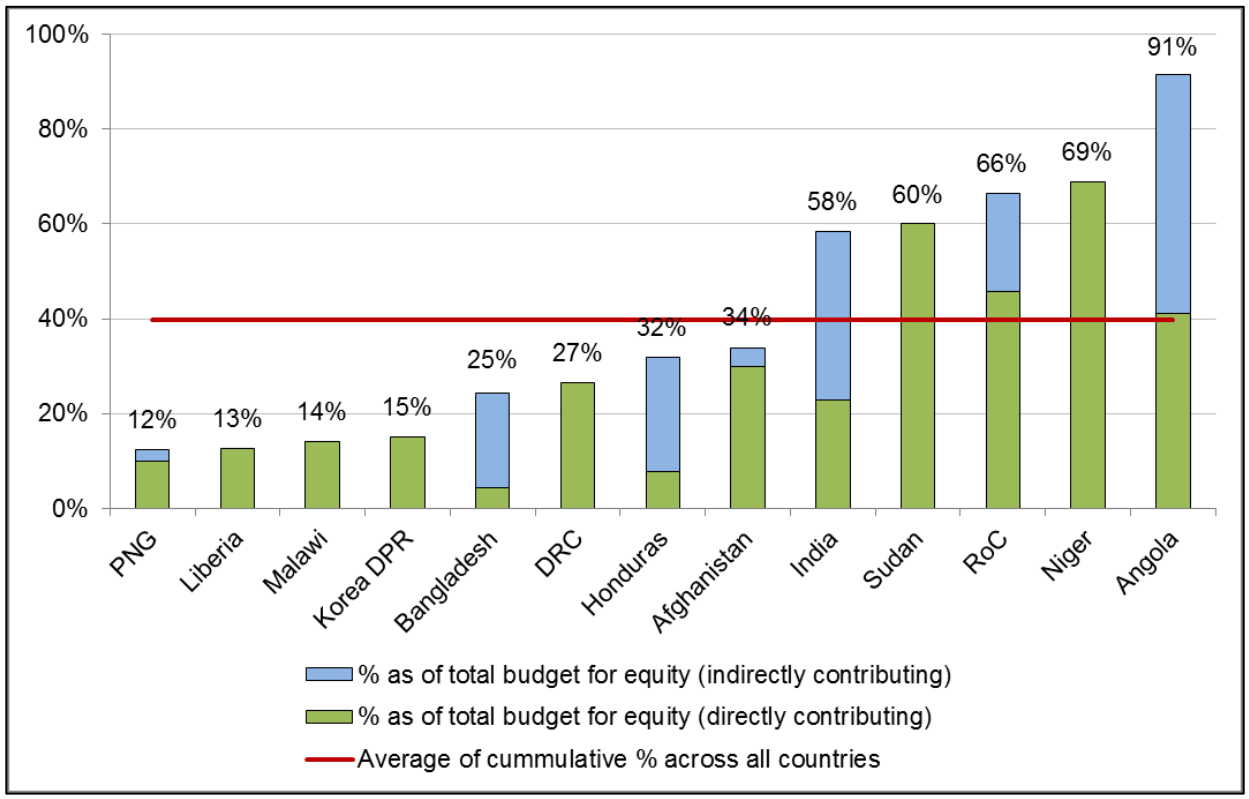
Figure 18: Objectives and equity[31]



We identified on average 40% of the total HSS budget among these countries that was invested into activities focussing on equity. Of note: not all activities described under an objective relating to equity might be equally relevant for equity. Between countries the proportions varied substantially as show in Figure 19. Also the association between DTP3 coverage and investments into equity activities is negative (Pearson correlation coefficient r=-0.4).

[31] For data on each country please refer to Annex 7.13; Table 35.

Figure 19: Proportion of total HSS budget planned for equity related activities



The variations that can be observed in the number of objectives relating to C&E and proportions of the total HSS budget can be explained through a variety of reasons:

1) It remains quite common for countries to mention that certain interventions will improve coverage and equity but without a clear pathway showing how these interventions/activities would translate into outputs/results or outcomes. Specifically for coverage this is critical because "many" activities can be broadly interpreted as contributions to overcoming health system bottlenecks that could eventually translate into better coverage. Countries often linked equity with strengthening national systems (surveillances and Health Management Information Systems (HMIS) and national-wide activities. However a plausible pathway for how this would contribute to reducing inequities was lacking. A positive example is Bangladesh where for Objective 1 "Strengthen vaccine-preventable disease (VPD) surveillance and its integration into HMIS" it was explained that: "The services in urban and the Chittagong Hill Tribal areas will be better reflected in national statistics; birth data will be more reliable thereby allowing for more evidence informed decisions on resource allocation and focus of programmatic interventions."

2) Countries often linked equity with a national-level / nation-wide orientation, rather than any specific implementation strategies for improving equity in terms of pushing the boundaries of those being reached with immunizations (e.g. one objective, where activities are specifically targeted, otherwise including national level interventions where unclear if they are sufficiently targeted). Of course also nation-wide interventions might reduce inequities but this is less clear and potentially neglects the need for special interventions to address and reach underserved populations.

3) Whilst the objective might be related to coverage and/or equity the subset of activities might not entirely be focussing on this. An example here is Afghanistan: "Objective 3. Improvement of demand for immunization services by implementing context specific communication interventions to cover the disadvantaged population" which makes reference to equity. However the proposed activities are in their majority not specifically targeting disadvantaged populations, e.g. “Evidence and Knowledge Generation (KAP survey)”[32]. Vice versa: There are a few examples where countries did not explicitly link objectives and activities to coverage and equity although they might be relevant and contributing to (e.g. Angola).

4) Several countries have almost exclusively operationalized equity through geographical interventions (e.g. Angola outlined activities heavy in training, supervision and equipment to reach “difficult-to-access populations”) A more detailed analysis of which population segments may still be under- or unimmunized is still often lacking or countries try to rephrase this into geographical dimensions, e.g. the urban poor. This was also confirmed by several key informants who explained that it is challenging and beyond Gavi’s funding possibilities to identify and target populations beyond geographical aspects, e.g. how to identify families that are “poor”.

5) The proportion of the budget contributing to coverage and equity should not be confused with the specificity and adequacy of interventions to truly change equity aspects in countries. Although overall, “reaching every district”, or even beyond, the “last mile child”, a greater investment is likely needed. Low budget proportions for equity related activities may reflect that the need is targeted towards a very specific population that is small in size. An in-depth understanding of the country situation is always required for an informed assessment.

Hence based on the planned activities/objectives and investments there is plausible evidence to conclude that Gavi has been contributing to improving the coverage and equity situation regarding immunization services in countries. However, the data extraction points towards a more complex relationship where directly causal results cannot be easily measured and demonstrated.

Integrated primary health care

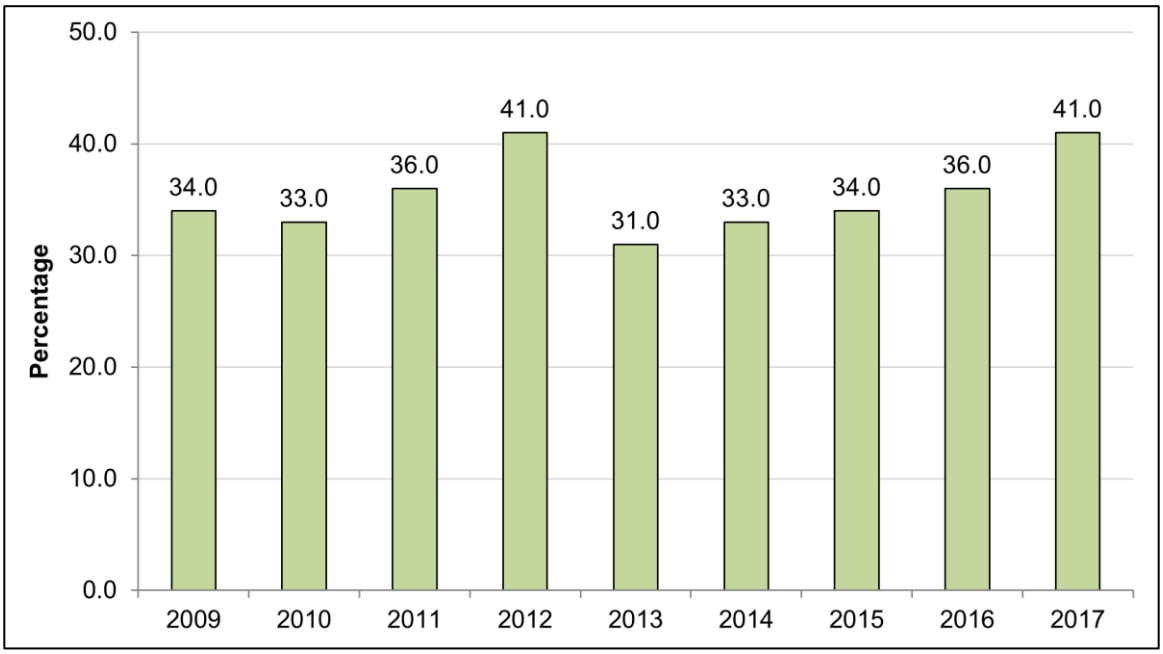
Evidence available on HSS investments contribution to the integration of primary health care and immunization

Next, the extent to which investments contribute to strengthening the capacity of integrated health systems to deliver immunization was assessed. Currently Gavi measures the integration of immunization delivery into health services by taking the percentage of countries that meet the Gavi-defined benchmark for integrated delivery of antenatal care and immunization services at PHC level. A country meets this benchmark if coverage levels for four interventions – namely, antenatal care, administration of neonatal tetanus, pentavalent and measles vaccines – are within 10 percentage points of each other, and all above 70% (23). Accordingly, we identified that annually 30-40% of Gavi supported countries had achieved this definition of integration (see Figure 20). However, for the period observed here, the data available did not reveal any specific trends that would suggest, for example, that the level of integration of services has changed consistently with the presence of Gavi HSS

[32] Acitivities: 3.1 Increasing awareness and promoting immunization through the mobilization of religious leaders; 3.2 Implementation of BCC activities through mass media, ICT and IPC; 3.3 Evidence and Knowledge Generation (KAP survey).

investments. To date Gavi does not follow any other specific indicators of service integration that might be more sensitive towards Gavi HSS investments. Hence, further quantitative data is not available.

Figure 20: Proportion of countries per year which meet the integration benchmark



Analysis of the planned objectives and activities revealed that some integration, either with PHC or with other services, is taking place.

An example of an objective and activities fostering integration is Sudan: “Objective 1: To improve sustainable and equitable access and utilization of quality Immunization as part of an Integrated Primary Health Care focusing on underserved and disadvantaged populations”. Activities for this objective are for instance to “Rehabilitate/upgrade (4) Family Health Centers (FHCs) in each of the six target states (24 FHC)” or to “Provide essential equipment for existing PHC facilities that are not providing the full PHC package with focus on immunization: for (3) FHCs and (3) FHUs annually in the six target states”

On the qualitative side, several key informants confirmed that immunization services are increasingly integrated (see also chapter 4.1.2). Respondents specified that they understood this to mean that immunization services are, for example, offered through the public (government run) PHC system. Vaccination services thereby even sometimes reportedly functioning as a catalyst for expanding the reach of other health services built up around immunization services. Others mentioned that Gavi is indirectly supporting integrated services through its investments in capacity building of health staff and rehabilitation of PHC facilities – both of which can be beneficial for increasing delivery of immunization, as well as other services. An illustrative example was cited from the Democratic Republic Congo (DRC) which has – upon request from the MoH – garnered support for the PBF scheme from the World Bank and other partners (e.g. USAID, Global Fund) of health services, including immunization, in PHC facilities. Further have HSS funds been directly contributing to the rehabilitation of PHC facilities. Various respondents noted that these efforts are being linked

to a concerted effort to offer immunization services as a kick-off service and that this attracts community members on one hand while triggering a push to provide more integrated services on the other.

It needs, however, to be qualified that several key informants indicated that integration is a process that is often dependent on the country context and that Gavi does not always have sufficient leverage to influence country-led processes on how immunization services are set up. More generally, there was a widely held view that the question of whether a country would offer immunization services through the governmental PHC system or a combination of governmental PHC system together with NGOs would depend on the pre-existing planning and implementation processes. This includes program management structures, system factors, as well as a country's capacity to access different geographic areas and target specific groups.

An example is Afghanistan, were the majority of provinces and population groups cannot be reached by governmental structures. In 31 out of 34 provinces the government contracts NGOs to deliver health services including vaccinations. In addition, there is a conscious decision to coordinate strongly with the World Bank "Sehatmandi Project" to ensure that vaccination services are also delivered in PHC facilities. Similar attempts are made with the private sector to facilitate that vaccination services are also offered by private clinics and providers.

Grant management modalities can also be a driver for more integrated services. Ethiopia was cited here as a good example where the pooled funding mechanism was reported to have served as an incentive for more integrated planning and implementation across services – including for immunization (for advantages and disadvantages of pooled funds; see section 4.2; Table 10).

Upon probing, informants revealed that the several factors might explain this:

1) Decision-making on integration is strongly country-driven;
2) The extent of integration is highly context specific and some countries do not have the possibilities to offer immunization throughout the country through the governmental PHC system (e.g. conditions of fragility, conflict etc.);
3) Gavi's HSS funds and with them the push for integration are rather limited in comparison to funding for other PHC components in particular in larger countries like India;
4) Gavi does not have a specific guidance, nor a set of interventions, that would drive integration, and competes here with other programs which have the same aim;
5) Piecemeal integration of several programs in parallel can simply cause an overloading of weak PHC systems;
6) There is room to provide greater clarity on the advantages of integration of services as well as how it can be meaningfully measured and tracked (for example operational research exploring why people attend a PHC facility and how comprehensive the packages of services is that they actually receive).

Programmatic and financial sustainability

HSS grants and sustainability considerations

Gavi has set clear expectations for countries applying for HSS support. The HSS section of application guidelines for Gavi support to countries[33] provides guidance related to sustainability. The guidelines discourage countries which are in the later stages of transition (i.e. preparatory and accelerated transition phases) from using HSS support for recurrent costs such as salaries and transport costs. For countries in other phases, although still acceptable, strong justification is required, together with a strong link to coverage and equity outcomes. In the guidelines, Gavi also requires countries to describe their governments' plans to increase domestic funding to cover recurring costs.

In the analysis we found 28 objectives with planned activities that were focused on addressing sustainability, i.e. creating structures or systems. 16 of the 67 (24%) objectives contributed to enhancing national and sub-national political commitment to immunization; 17 objectives (25%) contributed to preparing for sustained performance in immunization after graduation and 10 (15%) contributed to ensuring appropriate allocation and management of national human and financial resources to immunization through legislative and budgetary means. From the 13 countries under analysis none of those being in accelerated transition or full-self-financing stood out with substantially greater focus on these sustainability aspects – for example a planning on how certain externally funded activities (travel costs, transportation etc.) might be gradually taken over by domestic funding. This is also a theme that was repeatedly mentioned during Key Informant Interviews (KII). Regarding financial sustainability countries either made reference to a lack or already secured domestic funding but often failed to specify how it would be used from a strategic point of view – and where external funding would continue to be used for as long as possible.

Table 5: Links between grant objectives and sustainability

		Total number of objectives	Does the proposal…			
			1) Enhance national and sub-national political commitment to immunisation?	2) Ensure appropriate allocation and management of national human and financial resources to immunisation through legislative and budgetary means?	3) Prepare for sustained performance in immunisation after graduation?	Total number of objectives contributing to sustainability
Full self-financing	**Angola**	**6**	2	3	1	3
	RoC	**5**	2	1	0	2
	Honduras	**6**	0	0	0	0
Accelerated transition	**India**	**5**	1	0	3	4
	PNG	**5**	1	2	1	3
Preparatory transition	**Bangladesh**	**3**	0	0	1	1
	Sudan	**5**	2	1	4	5
Initial self-	**Afghanistan**	**5**	0	0	0	0

[33] Application guidelines for all types of Gavi support.pdf available on the Gavi website link

		Total number of objectives	Does the proposal…			
			1) Enhance national and sub-national political commitment to immunisation?	2) Ensure appropriate allocation and management of national human and financial resources to immunisation through legislative and budgetary means?	3) Prepare for sustained performance in immunisation after graduation?	Total number of objectives contributing to sustainability
financing	**DRC**	**6**	3	2	1	3
	Korea DPR	**5**	1	0	2	3
	Liberia	**5**	2	0	1	2
	Malawi	**6**	1	0	2	2
	Niger	**5**	1	1	1	1
Total for 13 countries		**67**	**16**	**10**	**17**	**28**

Similarly, the grant categorization showed that planned investments into health financing or into legal, policy and regulatory environments made up only about 1%-2% for each category of the grand total planned budget with very low levels for countries in "Full-self-financing" and "accelerated transition". Hence it is unlikely that these investment levels are sufficient to cover capacity needs specifically in these areas, see Table 6: Planned investments across grant categories by transition phase.

Table 6: Planned investments across grant categories by transition phase[34]

Countries	Advocacy, communication and social mobilization	Capacity building of human resources	Health Financing	Health Information Systems	Legal, policy and regulatory environments	Other	Procurement & Supply chain management	Program Management	Program Support Costs	Service Delivery
Full self-financing	6.6%	11.7%	0.2%	11.3%	0.4%	0.0%	31.8%	8.1%	0.0%	29.8%
Accelerated transition	9.8%	12.3%	0.0%	14.9%	0.1%	0.0%	39.3%	1.6%	6.8%	15.1%
Preparatory transition	0.8%	16.5%	0.1%	17.8%	1.1%	0.0%	25.4%	5.1%	0.0%	33.3%
Initial self-financing	9.6%	3.0%	2.5%	13.6%	1.4%	0.1%	35.1%	8.0%	1.0%	25.9%
Grand Total	**8.3%**	**7.3%**	**1.5%**	**14.4%**	**1.0%**	**0.1%**	**34.5%**	**6.1%**	**2.1%**	**24.7%**

Also key informants mentioned that there is no road-map for how countries will take up Gavi HSS activities and funding, and that despite Gavi's awareness of low capacities within governmental structures too little funding it directed towards building these lacking capacities, specifically at national level. Further respondents explained in the KIIs that Gavi HSS

[34] For data on each country please refer to Annex 7.13, Table 38.

investments often seem too broad and countries were unclear about the scope and objectives of HSS[35] and thus tended to focus on more direct interventions for which the results and benefits are evident in the short term. This approach is also inadvertently fostered because HSS grants are generally planned for a project cycle (e.g. 5 years) and predictability of continued funding thereafter is generally unclear at the time of proposal writing.

These findings are in line with the IRC review of 7 HSS applications in 2016 (24). The IRC reported that many countries continued to utilize HSS grants for payment of recurring costs such as staff salaries, equipment and transportation costs. More often than not, there was no discussion of how countries would maintain these costs once the grant comes to an end. There was little indication about how staff was to be used, deployed and retained; the information on financing gaps was isolated and fractioned; and the information on the role of partners for funds and programmatic allocation was not sufficient. A positive example of transition and financial sustainability identified by the IRC were the Solomon Islands because the country's application to Gavi included plans to progressively phasing out of external support for operational costs (25). Hence on these grounds there is still a dearth of evidence regarding Gavi's HSS contribution to programmatic and financial sustainability.

Another repeating aspect in the key informant interviews was that Gavi primarily gives attention towards fiduciary and programmatic risks compared to improving programmatic and financial sustainability. Hence funding through partners has increased over this strategic period compared to the previous (26) though this might hamper developments on sustainability.

To achieve better programmatic and financial sustainability key informants suggested that grants need to be designed to gradually phase out funding, countries should be given instructions on how much the country needs to input, advisory bodies should be built to make decisions, overall there should be better linkages for planning within budget systems and countries should be given a longer term perspective as HSS impact in 3-5 years can be hard to see. Lastly, it was suggested that countries should be provided with help/funding to revert activities and financial management back to the government system. This should be embedded and be given the necessary timeframe. On a similar note did the IRC recommend that countries should be reminded to provide specific and precise information in their applications on how countries will sustain Gavi supported activities in the short, medium and long-term (24). Further Gavi should provide more detailed guidance to countries that are in the preparatory transition phase clear information on expected plans for transition.

Further, investments into building capacities to enhance programmatic and financial sustainability might require partnering with complementary initiatives (outside HSS) or even sector wide partnerships or pooled funding mechanisms that have more leverage in trying to build national capacities for programmatic and financial sustainability. An example of such is the showcase of DRC.

Case study: Democratic Republic of Congo

Gavi HSS in complement with the PEF/TCA funds and the Global Fund supports the fiduciary agent that takes the joint role of assurance and capacity building for the MoH financial management team. In addition HSS funds together with GF funds are used to fund for direct

[35] The lack of clarity related to the scope and objectives of HSS grants has also been mentioned in the meta-review.

financial support to the financial management team. Typically this takes the form of using top-up salaries to recruit qualified staff. Capacities transfers thus occurred partly also through accountants previously engaged by the fiduciary agent and then transferred to MoH. These investments have resulted in strong improvement of the financial management of the grants over time. It is considered that without these investments it would still be challenging to channel funds through the government directly. The increased capacities that have been built through these modalities have been acknowledged by others: the World Bank taking a decision to channel parts of its funding through the MoH for the very first time. This is a great success albeit it is fragile and requires on-going support and time to mature as capacity limits nonetheless prevail and the volume of funds to be managed is substantial.

Support and challenges to the in-country institutional capacity building

Gavi follows a strategic indicator tracking institutional capacities (23).. In addition Gavi conducts PCAs which, if in future done on a regular basis, will yield insights in institutional capacities. However, when support is channelled through partners like WHO and UNICEF this can be seen as a limiting factor when it comes to Gavi's ambition to build national capacities from an organisational development and institutional capacity building perspective.

From the qualitative analysis of 13 countries (Table 7), we identified substantial planned support of Gavi for capacity strengthening in strategic planning, M&E and evidence based decision-making. In addition there was lesser, but still important planned support for vaccine procurement (forecasting, regulatory systems, vaccine management), program management, financial and human resources management, and sustainable service delivery models (including outreach and mobile services)[36].

Table 7: Links between grant objectives and national capacity strengthening

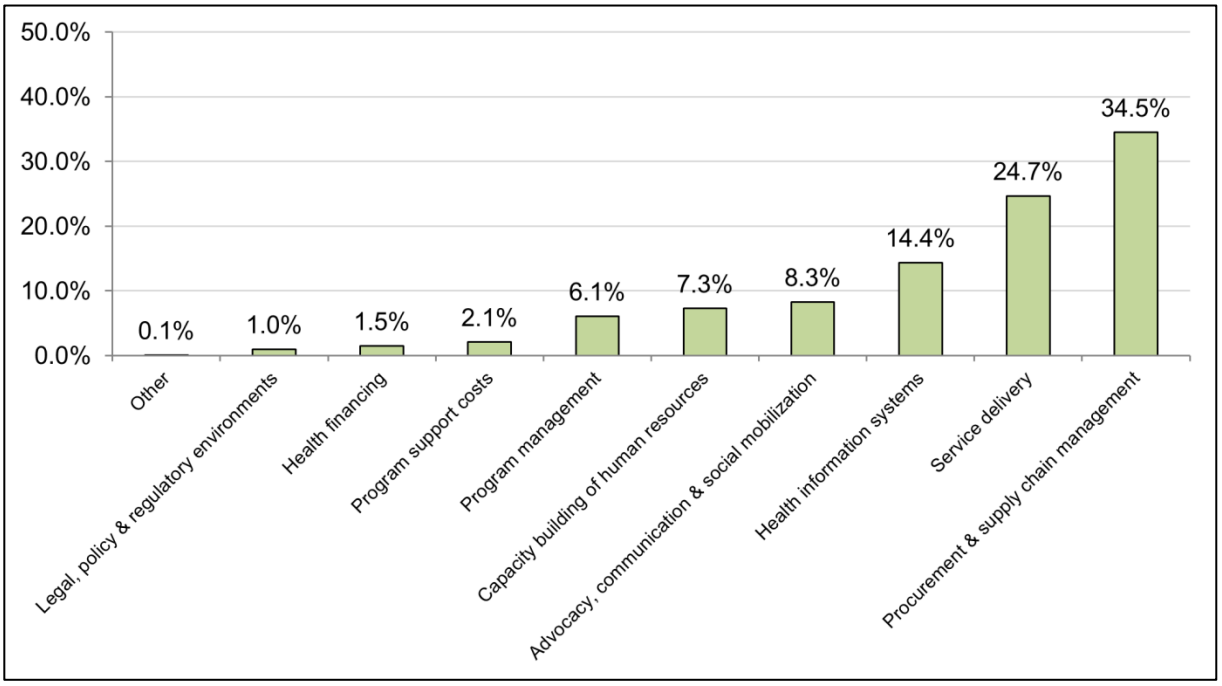
Countries	Total number of objectives	Vaccine procurement (forecasting, regulatory systems, vaccine management)	Program management, management of financial and human resources	Strategic planning / M&E / evidence based decision making	Sustainable service delivery models (incl. outreach and mobile services)
Afghanistan	5	1	1	2	1
Angola	6	3	2	2	2
Bangladesh	3	1	1	3	0
DRC	6	1	1	4	3
RoC	5	1	2	2	2
Honduras	6	1	1	2	0
India	5	1	2	4	0
Korea DPR	5	2	2	4	1
Liberia	5	2	1	5	1
Malawi	6	1	3	2	1
Niger	5	0	1	2	1
PNG	5	2	0	2	1

[36] Of note, the objectives were counted as soon as at least one activity subsumed under the objective is contributing or referring to any of these areas. Hence one cannot conclude that the nature of objective or all its subsumed activities are contributing to sustainability (see also section 2.3)

Countries	Total number of objectives	Vaccine procurement (forecasting, regulatory systems, vaccine management)	Program management, management of financial and human resources	Strategic planning / M&E / evidence based decision making	Sustainable service delivery models (incl. outreach and mobile services)
Sudan	5	1	4	3	1
Total for 13 countries	**67**	**17**	**21**	**37**	**14**

Additionally, the planned budgets categorised along the grant categories (Figure 21) include Capacity Building of HR (approx. 7% of the grant total budgets) and on Data Quality, Availability & Use (15% of the grant total budget) as well as planned investments into immunization supply chain (approx. 35% of the total). Hence there is reason to believe that with these investments Gavi also shaped to some extent the national institutional capacities which possibly have led to improvements in respective areas.

Figure 21: Distribution of budgets per grant category[37]



An area where improvements in results are likely to reflect Gavi investments is Effective Vaccine Management (EVM) (27). The WHO EFM Global Data Analysis 2009-2016[38] shows

[37] For data on each country please refer to Annex 7.13, Table 38.

[38] A representative sample of sites is selected at each level of the supply chain. Each of the 9 EVM Criteria is assessed at each supply chain level by observation, inspection of infrastructure and records, and by interview of staff. •Inputs, process and performance indicators are evaluated in each of the 9 areas at each level. Indicator scores are combined to give criterion scores for each area at each level. An area of vaccine management is considered "Effective" if its criterion score is greater than or equal to 80% -the EVM standard.

the number of countries with an increased composite score > 80% since 2010 (2010: 0/12 vs. 2016: 15/86) (albeit this may result purely from the increase in the absolute number of assessments that have been conducted). However, looking at the changes mean criterion scores across 50 countries comparing the last assessment score with the 1st assessment score, WHO recognises moderate improvement at Primary level, e.g. direct from an international vaccine manufacturer or distributors or a local vaccine manufacturer, at the Sub-national level SN and the Lowest distribution level LD levels. Also significant improvements are identified for vaccine storage and vaccine management.

No direct link can be made between the observed improvements based on the EVM assessment and Gavi HSS investments, as we do not have EVM country scores. However, there is a strong plausible link that Gavi contributed substantially to the observed areas of improvement. Certainly Gavi has brought attention to the previously invisible and under-funded area of supply chain. Concrete country examples include DRC where three warehouses have created majorly increased storage capacities as part of a wider package of significant capacity improvements in supply chain management.

Gavi HSS investments and the transition process

It might be assumed that investments are targeted to the transition phases defined by Gavi, i.e. countries in accelerated transition and full self-financing, could be expected to invest more in enhancing local capacities for sustaining routine immunization. However, we identified also investments for re-occurring costs and supply of equipment. This point has also been repeatedly mentioned by key informants and also been commented by the IRC (24).

Honduras: Objective 3. To strengthen the cold chain at national level

Exemplary proposed activities: “3.10 Procurement of spare parts for cold chain maintenance (refrigerators, vehicles, motorcycles, cold rooms)” or “3.13 Procurement of 3000 thermos flasks to preserve vaccines in priority health establishments country wide”.

The analysis of grant categories shows that in all transition groups about the biggest proportion of the planned budgets is going towards Procurement & Supply chain management. In the fully self-financing group still about 60% continues to be invested in Procurement & Supply chain management and service delivery in comparison to 12% for human resources capacity building and 7% for Advocacy, communication and social mobilization. Also in the proposals there are no specific considerations given to transitional activities (see

Table 6: Planned investments across grant categories by transition phase above).

Responses from key informants confirmed that too often there was no specific consideration for the type of activities that are funded when countries are moving towards transition. Interviewees explained that the transition phases are based on countries gross national income (GNI). Hence the countries categorised as accelerated transition and full self-financing represent a whole variety with different performances on grant implementation, immunization services and capacity readiness. Examples of such diverse countries include Papua New Guinea (PNG) and India which are both in the accelerated transition phase: On

the one hand PNG with its low coverage rates for routine immunization, dispended and reprogrammed HSS grant due to financial compliance issues, low capacities for implementing routine immunization due to low capacities of health providers but also difficulties in reaching hard-to reach areas. On the other hand India with a fairly solid PHC system, high programmatic and financial capacities and general political readiness to integrate Gavi operations into the general health system.

Moreover, some informants noted that countries sometimes saw a major increase in GNI per capita in the timeframe of just 1 or 2 years, and that countries could not be expected to think proactively about transition activities in such situations. Short timeframes based on GNI were considered inadequate for an incremental and robust transition especially because GNI may not always reflect the actual performance or capacity readiness of the country.

Contribution of domestic funds and Gavi HSS grants to routine immunization

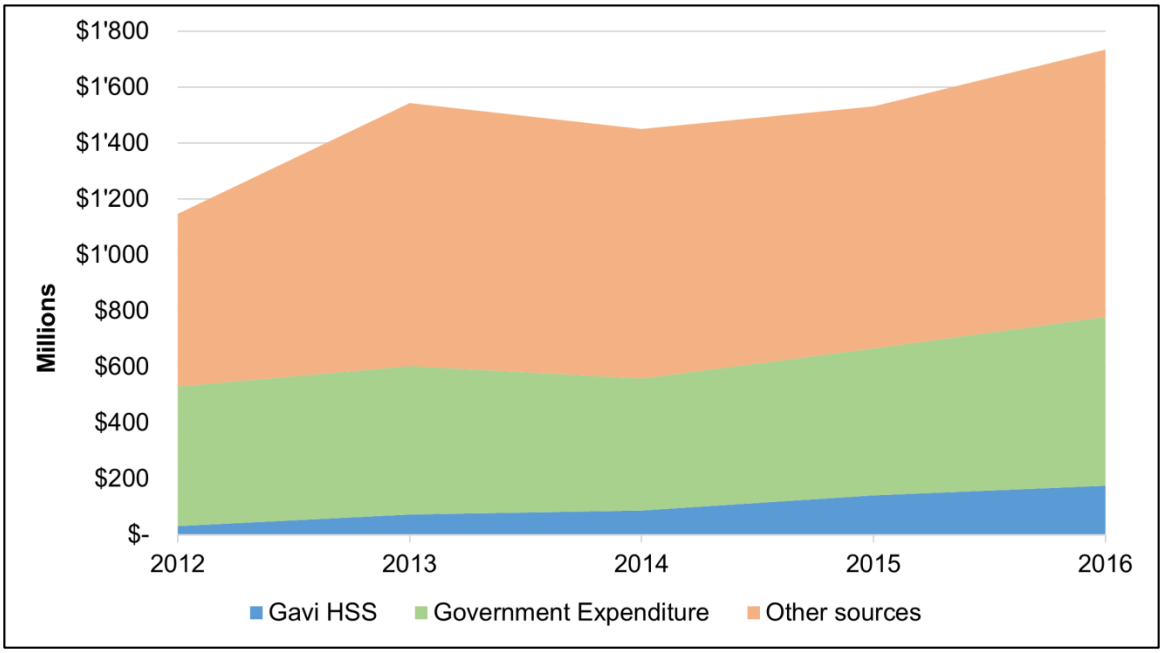
Based in the information reported by countries using the Joint Reporting Forms (13), we analysed the domestic funding of Routine Immunisation (RI)[39] during the period 2012 to 2016 in 69 countries that received Gavi-HSS grants.

As shown in Figure 22 the overall Routine Immunization expenditure increased by 51% during the period 2012 to 2016 (1,146 to 1,734 US$ millions). The annual change in Routine Immunization expenditure was always positive, with exception of a slight decrease (-6%) in 2014 due to reductions in government expenditure in Congo DR, India, Indonesia, Tanzania, and Zambia.

The contribution of HSS grants to the total expenditure in routine immunization increased from 3% to 10% between 2012 and 2016, whereas the government's contribution was 43% in 2012 and then remained stable in the range of 33-35% until 2016 (13). The other external sources of funding for routine immunisation include UNICEF and WHO, both of them funded by foundations such as Bill & Melinda Gates Foundation and bilateral agencies e.g. USAID, DFID, Canada and EU.

[39] Routine Immunization costs include: associated injection supplies, salaries and per diems of health staff working full-time on immunization, transport specific for immunization, vehicles and cold-chain maintenance, immunization-specific training, social mobilization, monitoring and surveillance, and programme management

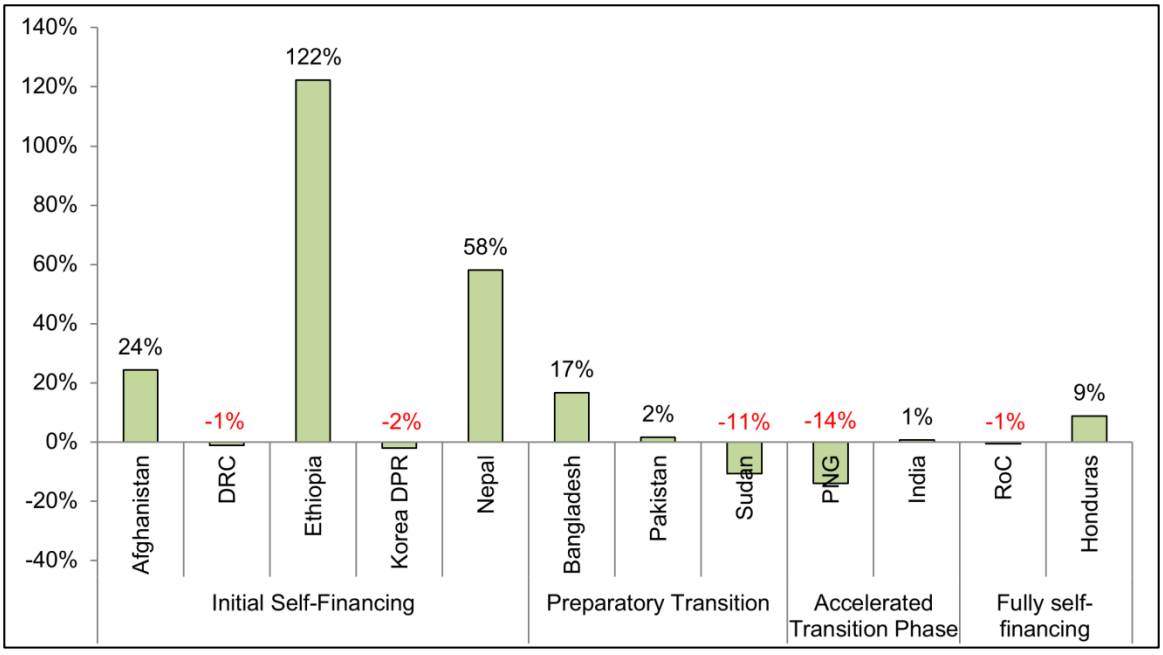
Figure 22: Contribution of Gavi HSS grants and governments to routine immunization expenditure in 69 countries that receive Gavi HSS funds



Source: Country co-financing information sheets drawn from WHO-UNICEF Joint Reporting Forms 2017

To assess a potential positive influence of Gavi HSS grants; the annual changes in the contribution of domestic funds to routine immunization during the period 2012 to 2016 were reviewed, for those countries included in the desk review with data available. We found countries in the later phases (accelerated transition and fully self-financing) not showing higher domestic contribution to routine immunization expenditures, than countries in previous phases.

Figure 23: Average annual change in domestic contribution to Routine Immunization expenditure during the period 2012-2016 per country and transition phase



Trends in domestic financing for vaccines and Routine Immunization

Based in the co-finance information sheets, we reviewed the domestic financing for vaccines and Routine Immunization over the life of HSS grants. The domestic contribution was compared across the different transition phases, and concurrent events were explored. It is worthy to mention that the expenditure in vaccines is equivalent to the 80% of Routine Immunization.

Among the countries that are in the initial self-financing phase, the annual increases in the contribution to vaccine expenditures were usually more consistent than the contribution for Routine Immunization expenditures. However Nepal and Ethiopia, both with pooled funding mechanism through which Gavi channels the HSS grants, had noticeable annual increases in specific years. The increase in the domestic funding of vaccine related expenditure was related to the introduction of vaccines.[40]

For countries in "preparatory transition", there was a noticeable increase in domestic financing for vaccines which again was related to the introduction of vaccines41. Regarding domestic financing of routine immunization, only Bangladesh experienced a substantial increase (on average 17%).

In the group of countries in "Accelerated Transition", India has a slight increase in Routine Immunization over the 4 years while Papua New Guinea showed a reduction[42]. As in the previous groups, increases in domestic financing of vaccines was related to co-finance contributions (India introduced IPV in 2013 and scaled up the Pentavalent vaccine in 2015 (28), and Papua New Guinea introduced Measles vaccine in 2015).

In the group of Full Self Financing Phase; Angola, Congo Republic and Honduras increased their domestic financing for vaccines over the four years, associated to the introduction of vaccines (Rotavirus in Angola and Congo Republic, and IPV in Honduras). Regarding funding of Routine Immunization, the decrease in the domestic funding of immunization in Congo Republic coincided with the plunge in the global price of oil, a main source of government revenues (29,30) .

We can summarize that introducing new vaccine requires countries to increase domestic funding for vaccines, whereas such strict requirements do not exist for financing of Routine Immunization, i.e. the cost of immunisation activities that exclude the cost of vaccines. Moreover, economic challenges and fiscal pressures had a negative effect on financing for Routine Immunizations, although interestingly not for vaccines themselves.

When Gavi provides New Vaccine Support (NVS) grants, countries commit to co-finance part of the vaccine cost in addition to meeting the full cost for the traditional vaccines[43]. As a result, increase in NVS support results in corresponding increases in domestic financing for vaccines. The HSS grants on the other hand do not include co-financing requirements for routine immunisation. Thus, there is no direct relationship between the level of HSS grants

[40] Afghanistan, Liberia, Nepal and Niger introduced Pneumococcal conjugate vaccine (PCV) in 2013, 2014, 2014 and 2013 respectively; Nepal introduced Measles in 2015 and Japanese Encephalitis Vaccine (JEV) in 2016; Niger introduced Rotavirus and 2014 and Polio Vaccine (IPV) in 2015.

[41] Bangladesh and Sudan introduced PCV in 2014 and 2013 respectively. Bangladesh also introduced IPV in 2015, Pakistan - Measles vaccine in 2013, and Sudan Meningitis vaccine in 2016.

[42] PNG's economy contracted between 2014 and 2017 mainly because of a fall in global commodities prices. Oil, gold and copper represent 60% of PNG GDP. During this period the GNI per capita decreased from US$ 3,010 to 2,410.

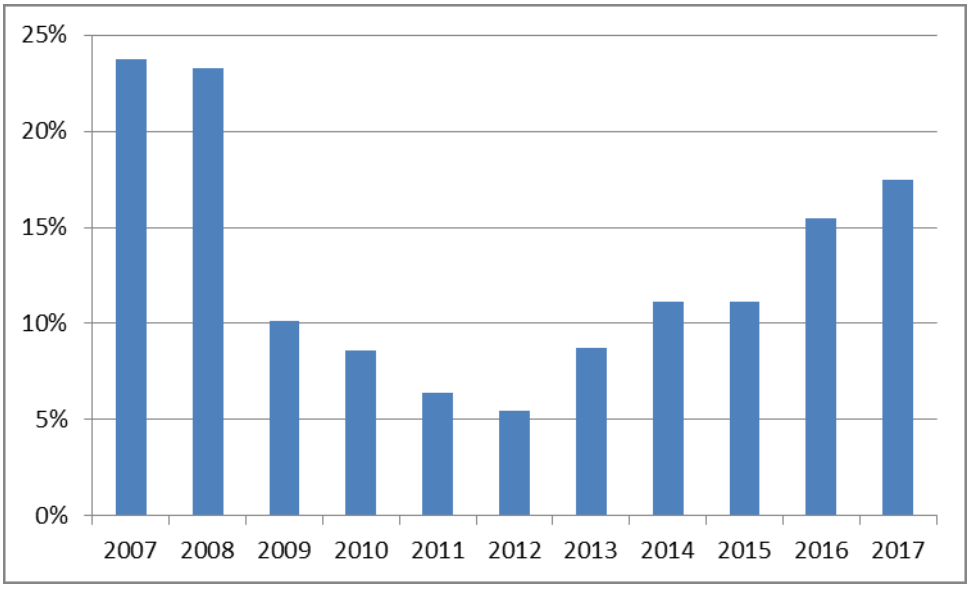
[43] In most countries this includes BCG (tuberculosis), oral polio and measles, as in many countries DTP3 (diphtheria-tetanus-pertussis) is included in the pentavalent vaccine that GAVI supports.

and domestic financing for routine immunisation. On the other hand domestic financing for health and specifically Routine Immunisation is closely related with a country's economic situation. For instance, economic challenges and fiscal pressures had a negative effect on financing for Routine Immunisation.

Gavi as source of external and total health financing

Gavi HSS investments constitute only a proportion of the total Gavi disbursements. After a sharp drop in 2008 and lowest proportion of Gavi HSS out of the total Gavi disbursements in 2012 the relative importance of Gavi HSS has been increasing again. In 2017 Gavi HSS constituted 17% of Gavi overall disbursements (see Figure 24).

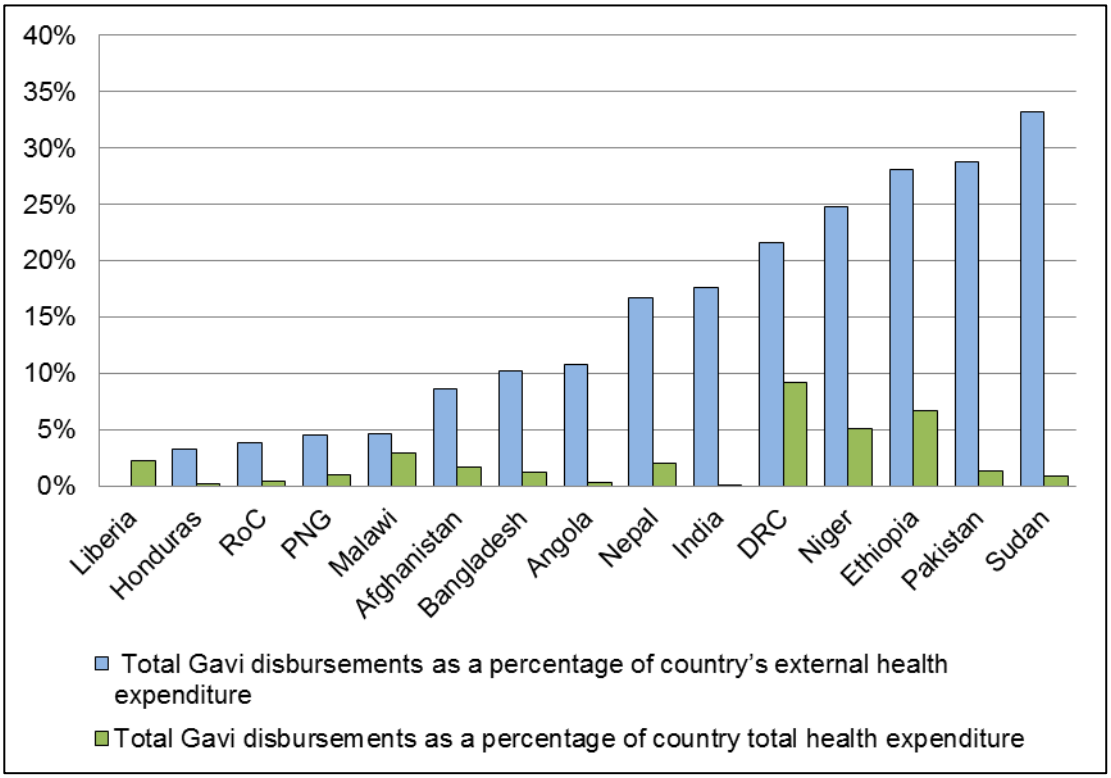
Figure 24: Proportion of HSS disbursments out of Gavi's total disbursements (incl. vaccines)



This review sought to establish how HSS grants are placed in the wider context of a country's health financing landscape, including domestic financing and all external contributions to the health sector. The graph below (Figure 25) presents how Gavi features within the funding landscape in 15 selected countries for the period 2014 and 2015[44] (31), showing: (i) total Gavi disbursements as a percentage of country's external health expenditure; and (ii) total Gavi disbursements as a percentage of country total health expenditure.

[44] Data extracted from the Global Health Expenditure Database on 29 October 2018. Except for Korea DPRK for which NHA were not available, the database had information for 2014 and 2015, and no earlier or later.

Figure 25: Gavi's contribution to country health expenditures for selected countries in 2014-2015



Whereas the total contribution of Gavi funds to the total health expenditure was minimal in the most of countries examined (only three countries were above 5%); the contribution to the external health expenditure was relatively substantial (nine countries were in the range of 10% to 35%).

Regarding HSS disbursements in 6 countries[45] reviewed, we found that during 2014 and 2015 the HSS funds were equivalent to less than the 5% of the annual external health expenditure, with exception of Niger (14% in 2014) and Congo DR (10% in 2015).

We conclude that total Gavi funding, as a source of external financing for health, is positioned enough in the health funding landscape to leverage in negotiating for increased domestic health financing. Typically HSS grants on their own do not constitute a substantial portion of country financing for health or routine immunization.

[45] Bangladesh, Niger, Papua New Guinea and Sudan in 2014 and Congo DR, Honduras, and Papua New Guinea in 2015

4.2. Implementation of grants

Contribution to Gavi's strategy

Implementation of HSS grants

This review identified that it is not easy to assess implementation progress in certain investment areas. Gavi relies mainly on the Grant Performance Framework and Joint appraisals (see also section 3.2.4 Monitoring and results mechanisms). Starting from the planned implementation of Gavi HSS grants one can say that they are consistent with Gavi's strategic focus areas (SFAs). Overall more than 65% of the Total HSS Budget of the 13 countries was categorised to contribute to a SFA. Comparing grant applications budgets by approval year and across countries, the largest proportions of investments have been made in Immunization Supply Chain (56%) and Data Quality, Availability & Use (23%) followed by demand promotion (13%), In-Country Leadership, Management & Coordination (7%) and financial & programmatic sustainability (2%) (see Table 8).

These priority investment areas vary very little, and based on the 13 countries investigated here do not seem to vary according to any predefined principles, e.g. approval year, transition phases (see Table 9).

Table 8: SFA financing categories by IRC approval year[46]

Strategic Focus Areas	2014	2015	2016	Grand Total
Data Quality, Availability & Use	22.4%	36.0%	19.0%	22.7%
Demand Promotion	12.3%	0.9%	16.5%	12.6%
Financial & Programmatic Sustainability	4.3%	0.0%	0.1%	2.3%
Immunization Supply Chain	51.3%	57.0%	62.4%	55.9%
In-Country Leadership, Management & Coordination	9.6%	6.1%	2.0%	6.5%

Analysis is based on 13 countries; 2014: 5 countries, 2015: 2 countries; 2016: 6 countries

Table 9: SFA financing categories over transition phases[47]

Transition phases	Data Quality, Availability & Use	Demand Promotion	Financial & Programmatic Sustainability	Immunization Supply Chain	In-Country Leadership, Management & Coordination	Total
Phase 1 : Initial self-financing	19.8%	14.2%	3.7%	53.9%	8.4%	100.0%
Phase 2 : Preparatory transition	40.5%	1.4%	0.2%	50.3%	7.5%	100.0%
Phase 3 : Accelerated transition	20.5%	14.7%	0.0%	64.1%	0.7%	100.0%
Phase 4 : Full self-financing	22.9%	11.5%	0.3%	59.9%	5.4%	100.0%
Grand Total	**22.7%**	**12.6%**	**2.3%**	**55.9%**	**6.5%**	**100.0%**

Analysis is based on Phase 1: 6 countries; Phase 2: 2 countries; Phase 3: 2 countries; Phase 4: 3 countries.

[46] For data on each country please refer to Annex 7.13, Table 36.

[47] For data on each country please refer to Annex 7.13, Table 37.

The key informants mentioned, however, that certain investment categories, e.g. immunization supply chain, seem to lend themselves to faster implementation than others. Further questions and probing suggested that this insight may be rather context-specific and not readily generalizable.

Changing planned activities in response to programmatic requirements

On the question of whether there is sufficient flexibility to adjust grants as implementation is on-going: perspectives gained from the KIIs reveal that there is a degree of flexibility to change planned budgets and activities depending on the progress that a country is making. There was quite some discussion on what would constitute "sufficient" flexibility in this context. Generally, Gavi differentiates between reallocations and reprogramming of grants. Reallocations refer to budget reallocations of less than 25% of the total budget (or less than USD 10 millions) and were considered relatively straightforward.

In terms of proposing a reallocation: Country teams evaluate national progress on a regular basis. In particular, during joint appraisals countries are encouraged to revisit the programs, identify savings, and consider reallocating grants to additional areas. If it should be the case that results are not met, implementation challenges are anticipated, or savings have been identified, it is for either a country itself or the Gavi country team to propose a reallocation.

Based on indications from key informants, reallocations seem to be common and not necessarily connected to unsatisfactory performance. One key informant described that the planned budget for several procurement items was largely overestimated and hence reallocations were deemed appropriate. Among key informants discussions on reallocations were described as a collaborative process that might evolve out of country visits and discussion with country partners but also the analysis of joint appraisal reports (JAR). Decisions on reallocations are taken by the Gavi country teams based on a "judgement call" and communicated via email to countries.

Reprogramming (>25% of budget or more than USD 10 millions) is in comparison a more administrative and structured process and can occur due a variety of reasons: 1) delayed implementation process/results are not met; 2) unforeseen saving; 3) budget increases, e.g. ceilings increases. Reprogramming of grants is a substantially more complex undertaking, almost similar to a new grant application.

Role of annual joint appraisals in the monitoring of program performance

During the previous Strategic Phase, the program monitoring of Gavi was ruled by the 2011-2015 Gavi's M&E Framework and Strategy. At the end of that period, Gavi monitoring of HSS grants was described as not functioning effectively, due to poorly designed indicators, low relevance for HSS programming, and not clearly defined roles and responsibilities.

The current Gavi's strategy (2016-2020) has included Monitoring and Evaluation as a strategic enabler, and a reviewing of Gavi's grant monitoring was implemented in 2015 to "strengthen the grant management to increase grant impact, better manage risk and improve value for money". That reviewing introduced the Grant Performance Framework (GPF), a reporting tool of key indicators to assess grant performance over time against targets agreed between Gavi and countries, including Core and Tailored indicators; and the Joint Appraisal Reports (JAR), an annual multi-stakeholder review of the implementation based on existing

results. The GPF and JAR have been designed to be the result of country-centric processes, either in the design and implementation of monitoring systems, as well as in the discussion and analysis of the information available.

Currently a country team can access to various sources to assess whether a HSS grant is achieving progress as expected: 1) the GPF, 2) Joint Appraisal Reports (JAR), 3) Surveys or grant specific assessments, and 4) dialogue with partners (e.g. during country visits).

In addition to the reports of grant specific and national studies, the JAR are expected to be uploaded in the Gavi's online portal. The JARs are designed to contain the most relevant information required by grant management. Despite the fact that Gavi provides standard guidance for key basic information in the JAR (e.g. vaccine coverage) the diversity in countries context is reflected in the diversity of JAR's content. In summary, whereas key high level indicators are collected using well defined standards (e.g. WUENIC), data coming from administrative sources is focused in the country specific context, through processes not necessarily oriented to ensure comparability across countries.

Whereas the GPF provides the most frequently updated information (annual, semi-annual), several key informants expressed the view that was not enough to track programmatic performance. Multiple informants highlighted that even when the data of the GPF and the joint appraisal were available, they only helped to identify activities that were off-track so late that corrective actions could no longer be introduced in time. Hence, it emerged that there was a high level of reliance on face-to-face interactions during their country visits for forming opinions on country progress. Specifically in countries where regular visits are possible this seems to be a viable option and KIIs revealed no discomfort when decisions were taken based on this.

Several informants explained that within their country portfolio they had in fact introduced a quarterly reporting cycle (e.g. India, Bangladesh and Afghanistan), which included progress reporting against specific activities and objectives, both programmatically and financially[48]. The KII indicated to use this (alongside information from regular direct interactions with in-country partners) as their main information sources. Specifically the frequency of submissions helps them to track the progress and to identify the need for corrective actions throughout the year rather than a one off.

In multiple interviews it was confirmed that Gavi has not established a system to report the programmatic or financial implementation of objectives or activities, and does not provide guidance about cut-off points to identify financial and/or programmatic underperformance. Under these circumstances, grant management decisions as reallocations and reprogramming become challenging.

Programmatic and financial sustainability

Channelling funds through partners and in-country ability to transition from Gavi support and maintain programs

HSS grants are meant to prepare and support countries to eventually finance and implement immunization programs without Gavi support. Program Capacity Assessments (PCAs) are conducted to identify gaps and the actions required to ensure robust program and financial management, including the ability to track, account for and report on Gavi funds. Generally,

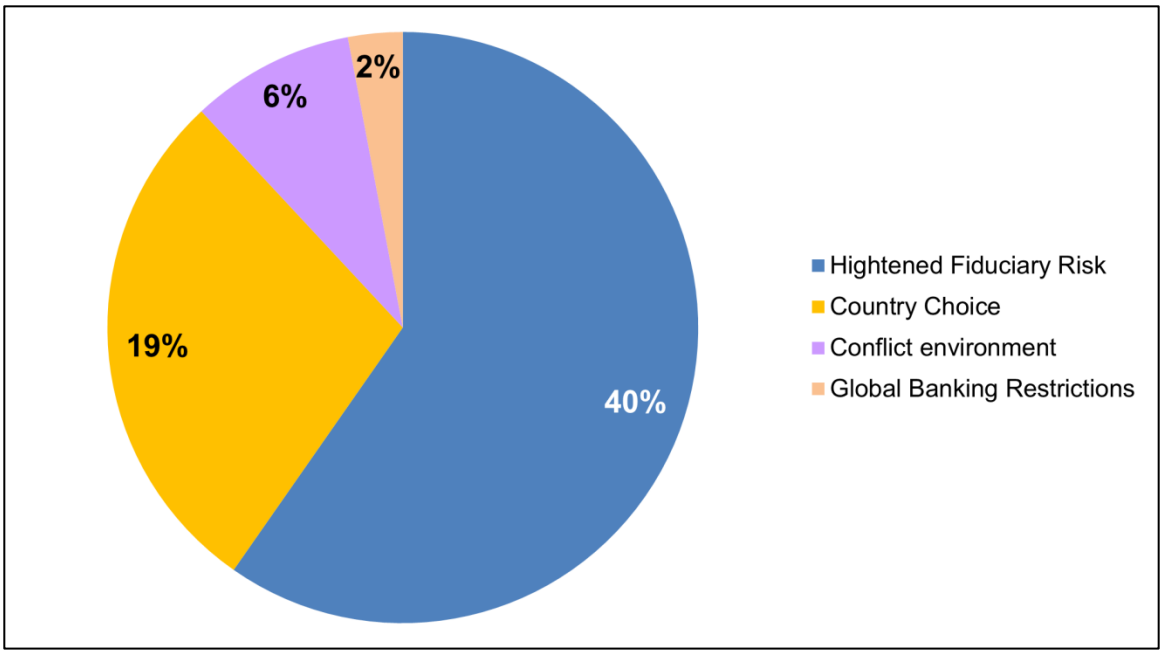
[48] The financial reporting is thus not strictly speaking financial reporting as data is not coming directly from a financial system.

PCAs reveal weak financial arrangements and internal controls within government entities. As a safeguard Gavi support is increasingly channelled through Alliance partners such as WHO and UNICEF. Even though Gavi's declared aim is to conduct PCAs before countries submit their HSS proposals, this is currently not yet the case. Hence, the proposals do not contain actions that countries will take to address gaps which these assessments identify. As a consequence, there is a missed opportunity to make capacity improvement part and parcel of on-going grant implementation.

As part of the three lines of defence model, an audit and investigations department was reconfigured and given a mandate to conduct program audits at country level. Since February 2015 the department has conducted 19 audits. The department reported that 18 of the countries audited were unable to properly account for provided funds and recommended that countries reimburse USD 20.1 million49 to Gavi. In response to adverse audit reports, Gavi channels funds away from government systems to Alliance partners in order to mitigate fiduciary risk.

Gavi transfers 63% of cash grants to partners, either solely (44%) or as hybrid arrangements (23%) where partners and governments manage the funds. Gavi records the reasons why the organisation channels funds away from government systems to partners. As Figure 26 below shows, of the funds channelled to partners i.e. 67% of the total cash grants, for 60% the reason is heightened fiduciary risk within country systems; whereas for 28%, the countries (Pakistan and India) requested Gavi to transfer the funds to partners to overcome legislative hurdles. Other reasons were conflict environment for 9% of funds corresponding to Central Africa Republic, Somalia, Yemen and South Sudan, and global banking restrictions for 3% of funds corresponding to Korea DPR and Cuba.

Figure 26: Reasons for channelling funds from government systems towards partners

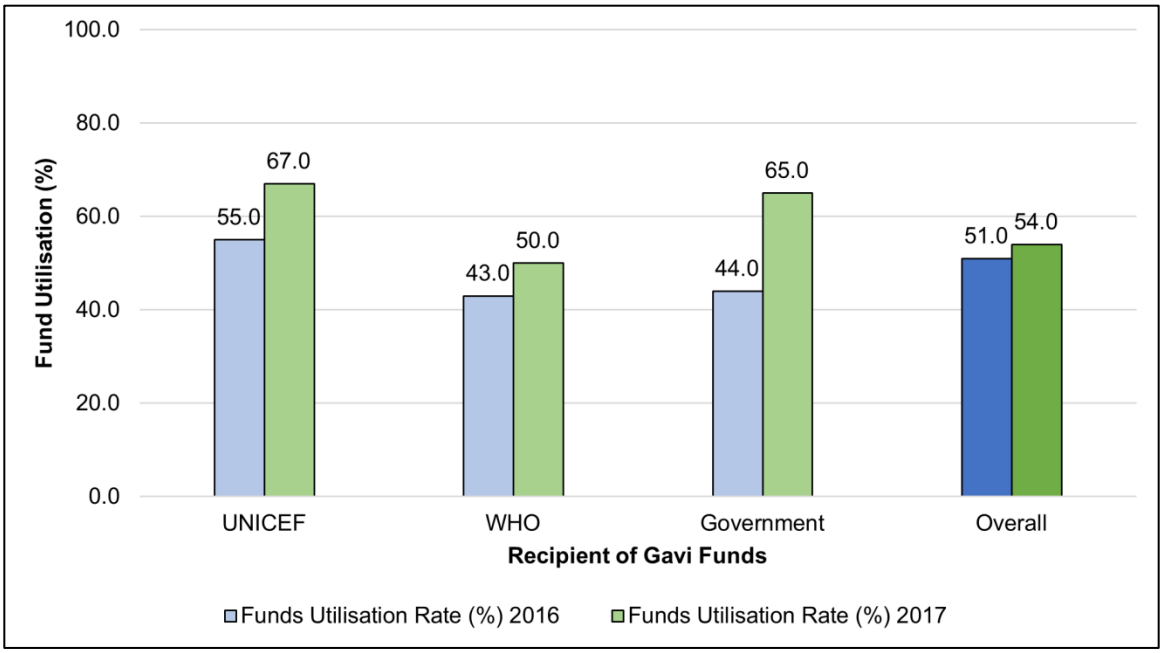


Source: Gavi Secretariat's report to the Programme and Policy Committee meeting of 18-19 October 2018: Titled 'Approaches to Fiduciary Risk Management in Gavi Cash Grants'

[49] Amount that Gavi has requested countries to reimburse per A&I report to AFC on July 2017. At this date, countries have repaid USD 12.23m of this amount to Gavi.

As the Figure 27 below shows, that the in-country utilisation of HSS funds is usually higher among partners than among governments. UNICEF shows thereby the highest rate of absorption of funds. The rate of utilisation improved in 2017, mainly among government recipients.

Figure 27: In-country utilisation of HSS grants in 2016 and 2017 (overall and by major recipients i.e. UNICEF, WHO and Government)



Source: Gavi's internal 'Programme Finance Department's Financial Report'. Obtained 6 November 2018

Alliance partners are the natural choice for channelling funds to programs specifically in fragile countries where national institutions are often weak and lacking the required capacity to implement immunization programs. Among the 16 countries selected for in-depth review this is true with the exception of Afghanistan, where 50% of the funds are channelled through the Ministry of Health. The Afghan Ministry of Health then contracts civil society organisations to deliver immunization services in 31 out of the 34 provinces.

From interviews with key informants, UN agencies are best suited to implement some of the activities in the HSS grant. For instance, in Afghanistan and Bangladesh, activities related to infrastructure development and procurement of equipment are implemented by UNICEF because, through the government systems the activities would not be undertaken within the programme timelines. In Bangladesh, it has been agreed that WHO is best placed to implement disease surveillance activities.

Generally, countries are informed of the actions they need to take to address the capacity weaknesses that caused the funding arrangements. These actions are normally included in the Grant Management Requirements (GMRs) at the start of each HSS grant. Gavi's PCA team performs monitoring visits to evaluate the country's progress with implementing the GMRs. After this review, Gavi make a judgement call as to whether the country has developed the capacity to manage grant funds. Then, the HSS grants are channelled back to government.

Contribution to sustainability by different grant management modalities

Gavi has various grant management modalities across countries. The grant modalities are often determined by fiduciary risk. Gavi channels funds in countries either through a partner model, the government system or a hybrid form (e.g. government with partners or vice versa). In some instances Gavi contributes to a pooled fund. It can be assumed that grant arrangements are likely to contribute or hamper adequate development of country capacities on the programmatic side. If the program is entirely managed through partners there are little possibilities for countries to mature capacities and to prepare for transitioning. Several key informants stressed that in order to develop capacity over time it is key that governmental structures are also in charge. To get countries ready this takes time and systematic building of capacity. This finding is very much in line with a previous conclusion of the meta-review of country evaluations (3) where the authors noted "…short-term consequences for country ownerships and flag potential consequences for long-term programmatic and financial sustainability…"

Hence, depending on the country context there may be missed opportunities for countries to successfully pivot towards transition. Gavi's decision to foster stronger government engagement over the next years through alternative models tailored to country context and risk profile and to increase governmental funding gradually until 2025 to 50% (currently 33%) will likely enhance programmatic sustainability.

Among these alternative models, the use of pooled funds seems to provide Gavi greater leverage at country level. The key informants reported that such funding mechanisms have resulted in better country ownership and increased government funding towards routine immunization (see also Table 10). Other advantages cited were the coordination and harmonisation among partners and that investments were fully aligned with the national strategies and needs. This at the expense though that the contribution of the various, individual donors cannot be traced and that sector-wide interests rather than donor specific interests may govern the design and layout of the programs.

It was also highlighted that national monitoring systems might not yield all the information that donors would ideally require to inform their own strategy and monitoring frameworks, nor would they be able to make donor specific decisions, e.g. regarding disbursement delays in case of unmet results. Interviewees emphasised that the grant management modalities need to be carefully considered and adapted to a given country context. In countries where a Sector Wide Approach (SWAp) is in place or some kind of donor council, then adequate representation of Gavi and its "like-minded" partners was considered essential to ensure sufficient attention to Gavi's interests.

Table 10: Strengths and risks of the pool funding mechanism

Strengths	Risks
• Increased country ownership/increased domestic financing • Risk diversification through partnership • Higher leverage for health investments advocacy • Better integration with existing health system • No duplication of funding • Better harmonisation and alignment of investments across partners and with national strategies	• Not able to show the contribution of specific donor and unable to track funds • Little room to delay funds based on performance issues • Not sufficiently adapted monitoring/unable to monitor against Gavi specific indicators • Depending on proportional size of financial investment the representation of donor specific interests might be hampered

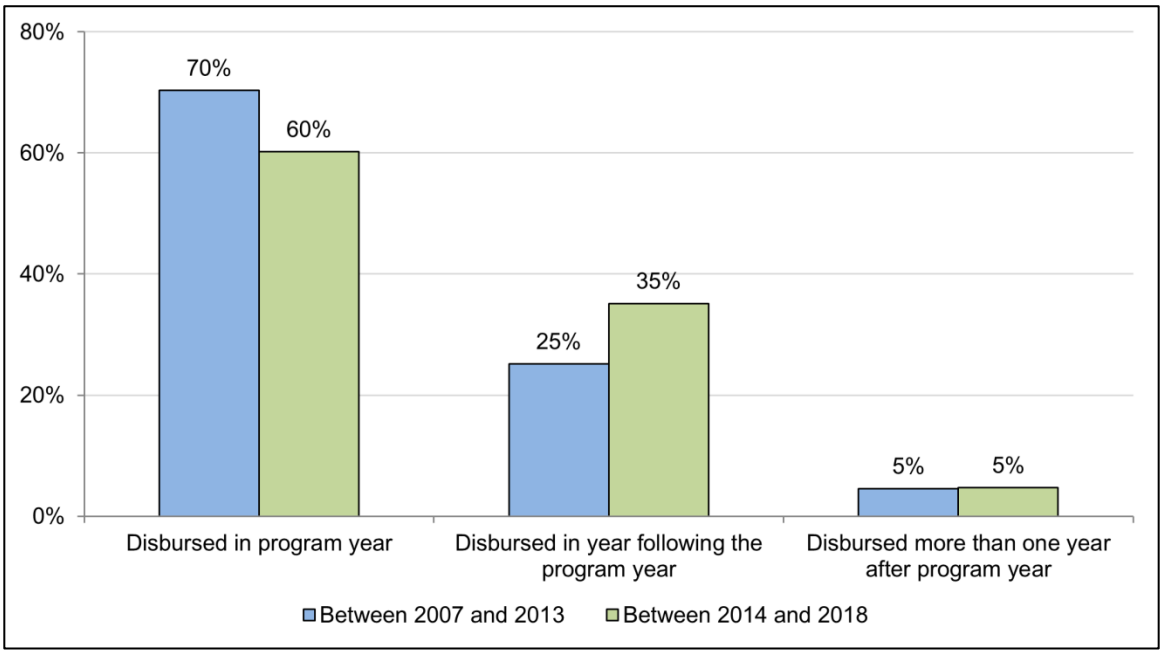
Delayed or unpredictable funding

Financial management capacity, program management, disbursement and absorption

Delayed and unpredictable funding has an impact on the ability to be transparent and achieve goals. To examine the delays in disbursement, the review established the percentage of HSS funds transferred in the program-year as planned in the approved budget; as well as the percentage transferred up to two years later than planned.

As illustrated in Figure 28, the percentage of funds transferred as established in the budget was 70% for the period 2007-2013, and then decreased to 60% in the period 2014-18. This change affected mainly the percentage of funds disbursed one year later.

Figure 28: Delays in disbursement (comparison of amount disbursed in 'actual year' with 'program year') for all HSS grants approved and disbursed between 2007 and 2018



Source: Gavi website https://www.gavi.org/country/all-countries-commitments-and-disbursements/

There are two potential points at which HSS grants to country can be slowed down: (i) between IRC approval and first disbursement, and (ii) during programme implementation after the initial release of funds.

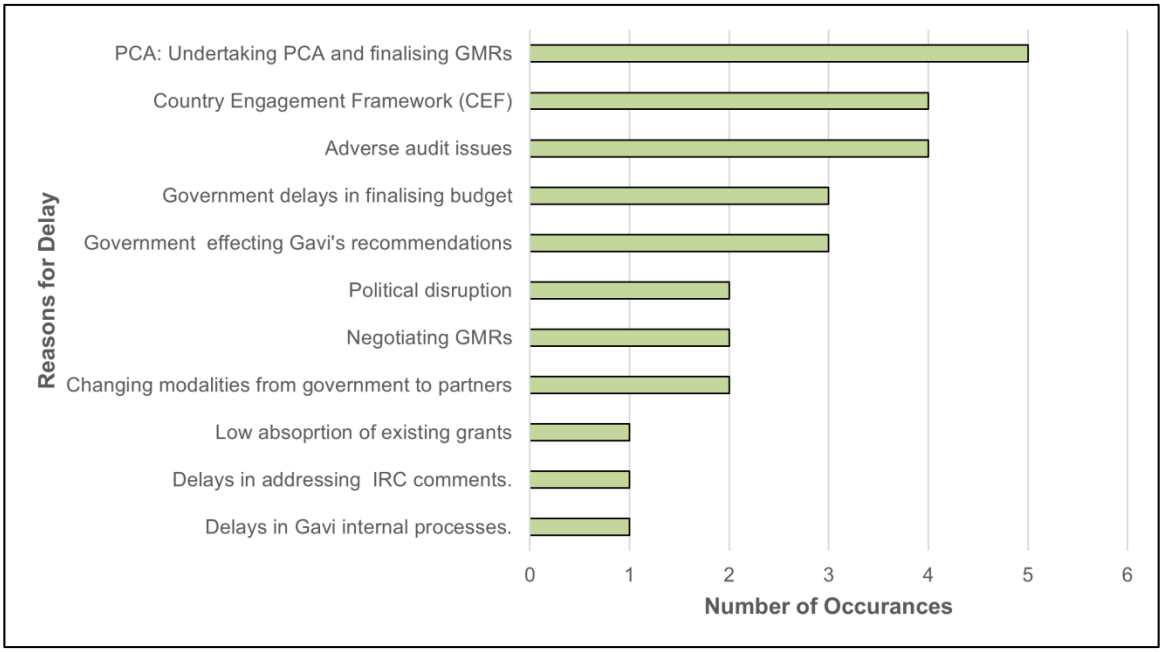
Since 2017, Gavi's Secretariat tracks the time between IRC approval and Gavi first disbursement, and the reasons for any delays. In 2017 and 2018 only 13% of countries registered a time for disbursement lower than Gavi's target of nine months[50]. The average numbers of months were 16.1 and 19.9 for 2017 and 2018 respectively.

Gavi Secretariat also records the reasons for the delays, and we have analysed them in the **Figure** 29 below. In seven of the 28 countries analysed the delays were related to "putting in place Grant Management Requirements (GMRs)" and "negotiating GMRs". Gavi conducts a Programme Capacity Assessment (PCA) to determine whether a country, that applies for HSS funds, has the systems in place to properly manage the grant. It takes Gavi and the country an extended period of time to agree GMRs. Further, once agreed, the GMRs required prior to first disbursement also take countries a long time to put in place.

[50] Target of nine month provided in Gavi's internal 'time to disbursement tracker'

The next most frequent reasons for delays were related to the scheduling and undertaking Country Engagement Framework (CEF), and heightened fiduciary risks that were revealed by audits.

Figure 29: Reasons for delays in effective the first disbursement i.e., longer than the nine-month target



Source: Gavi's internal 'time to disbursement tracker' (obtained 20 December 2018)

The key informants interviewed pointed to weak capacity in financial management as the major contributor to low rate of in-country funds absorption, at 51% and 54% in 2016 and 2017 respectively[51].

Slow absorption also impacts Gavi's ability to disburse grants on schedule because the Secretariat does not release additional funds if countries have high cash balances and until they have provided the required financial reports.

Recent audits and Program capacity assessments have cited weaknesses with regards to in-country financial management, including (32):

- Weak traceability of use of Gavi provided funds because they are not adequately earmarked at sub-national levels (58% of Gavi's audits)
- Non-compliance with national rules in the procurement and management of assets as well as retirements of advances (68% of Gavi audits)
- Weak Program management leading to low absorption of Gavi provided funds (47% of Gavi Audits)
- Poorly documented budget revisions, reprogramming not formally approved with inconsistent budget classifications (47% Gavi audits)

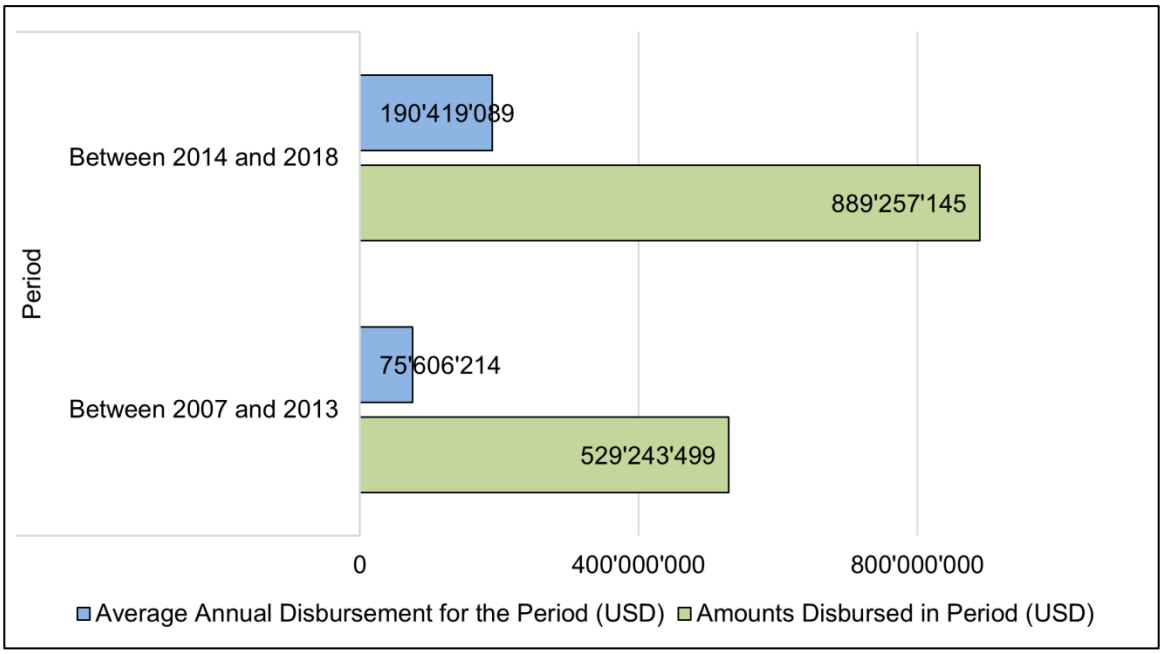
Gavi's board articulated a reduced appetite for fiduciary risk. In 2015 Gavi introduced a three lines of defence model. When this model was implemented, Gavi obtained better information on risks, especially fiduciary risk. The first line of defence which interacts directly with

[51] Fund absorption rates per Gavi Programme Finance Team's internal reports.

countries was enhanced with a program finance unit and an increase in the number of Senior Country Managers. The second line of defence includes Programme Finance, Finance, Risk Monitoring & Evaluation, Legal and Program Capacity Assessment (PCA) teams. The PCA reviews country capacities before they can receive HSS grants. Then, the third line of defence, an audit & investigations department was redefined and resourced. Delays arise because each of these lines of defence performs a checking role raising questions that countries are unable to resolve quickly because capacities are still low.

One should also note that there was a significant scale up of disbursements in actual terms from 2014. As the graph below illustrates, the average annual disbursement has more than doubled from USD 75m to USD 190m. The percentage rate of funds absorption is lower in the 2014 to 2018, partly because of scale up in HSS which is reflected in higher average annual disbursements when compared to earlier years. .

Figure 30: Scale up of HSS disbursements during the last four years as compared to the previous period



Source: Gavi website https://www.gavi.org/country/all-countries-commitments-and-disbursements/

Monitoring & results mechanisms

Monitoring and evaluation of grant implementation using a differentiated approach by country contexts

In 2016 Gavi changed the way it managed grants by introducing the Grant Performance Framework and Joint Appraisal Reports as mechanisms for tracking progress.

Beyond this, the Country Team collects grant specific evaluations, coverage surveys and contextual information from the country in question, and maintain direct contact with partners to gather information about the program performance and country context.

The guidance related to the Grant Performance Framework and Joint Appraisal Reports are standard across all the countries that receive Gavi support, it is worthy to mention that Gavi has not made available guidance to Country Teams about how to use this information to support the decision making in the grant management.

Gavi support to monitoring operational workplans

Gavi relies on countries to collect data about the immunization program and the grant performance, without data quality assurance from third parties. In addition, if a country requests its support, Gavi may provide financial support for the implementation of in-depth, specific assessments to better understand the intended and non-intended effects of interventions. The Senior Country Manager supports the team responsible for writing the Joint Appraisal Report to ensure it addresses the needs of the grant management.

The key informants indicated that regular monitoring of operational work plans and budget consumption is not included in Gavi's policies. However some countries have already taken the step to put such a practice in place, through programmatic and financial reports that can be as frequent as quarterly reports. In the lack of standardised guidance the format of this reporting varies across countries in accordance with the capacity available, support received through other partners and the willingness of a country to be fully open and accountable.

Use of the Grant Performance Frameworks to monitor progress of grants

A key informant expressed that Gavi "expects" countries to report 80% of indicators and to meet targets for these 80% of indicators; However, all key informants indicated that non-compliance with reporting or targets has not a direct effect on future disbursements. The process for deciding future support or changes in implementation rather rests with the Country Team's assessment of the GFP results using available contextual information to make recommendations.

The Grant Performance Framework (GPF) includes core indicators at the level of outcomes (coverage and equity), intermediate results and processes. The GPF also include country tailored indicators, which are proposed by the country and reviewed by Gavi Country Team during the elaboration of grant proposals. Reflecting the diversity of activities funded by Gavi, the tailored indicators are quite diverse, making their consolidation. In the view of the key informants there would be considerable potential to improve the section on proposed monitoring in the grant proposals.

Some key informants also pointed out that while the core indicators may be the best available source of evidence, they are subject to methodological limitations, e.g. the experts of WHO-UNICEF produce estimations of vaccine coverage starting from administrative reports that may be obtained of weak information systems. In 2016 an Internal Audit reported concerns regarding the lack of validation of data presented by countries in the GPF, and Gavi's management expressed willingness to improve the quality of data through the triangulation of data sources.

4.3. Design of grants

Aligning grants to country contexts

Alignment of Gavi HSS support to national comprehensive multi-year strategic plans (cMYPs) for immunization and national health strategies

From our review of IRC reports, the proposals that countries submit to Gavi are generally well aligned with country national comprehensive multi-year strategic plans (cMYPs) for immunization. In addition, for 8 out of 16 countries, proposals pointed to the national health strategy documents such as the National Health Sector Strategy in Sudan; Health Development Plans in Angola and Niger; National Health Plan in Papua New Guinea; National Health Plan in Honduras; National Health Sector Transformation Plan in Ethiopia; PBDS (The Biannual plan for health development) in Congo Republic; National Health and Nutrition Policy (NHNP) in Afghanistan; and the Investment Plan for Building a Resilient Health System in Liberia.

The IRC found that the proposal that Bangladesh submitted to Gavi in March 2015, lacked clear linkages between the proposed activities and the strategic plans. Further, the activities of the same proposal didn't clarify links with either the national health strategy or the cMYP. The IRC recommended that Bangladesh revises and then resubmits the proposal.

For Democratic Republic of Korea (DPRK), the cMYP was not available at the development stage of the HSS proposal. Nevertheless, the objectives and activities were developed around bottlenecks identified by national studies. Proposals submitted by India and Malawi mentioned alignment with national immunization strategy documents but fell short of demonstrating how these were reflected in the proposed activities.

In November 2015, the IRC recommended in its consolidated report that HSS grants should be aligned to the national health sector strategic plans and serve to integrate immunization activities, assets and systems into the wider health systems. This approach would be consistent with the general goal of universal health coverage to which Gavi contributes.

Generally, proposals are well aligned with national technical health strategies to the extent that countries demonstrate how their requests for immunization support and health systems support for the immunization system fit within the overall vision and strategic direction being pursued.

To garner the political support required to increase domestic financing for routine immunization, the economic case for investing in immunization and stronger health systems needs to be articulated much more clearly. For countries in transition it would be important to achieve alignment with national health financing strategies, the strategy of the Ministry of Finance and the use of fiscal space for health – which so far seems a distant vision.

Consultation of HSS grant applications and priorities with relevant stakeholders

Consultations of stakeholders are regularly taking place during the grant and proposal development process. Several stakeholder groups seem to be regularly involved in the consultation process:

- ✓ Departments of MoH beyond the EPI program are frequently involved – in particular Departments or Programs of MCH, Equipment& Maintenance)
- ✓ Ministry of Finance
- ✓ Bilateral & international donors/agencies

- ✓ Civil society organisations

The involvement of different MoH departments can be interpreted as a practical step to achieving greater integration in terms of planning across different programs that are rooted in PHC.

Sub-national stakeholders were also involved during the proposal development in more than half of investigated 16 countries. When they were not involved, reference was made to recent consultative processes for national health strategies where these stakeholders had been strongly involved.

With regards to CSO involvement, several countries have established immunization alliances or networks and thus representation of CSOs during the proposal development was ensured. However the nature of their involvement and the reflection of their interests could not be inferred from the proposals.

The Ministry of Finance was regularly involved in consultations. From proposals though it was not always clear to what extent decision makers from the Ministry of Finance have been involved, e.g. only half of proposals mentioned name of participant in the grant proposal. Involvement of the Ministry of Planning could only be confirmed for a few countries – as could the involvement of still further Ministries (beyond Ministries of Finance and Planning).

Private sector involvement was also shown to be rather unclear. Many proposals indicated that the private sector had been involved but remained vague as to the entities or names. Also there seemed to be a confusion of what constitutes the private sector, e.g. Niger mentions representative's participation from private health facilities run by religious organisations i.e. understood private in the sense of non-public/ not operated by the state. From the analysis no specific patterns related to consultation emerged across regions or transition phases of countries.

Table 11: Stakeholder groups participating/consulted for proposal development

Stakeholders	Consultation mentioned
Departments of MoH (other than EPI program)	100%
Bilateral & international donors/agencies	100%
Civil society	94%
Ministry of Finance	81%
Sub-national stakeholders	63%
Ministry of Planning	31%
Private sector representatives	31%
Other	31%
Other National Ministries	25%

From the proposal documents there is little evidence of the quality of involvement based on minutes or other documentation. However, the IRC reports refer to the availability of minutes and signature lists of workshops / meetings. From the meta-review it should though be concluded, that the integration of stakeholders could be improved (3).

Harmonization of Gavi support with other development partners' contributions

All investigated countries have a coordinating mechanism in the form of a Health Sector Coordination Committee and an Inter-agency Coordination Committee or Coordinating Body.

The strongest form of coordination – coupled with the ability to leverage synergies - were identified for countries with pooled funding, namely Ethiopia and Nepal. The existence of pooled funding mechanisms seems to catalyse harmonisation between partners. Such a mechanism also serves to reinforce national Governments in their coordination roles. Where such a mechanism lacks, the key informants confirmed that there are still many prevailing vested interests and not always an incentive for alignment and streamlining. In both Ethiopia and Nepal, despite inferences that there can be challenges for individual agencies to claim "visibility" for specific results, we identified common investment frameworks, a shared gap analysis, shared management mechanisms and shared monitoring frameworks – all of which were brought advantages to Gavi as markedly progress can be reported also related to routine immunization.

Beyond the two countries we identified coordinated technical assistance and funding arrangements also exist elsewhere, e.g. in DRC or Pakistan. Otherwise synergies were mainly exploited in relation to the monitoring, where Gavi used the national health information systems to avoid parallel systems. Coordinated technical assistance was also reported for Afghanistan, Niger and Bangladesh.

Aligning grants and Gavi's Strategy

Consistency of grant design with Gavi's 2016-20 Strategy and Programming Guidelines

The Gavi 2016-2020 strategy is overall reflected in the 14 grants[52] investigated here, though with different foci. Countries most frequently related to the Vaccine and Systems goals which aim to accelerate equitable uptake and coverage of vaccines, and to increase effectiveness and efficiency of immunization delivery as an integrated part of strengthened health systems. However, within each goal countries gave different emphasis on the various objectives.

Within the systems goal specifically the support to improvements in supply chains, health information systems, demand generation and gender sensitive approaches was given attention by many countries. These were followed by proposals to improve integrated and comprehensive immunization Programs, including fixed, outreach and supplementary components. Within the frame of the vaccine goal, countries aimed to increase coverage and equity of immunization.

We found that countries only addressed the sustainability goal to a lesser extent. Indeed, few proposals committed countries to advocate for increased domestic financing for immunization ("Ensure appropriate allocation and management of national human and financial resources to immunisation through legislative and budgetary means" or to "Enhance national and sub-national political commitment to immunization"). Decentralization was supported in several proposals with the rationale that it would foster good governance and improve geographic coverage[53]. However, once again there was generally not a high level of granularity on what exactly would be done and how it would be monitored.

The market goal was not found to be addressed by any of the countries as this primarily focuses on helping to make vaccine markets work better for lower-income countries. The

[52] Nepal and Ethiopia have not been investigated as implemented through pooled fund.

[53] To differentiate here: Countries aligned objectives with sustainability goal, However, only few activities were actually directly aiming at the various objectives of the sustainability goal.

findings on how far country objectives align with the Gavi strategy is further supported by our analysis of whether the objectives reflect Gavi programming guidelines. Here, the guidelines on "Demand generation", "Data" and "Supply chain" were aligned. We also found alignment between the proposal objectives and the programming guideline on "Gender" or "Urban immunization" – albeit to a lesser extent.

Informing of HSS investment with coverage and equity analysis

The majority of proposals investigated provide some insights into the coverage and equity situation in the country. However, the C&E analyses vary substantially across countries. Analyses are in most cases supported by evidence with more detailed analysis being specifically available for the countries approved in 2015, although no time trend should be derived due to the limited number of proposals thereafter.

In most cases, the key document on which C&E analysis in the proposal is based is a national coverage survey conducted in previous years. In some cases, the analysis draws upon national population and health surveys (Demographic Health Surveys, Multiple Indicator Cluster Surveys), either as a sole reference document or as a complement to data from the coverage survey. Specific C&E reviews or other specific documents were for several countries neither referenced in the proposals, e.g. Malawi has a "Plan for hard-to-reach-areas 2017-2021 (including situation of socio-cultural barriers)" but does not refer to this document explicitly, or documents were unavailable among the documents submitted with the proposals, e.g. Niger (see Table 12**).**

Looking across the countries analysed, various dimensions of equity (geographic, social (maternal education), economic (wealth quintile), gender) were mentioned to at least a minimum extent in all proposals (see Table 13). In particular references to geographical equity and gender-related barriers[54] were made. Wealth disparities in immunization were mentioned in approximately two thirds of the eight proposals so far considered and were in half of all cases supported by data. Maternal education appears to be the least analysed aspect.

The IRC Report from 2018 noted further (citing the typhoid application from Pakistan as one example) that while equity is a well-accepted measure of system performance, a deeper analysis frequently lacks. Such an analysis would be useful for countries to propose and implement specific interventions to improve equity of coverage.

Table 12: Availability of C&E analysis

Approval year	Country	Coverage improvement / equity analysis / plan available?	Does proposal (bottleneck / equity analysis) explicitly refer to analyses / documents?	C+E bottlenecks analysis in proposal?
2014	DRC	Yes	Yes (reference to Immunization coverage survey 2012 and MICS 2010)	some analysis - only some data
2014	Honduras	No	Yes (reference to DHS 2011/12)	some analysis - only some data

[54] Typically outlining that no gender differences in coverage exist.

Approval year	Country	Coverage improvement / equity analysis / plan available?	Does proposal (bottleneck / equity analysis) explicitly refer to analyses / documents?	C+E bottlenecks analysis in proposal?
2014	Korea DPR	No	Yes (reference to National Immunization Coverage Survey 2008)	some analysis - only some data
2014	Niger	No	Yes (reference made to DHS-MICS 2012)	some analysis - only some data
2014	Sudan	Yes	Yes (Sudan Household Health Survey 2010, EPI Coverage Survey 2012)	some analysis - only some data
2015	Bangladesh	Yes	Yes (reference to CES and EPI and VPD Surveillance Review)	comprehensive analysis with data
2015	RoC	Yes	Yes (reference to External EPI / Coverage Survey 2014 and DHS 2011/12)	comprehensive analysis with data
2015/2016	Afghanistan	Yes	Yes (reference to EPI coverage survey)	comprehensive analysis with data
2016	Angola	Yes	Yes (reference to Coverage Survey)	some analysis - only some data
2016	India	No	Yes (reference to Rapid Survey On Children (RSOC), Coverage Evaluation Survey 2009)	some analysis - only some data
2016	Liberia	Yes	No	some analysis - only some data
2016	Malawi	Yes	No	not available / no data
2016	PNG	Yes	Yes (reference made to EPI Review 2013 - but without providing data / detailed information)	not available / no data

Table 13: Analysis of equity in country proposals

Approval year	Country	Analysed equity along geographic barriers?	Analysed equity along social barriers (maternal education)?	Analysed equity along economic barriers (wealth quintile)?	Analysed equity along gender?
2014	DRC	Yes (no data)	No	Yes (with data)	Yes (no data)
2014	Honduras	Yes (with data)	No	Yes (with data)	Yes (with data)
2014	Korea DPR	Yes (with data)	No	Yes (no data)	Yes (with data)
2014	Niger	Yes (with data)	No	Yes (with data)	Yes (with data)
2014	Sudan	Yes (with data)	No	Yes (with data)	Yes (with data)
2015	Bangladesh	Yes (with data)	Yes (with data)	Yes (with data)	Yes (with data)
2015	RoC	Yes (with data)	Yes (with data)	Yes (with data)	Yes (with data)
2015/2016	Afghanistan	Yes (with data)	Yes (with data)	Yes (with data)	Yes (no data)
2016	Angola	Yes (no data)	Yes (no data)	No	Yes (no data)
2016	India	Yes (with data)	No	Yes (with data)	Yes (with data)
2016	Liberia	Yes (with data)	Yes (with data)	Yes (with data)	No

Approval year	Country	Analysed equity along geographic barriers?	Analysed equity along social barriers (maternal education)?	Analysed equity along economic barriers (wealth quintile)?	Analysed equity along gender?
2016	Malawi	Yes (with data)	Yes (no data)	Yes (with data)	Yes (no data)
2016	PNG	Yes (no data)	No	No	Yes (no data)

The findings are in line with the information obtained from KIIs, where it was stated that the country awareness on the dimensions of C&E have increased over time and more so as Gavi has emphasised these aspects in its 2016-2020 strategy. Hence for instance looking over the HSS1 - HSS 2 – HSS 3 grants in Bangladesh there was a positive trend, with an ever greater strategic focus on C&E aspects over time. Similarly some respondents gave examples of recent additional funding (e.g. increased ceiling for Afghanistan) or reallocation of budgets to address C&E aspects.

Several informants stated that countries tend to focus primarily on geographical inequities whilst other dimensions are rather neglected. Key informants expressed that in their perception countries rephrased other dimensions of inequities into geographical terms, e.g. “urban poor”, hard-to-reach areas. They attributed this to various reasons:

1) Poor use of available data and analytical documents and/or lack of data to clearly define those disadvantaged by other inequity dimensions (beyond geography)
2) Lack of knowledge of best practices for targeting other inequity dimensions
3) Difficulty to implement and monitor achievements for the other inequity dimensions.

In total, we identified 33/67 objectives directly or indirectly address equity aspects (see also chapter 4.1.2). However, of those objectives and proposed activities only 8 objectives clearly identified under-immunized populations.

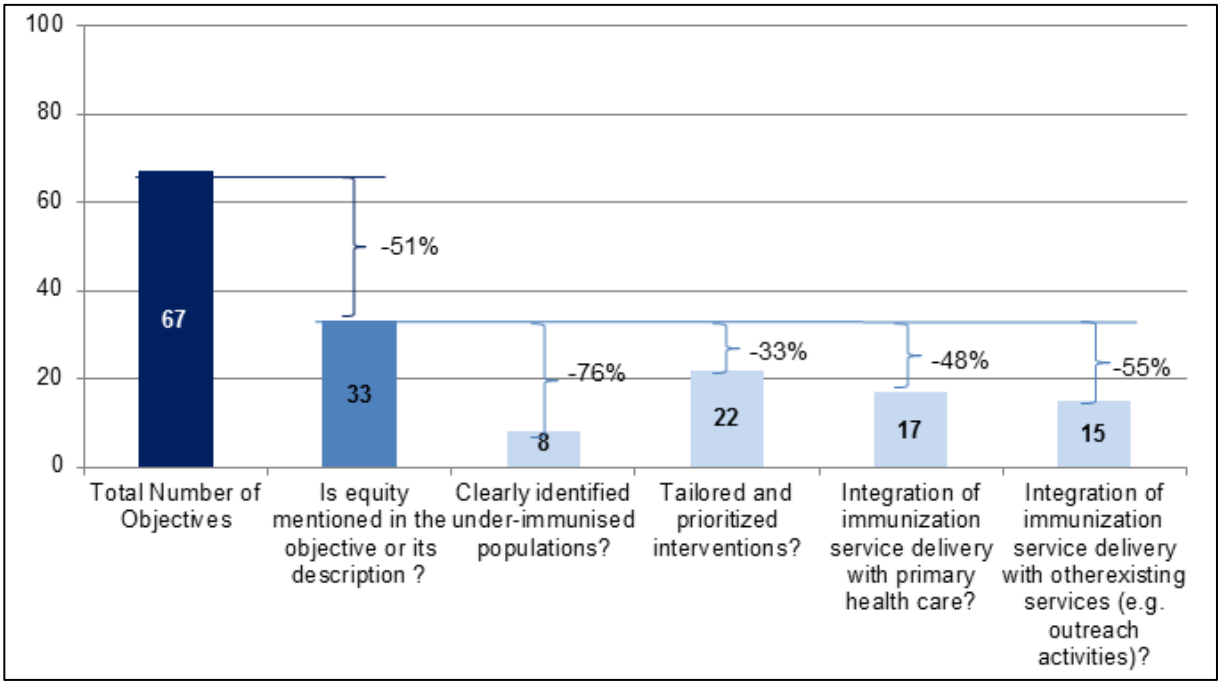
Despite not identifying and addressing clearly under immunized populations (8/33) more objectives proposed tailored and prioritised interventions (22/33); see Figure 31. The differences in the findings of these two aspects suggest that most countries that address equity issues package this in the form of geographic targeting, e.g. to districts with less than 80% penta vaccines, as this would be a tailored and prioritized intervention though not clearly identifying and targeting under-immunized populations as within the district there might be different subpopulations with different coverage rates.

One can hypothesise that this lack of targeting is due to lack of data and country-specific detailed analysis on C&E; as well as a dearth of best practice and experience sharing about how to reach the under and unimmunized. It could also be that countries are worried that focusing on under immunized populations will be a low visibility activity – absorbing a lot of resources but potentially only reaching a small number of new vaccinees. As Gavi core indicators on coverage and equity might be too insensitive to show progress, countries may wonder if their efforts for equity would be noticed and rewarded.

Of further note is the fact that the vast majority of objectives addressing equity aspects were embedded in the integration of immunization services service with PHC or other existing services. This is in line with findings outlined above where immunization services are typically described as being implemented within the primary care system or integrated with other services. From the analysis done to date we could not identify any patterns that would

suggest that certain groups of countries, e.g. stratified according to transition phases, funding channels or grant management modalities would contribute to or hamper progress towards C&E[55].

Figure 31: Equity objectives relating to underimmunised populations, prioritized interventions and integration



Implementation arrangements suggest that there is strong involvement of national and local actors during immunization programs.

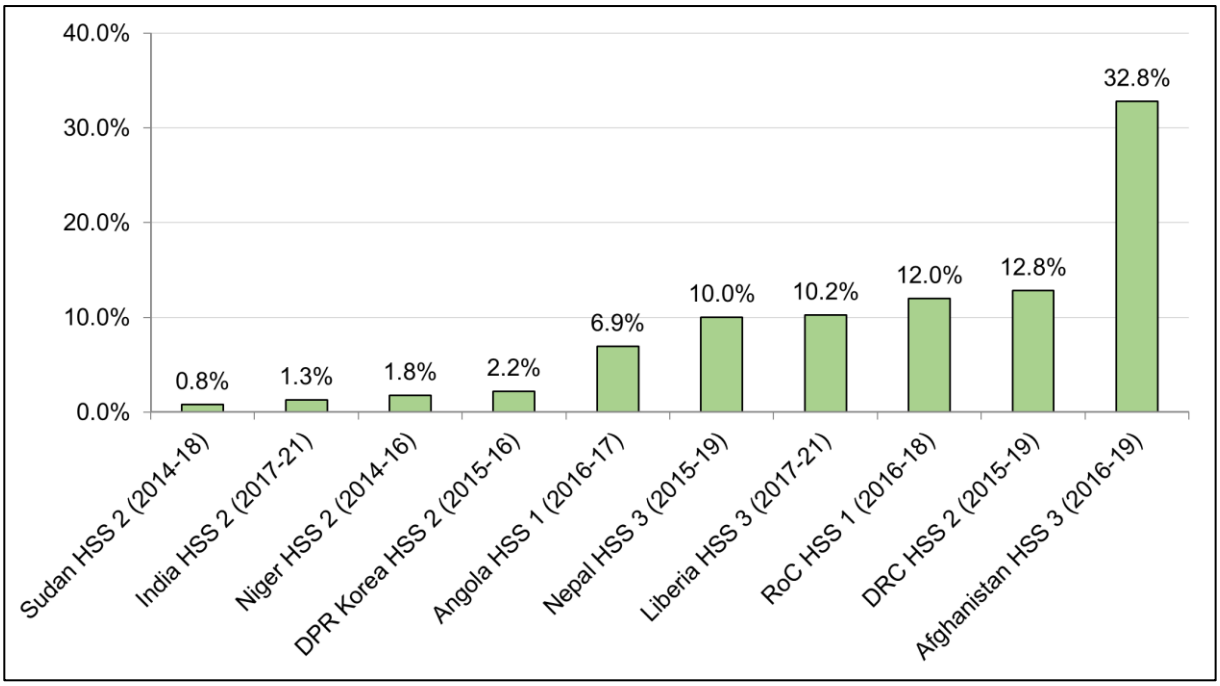
All countries indicated in their proposals that they are planning to involve CSOs in the implementation of grant activities with the exception of DPR Korea. The roles given to CSOs/NGOs thereby varies substantially between countries from being regular providers of immunization services (e.g. Afghanistan; Angola, Honduras, Ethiopia, India, Pakistan) to roles of Community mobilization (e.g. Bangladesh, Sudan) and specifically demand generation, community outreach in hard to reach populations/areas or awareness raising (e.g. Republic of Congo; India, Malawi). In cases where NGOs/CSOs are (main) providers of immunization services reasons differ substantially, e.g. being either fragile countries were only NGOs/CSOs have access to certain areas other countries experience an increasing privatization of the health sector where also NGOs/CSOs are playing an increasingly important role.

Despite some involvement of CSOs in almost all of the investigated 16 countries there were also two countries (Ethiopia and Honduras) that viewed their involvement more critically. Ethiopia articulated a lack of conviction – voicing that they did not see good practice or meaningful lessons learned from CSO involvement in previous grants. Also Honduras indicated to find it difficult to regulate CSO health practice and to monitor and systematise their involvement in providing immunization services.

[55] Countries with pooled funding (Ethiopia, Nepal) or implementation at provincial level were excluded from the coding of activities and objectives.

The findings on CSO engagement are broadly in line with a recent internal Gavi study on planned CSO involvement. Overall that study showed a relative decrease in proportional budgets for CSO involvement between the Strategic Period (2011-2015) and Strategic Period (2016-2020) from 11.67% to 5.37%. This might be related to the still on-going strategic period which is still to last for another two years. Of the 16 investigated countries in this review, data on CSO involvement was available for 10[56] and an associated budget were presented. Budget proportions for CSOs varied across countries and were proportionally highest for Afghanistan, followed by DRC (12.8%), Republic of Congo (12%) and Liberia and Nepal with approximately 10% of the total budgets going to NGOs/CSOs (see Figure 32).

Figure 32: Proportion of total budgets going to CSOs in selected countries



Planned private sector involvement in the implementation of the grant was described in only 6 of 16 proposals. These 6 proposals were: Afghanistan, India, Nepal, Niger, Pakistan and Papua New Guinea. However the roles of the engagement for implementing the HSS grant varied substantially between countries. In Afghanistan private sector providers operate in insecure areas through Public-Private Partnership (PPP) arrangements and provide in this way about half of the health services. In Nepal private sector health workers will be trained to provide immunization services in urban settings. Also in Niger, private providers of health services operate at various levels. In Pakistan it is planned to contract immunization services out to private sectors in light of the conceptual framework mentioned in the national EPI. Social mobilization activities are also planned as PPPs – making use of CSOs to enhance EPI card retention.

In India the involvement of the private sector was indirect and only through communication campaign in private radio channels. Papua New Guinea is planning to draw on the private sector but remains largely unspecific about how and for what purposes this should happen. The findings implicate that the role of the private sector is highly diverse and there are only few showcases, e.g. Afghanistan, where the private sector takes purposefully a great share

[56] Ethiopia, Malawi, Pakistan, Bangladesh, Papua New Guinea, Honduras

of the implementation. KIIs confirmed this and were unclear what Gavi would actually try to reach and target with the private sector, e.g. private health providers, private distributors.

Incorporation of lessons learnt and recommendations into new proposals

Countries routinely incorporate a section on lessons learnt in their proposals[57]. Exceptional here is PNG although one has to consider that this was the reprogrammed HSS program which discovered substantial operational and political challenges during the original implementation of the HSS grant. Among all other countries one third did though not explicitly refer to the lessons learnt from previous HSS grants and how the current HSS would relate to previous implementation activities. None of the countries explicitly referenced the Joint Appraisal Reports, though several made reference to Gavi country missions and discussions.

Table 14: Incorporation of lessons learnt in proposals

Countries	Previous HSS grant?	Section on lessons learnt?	Reference to previously implemented HSS grants?	Reference to joint appraisal reports?
Afghanistan	Yes	Yes	Yes	No
Angola	No	-	-	-
Bangladesh	Yes	Yes	Yes	No
DRC	No	-	-	-
RoC	Yes	Yes	Yes	No
Ethiopia	Yes	Yes	No	No
Honduras	Yes	Yes	Yes	No
India	Yes	Yes	Yes	No
Korea DPR	Yes	Yes	Yes	No
Liberia	CEF			
Malawi	CEF			
Nepal	Yes	Yes	No	No
Niger	Yes	Yes	Yes	No
Pakistan	Yes	Yes	No	No
PNG	Yes	No	No	No
Sudan	Yes	Yes	Yes	No

Evolution of findings from the Independent Review Committee

The Independent Review Committee Global reports summarize the main findings of reviewing the countries applications to Gavi grants. The criteria for review include the extent to which proposals (a) meet mandatory requirements and (b) principles of support as specified in Gavi guidelines and (c) contribution to achieving Gavi mission and strategy. We identified some HSS specific recommendations related to the Gavi strategy, though of note that the IRC letters after March 2017 are not having a specific section on HSS.

Recommendations relate to achieving:

- Clearer answers on how issues of fragility may impact the countries immunization Program, planning for introduction of routine immunization or campaigns and financing of these activities.
- More comprehensive information on equity and, countries providing their equity strategies.

[57] We did not consider Liberia and Malawi as new CEF process was in place.

- Investments in capacity development on generating, analysing, and using quality sub-national equity data for equity-oriented interventions in the context of immunization.
- Better and clearer linking of identified inequities in coverage and clarifications on the various aspects of gender differences (e.g. barriers to women caregivers' ability to seek vaccination for her children).
- Better documentation and identification of activities and cost categories dedicated for CSO/private sector, especially coverage and equity.
- Development of local potentials and home-made solutions; building on previous progress (e.g. from earlier grants) specifically for countries approaching transition so as to support building capacity and sustainability of health systems.
- A wider vision of health sector support in the HSS proposals, with CCE rightly placed within the supply management system and without detracting attention from other key health systems components (HR, data, governance, financing).
- Country ownership and a sector wide approach for helping the MoH lead and manage harmonization, to promote government accountability for rational domestic investments that move from donor dependency to sustainability, especially for recurrent costs.

Alignment between 2016-2017 proposal design and IRC high level recommendations

From the recommendations given it seems that the Country Engagement Framework (CEF) process, initiated in 2016, is incorporating those recommendations and taking these up. Based on the report on the findings of the CEF process (33) there is:

- An increase in multi-stakeholder engagement, for the benefit of effective and coordinated planning, although there is need to continue this engagement beyond the planning stage.
- Stronger alignment with country plans and other donors, although delays are preventing alignment with country financial cycles.
- The portfolio approach which is useful and aids integration.
- A well-received and beneficial role of the Gavi Secretariat as well as an instrumental involvement of external consultants as well has been instrumental for CEF.
- An increased focus on coverage and equity as well as greater sustainability.

Monitoring & Evaluation

Having previously described that the mechanisms in place to monitor the HSS grant implementation includes the Grant Performance Framework, joint annual reports, and the information collected by the Gavi's country team through their contacts with in-country implementers and partners, we will focus here in the information contained in the GPF.

To assess the completeness of reporting, we estimated the percentage of countries receiving HSS funds that report annually to the GPF. For that purpose, out of the 21,651 data points included in the GPF we focused in the core indicators which are defined as mandatory by Gavi.

Though 74 different core indicators were identified in the GPF, our assessment initially included those 14 core indicators identified by Gavi as relevant for the HSS grants. Then five of those core indicators were excluded because they are collected through national surveys or effective vaccine management assessments, so they are not available for annual reporting.

Out of the registers corresponding to the remaining nine core indicators, only those corresponding to active HSS grants (active_hss=1) and with a number reported as result were included. Countries reporting sub-national GPF (Pakistan and Somalia) were excluded to enable the comparison across countries. After all this process 1,853 registers corresponding to 63 countries during the period 2014-2017 were selected.

The nine core indicators included six outcome indicators and three intermediate indicators, and according to the GPF proceed from the WHO-Joint Reporting Form. The outcome indicators included three related to coverage and three related to geographical equity; and the intermediate indicators were the number of children receiving Penta1, Penta 3 and MCV1 vaccines. Table 18 shows that out of 63 countries the number of countries reporting each indicator during the period 2014-17 ranged between 49 to 55 (78% – 88%).

Table 15: Core indicators included in the GPF and number of countries reporting per year (n=63)

Level	Indicator	2014	2015	2016	2017
Intermediate	Number of surviving infants who received the first recommended dose of pentavalent vaccine (Penta1)	51	49	51	55
Intermediate	Number of surviving infants who received the third recommended dose of pentavalent vaccine (Penta3)	51	49	51	55
Intermediate	Number of surviving infants who received the first recommended dose of measles containing vaccine (MCV1)	51	49	51	55
Outcome	Pentavalent 3 coverage at the national level (Penta 3)	51	49	51	55
Outcome	Measles containing vaccine (first dose) coverage at the national level (MCV1)	51	49	51	55
Outcome	Drop-out rate between Penta1 and Penta3	51	49	51	55
Outcome	Percentage of districts or equivalent administrative area with Penta3 coverage greater than 95%	51	49	48	54
Outcome	Percentage of districts or equivalent administrative area with Penta3 coverage greater than 80%	50	49	50	54

Level	Indicator	2014	2015	2016	2017
Outcome	Percentage of districts or equivalent administrative area with Penta3 coverage between 50% and 80%;	51	49	49	54

In order to assess their relevance, we verified if the tailored indicators provide information that could be related to the HSS grant objectives. According to the guidance provided by Gavi to countries applying for grants, the GPF must include indicators tailored to the specific objectives of each grant in order to ensure the performance framework provides a complete overview of performance for each type of support provided.

To assess the compliance with these directives, we reviewed the 332 tailored indicators reported by 12 of the countries included in the in-depth desk. The purpose was to identify if the GPF included at least one indicator per level (process, intermediate or outcome) for each of the 53 HSS grant objectives. Whereas the GPF includes a column to identify objective, this is not completely populated, so the reviewers identified the links using the objective description and the corresponding activities in the grant proposal.

Table 16 shows that in 8 of 12 countries every objective was represented with at least one indicator in the GPF. With the exception of Congo, in the remaining four countries only one objective lacked an indicator in the GPF.

Out of the total of 53 grant objectives only 33 were represented in the GPF with at least one process indicator, and only in two countries the GPF included one process indicators for all their grant objectives. At the same time were only 32/53 grant objectives represented by at least one intermediate indicator.

Only Congo DRC included an indicator categorized in the level of outcome ("proportion of children recovered by CSOs in 112 zones". This indicator was related to the objective "Improve the availability of quality health services in 112 targeted Health Zones").

Table 16: Proportion of objectives with at least one indicator reported in the GPF during 2014-18 by level of indicator

Country	Process	Intermediate results	Process and intermediate	Outcome	Any level
Afghanistan	3/4	3/4	2/4	0/4	4/4
Angola	4/5	2/5	1/5	0/5	5/5
Bangladesh	1/2	2/2	1/2	0/2	2/2
DRC	2/5	3/5	1/5	1/5	4/5
RoC	0/5	3/5	0/5	0/5	3/5
DPR Korea	5/5	1/5	1/5	0/5	5/5
Honduras	4/5	3/5	2/5	0/5	5/5
India	2/4	4/4	2/4	0/4	4/4
Liberia	4/4	4/4	4/4	0/4	4/4
Niger	1/4	3/4	1/4	0/4	3/4
Pakistan	5/6	2/6	2/6	0/6	5/6
Sudan	2/4	2/4	0/4	0/4	4/4
Total	**33/53**	**32/53**	**17/53**	**1/53**	**48/53**

We also assessed if the tailored indicators included in the GPF contain information about the grant's result chain by identifying if at least one process and one intermediate indicator per objective was available. In Table 17 we have selected two objectives to illustrate how the inclusion of both process and intermediate indicators related to one objective can support the progress related to specific bottlenecks. In the example for Afghanistan the process indicators track progress training, resources and mobilisation which it is expected to improve the performance (dropout rate) of health facilities; and in Bangladesh the availability of cold rooms was expected to reduce the stock outs of vaccines.

Table 17: GPF indicators designed to inform the objective's result chain (illustrative)

Country - Objective	Process Indicators	Intermediate Indicator
Afghanistan - Objective 1: Enhancement of equitable access and effective coverage of immunization services through integrated public health care system, private health sector-PPPs, and community participation with more focus on underserved population	• Number of CHWs trained to provide CIMCI services in 5 target provinces • Proportion of Kochi CHWs trained on standard CHW training and providing services according to their TORs • Number of districts where religious leader orientations held • Utilisation of HSS cash support by CSOs • Allocation of HSS budget to CSOs	• Proportion of health facilities with negative dropout rate (Penta1-Penta3)
Bangladesh – Objective 2: Improve cold chain and supply chain management system performance	• Number of district level cold rooms functioning	• Proportion of health facilities (both urban and rural) with no stock out of vaccines for the past 6 months

The GPF included at least one process and one intermediate indicator for 17 of 53 objectives, and only in one country (Liberia) all objectives were represented at the process and intermediate level.

We conclude that the core indicators can provide information about the performance of HSS grants mainly at the highest level of the chain result, so providing a valuable reference about the country status and achievements, but not about the progress in the HSS activities.

By reviewing if the tailored indicators are actually filling that gap of information, we found that almost all the grant objectives were represented by one tailored indicator. However in spite of the high ratio of tailored indicators per grant objective (332/53), some activities and objectives are not monitored by the GPF.

Grant Performance Framework alignment with the country context

Assuming the Country Multiyear Plan (CMY) represents the country consensus about the most relevant needs in the local context, we identified the strategies or goals set at the highest level of planning in the CMY of 14 countries.

Next the tailored indicators of these countries were reviewed to identify if they could be considered as informing the progress towards the CMY strategies or goals. The tailored indicators are designed by the country stakeholders, so they are supposed to monitor the progress of activities responding to the priorities previously identified. Papua New Guinea and Ethiopia were excluded because they lack tailored indicators in the GPF. Pakistan was also excluded because having adopted a sub-national GPF; it makes any comparison with other countries difficult.

In Table 18 is shown that in five of the 11 countries, the review was able to link at least one tailored indicator with all the CMY strategies/objectives; at the other end, in two countries it was possible to link tailored indicators with only a half or less of the strategies/objectives. However, it was not possible to identify both process and intermediate tailored indicators linkable with all the CMY strategies/objectives.

Taking into consideration that the CMY strategies/objectives are widely defined, we conclude that whereas the GPF is aligned with the main issues identified by countries, it is not designed as an instrument to monitor the implementation and achievements of Country Multiyear Plans.

Table 18: Proportion of CMY objectives/strategies with at least one tailored indicator reported in the GPF during 2014-18 by level of indicator

Country	Number of CMY objectives/strategies	Process	Intermediate	Process and inter-mediate	Outcome	Any level
Afghanistan	7	6/7	4/7	4/7	0/7	6/7
Angola	9	5/9	3/9	2/9	0/9	6/9
Bangladesh	6	0/6	1/6	0/6	5/6	6/6
RoC	10	0/10	5/10	0/10	0/10	5/10
DPR Korea	4	4/4	1/4	1/4	0/4	4/4
DRC	6	2/6	5/6	1/6	2/6	6/6
Honduras	14	9/14	8/14	7/14	0/14	10/14
Liberia	5	4/5	5/5	4/5	1/5	5/5
Nepal	8	1/8	1/8	0/8	5/8	7/8
Niger	5	1/5	5/5	1/5	0/5	5/5
Sudan	10	2/10	3/10	2/10	0/10	3/10

5. Recommendations

5.1. Recommendations related to this review

Based on the findings and conclusions the following recommendations are made:

(1) Immunization coverage and equity

To optimize the contribution to coverage and equity, it is recommended that Gavi potentiate HSS investments by:

- Requiring countries to strengthen documentation about how they will increase coverage and improve multiple dimensions of equity. The assumptions subjacent to the choice of proposed activities and the intermediate results leading to coverage and equity should be more clearly delineated in HSS proposals.
- Providing additional guidance to countries about evidence-based decision-making, using the most updated knowledge about cost effectiveness and feasibility of Health Immunization System Strengthening interventions.

(2) Integrated PHC

To enhance the effectiveness of immunization delivery service through greater integration into other primary health care services by:

- Providing further guidance to countries and country teams about the benefits and the potential opportunities to foster the integration of immunization programs with other PHC services.

(3) Sustainability of national immunization programmes

To optimize the contribution of HSS grants to the sustainability of immunization programs, through longer term planning by:

- Approaching HSS investments with a longer term perspective as it is difficult to identify or even measure health system change on a project cycle timeline.
- Encouraging the design of Gavi-funded HSS grants as a continuum across transition phases, with commitments and objectives beyond the life of grant, and in alignment with country multi-annual planning cycles.
- Adopting time bound milestones for the development of key programmatic and financial management capacities on the part of Governments.
- Refining the transition policy by adopting criteria to identify up-front countries requiring not only an extended transition, but also specific interventions to ensure sustainable management of their immunization programs after graduation.
- Fostering milestones for the domestic contribution to Routine Immunization expenditures of medium and long term milestones planning.

(4) Fragile countries

To ensure an effective contribution of HSS grants in fragile countries, through a more differentiated management by:

Providing additional guidance to countries and Gavi's secretariat for addressing health system weaknesses frequently encountered in contexts of fragility. This guidance may include topics as sub-national approaches to address imbalances in access to immunisation services, investment in commodities and operational for humanitarian and development assistance settings, and articulation of immunisation strategy during and post conflict.

(5) Information to monitor HSS results

To strengthen decision-making at the grant and portfolio level through enhanced financial and programmatic reporting of grant implementation by:

- Requiring that grant proposals identify indicators for processes and intermediate results that are linked to key objectives/activities. These links should be consistent with the theory of change adopted. Considering the currently high number of tailored indicators reported to the GPF, this improvement is unlikely to increase the reporting burden for countries.
- Engaging in a technical discussion with countries to accelerate the use of well-established standards, including but not limited to definition of indicators and data sources, predefined analytical approaches and routines to assess data quality. The adoption of standards will enable a wider discussion and cross-country learning.

5.2. Recommendations for future HSIS evaluations

General remarks

1. Any evaluation effort should respond to the specific decisions it is meant to address and needs, therefore, to be guided by the specific decisions that an organisation is preparing to make. The most crucial issue for ascertaining the relevance, feasibility or "fit for purpose" of any evaluation is to spell out the decision scope that it is intended to inform. Approaches focused on producing 'generic knowledge' about *how things are going* may not be so useful and are often found as the underlying root of evaluation challenges.
    a. Cross-country comparison need to be specific and clarity is needed on what basis the comparison is required and which decision it is linked to. If cross-country comparisons are considered meaningful, all aspects, i.e. financial data, relevant contextual indicators and expected outcomes should be aligned.
    b. Sub-national data and analysis is relevant when Gavi investments are directed to sub-national targets. In such cases reliable and valid sub-national data is required for all aspects, i.e. financial data, relevant contextual indicators and expected outcomes. Countries already collect sub-national administrative data, but its use for M&E is limited by quality concerns inherent to the weaknesses in the immunisation information system, but more importantly by the absence of HSS financial/programmatic data at the same level of disaggregation. However, the real issue is whether available data is of "enough" quality to support the decisions it is meant to support. Hence it is required to look at each evaluation issue or domain to determine whether existing data is sufficiently good.
2. Defining the decision scope is paramount to guide future evaluation efforts. However, the scope of decisions and the "spaces" in which these decisions are taken are neither linear

nor isolated, and can span across organisation levels and knowledge domains. Therefore, the definition of the decision space is actually a 'practical' exercise that should involve the organisation, stakeholders and beneficiaries. Examples from the policy-making domain where the same challenge has been met may prove to be inspiring here (34,35).

3. In any scenario, key concepts need to be accompanied by clear and consensual definitions, particularly when most of the terms used in the context of evaluations are frequently used in common language (e.g. relevance, impact, progress, process).

Relevance of an evaluation of Gavi's HSIS support

Relevance is defined as "the quality or state of being closely connected or appropriate"(36); such as to the decisions that evaluations are meant to inform.

Gavi seems to understand relevance in terms of the adequacy between HSS support and the problems it is meant to address.

Gavi may want to consider a 'decision-making' approach to evaluation. For example, 'major funding decisions' are the responsibility of the Gavi board, while 'Advisory Committees' have no decision-making power (37). In this case, the key issue is to ascertain the criteria that the Gavi board is using to issue those decisions and what degree of certainty (38) is required for the indicators measuring those criteria. Gavi may want to consider carrying out this exercise for every decision level, mapping decisions with criteria and indicators by each decision level.

If this is done, this would be followed by a process, to identify the most efficient way of measuring the indicators required with the desired level of certainty.

Based on these reflections, we believe that the issue of 'Relevance of HSS support evaluation" may not be totally appropriate and may not be informed by the findings of this review. Some aspects of the HSS evaluation are relevant (some of which are feasible; others not), while some would seem to be irrelevant.

Feasibility of evaluating Gavi HSS support

Gavi may want to consider that at present there is very limited good quality evidence relating HSS investments and progress in "addressing health system bottlenecks to equity in immunisation coverage", as well for tracking progress towards Gavi's strategic goal on sustainability.

While HSS support targets the health system, Gavi HSS is not the unique or the main factor leading to better health systems performance, not even in the immunisation programme domain. This is because (i) the health system is much larger than the 'immunisation system'; (ii) there is no blueprint on how to improve health systems; (iii) there are other forms of support that do not necessarily create synergies with Gavi HSS support.

As a consequence it is not necessarily informative and useful for decision-making to attempt an atomisation of contributions in order to demonstrate attribution. The main challange is not to 'isolate' a given contribution once it has been already implemented alongside all sorts initiative, but that attribution requires methodologies that cannot really be implemented in a routine basis. The intention to impact on the system as a whole introduces a complexity that can not be undone when trying to evaluate the effects of these investments.

However, we argue that evidence gaps are dependent on what is considered to be relevant in terms of decision-making. We would suggest that Gavi could consider to:

1) List decisions types at each managerial level, including in beneficiary countries;
2) Map those decisions against the criteria used to inform them;
3) Define the indicators and type of evidence to population those criteria.

Regarding evaluation of HSS support effectiveness, Gavi may want to consider different scenarios:

1) Support to essential activities or resources: this refers to all resources that are critical for vaccination services to take place and to respond to the managerial and institutional setup of vaccination programmes. Examples include: human resources, vaccines, syringes or cold chain.
2) Support to improve performance of targeting interventions which are not necessarily routine but rather designed to make a difference to the performance of a programme. These may include: (i) activities that are (relatively) well established and for which there is an appropriate body of evidence that they can improve vaccination programmes performance e.g. outreach strategies; mass campaigns' or (ii) activities where it is uncertain whether they can improve vaccination programmes performance due to the absence of reliable evidence or conflicting evidence e.g. supervision, training modalities. This scenario complies with the recommended actions for the strategic objective 3 of GVAP: "benefits of immunization are equitably extended to all people".

Gavi may consider evaluating essential activities (point 1, immediately above) using existing EPI reviews or the GPF including a carefully selected small number of routine programmatic indicators. However, if the essential programmatic elements that are needed to carry out vaccinations are not in place, there is little scope to consider further support or how additional support may have impacted vaccination.

With regards to point 2, Gavi should consider which evidence can inform additional systems support – albeit recognising that good or consistence evidence is not available to support all interventions. To make Gavi's HSIS support more evidence-informed, Gavi might like to consider a sort of "evidence watch entity", which would gather and disseminate the evidence required to inform Gavi support, in order to transparently understand on which grounds Gavi supports what (beyond particular countries preferences). This would not need to contradict the autonomy of countries or their discretion regarding the kind of support they apply for. On the contrary, this would empower countries to enter into a dialogue about what works and what not, and about the system deficiencies that exist and how Gavi could support to overcome them. For example:

Type of issue	Examples of issues	Evaluation indicators / approach	Examples of data sources
Essential issue	Enough vaccination workforce all over the country	Proportion of population without a vaccination service at less than 1 hour from the household	Human resources information systems; health services geographical distribution
Essential issue	Availability of vaccines	Proportion of vaccination points with regular supply of systematic vaccines	Stock management; national and district level supply chain management information systems
Interventions with known effects	Geographical distribution of outreach sessions	Vaccination coverage in fixed versus outreach sessions; overall vaccination coverage and drop-out rates in sentinel sites (e.g. those known where most vulnerable population lives)	Activities summaries; sub-national and national coverage data & WUENIC
Interventions with unknown effects	Traditional Religious leaders to promote vaccination in the community	Comparative studies or time series in selected areas.	Study data sources

Gavi might further outline which proven interventions are aligned to different SFAs. Similarly SFAs could be reflected upon on the basis of available evidence and evidence needs- For instance “Data quality, availability and use”: A lot of evidence on poor data quality is available but strikingly low evidence on what works to improve data quality or even what is the meaning of data quality for decision making.

Regarding feasibility and approaches for future evaluations, it is suggested to keep evaluation efforts for interventions that are well known to work (e.g. outreach) minimal as it is already known that interventions in this category produce effects. Gavi could consider limiting evaluation efforts to showing if there is a reasonable level of implementation. For less well proven interventions, evaluation efforts would require more intensity and draw from the wide array of quantitative and qualitative methodologies.

Here Gavi could consider evaluating by “intervention” rather than by the type of support (e.g. “HSS support”). In summary:

- programme management support / institutional capacities: a few indicators of routine vaccination activities;
- interventions known to be effective: a few indicators of the intervention implementation;
- interventions unknown to be effective: specific studies, considering a research setup.

This would require Gavi to consider a combination of the following: (1) establishing an “evidence watch entity” within the existing M&E teams; (2) refocusing HSS support in three categories: (a) essential support, (b) effective interventions and (c) uncertain interventions, and in so doing shifting the dialogue with countries (and the attached formalities) to the technical and scientific arena (adapting support calls and budgeting structures); (3) reducing evaluation efforts to focus on generating better evidence from a smaller number of areas or domains, while taking stronger advantage of what is already known.

Parameters for future evaluation approaches

Technically, evaluations (in the terms defined above) need to have the following characteristics:

1) transparent and systematic: explicit methods, shared with stakeholders, with specific analytical plans and consistency between evaluation protocols and evaluation implementation. Fungible money is not supportive of transparency, and considering that Gavi HSS grants are small portion of recipient countries' health financing, there may be limited value in fungibility.
2) independent to ensure that there is no interference by interested parties;
3) prospective: data collection and analyses are defined before data is collected;
4) using research methods: the rationale for using research methods is to minimise bias; if evaluation uses precarious methods or methods which are not properly applied, then Gavi has to accept that bias is being introduced – with the corollary that wrong decisions may be taken on the basis of such research. It should here be noted that research methods do not need to be more expensive or cumbersome – but they need to be more strictly applied;
5) the issue of 'attribution' can be limited to the level of theoretical frameworks, supported by available evidence. If the 'unit of evaluation' is shifted to be specific interventions, Gavi will be able to establish whether its support has led to the expected effects and if so, then to which extent;
6) ecological studies of associations between HSS performance and financial inputs are of very limited value, even if carried out with the best intention and methods. In our experience, these studies can inform further research but lack the required credibility for policy makers to make decisions or to inform vaccination strategies. If these studies are considered, they should be based on a careful review of available evidence in bearing carefully in mind the kind of decisions they would inform.

Gavi may find it difficult to reach a consensus among all contributors, including countries, on how to approach evaluation in general, of HSS or in any particular domain. This may be due to the legitimate diverse perspectives of different Gavi staff and stakeholders and the lack of universal consensus on methodological approaches. We recommend Gavi to consider the development of an evaluation framework and approach, which is informed by the 'real' decisions that are made at different levels and feasible and credible given the resources that can be reasonably dedicated to evaluation. We have outlined above the principles that this evaluation approach should respond to.

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7. Annexes

7.1. Review questions as stated in request for proposal

Table 19: Review questions as stated in request for proposal

Questions	Sources	Remarks
7.1. OUTCOMES & RESULTS		
7.1.1 Coverage & Equity in immunisation:		
How do Gavi's HSS investments contribute to, or are likely to contribute to, improved coverage and/or equity of routine immunisation?	Data sources detailed in Annex 7.3 Documents (proposal document, Coding of HSS activity table provided by Gavi) KII	
How do HSS investments contribute to new vaccine introductions?	Data sources detailed in Annex 7.3	
To what extent does Gavi HSS support contribute to improved equity between and within countries including, but not limited to, gender equity and equity between the poor and the non-poor?	Data sources detailed in Annex 7.3 Documents (proposal document, Coding of HSS activity table provided by Gavi) KII	
How do Gavi's HSS investments contribute to, or are likely to contribute to, achievement of results in terms of GPF or other targets?	GPF Documents (Audit of Grant Monitoring and Reporting Process, February 2017-2, Grant	

	Management Approach, GAVI Alliance ME Framework and Strategy, The Gavi grant management change process) KII	
7.1.2 Integrated primary health care:		
To what extent do the investments contribute to strengthening the capacity of integrated health systems to deliver immunisation?	Documents (Gavi Strategy 2016-20, Gavi 2016-2020 Strategy Indicator Baselines and Targets) KII	
How do Gavi's HSS investments contribute to, or are likely contribute to, improvements in primary health care systems and toward universal health coverage? (e.g. through thematic investments in health information or management)?	Documents (proposal document, HSS activity table).	UHC no/little evidence in documents
7.1.3 Programmatic and Financial sustainability:		
How do Gavi's HSS investments contribute, or are likely to contribute, to improvements in programmatic or financial sustainability in thematic areas (e.g. through increased efficiency)?	Documents (proposal document, Coding of HSS activity table provided by Gavi, Joint Annual Appraisal reports) KII	
How are HSS investments contributing to build national institutional capacity in - vaccine procurement (forecasting, regulatory systems, vaccine management…)? - programme management, management of financial and human resources? - strategic planning / M&E / evidence based decision making? - sustainable service delivery models (including outreach and mobile services)?	Documents (proposal document, Coding of HSS activity table provided by Gavi, Joint Annual Appraisal reports)	
How are Gavi HSS investments supporting the transition process?	Documents (proposal	

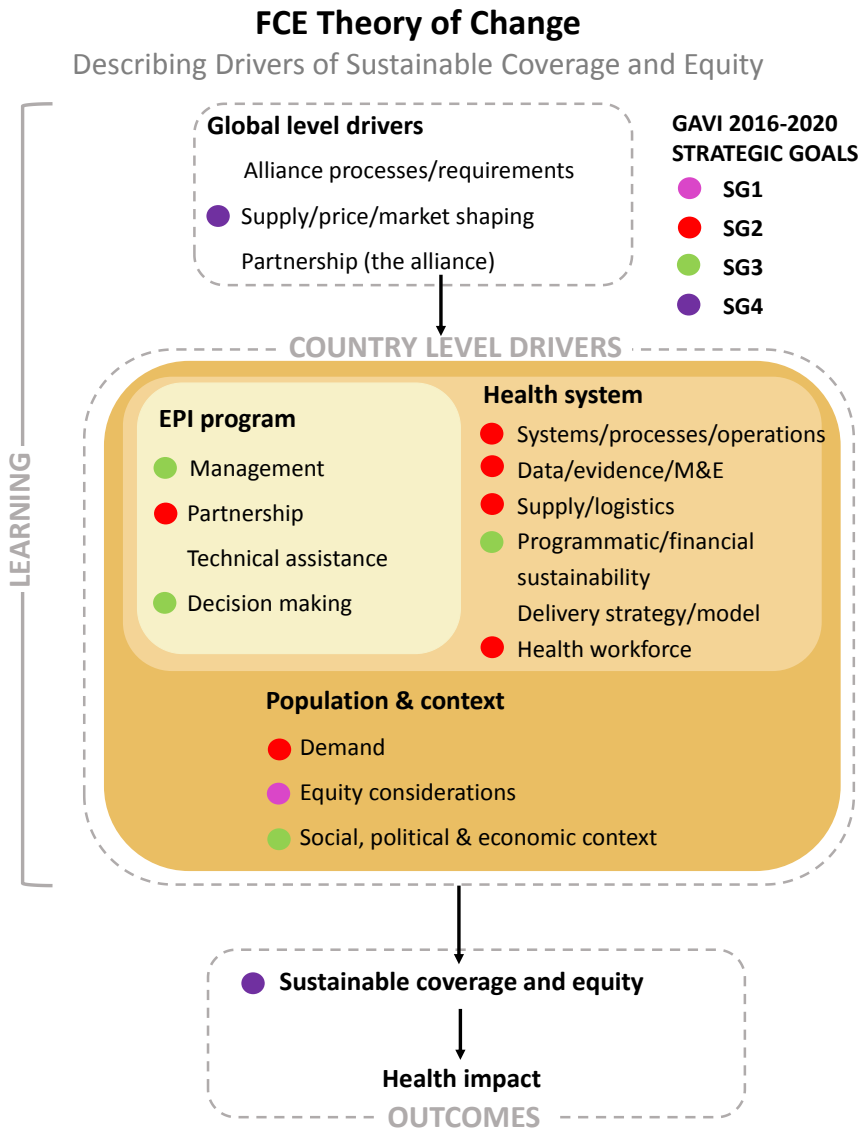
	document, Coding of HSS activity table provided by Gavi) KII	
Exploratory: How are HSS investments contributing to improved domestic financing of immunization and financial sustainability? (e.g. innovative financing mechanisms …)	Analysis of Fincial Data, Documents KII	
7.2 IMPLEMENTATION OF HSS GRANTS		
7.2.1 Contribution to Gavi's strategy		
To what extent is the implementation of HSS support prioritising, or increasingly prioritising, investments in: - Districts, areas or communities with low coverage, high inequalities, and/or large number of under-immunised children? - Thematic strategic focus areas? - Integration of services? - Is there sufficient flexibility to adjust grants to accommodate changing data or when results are not met?	Documents (Gavi strategy, Coding of activity table provided by Gavi, proposal), KII	
7.2.2 Programmatic and financial sustainability		
Are there evidence-based reasons for investments implemented outside of country systems (e.g. financial management; procurement; activities implemented through technical assistance partners)?	Analysis of Fincial Data, Documents, KII	
Where implementation is not through country systems, is there appropriate consideration, or considerations being established, of when such implementation would revert to country systems?	KII	
How do different grant management modalities contribute to programmatic sustainability?	KII	
Exploratory: Does implementation of Gavi's HSS support change as countries approach transition?	KII Documents	
Exploratory: How do the amounts of Gavi's HSS investments in terms of value for money, compare with other Development Partners' benchmarks?	Dropped	Insufficient data availability from development partners on HSS
7.2.3 Delayed or unpredictable funding:		

What factors contributed to causing delays in funds commitment and disbursement, relative to anticipated timelines (e.g. new assessments, changing risk appetite, changing country context)?	Analysis of Fincial Data, KII	
What actions are taken to mitigate delays and unpredictable funding?	KII	
7.2.4 Monitoring & results mechanisms:		
Does the Alliance have a mechanism for monitoring grant implementation that is appropriately differentiated by country contexts?	Documents, KII	
Does the Alliance support countries in monitor operational workplans and budgets to be able to identify in a timely fashion when grants are off track? How are countries supported to correct course accordingly?	Documents, KII	
How are Grant Performance Frameworks (GPFs) used to monitor progress on implementation of grants, and inform improvements when off track?	Documents, KII	
Exploratory: Does the Alliance sufficiently capture country progress in reports / literature for future use, future HSS grants and Gavi-wide reporting?	Documents, KII	
Exploratory: How are the results of GPF monitoring used to inform Gavi's strategic priorities, focus and necessary changes?	KII	
7.3 DESIGN OF HSS GRANTS		
7.3.1 Aligning grants to country contexts:		
Are the HSS grants aligned to national strategies? Are the HSS grant application and priorities being developed in consultation with relevant stakeholders?	Documents (IRC letters & proposal document)	
To what extent is the Gavi support from different streams coordinated or consolidated into one supporting programme?	KII	
How is the HSS grant placed in the country's health financing landscape (including domestic financing and all external contributions to the health sector)? What is the dimension of Gavi support in the sector?	Analysis of Fincial Data	
How is Gavi support harmonized with other development partners' contributions and where are synergies exploited? (e.g. common investment framework, coordinated TA, management mechanisms …)	Documents (Proposal document)	
7.3.2 Aligning grants and Gavi's Strategy:		
To what extent do countries design grants consistent with Gavi's 2016-20 Strategy and Programming Guidelines?	Documents (Proposal document,	

	Gavi Programming Guidelines)	
Have the objectives around Coverage & Equity (C&E) been clearly defined and pursued with: - clearly identified under-immunised populations? - tailored and prioritized interventions? - integration of immunization service delivery with primary health care?	Documents (Coding based on Gavi HSS activity table provided by Gavi, proposal document)	
Have HSS investment been informed by coverage and equity analysis?	Documents (proposal document & annexes to proposal)	
Exploratory: To what extent do HSS proposals capture the potential of national / local actors, including CSOs and private sector?	Documents (proposal document & CSO analysis conducted by Gavi)	
Exploratory: to what extent is HSS proposal design influenced by the funding channel and grant management modality defined in advance? How does this contribute to, or hamper, progresses toward C&E?	KII	
Exploratory: Do countries routinely incorporate lessons learnt & recommendations (e.g. from previously implemented HSS grants; Joint Appraisals) into new proposals?	Documents (proposal document)	
Exploratory: What have the findings from the Independent Review Committee over time suggested in terms of aligning grants with Gavi's strategy? How do 2016-2017 proposal design matches with these IRC high level recommendations?	Documents (IRC Global Reports, proposal document)	
7.3.3 Monitoring & Evaluation:		
To what extent are the monitoring & evaluation mechanisms in place sufficient to measure progress toward agreed HSS grant objectives? Is the grant M&E framework aligned with country health sector and immunization frameworks? Are they complementary or integrated?	Documents (Overview of the Performance Framework, Audit of	Agreed that country health sector and immunization frameworks

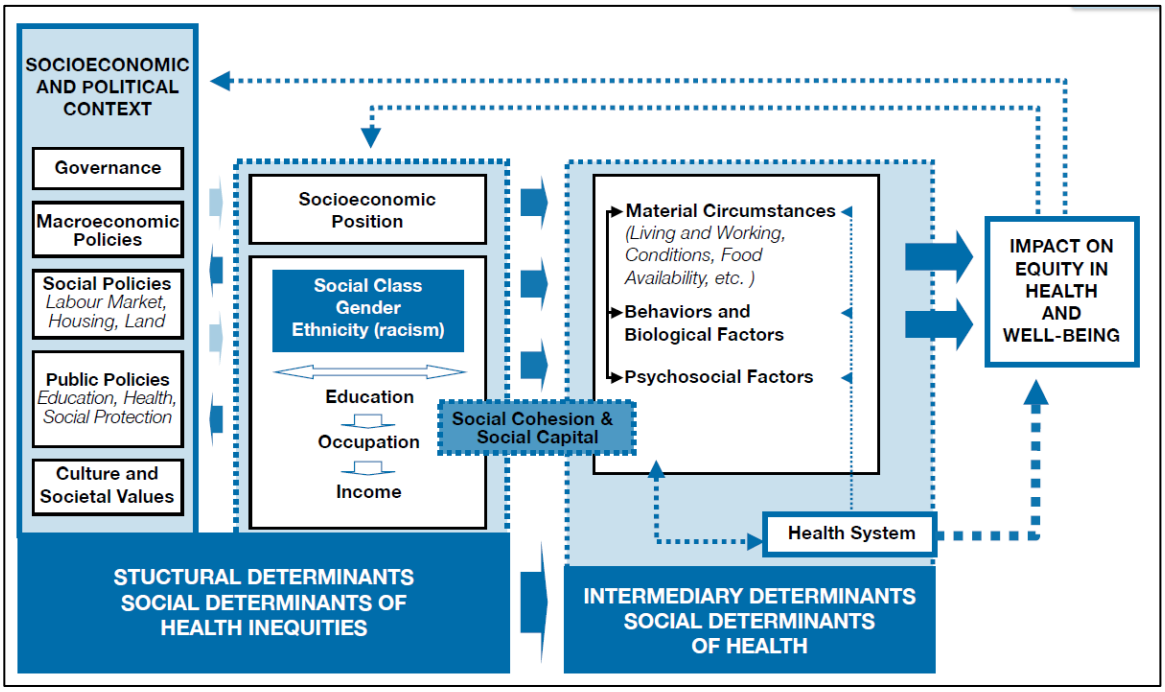
	Grant Monitoring and Reporting Process, February 2017-2) KII	= CMY objectives

7.2. Theory of Change



Source: Gavi Full Country Evaluations. 2016 Annual Dissemination Report

7.3. Conceptual Framework for Social Determinants of Health (7)



7.4. Data sources

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b. Gavi - Workbook: CONSOLIDATED Approvals and Disbursements - 30 June 2018_HSS 1 2 and 3; sheet: 'Disbursements by Year Paid'

c. Gavi - Workbook: GPF_Results; sheet: "data", received on 26 October 2018

d. WHO/UNICEF: Estimates of National Immunization Coverage (WUENIC) and WHO Protection at birth (PAB) estimates http://www.who.int/immunization/monitoring_surveillance/data/en/ accessed on 16 November 2018 (39)

e. WHO Joint Reporting Form www.who.int/entity/immunization/monitoring_surveillance/data/indicator_series.xls accessed 18 October 2018 (25)

f. WHO Global Health Expenditure Database http://apps.who.int/nha/database/Select/Indicators/en accessed on 20 October 2018 (31)

g. World Bank:

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    b. Worldwide Governance Indicators http://info.worldbank.org/governance/wgi/#home accessed on 23 October 2018 (41)

    c. Fragility States Index http://fundforpeace.org/fsi/excel/ accessed on 01 October 2018 (42)

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    e. United Nations – Department of Economic and Social Affairs. World Population Prospects 2017. https://population.un.org/wpp/Download/Standard/Population/ accessed on 12 November 2018.

7.5. Data points (country-years) available for potential control predictors

Figure 33: Data points (country-years) available for variables considered as potential control predictors

Variable	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Total	
																				n	%
Country	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	1463	100%
Gross Domestic Product per capita	71	72	73	73	73	73	73	73	73	73	74	73	72	72	72	72	71	70		1303	89%
Gini coefficient	10	15	22	18	18	22	14	19	15	17	20	20	21	14	18	16	10			289	20%
Nurses and midwives (per 1,000 people)									40	41	60	28	31	28	29	12	7			276	19%
Physicians (per 1,000 people)									44	43	62	32	36	29	29	12	8			295	20%
UHC service coverage index																56				56	4%
Coverage of Antenatal Care	46	17	8	20	10	23	37	20	15	12	31	18	25	15	28	15	13	3		356	24%
Fragile States Index							66	75	75	75	75	75	76	76	76	76	76	76	76	973	67%
Voice and Accountability	74		74	74	74	74	74	74	74	74	74	75	75	75	75	75	75	75		1265	86%
Control of Corruption	74		74	74	74	74	74	74	74	74	75	75	75	75	75	75	75	75		1266	87%
Government Effectiveness	74		74	74	74	74	74	74	74	74	74	75	75	75	75	75	75	75		1265	86%
Regulatory Quality	74		74	74	74	74	74	74	74	74	74	75	75	75	75	75	75	75		1265	86%
Rule of Law	74		74	74	74	74	74	74	74	74	74	75	75	75	75	75	75	75		1265	86%
Political Stability and Absence of Violence ar	73		73	74	74	74	74	74	74	74	74	75	75	75	75	75	75	75		1263	86%
Ethnic Fragmentation	73		72	72	72	73	73	73	73	73	73	73	73	73	73	73	73	73	72	1310	90%
Linguistic Fragmentation	72		71	71	71	72	72	72	72	72	72	72	72	72	72	72	72	72	71	1292	88%
Religious Fragmentation	75		74	74	74	75	75	75	75	75	75	75	75	75	75	75	75	75	74	1346	92%

7.6. Key informants

Table 20: Key informants

Name	Role
Bor, Emmanuel	SCM, DRC
Cornejo, Santiago	Director, IF&S
Craw, Laura	Senior Manager, M&E
Diop, Thierno	Senior Manager PF
Gehl, Dirk	SCM, Bangladesh
Lacorte, Ricard	SCM, Afghanistan
Powell, David (David Sali)	Head, PF
Reynolds, Alexa	SCM, PNG
Rwamushaija, Tito	SCM, Ethiopia
Serres, Adrien	Senior Manager, PF
Setayesh, Hamidreza	SCM Pakistan
Soundardjee, Riswana	M&E
Szeto, Carol	SCM, India
Wunderlich, Joshua	M&E

7.7. Guideline for key informant interviews

1. IMPLEMENTATION OF HSS GRANTS

a. Contribution to Gavi's strategy

How is the alignment of HSS grants with C&E, SFAs supported at different levels (e.g. Gavi, country)?

How are vaccination services integrated with other services at country level?

Are the activities as planned in the budget also implementation? How are activities linked to any financial reporting (use of funds)?

To what extent is the implementation of HSS support prioritizing investments in C&E, SFAs and the integration of services?

How do you monitor Gavi's investments in C&E/SFAs?

- Which processes are in place? Which templates you use?
- What are the strengths and weakness of approach?
- What are the opportunities you see for improvement?

Are countries (increasingly) investing Gavi funds in C&E, SFAs?

Does Gavi support activities for prioritizing investments into C&E/SFAs at country level and when/if this is the case, how does the harmonization take place?

How do you know if a country meets or does not meet program results?

- In case Joint Appraisal Reports are mentioned: How are they analysed? Which aspects/criteria/targets are you taking in consideration for this judgment (e.g. financial, implementation of activities?)? Do you know about any cases, where countries identified and informed Gavi of any changes in data or that results are not met?

Do you have own indications on the above (e.g. through newly published surveys, reports)?

How are these changes (identified by country, Gavi, or other) being addressed in the grant?

Can you point us to some cases where HSS grants were altered to address performance challenges?

b. Programmatic and financial sustainability

What are the reasons why investments are implemented outside of country system and are supporting documents ("evidence base") for that decision available? e.g.

How are decisions for investments/activities (e.g. financial management, procurement) implemented outside of country systems made?

- Is this evidence driven?
- Weighting of considerations (fiduciary risk versus capacity)?

What factors are taken into consideration/will be taken into consideration for implementation to revert back?

Is there a plan to revert to country systems (if yes, when?)

When was the decision to revert taken (e.g. planned from beginning)?

Specific activities/measures in process to revert to country systems, e.g. progress of transition plan and achievements.

From your perspective: Does the funding and grant modality (use of partners, MoH, MoF, etc) affect Gavi's position to negotiate for increases in immunization financing at national/sub-national level?

Whom do you get to talk to (level of hierarchy) as main interaction point for negotiating increases in immunization financing/for political commitment to immunization?

From your perspective: Are countries increasing their allocation of domestic resources, financial and management resources towards immunization? Are these increases at the pace you expect?

Are (sufficient) arrangements in place for (timely) transition of implementation/activities back to government?

What measures are in place to support these countries to take over fully implementation of HSS support/activities?

How does implementation of Gavi's HSS support change as countries approach transition?

c. Delayed or unpredictable funding

What is the reason for transferring funds via partners?

To what extend is Gavi able to disburse funds within the program year? If/when, there are delays (in providing countries with funds during the program year) what are the causes? How do the delays affect implementation at country level?

What actions are taken to mitigate delays and unpredictable funding for countries?

How does disbursing funds to partners support/improve absorption of funds (as observed that disbursements to partners are timelier that those to Gov't)?

Is there a relationship between timeliness in reporting and disbursement of funds (are cash disbursements linked to fulfilling reporting requirements)?

d. Monitoring & results mechanisms

In monitoring countries: Does Gavi separate countries by context? If so, how?

Does the performance framework mirror the requirements by country context?

On which basis are the indicators assigned to objectives/activities?

How well are the indicators tailored to the Gavi HSS support??

Within Gavi: Who is responsible for checking the compliance and accuracy of data/indicators?

Is there a defined feedback process to countries on the above?

Are there consequences in case of non-compliance (data not complete, errors)?

How does Gavi monitor grant implementation?

How will a Senior Country Manager know that a program is on track?

Is the status of grant implementation part of the performance framework?

What are the sources of information?

Do Joint Appraisal Reports capture progress in the implementation? If applicable: Are any gaps from the GPF addressed through the Joint Appraisal report?

Is there a consolidation of the Joint Appraisal reports over countries? How are cross-country comparisons processed and fed back to the SCM?

Is information extracted to document progress of HSS grants?

Are Gavi KPIs informed by implementation and progress experiences?

2. DESIGN OF HSS GRANTS

a. Aligning grants to country contexts

How do countries align grants to country context?

How does Gavi support alignment to the various country context, e.g. through technical assistance, or working through partners?

To what extent is the Gavi support from different streams (e.g. new vaccine introduction) coordinated or consolidated into one supporting Program?

Is there a coordination mechanism, coordination of technical assistance, management mechanism (e.g. common program management unit, same fiduciary agent)

b. Aligning grants and Gavi's Strategy

How do you see Gavi working with the private sector? How can these initiatives be taken to scale?

7.8. Coding Example Coverage & Equity

Example Afghanistan	Description	Coverage	Reasonable effect on coverage	Equity	Reasonable effect on equity	Aiming at disadvantaged	Reducing gradient	Budget contributing to coverage	Budget contributing to equity	Overall budget contributing to C&E
Objective 3. Improvement of demand for immunization services by implementing context specific communication interventions to cover the disadvantaged population.		+	+	+	+	-	+	1‘689‘280	360'480	1‘689‘280
Activity 3.1: Increasing awareness and promoting immunization through the mobilization of religious leaders **Budget: 360'480**	It includes development of IEC materials and conducting seminars at district level to raise awareness about need for immunizations among 14,400 religious leaders. They are encouraged to disseminate these messages to disseminate to their communities with objectives of building trust in immunizations, removing misconceptions and improving demand for immunizations. They possess a key role in Afghani society and their position of great respect will help in creating demand for vaccination.	+	+	+	+	-	+	+	+	+
Activity 3.2: Implementing BCC activities through mass media, ICT and IPC. **Budget: 1’328'800**	It include enlisting broadcast media, supporting the Health Information Call Center, and building the capacity of frontline health workers and school teachers, as well as supporting CHWs other mobilizers with tools and advocacy materials for interpersonal communication (IPC).	+	+	-	-	-	-	+	-	+
Activity 3.3: Generating Evidence and Knowledge **Budget: 939’292**	Baseline, midline and end-line studies will ground the strategy in evidence and data and generate critical feedback and lessons learned for program improvement at different stages of implementation.	-	-	-	-	-	-	-	-	-

7.9. Annual Gavi's disbursements

Table 21: Amount disbursed (US$) by Gavi through all HSS grants and Non-HSS grants

Year	Non-HSS grants (US$ millions)	All HSS (US$ millions)
2000		2
2001		114
2002		94
2003		158
2004		136
2005		206
2006		194
2007	92	296
2008	138	456
2009	34	301
2010	50	534
2011	44	637
2012	52	900
2013	119	1,251
2014	145	1,153
2015	172	1,372
2016	194	1,059
2017	226	1,070
2018	76	470

7.10. Gavi disbursemetns per country and strategic periods

Table 22: Amount of Gavi funds disbursed by Gavi HSS and non-HSS grants per country and during the Gavi strategic periods

Country	Period 2000-2005		Period 2006-2010		Period 2011-2015		Period 2016-2018		Total HSS	Total No-HSS
	HSS	Non-HSS	HSS	Non-HSS	HSS	Non-HSS	HSS	Non-HSS		
Afghanistan	0	3,754,500	26,800,000	55,205,501	23,200,000	103,300,000	21,100,000	77,214,706	71,100,000	239,474,707
Albania	0	613,271	0	1,061,397	0	846,372	0	0	0	2,521,040
Angola	0	11,690,735	0	35,732,706	0	52,012,491	5,738,940	10,520,633	5,738,940	109,956,565
Armenia	0	638,101	139,500	1,277,921	152,000	2,553,698	0	1,745,170	291,500	6,214,890
Azerbaijan	0	1,365,117	0	2,286,740	582,000	8,883,089	0	907,155	582,000	13,442,102
Bangladesh	0	36,373,585	7,243,500	111,100,000	6,428,000	271,100,000	22,900,000	158,300,000	36,571,500	576,873,585
Benin	0	8,437,948	0	23,984,536	2,886,036	49,575,729	2,246,002	21,751,259	5,132,038	103,749,472
Bhutan	0	437,953	76,000	517,883	118,000	768,136	0	64,166	194,000	1,788,139
Bolivia	0	516,000	1,046,000	8,574,683	1,047,000	15,726,900	2,162,766	4,050,888	4,255,766	28,868,471
Bosnia & Herzegovina	0	284,924	0	1,860,071	0	120,855	0	0	0	2,265,851
Burkina Faso	0	13,714,871	3,693,500	38,309,850	2,927,937	91,701,693	2,793,410	54,206,123	9,414,847	197,932,537
Burundi	0	10,446,938	4,978,000	20,168,053	15,500,000	54,663,838	11,400,000	23,315,576	31,878,000	108,594,405
Cambodia	0	7,102,781	5,161,000	8,334,615	5,154,500	36,888,165	7,738,914	15,416,828	18,054,414	67,742,389
Cameroon	0	11,599,212	5,737,500	32,242,469	1,226,948	125,000,000	(107,159)	27,020,153	6,857,289	195,861,834
CAR	0	1,030,749	1,893,000	6,176,817	1,270,000	15,443,167	6,040,817	9,241,874	9,203,817	31,892,608
Chad	0	1,401,132	707,000	14,495,646	4,271,010	29,818,445	749,199	16,325,124	5,727,209	62,040,347
China	0	38,679,133	0	0	0	0	0	0	0	38,679,133
Comoros	0	467,228	0	568,635	1,198,376	677,415	490,163	144,199	1,688,539	1,857,477
RoC	0	1,116,019	0	6,585,985	0	14,258,849	5,200,000	1,890,568	5,200,000	23,851,421
Côte d'Ivoire	0	9,714,835	1,790,000	22,282,692	3,939,153	67,520,843	4,774,275	56,050,343	10,503,428	155,568,713
Cuba	0	170,500	0	189,500	2,369,000	730,389	0	834,325	2,369,000	1,924,714
Djibouti	0	146,700	0	952,497	680,000	3,205,947	982,488	1,245,831	1,662,488	5,550,975
DPRK	0	3,929,317	2,161,100	7,831,642	8,354,759	14,091,643	12,500,000	4,044,467	23,015,859	29,897,070
DRC	0	16,551,016	41,700,000	123,800,000	77,600,000	329,400,000	42,300,000	144,300,000	161,600,000	614,051,016
Eritrea	0	2,151,109	664,000	4,408,821	2,114,000	6,332,121	2,399,708	7,617,818	5,177,708	20,509,869
Ethiopia	0	6,652,697	76,500,000	143,700,000	54,300,000	487,500,000	41,600,000	143,600,000	172,400,000	781,452,697
Gambia	0	3,963,088	0	4,727,676	0	15,822,109	1,574,306	4,608,754	1,574,306	29,121,627

Country	Period 2000-2005		Period 2006-2010		Period 2011-2015		Period 2016-2018		Total HSS	Total No-HSS
	HSS	Non-HSS	HSS	Non-HSS	HSS	Non-HSS	HSS	Non-HSS		
Georgia	0	306,755	311,000	1,125,574	124,500	3,243,501	0	1,297,604	435,500	5,973,433
Ghana	0	37,636,355	4,650,750	39,000,537	9,318,650	143,600,000	2,802,994	42,025,356	16,772,394	262,262,248
Guinea	0	2,647,270	0	13,128,476	2,134,500	23,489,535	7,553,740	11,058,726	9,688,240	50,324,007
Guinea-Bissau	0	384,359	338,500	2,661,044	955,657	3,495,332	125,962	4,514,518	1,420,119	11,055,252
Guyana	0	891,148	0	1,275,281	0	1,756,181	0	451,304	0	4,373,913
Haiti	0	1,558,000	0	95,500	2,173,689	12,914,413	1,126,226	8,045,517	3,299,915	22,613,430
Honduras	0	457,000	1,611,500	10,422,445	4,361,687	19,335,459	3,254,666	1,915,087	9,227,853	32,129,991
India	0	20,764,862	0	25,348,660	68,400,000	244,900,000	65,100,000	288,200,000	133,500,000	579,213,522
Indonesia	0	28,006,585	7,961,000	13,467,758	16,900,000	54,430,500	0	51,914,522	24,861,000	147,819,365
Kenya	0	65,645,398	9,903,000	86,640,808	0	232,200,000	5,826,864	67,158,506	15,729,864	451,644,712
Kiribati	0	0	0	199,874	0	425,134	0	15,323	0	640,331
Kyrgyzstan	0	886,710	935,000	4,598,766	491,421	9,359,517	1,687,574	4,088,358	3,113,995	18,933,352
Lao PDR	0	4,737,522	0	5,246,508	3,993,088	12,875,050	4,390,956	8,121,628	8,384,044	30,980,707
Lesotho	0	568,832	0	1,713,824	791,168	1,952,337	148,258	3,096,553	939,426	7,331,546
Liberia	0	1,682,446	3,067,500	7,480,608	3,862,246	17,665,736	4,222,092	8,323,218	11,151,838	35,152,008
Madagascar	0	12,253,095	2,515,500	27,793,707	8,421,270	93,462,977	3,207,309	36,172,023	14,144,079	169,681,802
Malawi	0	34,044,747	5,539,250	34,917,372	5,463,125	97,994,583	12,500,000	36,442,351	23,502,375	203,399,053
Mali	0	8,616,454	2,918,000	44,337,489	1,657,800	80,620,425	8,640,000	56,473,155	13,215,800	190,047,523
Mauritania	0	897,593	0	4,602,131	763,500	16,276,986	3,001,220	7,599,331	3,764,720	29,376,041
Moldova	0	523,458	0	1,886,438	0	3,361,868	0	753,282	0	6,525,046
Mongolia	0	771,955	165,000	3,430,596	339,500	1,894,125	0	17,030	504,500	6,113,706
Mozambique	0	17,306,976	0	24,313,968	5,514,068	96,438,447	5,323,599	76,262,789	10,837,667	214,322,180
Myanmar	0	14,148,941	0	6,737,297	29,400,000	66,340,089	341,271	53,384,271	29,741,271	140,610,598
Nepal	0	12,424,478	8,667,000	20,524,396	14,500,000	46,943,686	12,200,000	16,543,315	35,367,000	96,435,875
Nicaragua	0	138,000	690,000	7,446,481	1,871,316	21,623,156	1,232,284	3,870,545	3,793,600	33,078,182
Niger	0	2,507,924	0	28,860,969	13,500,000	75,902,503	14,600,000	39,460,540	28,100,000	146,731,936
Nigeria	0	10,061,338	22,100,000	58,682,795	18,100,000	407,500,000	(9,941,718)	270,300,000	30,258,282	746,544,133
Pakistan	0	37,097,738	16,900,000	236,400,000	6,626,000	524,400,000	58,900,000	232,200,000	82,426,000	1,030,097,738
PNG	0	0	0	6,943,268	1,103,854	21,061,392	1,963,296	3,948,498	3,067,150	31,953,158
Rwanda	0	21,317,901	3,889,500	15,897,881	6,155,457	75,904,112	5,414,503	19,807,513	15,459,460	132,927,407

Country	Period 2000-2005		Period 2006-2010		Period 2011-2015		Period 2016-2018		Total HSS	Total No-HSS
	HSS	Non-HSS	HSS	Non-HSS	HSS	Non-HSS	HSS	Non-HSS		
Senegal	0	8,476,024	1,133,000	24,477,364	2,452,500	58,739,720	6,578,863	30,164,594	10,164,363	121,857,702
Sierra Leone	0	1,925,491	1,684,750	16,836,573	(523,303)	34,798,517	2,063,128	12,744,461	3,224,575	66,305,042
Solomon Islands	0	0	0	806,755	1,008,620	1,906,839	892,033	629,704	1,900,653	3,343,298
Somalia	0	819,140	0	609,000	11,500,000	9,457,223	6,547,460	3,944,116	18,047,460	14,829,479
South Sudan	0	453,450	2,620,910	4,250,824	9,456,460	14,578,434	12,600,000	7,563,114	24,677,370	26,845,823
Sri Lanka	0	2,555,475	2,358,750	14,158,392	2,146,250	6,833,341	0	1,948,437	4,505,000	25,495,644
STP	0	238,455	0	314,580	0	1,074,334	1,363,338	893,791	1,363,338	2,521,160
Sudan	0	7,270,576	9,437,500	49,795,090	14,600,000	211,400,000	8,505,166	70,915,042	32,542,666	339,380,708
Tajikistan	0	2,615,818	282,000	7,706,573	1,032,500	12,172,931	2,300,000	5,856,170	3,614,500	28,351,492
Tanzania	0	28,251,223	0	48,650,831	3,786,840	232,100,000	7,870,622	88,897,984	11,657,462	397,900,038
Timor-Leste	0	0	0	0	868,513	1,135,471	1,342,946	1,715,313	2,211,459	2,850,785
Togo	0	2,336,512	0	10,358,905	2,404,498	24,798,615	2,811,851	16,334,837	5,216,349	53,828,869
Turkmenistan	0	1,142,021	0	91,638	0	0	0	0	0	1,233,659
Uganda	0	63,274,458	0	57,821,321	12,800,000	120,200,000	4,793,054	91,593,118	17,593,054	332,888,897
Ukraine	0	2,706,981	0	837,482	0	0	0	0	0	3,544,463
Uzbekistan	0	4,350,997	0	17,501,655	0	34,112,552	7,380,000	13,663,683	7,380,000	69,628,887
Vietnam	0	11,729,744	16,300,000	28,807,503	20,800,000	95,642,808	3,562,452	13,106,592	40,662,452	149,286,647
Yemen	0	16,913,432	5,548,500	42,149,864	4,986,500	124,900,000	10,100,000	36,673,600	20,635,000	220,636,896
Zambia	0	23,422,063	2,917,500	26,773,028	(364,502)	62,275,809	4,444,496	37,105,427	6,997,494	149,576,327
Zimbabwe	0	1,459,614	0	18,091,013	1,918,714	56,658,441	5,169,072	27,166,575	7,087,786	103,375,643
Total	0	711,174,777	314,735,510	1,781,595,175	531,114,805	5,312,093,973	496,529,407	2,598,793,381	1,342,379,722	10,403,657,306

7.11. Countries included in the quantitative analyses – 2017 (illustrative)

Table 23: Key characteristics of countries included in the quantitative analyses – 2017 (illustrative)

Countries	DTP1 national coverage (%)	DTP3 national coverage (%)	MCV1 national coverage (%)	Gross domestic product per capita (US$)	Political stability score	Fragility state index
Afghanistan	73	65	62	586	-2.781	107
Albania	99	99	96	4,538	0.398	61
Angola	61	52	42	4,170	-0.295	91
Armenia	97	94	96	3,937	-0.705	71
Azerbaijan	97	95	98	4,132	-0.76	76
Bangladesh	99	97	94	1,517	-1.249	89
Benin	86	82	74	830	0.045	78
Bhutan	99	98	97	3,110	1.128	76
Bolivia	91	84	83	3,394	-0.303	77
Bosnia and Herzegovina	92	75	69	5,181	-0.382	73
Burkina Faso	95	91	88	671	-0.925	88
Burundi	94	91	90	320	-1.97	99
CÃ´te d'Ivoire	99	84	78	1,662	-1.094	97
Cambodia	94	93	84	1,384	0.168	86
Cameroon	93	86	77	1,447	-1.085	96
CAR	69	47	49	418	-1.939	113
Chad	55	41	37	670	-1.341	109
China	99	99	99	8,827	-0.251	75
Comoros	96	91	90	797	0.031	85
RoC	75	69	70	1,658	-0.527	93
Cuba	99	99	99		0.692	65
Djibouti	74	68	75	1,928	-0.708	89
DPRK	98	97	99		-0.481	93
DRC	82	81	80	458		110
Eritrea	97	95	99		-0.656	98
Ethiopia	85	73	65	768	-1.687	101
Gambia	93	92	90	483	-0.208	89
Georgia	98	91	95	4,078	-0.371	77
Ghana	99	99	95	1,641	0.086	70
Guinea	63	45	48	825	-0.606	102
Guinea-Bissau	95	87	81	724	-0.6	100
Guyana	97	97	99	4,725	-0.037	71
Haiti	79	60	53	766	-0.705	105
Honduras	99	97	97	2,480	-0.552	79
India	91	88	88	1,940	-0.826	78
Indonesia	96	79	75	3,847	-0.512	73
Kenya	93	82	89	1,508	-1.084	96
Kiribati	96	90	81	1,685	0.897	
Kyrgyzstan	94	92	95	1,220	-0.433	80
Lao PDR	89	85	82	2,457	0.43	82
Lesotho	98	93	90	1,182	-0.248	82
Liberia	99	86	87	456	-0.411	94
Madagascar	80	74	58	450	-0.334	84
Malawi	93	88	83	338	-0.272	88
Mali	73	66	61	825	-1.91	93
Mauritania	89	81	78	1,137	-0.619	94
Moldova	91	88	93	2,290	-0.24	72
Mongolia	99	99	99	3,735	0.816	57

Countries	DTP1 national coverage (%)	DTP3 national coverage (%)	MCV1 national coverage (%)	Gross domestic product per capita (US$)	Political stability score	Fragility state index
Mozambique	90	80	85	416	-0.976	89
Myanmar	94	89	83	1,299	-1.084	96
Nepal	95	90	90	835	-0.662	91
Nicaragua	99	98	99	2,222	-0.045	77
Niger	93	81	78	378	-1.303	97
Nigeria	49	42	42	1,969	-1.943	102
Pakistan	83	75	76	1,548	-2.399	99
Papua New Guinea	69	62	62	2,556	-0.583	86
Rwanda	99	98	95	748	0.039	91
Senegal	97	93	90	1,033	-0.045	82
Sierra Leone	98	90	80	499	0.03	89
Solomon Islands	99	94	84	2,132	0.215	85
Somalia	52	42	46	500	-2.326	113
South Sudan	35	26	20		-2.461	114
Sri Lanka	99	99	99	4,065	-0.061	87
STP	96	95	90	1,913	0.215	72
Sudan	98	95	90	2,899	-2.007	111
Tajikistan	98	96	98	801	-0.668	82
Tanzania	99	97	99	936	-0.583	80
Timor-Leste	80	76	70	2,279		91
Togo	92	90	91	617	-0.74	84
Turkmenistan	99	99	99	7,356	-0.148	74
Uganda	95	85	80	604	-0.557	96
Ukraine	65	50	86	2,640	-1.886	74
Uzbekistan	99	99	99	1,504	-0.278	82
Vietnam	98	94	97	2,343	0.305	70
Yemen	76	68	65		-2.961	111
Zambia	95	94	96	1,510	0.11	88
Zimbabwe	94	89	90	1,080	-0.774	102

7.12. Mixed binomial regression estimates and odds ratios

Table 24: DTP1 coverage

Predictor	Estimate	Low95[a]	High95[a]	OR[b]	ORlow[c]	ORhigh[c]	p-value	Sig.codes[d]
HSS1	0.0079	0.00037	0.01543	1.00793	1.00037	1.01554	0.03972	*
HSS2	0.00992	0.00117	0.01868	1.00997	1.00117	1.01885	0.02632	*
HSS3	0.01675	0.00662	0.02687	1.01689	1.00664	1.02724	0.00119	**
nonHSS1	0.00635	0.00337	0.00933	1.00637	1.00338	1.00937	0.00003	***
nonHSS2	-0.00189	-0.00515	0.00137	0.99811	0.99486	1.00137	0.2559	
nonHSS3	0.00503	0.00144	0.00862	1.00504	1.00144	1.00866	0.00607	**
Year	0.07655	0.05627	0.09684	1.07956	1.05788	1.10168	<0.00001	***
Year^2	-0.00372	-0.00473	-0.00272	0.99628	0.99528	0.99729	<0.00001	***
cGDP	0.02734	-0.07748	0.13217	1.02772	0.92545	1.1413	0.60917	
cHSE	0.01703	-0.08585	0.11991	1.01718	0.91773	1.1274	0.7456	
cFSI	-0.06822	-0.13743	0.00099	0.93406	0.8716	1.00099	0.05337	.
cACC	-0.13285	-0.20924	-0.05645	0.8756	0.8112	0.94511	0.00065	***
cSTA	0.08682	0.03789	0.13575	1.0907	1.03862	1.1454	0.00051	***
cGOV	0.06106	-0.01701	0.13914	1.06297	0.98313	1.14929	0.12529	
cREG	-0.07074	-0.14955	0.00807	0.93171	0.8611	1.0081	0.07854	.
cLAW	0.11461	0.02074	0.20848	1.12144	1.02096	1.23181	0.01671	*
cCOR	0.06656	-0.00987	0.14299	1.06883	0.99018	1.15372	0.08782	.
cETH	-0.0302	-0.16902	0.10863	0.97025	0.84449	1.11475	0.66985	
cLANG	-0.087	-0.22282	0.04883	0.91668	0.80026	1.05004	0.20935	
cREL	-0.00284	-0.08908	0.08339	0.99716	0.91477	1.08697	0.9485	
clogPOP	-0.05891	-0.16024	0.04243	0.9428	0.85194	1.04334	0.25457	
cDEN	0.11608	0.01488	0.21729	1.12309	1.01499	1.2427	0.02457	*

[a] low95 and high95: lower and upper limits of the 95% confidence interval of estimates
[b] OR: Odds Ratio
[c] ORlow and ORhigh: lower and upper limits of the 95% confidence interval of Odds Ratio
[d] Significance codes: ***: p < 0.001; **: 0.001 < p < 0.01; *: 0.01 < p < 0.05

Table 25: DTP3 coverage

Predictor	Estimate	Low95[a]	High95[a]	OR[b]	ORlow[c]	ORhigh[c]	p-value	Sig.codes[d]
HSS1	0.00645	0.0002	0.01269	1.00647	1.0002	1.01277	0.04297	*
HSS2	0.00789	0.00077	0.01501	1.00792	1.00077	1.01512	0.02976	*
HSS3	0.01187	0.00384	0.01989	1.01194	1.00385	1.02009	0.00375	**
nonHSS1	0.00241	0.00007	0.00474	1.00241	1.00007	1.00475	0.04342	*
nonHSS2	0.00003	-0.00251	0.00258	1.00003	0.99749	1.00258	0.98032	
nonHSS3	0.00665	0.0038	0.0095	1.00667	1.00381	1.00955	<0.00001	***
Year	0.06395	0.04659	0.08131	1.06604	1.04769	1.0847	<0.00001	***
Year^2	-0.00311	-0.00396	-0.00226	0.99689	0.99605	0.99774	<0.00001	***
cGDP	0.06595	-0.02186	0.15375	1.06817	0.97838	1.1662	0.14102	
cHSE	-0.00487	-0.08678	0.07704	0.99514	0.91688	1.08008	0.9072	
cFSI	0.00839	-0.04854	0.06532	1.00842	0.95262	1.0675	0.77276	
cACC	-0.09099	-0.15548	-0.0265	0.91303	0.856	0.97385	0.00569	**
cSTA	0.10074	0.05829	0.1432	1.10599	1.06002	1.15396	<0.00001	***
cGOV	0.03052	-0.0353	0.09634	1.03099	0.96532	1.10113	0.36339	
cREG	-0.02828	-0.09292	0.03636	0.97211	0.91127	1.03702	0.39112	
cLAW	0.10157	0.02398	0.17916	1.10691	1.02427	1.19621	0.0103	*
cCOR	0.02908	-0.03312	0.09127	1.0295	0.96742	1.09557	0.35955	
cETH	-0.03888	-0.16048	0.08273	0.96187	0.85174	1.08624	0.53092	
cLANG	-0.10761	-0.227	0.01177	0.89797	0.79692	1.01184	0.07727	.
cREL	-0.02989	-0.10517	0.04539	0.97055	0.90017	1.04644	0.43647	
clogPOP	-0.04848	-0.13605	0.03909	0.95268	0.8728	1.03987	0.27792	
cDEN	0.08785	0.00241	0.17329	1.09182	1.00241	1.18921	0.04388	*

[a] low95 and high95: lower and upper limits of the 95% confidence interval of estimates
[b] OR: Odds Ratio
[c] ORlow and ORhigh: lower and upper limits of the 95% confidence interval of Odds Ratio
[d] Significance codes: ***: $p < 0.001$; **: $0.001 < p < 0.01$; *: $0.01 < p < 0.05$

Table 26: DTP-DTP3 drop-out rate

Predictor	Estimate	Low95[a]	High95[a]	OR[b]	ORlow[c]	ORhigh[c]	p-value	Sig.codes[d]
HSS1	0.00781	-0.00143	0.01704	1.00784	0.99857	1.01719	0.09757	.
HSS2	0.00809	-0.0022	0.01838	1.00812	0.99781	1.01855	0.12321	
HSS3	0.00893	-0.00241	0.02027	1.00897	0.99759	1.02047	0.12282	
nonHSS1	-0.00032	-0.00353	0.00288	0.99968	0.99647	1.00289	0.84285	
nonHSS2	0.00402	0.00051	0.00754	1.00403	1.00051	1.00756	0.02494	*
nonHSS3	0.0093	0.00528	0.01332	1.00934	1.0053	1.01341	0.00001	***
Year	0.06636	0.04233	0.09038	1.06861	1.04324	1.09459	<0.00001	***
Year^2	-0.00314	-0.00432	-0.00197	0.99686	0.99569	0.99804	<0.00001	***
cGDP	0.31017	0.17271	0.44762	1.36365	1.18852	1.56458	0.00001	***
cHSE	-0.08978	-0.2096	0.03005	0.91413	0.81091	1.0305	0.14196	
cFSI	0.04613	-0.04027	0.13252	1.04721	0.96053	1.1417	0.29534	
cACC	-0.13929	-0.24146	-0.03711	0.86998	0.78548	0.96357	0.00754	**
cSTA	0.1594	0.09726	0.22154	1.17281	1.10215	1.24799	<0.00001	***
cGOV	0.0664	-0.03003	0.16284	1.06866	0.97042	1.17684	0.17712	
cREG	-0.07148	-0.1701	0.02715	0.93102	0.84358	1.02753	0.15549	
cLAW	0.05586	-0.05684	0.16856	1.05745	0.94474	1.1836	0.33134	
cCOR	-0.00824	-0.10016	0.08367	0.99179	0.90469	1.08727	0.86046	
cETH	-0.03534	-0.3109	0.24023	0.96528	0.73279	1.27154	0.80155	
cLANG	-0.22063	-0.49119	0.04993	0.80201	0.6119	1.05119	0.10997	
cREL	-0.10264	-0.27313	0.06784	0.90245	0.76099	1.07019	0.23797	
clogPOP	-0.08287	-0.27239	0.10665	0.92047	0.76156	1.11255	0.39143	
cDEN	0.23461	0.05586	0.41336	1.26442	1.05745	1.51188	0.01009	*

[a] low95 and high95: lower and upper limits of the 95% confidence interval of estimates
[b] OR: Odds Ratio
[c] ORlow and ORhigh: lower and upper limits of the 95% confidence interval of Odds Ratio
[d] Significance codes: ***: p < 0.001; **: 0.001 < p < 0.01; *: 0.01 < p < 0.05

Table 27: MCV1 coverage

Predictor	Estimate	Low95[a]	High95[a]	OR[b]	ORlow[c]	ORhigh[c]	p-value	Sig.codes[d]
HSS1	0.00868	0.0028	0.01456	1.00872	1.0028	1.01467	0.00382	**
HSS2	0.00255	-0.00399	0.00909	1.00255	0.99602	1.00913	0.44487	
HSS3	0.00568	-0.00172	0.01307	1.00569	0.99828	1.01316	0.13232	
nonHSS1	0.00112	-0.00109	0.00332	1.00112	0.99891	1.00333	0.32196	
nonHSS2	0.00137	-0.00107	0.0038	1.00137	0.99893	1.00381	0.27191	
nonHSS3	0.00403	0.00133	0.00672	1.00403	1.00133	1.00674	0.00344	**
Year	0.04399	0.02708	0.0609	1.04497	1.02745	1.0628	<0.00001	***
Year^2	-0.00233	-0.00316	-0.0015	0.99767	0.99684	0.9985	<0.00001	***
cGDP	0.05673	-0.0311	0.14456	1.05837	0.96938	1.15553	0.20554	
cHSE	0.04668	-0.0374	0.13077	1.04779	0.96329	1.13971	0.27653	
cFSI	0.01843	-0.03717	0.07403	1.0186	0.96351	1.07684	0.51594	
cACC	-0.03759	-0.09907	0.02388	0.96311	0.90568	1.02417	0.23072	
cSTA	0.06018	0.01923	0.10113	1.06203	1.01942	1.10642	0.00397	**
cGOV	-0.0104	-0.07412	0.05333	0.98966	0.92856	1.05477	0.74916	
cREG	-0.00544	-0.0688	0.05792	0.99457	0.93351	1.05963	0.86636	
cLAW	0.03341	-0.04246	0.10927	1.03397	0.95843	1.11546	0.3881	
cCOR	0.08575	0.02553	0.14597	1.08953	1.02585	1.15716	0.00526	**
cETH	-0.02844	-0.14217	0.08529	0.97196	0.86747	1.08903	0.62405	
cLANG	-0.10664	-0.21952	0.00623	0.89885	0.80291	1.00625	0.06405	.
cREL	-0.02006	-0.0903	0.05017	0.98014	0.91366	1.05145	0.57559	
clogPOP	-0.01557	-0.09786	0.06672	0.98455	0.90678	1.06899	0.71074	
cDEN	0.05531	-0.02376	0.13439	1.05687	0.97652	1.14383	0.17035	

[a] low95 and high95: lower and upper limits of the 95% confidence interval of estimates
[b] OR: Odds Ratio
[c] ORlow and ORhigh: lower and upper limits of the 95% confidence interval of Odds Ratio
[d] Significance codes: ***: $p < 0.001$; **: $0.001 < p < 0.01$; *: $0.01 < p < 0.05$

Table 28: Pol3 coverage

Predictor	Estimate	Low95[a]	High95[a]	OR[b]	ORlow[c]	ORhigh[c]	p-value	Sig.codes[d]
HSS1	0.00674	0.0005	0.01298	1.00676	1.0005	1.01306	0.03416	*
HSS2	0.00374	-0.00318	0.01065	1.00374	0.99683	1.01071	0.28955	
HSS3	0.01057	0.00261	0.01853	1.01062	1.00261	1.0187	0.00928	**
nonHSS1	0.0026	0.00029	0.0049	1.0026	1.00029	1.00491	0.02715	*
nonHSS2	-0.00014	-0.00265	0.00236	0.99986	0.99736	1.00236	0.91157	
nonHSS3	0.00555	0.00276	0.00833	1.00556	1.00277	1.00837	0.00009	***
Year	0.0656	0.0484	0.0828	1.0678	1.04959	1.08632	<0.00001	***
Year^2	-0.0031	-0.00395	-0.00226	0.9969	0.99606	0.99774	<0.00001	***
cGDP	0.11435	0.02384	0.20487	1.12115	1.02412	1.22736	0.01328	*
cHSE	-0.0587	-0.14203	0.02462	0.94299	0.8676	1.02493	0.16733	
cFSI	-0.01589	-0.07322	0.04143	0.98423	0.9294	1.0423	0.58688	
cACC	-0.08725	-0.15302	-0.02149	0.91644	0.85811	0.97874	0.00931	**
cSTA	0.11158	0.06906	0.15409	1.11804	1.0715	1.1666	<0.00001	***
cGOV	0.08891	0.02319	0.15464	1.09299	1.02346	1.16724	0.00801	**
cREG	-0.03985	-0.10448	0.02478	0.96094	0.90079	1.02509	0.22688	
cLAW	0.01847	-0.05878	0.09572	1.01864	0.94292	1.10045	0.6393	
cCOR	0.01359	-0.04851	0.07568	1.01368	0.95265	1.07862	0.66804	
cETH	-0.04567	-0.17387	0.08254	0.95536	0.84041	1.08604	0.48508	
cLANG	-0.10456	-0.23016	0.02103	0.90072	0.79441	1.02126	0.10273	
cREL	-0.0207	-0.1	0.05859	0.97951	0.90484	1.06034	0.6088	
clogPOP	-0.06123	-0.15294	0.03048	0.94061	0.85818	1.03095	0.19067	
cDEN	0.11639	0.0266	0.20617	1.12343	1.02696	1.22896	0.01106	*

[a] low95 and high95: lower and upper limits of the 95% confidence interval of estimates
[b] OR: Odds Ratio
[c] ORlow and ORhigh: lower and upper limits of the 95% confidence interval of Odds Ratio
[d] Significance codes: ***: p < 0.001; **: 0.001 < p < 0.01; *: 0.01 < p < 0.05

Table 29: Hep3 coverage

Predictor	Estimate	Low95[a]	High95[a]	OR[b]	ORlow[c]	ORhigh[c]	p-value	Sig.codes[d]
HSS1	0.01017	0.00317	0.01718	1.01023	1.00317	1.01733	0.00443	**
HSS2	0.00997	0.0021	0.01783	1.01001	1.0021	1.01799	0.01301	*
HSS3	0.01561	0.00688	0.02434	1.01573	1.0069	1.02464	0.00046	***
nonHSS1	0.00483	0.00235	0.00732	1.00484	1.00235	1.00734	0.00014	***
nonHSS2	0.00004	-0.00261	0.00269	1.00004	0.99739	1.0027	0.97563	
nonHSS3	0.00529	0.00234	0.00824	1.00531	1.00234	1.00828	0.00044	***
Year	0.03421	0.00773	0.06069	1.0348	1.00775	1.06257	0.01135	*
Year^2	-0.00174	-0.00292	-0.00056	0.99826	0.99708	0.99944	0.00386	**
cGDP	0.35808	0.24504	0.47112	1.43058	1.27767	1.60179	<0.00001	***
cHSE	-0.18491	-0.27966	-0.09015	0.83118	0.75604	0.91379	0.00013	***
cFSI	-0.01998	-0.09612	0.05617	0.98022	0.90836	1.05777	0.60711	
cACC	-0.23054	-0.31424	-0.14685	0.7941	0.73034	0.86342	<0.00001	***
cSTA	0.15819	0.1046	0.21178	1.17139	1.11027	1.23588	<0.00001	***
cGOV	0.05413	-0.03223	0.1405	1.05563	0.96828	1.15085	0.21925	
cREG	-0.00028	-0.08154	0.08098	0.99972	0.9217	1.08435	0.99465	
cLAW	0.03112	-0.06856	0.13079	1.03161	0.93374	1.13973	0.54064	
cCOR	0.13448	0.05456	0.2144	1.14394	1.05607	1.23912	0.00097	***
cETH	0.02205	-0.17209	0.21619	1.0223	0.84191	1.24134	0.82381	
cLANG	-0.05468	-0.24387	0.13451	0.94678	0.78359	1.14397	0.57104	
cREL	-0.04959	-0.16863	0.06945	0.95162	0.84482	1.07191	0.41419	
clogPOP	-0.18782	-0.32449	-0.05115	0.82876	0.7229	0.95013	0.00707	**
cDEN	0.22229	0.0903	0.35428	1.24893	1.0945	1.42516	0.00096	***

[a] low95 and high95: lower and upper limits of the 95% confidence interval of estimates
[b] OR: Odds Ratio
[c] ORlow and ORhigh: lower and upper limits of the 95% confidence interval of Odds Ratio
[d] Significance codes: ***: $p < 0.001$; **: $0.001 < p < 0.01$; *: $0.01 < p < 0.05$

Table 30: Geographic equity in DTP coverage

Predictor	Estimate	Low95[a]	High95[a]	OR[b]	ORlow[c]	ORhigh[c]	p-value	Sig.codes[d]
HSS1	0.00293	-0.00326	0.00912	1.00293	0.99674	1.00916	0.35378	
HSS2	-0.01246	-0.01994	-0.00499	0.98762	0.98026	0.99503	0.00109	**
HSS3	0.00491	-0.00366	0.01348	1.00492	0.99634	1.01357	0.26166	
nonHSS1	0.00709	0.00479	0.00939	1.00711	1.0048	1.00943	<0.00001	***
nonHSS2	0.00318	0.00064	0.00573	1.00319	1.00064	1.00574	0.01422	*
nonHSS3	0.00924	0.00645	0.01203	1.00928	1.00647	1.0121	<0.00001	***
Year	0.15515	0.12152	0.18878	1.16783	1.12921	1.20777	<0.00001	***
Year^2	-0.00522	-0.00666	-0.00378	0.9948	0.99336	0.99623	<0.00001	***
cGDP	-0.22065	-0.39888	-0.04242	0.802	0.67107	0.95847	0.01525	*
cHSE	-0.21231	-0.34595	-0.07867	0.80872	0.70755	0.92435	0.00185	**
cFSI	-0.23865	-0.32529	-0.152	0.78769	0.72232	0.85899	<0.00001	***
cACC	-0.01282	-0.11461	0.08896	0.98726	0.89171	1.09304	0.80495	
cSTA	0.01698	-0.04571	0.07968	1.01713	0.95532	1.08294	0.59545	
cGOV	0.4489	0.35922	0.53858	1.56659	1.43222	1.71357	<0.00001	***
cREG	-0.04157	-0.13207	0.04893	0.95928	0.87628	1.05015	0.36799	
cLAW	0.05195	-0.05293	0.15683	1.05333	0.94845	1.1698	0.33161	
cCOR	-0.24917	-0.33601	-0.16232	0.77945	0.71462	0.85017	<0.00001	***
cETH	-0.12913	-0.65564	0.39738	0.87886	0.51911	1.48792	0.63072	
cLANG	-0.18244	-0.70206	0.33718	0.83324	0.49556	1.401	0.49136	
cREL	-0.09719	-0.43269	0.23831	0.90738	0.64876	1.2691	0.57016	
clogPOP	-0.10182	-0.46118	0.25754	0.90319	0.63054	1.29375	0.57867	
cDEN	0.81003	0.52374	1.09632	2.24798	1.68834	2.99312	<0.00001	***

[a] low95 and high95: lower and upper limits of the 95% confidence interval of estimates
[b] OR: Odds Ratio
[c] ORlow and ORhigh: lower and upper limits of the 95% confidence interval of Odds Ratio
[d] Significance codes: ***: $p < 0.001$; **: $0.001 < p < 0.01$; *: $0.01 < p < 0.05$

Table 31: HSS and DTP vaccine introduction grants

Predictor	Estimate	Low95[a]	High95[a]	OR[b]	ORlow[c]	ORhigh[c]	p-value	Sig.codes[d]
HSS1	0.02208	-0.00652	0.05068	1.02233	0.9935	1.05199	0.13029	
HSS2	-0.00052	-0.0422	0.04116	0.99948	0.95868	1.04202	0.98055	
HSS3	0.01078	-0.04118	0.06274	1.01084	0.95965	1.06475	0.68432	
nonHSS1	0.0062	0.00321	0.00919	1.00622	1.00321	1.00923	0.00005	***
nonHSS2	-0.00194	-0.00521	0.00133	0.99806	0.9948	1.00133	0.24426	
nonHSS3	0.00511	0.0015	0.00871	1.00512	1.0015	1.00875	0.00552	**
HSS1:VIG_DTP	-0.01516	-0.04444	0.01412	0.98495	0.95653	1.01422	0.31007	
HSS2:VIG_DTP	0.01098	-0.03131	0.05327	1.01104	0.96918	1.05472	0.6107	
HSS3:VIG_DTP	0.00646	-0.04589	0.05882	1.00649	0.95515	1.06058	0.80879	
Year	0.07677	0.05647	0.09707	1.07979	1.05809	1.10194	<0.00001	***
Year^2	-0.00373	-0.00474	-0.00272	0.99628	0.99528	0.99728	<0.00001	***
cGDP	0.02598	-0.07885	0.1308	1.02632	0.92418	1.13974	0.6272	
cHSE	0.01744	-0.0855	0.12038	1.01759	0.91805	1.12792	0.73985	
cFSI	-0.06982	-0.13911	-0.00054	0.93256	0.87014	0.99946	0.04825	*
cACC	-0.13223	-0.2086	-0.05586	0.87614	0.81172	0.94567	0.00069	***
cSTA	0.08724	0.03813	0.13635	1.09115	1.03886	1.14608	0.0005	***
cGOV	0.06138	-0.01675	0.1395	1.0633	0.98339	1.1497	0.12362	
cREG	-0.07121	-0.15019	0.00777	0.93127	0.86054	1.0078	0.0772	.
cLAW	0.1155	0.02092	0.21008	1.12244	1.02115	1.23378	0.01668	*
cCOR	0.06472	-0.01201	0.14145	1.06686	0.98806	1.15195	0.0983	.
cETH	-0.02884	-0.16756	0.10988	0.97157	0.84573	1.11614	0.68366	
cLANG	-0.08725	-0.22296	0.04845	0.91644	0.80015	1.04964	0.20758	
cREL	-0.00221	-0.08842	0.08399	0.99779	0.91538	1.08762	0.95983	
clogPOP	-0.05929	-0.16057	0.04199	0.94243	0.85166	1.04288	0.25121	
cDEN	0.11688	0.01572	0.21804	1.12399	1.01584	1.24364	0.02354	*

[a] low95 and high95: lower and upper limits of the 95% confidence interval of estimates
[b] OR: Odds Ratio
[c] ORlow and ORhigh: lower and upper limits of the 95% confidence interval of Odds Ratio
[d] Significance codes: ***: $p < 0.001$; **: $0.001 < p < 0.01$; *: $0.01 < p < 0.05$

Table 32: Health system integration

Predictor	Estimate	Low95[a]	High95[a]	Sig.codes[b]
Year	-0.22192	-1.1551	0.71125	
Year^2	0.0148	-0.02262	0.05221	
HSS1	0.03794	-0.11189	0.18776	
nonHSS1	-0.03492	-0.0914	0.02157	
HSS2	0.07598	-0.0885	0.24047	
nonHSS2	-0.0001	-0.0594	0.05919	
HSS3	0.05656	-0.12891	0.24203	
nonHSS3	0.01022	-0.05397	0.07441	
cGDP	0.40839	-2.44598	3.26276	
clogPOP	0.45877	-1.75852	2.67606	
cFSI	2.51156	0.42566	4.59746	*
cACC	-0.18193	-2.14998	1.78613	
cGOV	1.56928	-0.93454	4.07309	
cLAW	-1.77375	-4.38357	0.83607	
cSTA	1.94142	0.15727	3.72557	*
cCOR	-0.52356	-2.58122	1.53409	
cETH	0.03062	-2.56184	2.62307	
cLANG	0.18062	-2.16698	2.52822	
cREL	-0.1195	-1.65471	1.41571	
cDEN	-0.14471	-1.83287	1.54346	
cHSE	-2.39735	-6.22853	1.43383	
cREG	0.24889	-1.95865	2.45642	

[a] low95 and high95: lower and upper limits of the 95% confidence interval of estimates
[b] Significance codes: ***: p < 0.001; **: 0.001 < p < 0.01; *: 0.01 < p < 0.05

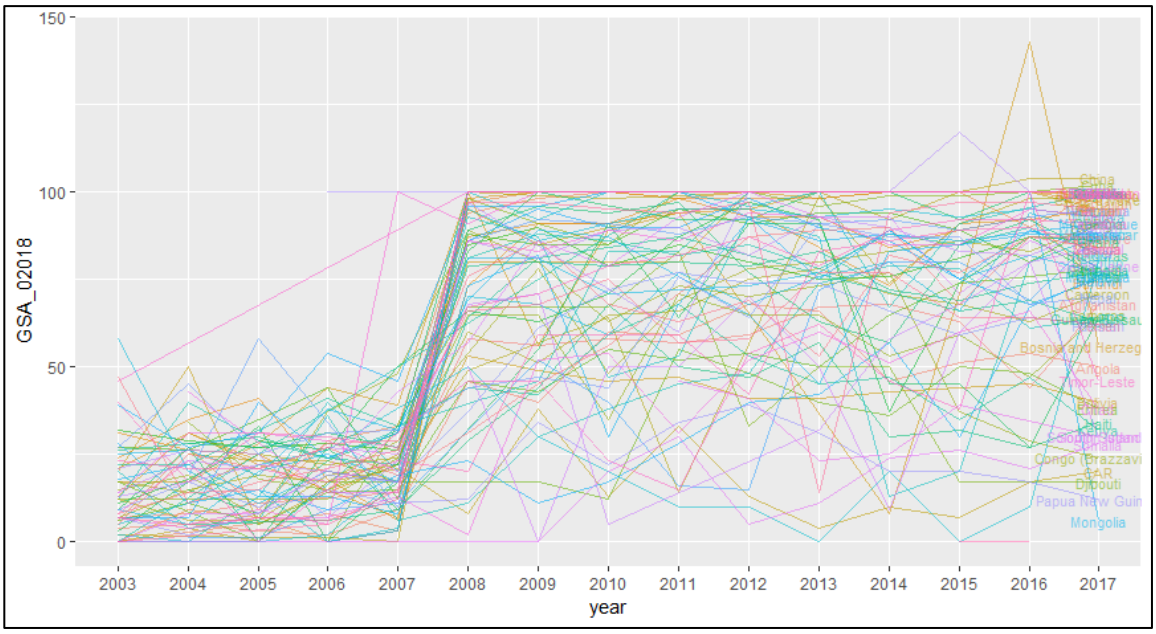
Table 33: Tetanus PAB coverage

Predictor	Estimate	Low95[a]	High95[a]	OR[b]	ORlow[c]	ORhigh[c]	p-value	Sig.codes[d]
HSS1	0.00051	-0.00559	0.0066	1.00051	0.99443	1.00663	0.87053	
HSS2	-0.00218	-0.00869	0.00434	0.99783	0.99135	1.00435	0.51289	
HSS3	-0.00051	-0.00809	0.00708	0.99949	0.99194	1.0071	0.89594	
nonHSS1	0.00045	-0.00174	0.00265	1.00045	0.99826	1.00265	0.6872	
nonHSS2	0.00072	-0.00174	0.00318	1.00072	0.99826	1.00319	0.56597	
nonHSS3	-0.00224	-0.0049	0.00042	0.99776	0.99511	1.00042	0.09914	.
Year	-0.00996	-0.02736	0.00745	0.99009	0.97301	1.00748	0.26228	
Year^2	0.00057	-0.00034	0.00147	1.00057	0.99966	1.00147	0.21812	
cGDP	-0.0664	-0.11313	-0.01966	0.93576	0.89303	0.98053	0.00536	**
cHSE	0.13904	0.0552	0.22288	1.14917	1.05676	1.24967	0.00115	**
cFSI	-0.02507	-0.05792	0.00777	0.97524	0.94373	1.0078	0.1346	
cACC	-0.01297	-0.04434	0.01841	0.98712	0.95662	1.01858	0.4179	
cSTA	0.01409	-0.01854	0.04673	1.01419	0.98163	1.04784	0.39737	
cGOV	0.04624	0.00068	0.09179	1.04732	1.00068	1.09614	0.04668	*
cREG	-0.04562	-0.08384	-0.00741	0.9554	0.91958	0.99262	0.01929	*
cLAW	0.03232	-0.02263	0.08727	1.03285	0.97763	1.09119	0.24895	
cCOR	-0.01868	-0.06116	0.0238	0.98149	0.94067	1.02408	0.38868	
cETH	0.0182	-0.0131	0.0495	1.01837	0.98699	1.05075	0.25439	
cLANG	0.01167	-0.01714	0.04048	1.01174	0.98301	1.04131	0.42725	
cREL	-0.02541	-0.04549	-0.00532	0.97491	0.95553	0.99469	0.01315	*
clogPOP	-0.02608	-0.05779	0.00563	0.97426	0.94385	1.00565	0.10697	
cDEN	0.04287	0.01418	0.07156	1.0438	1.01428	1.07418	0.00341	**

[a] low95 and high95: lower and upper limits of the 95% confidence interval of estimates
[b] OR: Odds Ratio
[c] ORlow and ORhigh: lower and upper limits of the 95% confidence interval of Odds Ratio
[d] Significance codes: ***: p < 0.001; **: 0.001 < p < 0.01; *: 0.01 < p < 0.05

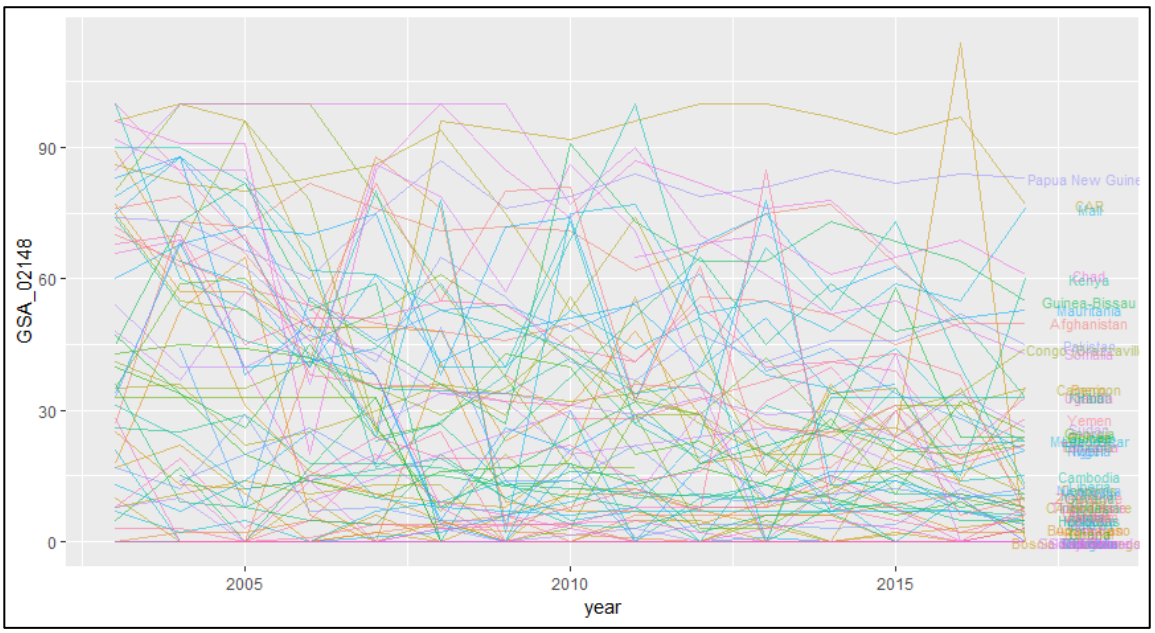
7.13. Additional graphs (quantitative analysis)

Figure 34: Percent of districts with DTP3 coverage greater than 80%



Source: JRF

Figure 35: Percent of districts with DTP1-3 dropout <10%



Source: JRF

7.14. Additional tables and information (qualitative analysis)

Table 34: Links between grant objectives and coverage

	Total number of objectives	Is **coverage** mentioned in the objective or ist description?	Thereof: Is **coverage** mentioned in the objective?	Thereof:…if not in the title, is **coverage** mentioned in the description?	Thereof: Is there a logical link between the objective and **coverage**?	Thereof: Is there a reasonable effect between the objective and **coverage**?
Afghanistan	5	3	2	1	2	2
Angola	6	3	2	1	3	2
Bangladesh	3	2	0	2	2	0
DRC	6	4	1	3	3	2
RoC	5	4	3	1	3	3
Honduras	6	5	0	5	4	2
India	5	4	2	2	4	2
Korea DPR	5	4	2	2	3	2
Liberia	5	2	2	0	2	2
Malawi	6	4	2	2	4	2
Niger	5	2	2	0	2	2
PNG	5	3	2	1	3	0
Sudan	5	2	1	1	2	1
Total for 13 countries (n)	**67**	**42**	**21**	**21**	**37**	**22**
Percentages (%)	**100**	**63**	**50**	**50**	**88**	**52**

Table 35: Links between grant objectives and equity

	Total number of objectives	Is **equity** mentioned in the objective or its description?	Thereof: Is **equity** mentioned in the objective / activity title?	Thereof: if not in the title, is **equity** mentioned in the description?	Thereof: Is there a logical link between the objective and **equity?**	Thereof: Is there a reasonable effect between the objective and **equity?**	Thereof: Is a **logic model** developed that illustrates the hypothesised mechanism of action, i.e. pathways through which the activity is **expected to affect health equity**?	Thereof: Are **activities directly aiming at the disadvantaged** or at **reducing the gradient** across populations?
Afghanistan	5	3	2	1	3	2	4	2
Angola	6	2	1	1	2	2	1	1
Bangladesh	3	2	0	2	1	0	2	0
DRC	6	5	1	4	3	2	4	2
RoC	5	3	3	0	3	3	3	3
Honduras	6	3	0	3	1	1	2	1
India	5	4	2	2	4	2	2	2
Korea DPR	5	4	2	2	3	1	2	1
Liberia	5	1	1	0	1	0	0	1
Malawi	6	2	2	0	2	1	1	1
Niger	5	1	1	0	1	1	1	2
PNG	5	1	0	1	1	0	0	0
Sudan	5	2	2	0	2	1	1	1
Total for 13 countries (n)	**67**	**33**	**17**	**16**	**27**	**16**	**23**	**17**
Percentages (%)	**100**	**49**	**52**	**48**	**82**	**48**	**70**	**52**

Table 36: Countries strategic focus areas by Approval Year

IRC Approval Year	Data Quality, Availability & Use	Demand Promotion	Financial & Programmatic Sustainability	Immunization Supply Chain	In-Country Leadership, Management & Coordination	Grand Total
2014	**22.4%**	**12.3%**	**4.3%**	**51.3%**	**9.6%**	**53.2%**
Congo, Democratic Republic of the	19.6%	13.4%	5.8%	57.0%	4.2%	68.9%
Democratic People's Republic of Korea	21.4%	12.5%	1.7%	41.0%	23.4%	10.2%
Honduras	25.9%	10.8%	0.0%	55.1%	8.2%	2.8%
Niger	25.1%	8.7%	0.6%	40.3%	25.3%	13.9%
Sudan	59.9%	7.9%	1.2%	17.2%	13.9%	4.3%
2015	**36.0%**	**0.9%**	**0.0%**	**57.0%**	**6.1%**	**10.8%**
Bangladesh	36.3%	0.0%	0.0%	57.5%	6.2%	97.2%
Congo, Republic of	26.8%	33.4%	0.0%	36.4%	3.4%	2.8%
2016	**19.0%**	**16.5%**	**0.1%**	**62.4%**	**2.0%**	**36.0%**
Afghanistan	11.6%	19.5%	0.7%	62.2%	6.0%	14.7%
Angola	15.8%	4.8%	0.9%	77.5%	0.9%	2.2%
India	21.0%	14.7%	0.0%	63.7%	0.6%	61.3%
Liberia	20.3%	37.5%	0.0%	40.7%	1.6%	4.6%
Malawi	19.8%	16.1%	0.0%	60.4%	3.7%	15.4%
Papua New Guinea	3.7%	13.4%	0.0%	77.6%	5.3%	1.7%
Grand Total	**22.7%**	**12.6%**	**2.3%**	**55.9%**	**6.5%**	**100.0%**

Table 37: Countries Strategic Focus Areas by transition phase

	Data Quality, Availability & Use	Demand Promotion	Financial & Programmatic Sustainability	Immunization Supply Chain	In-Country Leadership, Management & Coordination	Total
Phase 1 : Initial self-financing	**19.8%**	**14.2%**	**3.7%**	**53.9%**	**8.4%**	**62.0%**
Afghanistan	11.6%	19.5%	0.7%	62.2%	6.0%	8.6%
Congo, Democratic Republic of the	19.6%	13.4%	5.8%	57.0%	4.2%	59.1%
Democratic People's Republic of Korea	21.4%	12.5%	1.7%	41.0%	23.4%	8.7%
Liberia	20.3%	37.5%	0.0%	40.7%	1.6%	2.7%
Malawi	19.8%	16.1%	0.0%	60.4%	3.7%	9.0%
Niger	25.1%	8.7%	0.6%	40.3%	25.3%	11.9%
Phase 2 : Preparatory transition	**40.5%**	**1.4%**	**0.2%**	**50.3%**	**7.5%**	**12.7%**
Bangladesh	34.6%	0.0%	0.0%	54.8%	5.9%	82.2%
Sudan	12.6%	1.7%	0.2%	3.6%	2.9%	17.8%
Phase 3 : Accelerated transition	**20.5%**	**14.7%**	**0.0%**	**64.1%**	**0.7%**	**22.7%**
India	14.0%	9.8%	0.0%	42.5%	0.4%	97.3%
Papua New Guinea	2.8%	10.0%	0.0%	57.8%	4.0%	2.7%
Phase 4 : Full self-financing	**22.9%**	**11.5%**	**0.3%**	**59.9%**	**5.4%**	**2.6%**
Angola	9.9%	3.0%	0.6%	48.4%	0.6%	31.1%
Congo, Republic of	5.6%	6.9%	0.0%	7.6%	0.7%	11.5%
Honduras	21.7%	9.0%	0.0%	46.2%	6.9%	57.3%
Grand Total	**22.7%**	**12.6%**	**2.3%**	**55.9%**	**6.5%**	**100.0%**

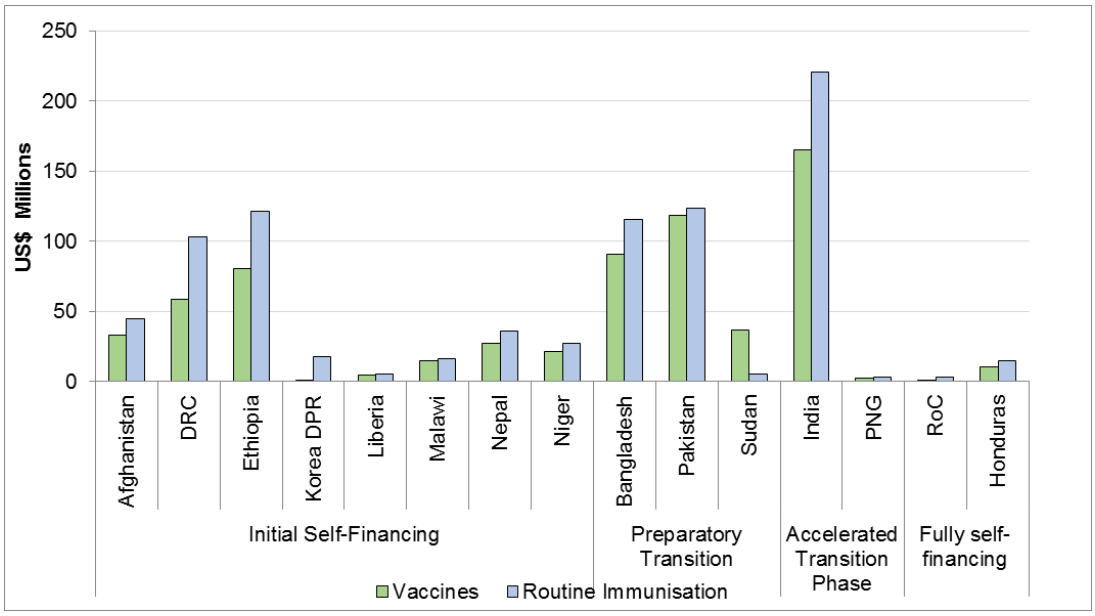
Table 38: Distribution of budgets per grant category

Countries	Advocacy, communication and social mobilization	Capacity building of human resources	Health Financing	Health Information Systems	Legal, policy and regulatory environments	Other	Procurement & Supply chain management	Program Management	Program Support Costs	Service Delivery
Full self-financing										
Angola	0.00%	17.70%	0.00%	24.60%	0.00%	0.00%	47.10%	5.90%	0.00%	4.70%
RoC	10.40%	0.90%	4.50%	16.00%	2.00%	0.00%	43.00%	6.80%	0.00%	16.50%
Honduras	6.90%	5.60%	0.00%	4.30%	0.70%	0.00%	7.20%	20.80%	0.00%	54.40%
Accelerated transition										
India	8.40%	2.30%	0.30%	5.00%	0.60%	0.00%	24.70%	13.70%	2.70%	42.20%
PNG	3.00%	15.20%	0.60%	9.90%	0.60%	0.00%	44.90%	5.00%	0.00%	20.80%
Preparatory transition										
Bangladesh	10.00%	15.50%	0.00%	2.80%	4.00%	0.00%	57.80%	0.00%	0.00%	10.00%
Sudan	1.70%	15.20%	0.20%	10.80%	2.10%	0.00%	3.10%	4.30%	0.00%	62.40%
Initial self-financing										
Afghanistan	8.00%	6.90%	1.10%	13.40%	0.30%	0.00%	26.30%	17.60%	6.50%	19.80%
DRC	9.00%	14.10%	0.00%	18.10%	0.00%	0.00%	42.00%	0.20%	0.00%	16.50%
Korea DPR	9.80%	12.30%	0.00%	15.20%	0.00%	0.00%	38.90%	1.70%	7.00%	15.20%
Liberia	27.40%	4.10%	0.00%	14.50%	0.10%	0.00%	27.60%	1.10%	0.00%	25.20%
Malawi	10.00%	7.70%	0.00%	12.20%	2.30%	0.00%	35.30%	8.00%	0.00%	24.40%
Niger	5.00%	5.50%	0.40%	13.90%	0.40%	0.70%	23.00%	1.70%	0.00%	49.60%
Grand Total	**8.30%**	**7.30%**	**1.50%**	**14.40%**	**1.00%**	**0.10%**	**34.50%**	**6.10%**	**2.10%**	**24.70%**

Table 39: Equity objectives relating to underimmunised populations, prioritized interventions and integration

Counries	Total Number of Objectives	Is equity mentioned in the objective or its description ?	Clearly identified under-immunised populations?	Tailored and prioritized interventions?	Integration of immunization service delivery with primary health care?	Integration of immunization service delivery with otherexisting services (e.g. outreach activities)?
Afghanistan	5	3	1	2	2	1
Angola	6	2	0	2	3	2
Bangladesh	3	2	0	0	0	0
DRC	6	5	0	1	1	1
RoC	5	3	2	3	3	2
Honduras	6	3	1	1	1	1
India	5	4	1	3	1	2
Korea DPR	5	4	1	1	2	1
Liberia	5	1	2	2	1	1
Malawi	6	2	0	2	0	1
Niger	5	1	0	1	1	1
PNG	5	1	0	3	1	1
Sudan	5	2	0	1	1	1
Total for 13 countries	**67**	**33**	**8**	**22**	**17**	**15**
Percentage	**100**	**52**	**23**	**63**	**49**	**43**

Figure 36: Country Expenditure in vaccines and routine immunization in 2016



Source: WHO UNICEF Joint Reporting Forms

Figure 37: Percentage of change in government funding in initial self-financing phase countries

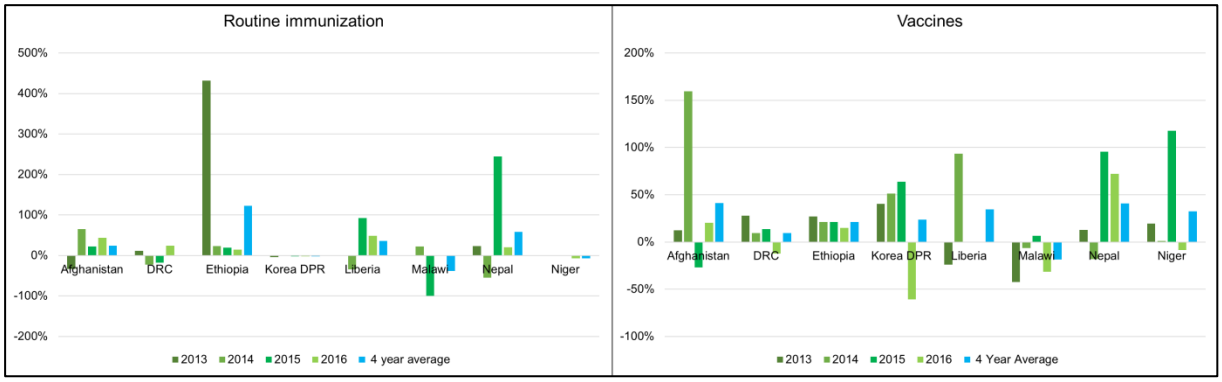


Figure 38: Percentage of change in government funding in preparatory transition phase countries

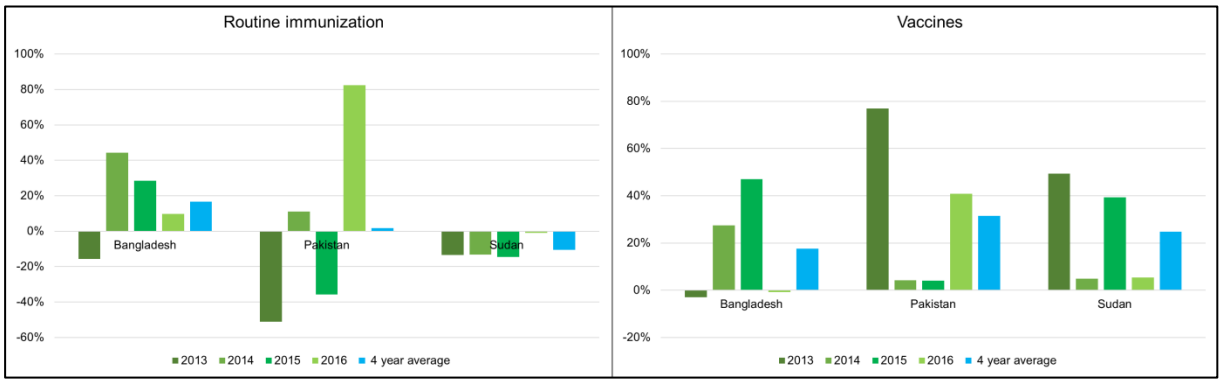


Figure 39: Percentage of change in government funding in accelerated transition phase countries

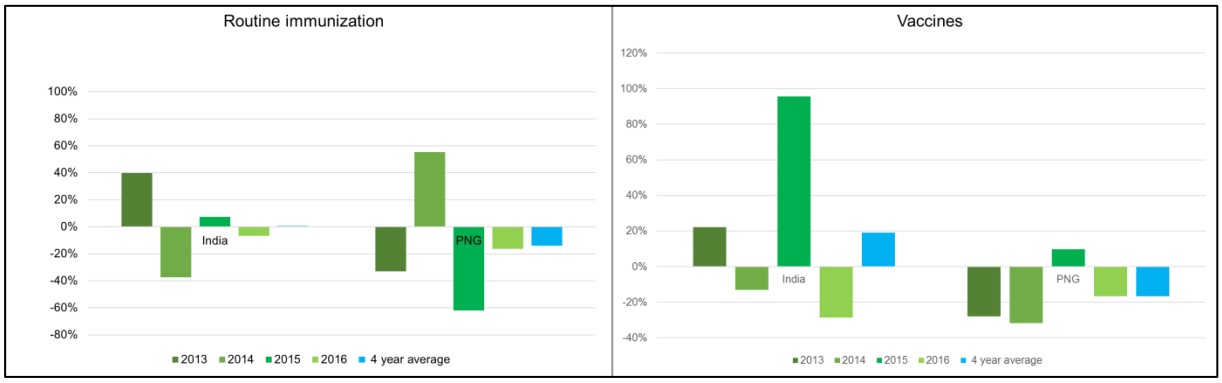


Figure 40: Percentage of change in government funding in fully self-financing phase countries

Table 40: Participation of Gavi grants in countries' health funding landscape – 2014

Countries	Global Fund HSS expenditure[58] / budgets (USD)	Gavi HSS grants (disbursements in USD)	Total Gavi grants in 2014 (USD)	Gavi grants as % of External Health Expenditure	Gavi HSS grants as % of External Health Expenditure	Gavi grants as % of Total Health Expenditure
Afghanistan	4,158,448		44,820,404	10.35%	0.961%	2.28%
Angola			11,194,593	9.67%		0.37%
Bangladesh		6,428,000	35,996,013	5.66%		0.80%
Congo			273,945	0.86%		0.08%
DRC			97,903,640	17.05%		7.39%
Ethiopia	1,239,937		114,453,420	22.29%	0.241%	6.56%
Honduras			2,521,416	2.26%		0.17%
India			94,461,548	17.09%		0.14%
Liberia			3,422,437	1.78%		1.23%
Malawi			14,020,672	3.79%		2.54%
Nepal			13,929,365	10.86%		1.34%
Niger		9,539,692	19,144,126	27.90%		4.11%
Pakistan			84,401,714	22.50%		1.27%
Papua New Guinea		565,747	4,970,803	3.13%		0.66%
Sudan		7,919,859	58,633,211	36.40%		1.40%
DPRK[59]			3,485,378			

[58] For Afghanistan, budget figures are considered in the absence of expenditure data.
[59] Health expenditure data was not available for Korea DPR

Table 41: Participation of Gavi grants in countries' health funding landscape – 2015

Countries	Global Fund HSS expenditure[60] / budgets (USD)	Gavi HSS grants (disbursements in USD)	Total Gavi grants (USD)	Gavi grants as % of External Health Expenditure	Gavi HSS grants as % of External Health Expenditure	Gavi grants as % of Total Health Expenditure
Afghanistan	1,904,347	-	21,285,001	6.38%	0.571%	1.05%
Angola			10,393,083	12.41%		0.41%
Bangladesh			86,349,685	15.35%		1.73%
Congo			2,210,447	6.77%		0.77%
DRC		62,412,353	154,415,680	26.12%	0.000%	11.01%
Ethiopia	3,904,361		134,594,154	36.28%		6.94%
Honduras		3,439,311	4,701,368	4.21%	0.000%	0.31%
India			133,342,060	18.11%		0.18%
Liberia			9,609,188	4.35%		3.15%
Malawi			18,211,658	5.66%		3.25%
Nepal			29,703,180	22.27%		2.62%
Niger	1,395,910		30,523,434	23.15%		6.02%
Pakistan			101,332,958	37.54%		1.44%
Papua New Guinea		538,107	8,872,187	6.24%	0.000%	1.45%
Sudan			34,243,340	28.94%		0.58%
DPRK[61]		6,155,859	9,657,796			

[60] For Afghanistan, budget figures are considered in the absence of expenditure data.
[61] Health expenditure data was not available for Korea DPR