



Republic of Rwanda

Report
**Comprehensive Review:
Expanded Programme on Immunization**

SEPTEMBER 23-OCTOBER 10, 2019

Acknowledgements:

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Contents

ACKNOWLEDGEMENTS:	I
1 EXECUTIVE SUMMARY	IV
1.1 INTRODUCTION.....	IV
1.2 METHODS	IV
1.3 FINDINGS.....	V
1.4 CONCLUSIONS AND RECOMMENDATIONS	VIII
2 INTRODUCTION AND BACKGROUND	1
2.1 INTRODUCTION.....	1
2.2 BACKGROUND	1
2.2.1 <i>Geography and Demography</i>	1
3 THE HEALTH SYSTEM	2
4 IMMUNIZATION PROGRAMME IN THE LAST 5 YEARS	5
4.1.1 <i>Rwanda's performance towards global/regional targets</i>	9
4.1.2 <i>Vaccine Preventable Disease Surveillance System</i>	11
5 THE REVIEW	14
5.1 OBJECTIVES.....	14
5.2 METHODS	14
5.2.1 <i>Desk review</i>	15
5.2.2 <i>Tools</i>	15
5.2.3 <i>Selection of districts</i>	16
5.2.4 <i>Reviewers</i>	17
6 REVIEW FINDINGS BY IMMUNIZATION SYSTEM COMPONENTS	17
6.1 GOVERNANCE, LEADERSHIP AND PROGRAMME MANAGEMENT	17
6.1.1 <i>Strengths</i>	18
6.1.2 <i>Areas that need improvement</i>	19
6.1.3 <i>Recommendations:</i>	19
6.2 HUMAN RESOURCE MANAGEMENT	19
6.2.1 <i>Strengths</i>	19
6.2.2 <i>Weakness/threats</i>	20
6.2.3 <i>Recommendations</i>	20
6.3 FINANCING	21
6.3.1 <i>Planning and Funding Immunization</i>	21
6.3.2 <i>Recommendations:</i>	24
6.4 VACCINE SUPPLY, QUALITY AND LOGISTICS.....	24
6.4.1 <i>Background</i>	24
6.4.2 <i>Strengths</i>	25
6.4.3 <i>Weaknesses</i>	26
6.4.4 <i>Recommendations</i>	26
6.5 EPI SERVICE DELIVERY	26
6.5.1 <i>Background</i>	26
6.5.2 <i>National level: Strengths</i>	27
6.5.3 <i>Weaknesses</i>	28
6.5.4 <i>District level: Strengths</i>	28
6.5.5 <i>Weaknesses</i>	29
6.5.6 <i>Observations and data collected</i>	29

6.5.7	<i>Conclusions</i>	31
6.5.8	<i>Recommendations</i>	31
6.6	VPD SURVEILLANCE	32
6.6.1	<i>Background</i>	32
6.6.2	<i>National level strengths:</i>	33
6.6.3	<i>National level: Weaknesses</i>	34
6.6.4	<i>District level: Strengths</i>	34
6.6.5	<i>District level: Weaknesses</i>	34
6.6.6	<i>Surveillance at health facilities: Strengths</i>	34
6.6.7	<i>Weaknesses</i>	35
6.6.8	<i>Surveillance: Laboratory Strengths</i>	35
6.6.9	<i>Surveillance Laboratory: Weaknesses</i>	35
6.6.10	<i>Conclusions</i>	35
6.6.11	<i>Recommendations</i>	35
6.7	COVERAGE MONITORING AND DATA VERIFICATION	36
6.7.1	<i>Background:</i>	36
6.7.2	<i>Strengths</i>	36
6.7.3	<i>Weaknesses</i>	36
6.7.4	<i>Recommendations</i>	37
6.8	ADVOCACY, COMMUNICATION AND SOCIAL MOBILIZATION	37
6.8.1	<i>Strengths</i>	37
6.8.2	<i>Weaknesses</i>	37
6.8.3	<i>Recommendations</i>	38
7	CONCLUSIONS	38
8	RECOMMENDATIONS:	39

1 Executive summary

1.1 Introduction

Rwanda's Expanded Programme on Immunization (EPI) is recognized as one of the best performing programmes in the African region. The coverage estimates through administrative reporting has been consistently high throughout the past decade. The high coverage was also corroborated by the immunization coverage survey in 2018 and other reliable (WHO/UNICEF) estimates. Regardless of this high coverage, the Government of Rwanda planned to conduct a comprehensive EPI review to further strengthen the achievements through addressing identified gaps.

The World Health Organization recommends that countries conduct a comprehensive review of national immunization programmes at least once in every five years. The last EPI review in Rwanda was conducted in November 2014.

The EPI programme of Rwanda in collaboration with WHO and other supporting partners (UNICEF, the Centers for Disease Control for Prevention USA) conducted a Comprehensive Immunization program review from 23 September to 10 October 2019

The main objectives of the review were to assess the performance of the immunization programme and vaccine preventable disease surveillance in Rwanda with particular focus on identifying strengths, gaps and opportunities - any system-wide barriers and propose ways of strengthening the system with an action plan to address the findings and recommendations.

Specific objectives include:

- To assess programme management and financing, and propose strategies for a more effective programme management.
- To evaluate national policies and guidelines.
- To review the cold chain logistics system and define strategies that will ensure efficient/effective systems.
- To assess the performance in vaccine preventable disease surveillance and make recommendations for improvement.
- To review the methods and the adequacy of the existing programme monitoring activities at various levels and make recommendations for improvement.
- To assess the design, methods, materials and effectiveness of the communication component of EPI and propose strategies for improved community utilization of EPI services.

1.2 Methods

A combination of desk review of key documents and a field visit to all 12 districts was used to make the assessment in this review. Four teams of paired external and internal staff were formed to conduct the field visits to district hospitals and health centers. One team conducted assessment at national level. The teams used an adapted WHO tool to collect, analyze data and provide recommendations.

The district teams visited 29 health facilities in the 12 districts and conducted interviews with key personnel at district and health facilities, observed 16 immunization sessions and also interviewed 65 care givers (clients).

At the national level the team, in addition to reviewing key documents, interviewed officials and personnel that include;

- Division Managers: (Maternal, Child and Community Health), Epidemic Surveillance and Response, Planning and Monitoring & Evaluation, Human Resource, Rwanda Health Communication Centre
- EPI Programme manager and team, the laboratory, HMIS unit, vaccine stores and cold rooms
- Partner agencies: WHO, UNICEF, USAID
- Committees: NITAG, NPEC, Measles Elimination Verification Committee

1.3 Findings

The EPI programme in Rwanda has achieved WHO regional office performance indicators in the last five years. Since the last EPI review, the programme has developed the cMYP 2017-2021, conducted the cold chain inventory, Effective Vaccine Management Assessment and coverage survey.

Summary of the findings from this review:

Strengths	Weaknesses
Programme management and finances	
<ul style="list-style-type: none"> • Strong leadership and political support • Clear strategies and milestones set by the programme • Active and committed committees support the EPI programme • Biannual integrated supportive supervision, using integrated checklists and providing feedback to facilities • Government fully funds traditional vaccines • Quarterly coordination meetings between Maternal, Child, and Community Health and districts to review performance 	<ul style="list-style-type: none"> • Heavily dependent on external sources for funding new vaccines (at more than 85%) • Although supervision to health centers is always integrated, there is limited time to help health workers correct some practices • Despite the expansion of services and the need to keep up the high coverage, the EPI programme remained as a unit in RBC
Human Resource Management	
<ul style="list-style-type: none"> • Structured human resource positions exist at all levels • Full-time, dedicated EPI supervisors oversee vaccine supply, cold chain, immunization and surveillance in district hospitals • EPI Technical guidelines available at district and facilities 	<ul style="list-style-type: none"> • Number of EPI core staff at RBC has not kept pace with the expansion of the programme • Inadequate staffing with one person at hospital and health facilities for EPI, Surveillance and other public health activities • Limited opportunity to follow up on action points due to high rotation of supervisory staff

Service Delivery	
<ul style="list-style-type: none"> • Immunization coverage meets regional targets • Electronic register is introduced to monitor coverage and defaulters • Regular immunization and surveillance performance review meetings improve quality of service • Local leaders and community health worker involvement strengthens defaulter tracking mechanism 	<ul style="list-style-type: none"> • Decline in percent of districts achieving Penta 3 >80% in 2018 and MCV1 >95% coverage • Half (51%) health facilities visited do not have a standard REC Micro-Plan with all the components • Observed that some care givers waited for a long time before attended to by a health worker
Vaccine Management and Safety	
<ul style="list-style-type: none"> • All cold chain equipment (CCE) on stable electric energy with minimal interruptions and availability of generator backup • Electronic temperature monitoring system is in place and up to date at all levels • Stock management system is in place; records up to date with no discrepancies observed • Procurement of refrigerated vehicles to enable monthly transportation of vaccines to districts • Waste management system in place and implemented 	<ul style="list-style-type: none"> • Weak implementation of the Multidose Vial Policy observed at some health facilities visited • Wastage monitoring is not differentiated into open and unopened, hence avoidable wastage cannot, currently be monitored
VPD Surveillance	

<ul style="list-style-type: none"> • NPAPF and NMFRI met at national level for the last 5 years • Functional national committees for polio, measles, AEFI exist and members are very committed • Members for Polio Committees (NCC , NPEC, NTF), MVC and AEFI are functional and they are committed • Surveillance focal persons exist in all districts and facilities • Most (80%) of surveillance focal persons have written terms of reference • Surveillance focal persons know the case definitions for AFP, Measles and NNT • 70% of health facility focal persons had refresher training in the last 12 months • VPD surveillance guidelines available in > 70% of health facilities visited 	<ul style="list-style-type: none"> • Surveillance gaps in districts along international borders observed • No data harmonization meeting between Laboratory and surveillance teams • Laboratory personnel are not trained on data management • Occasional shortage of measles testing kits • In 90% of districts, no written schedule for visiting priority health facilities • No updated list of priority health facilities for surveillance and no active surveillance • Most districts don't know minimal expected cases to be detected or target for non-polio and non-measles febrile illness • In 50% of districts, there was no log book to record/report outbreaks and rumors • Of 28 facilities visited, 44% not trained on AEFI reporting, 40% had no AEFI guidelines and 45% had no AEFI reporting forms
Laboratory	
<ul style="list-style-type: none"> • Lab processing specimens (measles/rubella) properly and timely • Scored 100% on recent external quality assurance (Proficiency Test) 	<ul style="list-style-type: none"> • During the visit, Measles Lab database contains data only from August 2019 till to-date • Sentinel surveillance data for rotavirus and PBM not shared with WHO • Shortage of measles test kits • Measles Lab data managers not trained on data management No data harmonization with ESR and Lab
Data Management	
<ul style="list-style-type: none"> • Complete and timely data submitted by health facilities and districts • Data managers and reporting tools in place at all levels • Defaulter tracking systems in place to determine dropout or missed children • Data validation system in place • Routine meetings occur to review data quality and trends and provide feedback • Regular data management training occurs at all levels 	<ul style="list-style-type: none"> • EPI target population size at the level of cells and village is not projected from census; there is a risk of over/underestimation • Problems in data quality (e.g., Penta1 to Penta3 negative dropout rate, MCV1 more than Penta3) • Outdated chart/graph/table for monitoring priority disease trends; not used to interpret the data • Discrepancies between summary data, monitoring charts, and tally sheets • Currently no data quality improvement plan (under development)
Advocacy, Communication and Social Mobilization	

<ul style="list-style-type: none"> • Close coordination of the EPI with Rwanda Health Communication Centre (RHCC) • Heads of health centers and health workers meet frequently with community leaders to discuss and promote health interventions • Very high demand for vaccines by communities • Close coordination and close working relationship with education and other sectors 	<ul style="list-style-type: none"> • No strategic communication plan for immunization • Knowledge, Attitude, Practice and Behavior (KAPB) study not conducted, despite being on plan • No action plan for communication activities undertaken • No evidence of special strategies to identify and reach out hard-to-reach populations
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1.4 Conclusions and recommendations

The EPI programme in Rwanda is well organized and run efficiently, which has resulted in achieving regional and global targets. The biggest challenge for the programme will be to sustain this high performance and achievement level. The success should not shift the attention and support from the Government of Rwanda and partners away from the programme, as it has to continue reaching new cohort of infants every year with all the antigens.

Key recommendations:

- EPI programme to document the evidence in support of continued and increased investment in immunization
- Initiate and strengthen in-country discussions on funding operations, especially with Ministry of Finance and Economic Planning
- Develop a strategy to engage with private sector
- RBC to review the human resource organogram to strengthen the capacity of the immunization programme and explore the possibility of upgrading EPI/Vaccination program to a higher level
- Review the impact of the frequent supervisory staff rotation on the quality of service
- RBC to strengthen Reaching Every Child strategy in all Health Facilities by systematizing the development and utilization of standard Micro-Plan (all components) and include involvement of the community
- Update surveillance guidelines and SOPs, prioritization of health facilities for active surveillance
- Training of district teams on VPD surveillance and outbreak investigation; ensure that districts know the minimal targets of NPAFP and NMFRI per year
- Intensify surveillance in districts along international boundaries and ensure that such districts have sensitive surveillance in place that meets key performance targets
- The Integrated Supportive Supervision should build the capacity to ensure that data is analyzed at district level and used to guide corrective actions
- Conduct operational research to address some of the data problems
- Develop a strategic plan for communication
- Conduct Knowledge Attitude Practice and Behavior (KAPB) study to find out health seeking behaviors and bottle neck in reaching the remaining few children
- The programme should document and share best practices through publications

Abbreviations

AFRO	African Regional Office
AEFI	Adverse Events Following Immunization
AFP	Acute Flaccid Paralysis
BCG	Bacillus Calmette Guerin
CHW	Community Health Worker
cMYP	comprehensive Multi Year Plan
DHIS	District Health Information Software
DQS	Data Quality Self-Assessment
DTwPHibHepB	Diphtheria-Tetanus-Pertussis-- Haemophilus influenzae type b Hepatitis-B
EDPRS	Economic Development and Poverty Reduction Strategy
EPI	Expanded Programme on Immunisation
ESR	Epidemic, Surveillance and Response
EVMA	Effective Vaccine Management Assessment
FBO	Faith Based Organization
GAVI	Global Alliance for Vaccine and Immunisation
GDP	Gross Domestic Product
GVAP	Global Vaccine Action Plan
HIC	High-Income Country
HMIS	Health Management Information System
HSSP	Health Sector Strategic Plan
IDSR	Integrated Disease Surveillance and Response
JA	Joint Appraisal
JRF	Joint Reporting Format
KAPB	Knowledge Attitude Practice Behaviour
MCV	Measles Containing Vaccine
MIC	Middle Income Country
MoF	Ministry of Finance
MoH	Ministry of Health
NNT	Neonatal Tetanus
NRA	National Regulatory Authority
NST	National Strategy for Transformation
ODK	Open Data Kit
OPV	Oral Polio Vaccine
PIE	Post Introduction Evaluation
RBC	Rwanda Biomedical Center
REC	Reaching Every Child
RED	Reaching Every District
RHSS	Rwanda Health Systems Strengthening
SIA	Supplementary Immunisation Activity
TT	Tetanus Toxoid
TWG	Technical Working Group
UHC	Universal Health Coverage (UHC)
UNICEF	United Nations Children's Fund
VPD	Vaccine Preventable Diseases
WHO	World Health Organization

2 Introduction and Background

2.1 Introduction

National Immunization Programme Review, is the comprehensive assessment of the strengths and weaknesses of an immunization programme at national, subnational and service-delivery levels. The purpose of the Review is to provide evidence for the programme's strategic directions and priority activities.

The Republic of Rwanda had the latest review in 2014. The Ministry of Health decided to conduct a comprehensive review of the immunization programme to assess the current context of the health sector and external environment in Rwanda. The review also evaluates the organization and the implementation of vaccine preventable diseases (VPD) surveillance, with a specific focus on Acute Flaccid Paralysis (AFP), measles and Adverse Events Following Immunization (AEFI) surveillance at all administrative levels. The objective is to identify strengths, gaps and opportunities and propose ways of strengthening the system.

2.2 Background

2.2.1 Geography and Demography

The Republic of Rwanda is a landlocked nation found in East Africa. The country is located south of Equator between 1°4' and 2°51' latitude South and 28°53' longitude east. It borders Uganda in the north, Burundi to the south, Democratic Republic of Congo to the west and Tanzania to the east. The surface area covers 10,169 square miles (26,338 square kilometers). Its topography is mountainous with the average altitude of 1700 meters. In Rwanda's center, mountainous terrain gives way to the rolling hills that give the country its nickname, "Land of a Thousand Hills."

In 2019, the population is estimated at 12.63 million, an increase from 11.8 million in 2013. Rwanda has a population density of 479.5 people per square km, considered one of the highest population densities in Africa (1,060/sq. mi) with a young, mostly rural population. Large concentrations tend to be in the central regions and along the shore of Lake Kivu in the west.

The population of Rwanda is young, with one in two persons being under 19 years old. People aged 65 years and above account for only 3% of the resident population. Urban areas have more young adults than rural ones with 34% of the urban population aged between 20 and 34, compared to 24% of the population in rural areas while 42% of the population living in rural areas is under 15 compared to only 35% in urban areas. The mean age of the population of Rwanda is 22.7 years. The mean age of females is higher than that of males.

Administratively, Rwanda is divided into four provinces and the city of Kigali. It has 30 districts and each district is divided into sectors which are further subdivided into cells and village. The smallest administrative unit is the cell.

Since the turn of the 21st century, Rwanda has been experiencing significant economic growth- largely due to policy reform. The main industries within Rwanda are agriculture, energy, industry, and tourism.

Rwanda now aspires to reach Middle Income Country (MIC) and High-Income Country (HIC) status by 2035 and 2050, respectively. The Vision will be effected through a series of seven-year National Strategies for Transformation (NST1), with detailed sectoral strategies that are aimed toward achievement of the SDGs. The economic growth averaged 7.5% over the decade to 2018 while per capita growth domestic product (GDP) grew at 5% annually (World Bank Report).

Rwanda's strong economic growth was accompanied by substantial improvements in living standards, with a two-thirds drop in child mortality and near-universal primary school enrolment. A strong focus on home grown policies and initiatives has contributed to significant improvement in access to services and human development indicators. Measured by the national poverty line, poverty declined from 59 to 39% between 2001 and 2014 but was almost stagnant between 2014 and 2017. The official inequality measure, the Gini index, declined from 0.52 in 2006 to 0.43 in 2017¹.

3 The health system

The government of Rwanda has vision 2050 Development program, a development strategy that envisions achieving high-income status by the middle of the century. All line Ministries align their strategies and missions to this common vision. The health sector has developed the 4th National Health Sector strategic plan (NHSSP 2018-2024), which is aligned to Vision 2050 and the Sustainable Development Goals to accelerate the country development agenda. The strategic plan is also aligned to the priorities and interventions of the Economic Development and Poverty Reduction Strategy (EDPRS) III. Health challenges are addressed according to the guiding principles of the health sector policy, National Strategy for Transformation (NST), Universal Health Coverage (UHC) principles and the Sustainable Development goals which include a people-centered approach as well as integrated and sustainable services.

The HSSP4 has been designed to be responsive to the country's aspiration to become high-income country with better quality of life of the population. Article 41 of the Rwandan Constitution amended in 2015 stipulates that health is a human right: "All citizens have rights and duties relating to health. The State has the duty of mobilizing the population for activities aimed at promoting good health and to assist in the implementation of these activities. All citizens have the right of equal access to public services in accordance with their competence and abilities."

The Vision 2050 ("The Rwanda We Want") will translate right to health into socio-economic development strategies. It will be people-centered, encompass all age cohorts, and aim to achieve its short, medium and long-term strategies through crosscutting pillars. The health

¹ World Bank Rwanda: <https://www.worldbank.org/en/country/rwanda/overview>

paragraph of Vision 2050 addresses the high population growth rate (2.6% per year), reproductive health challenges, the importance of reducing the prevalence or elimination infectious diseases (including malaria, vaccine preventable diseases and HIV) and attention to the rising prevalence of non-communicable diseases. Relevant health indicators with their baseline (2018), mid-term targets (2020), and final targets (2024) have been included.

In the HSSP4, it is envisioned that health sector will play a critical role in producing a healthy and productive population that will drive the Rwandan economy into a thriving upper-middle income country status by 2035 and to a high-income country by 2050.

Objectives and priorities of the NHSSP 2018-2024

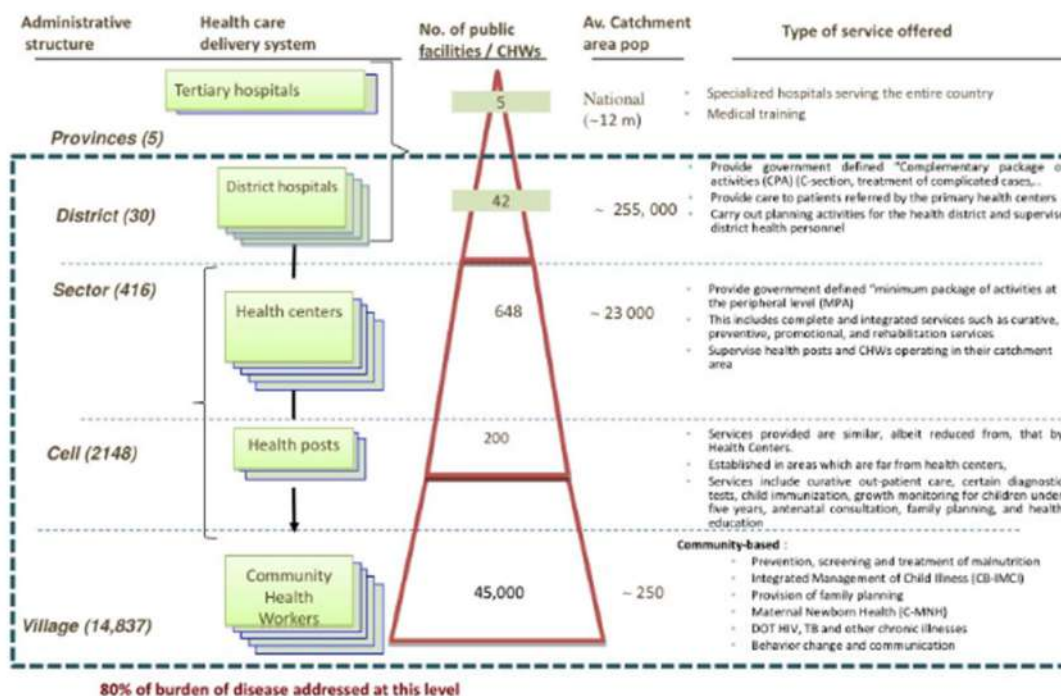
The overall objective of the health sector is to ensure universal accessibility (in geographical and financial terms) of equitable and affordable quality health services that includes preventative, curative, rehabilitative and promotional services for all Rwandans. This will be attained through four strategic objectives with respective focus on:

1. Full implementation of the various programs (improve demand, access, coverage and quality)
2. Strengthening the various health system components (strengthen policies, resources and management)
3. Strengthening all levels of service delivery (organize the services effectively at all levels)
4. Ensuring effective governance of the sector (strengthen decentralization, partnership, coordination, aid effectiveness and financial management)

The implementation of HSSP4 will be monitored through annual operational plans at all levels, based on the robust existing monitoring and evaluation system. Health system research will provide relevant and evidence-based information that will then inform policies and responsible decision-making.

The health system in Rwanda is a pyramidal structure with five levels: national, district, sector, cell and village. The health sector is led by the Ministry of Health (MoH), which, through the Rwanda Biomedical Center (RBC), supports, coordinates and regulates all interventions aimed at improving the health status of the population. Services are provided at different levels of the health care system (community, health post, health center, district hospital and referral hospitals; and by different types of providers (public, Faith Based Organizations (FBO), private-for-profit, and Non- Governmental Organizations (NGOs)

Figure1: the health system in relation to the administrative structure in Rwanda



At the decentralized, local level, the district oversees and coordinates the local implementing institutions including health facilities and district pharmacies. Local administration entities play an important role in health promotion and prevention. The government recognizes the need to address existing disparities and has instituted several interventions to improve the situation. For example, the performance based financing initiative has been promoted to improve sexual, maternal and reproductive health outcomes across the country.

Table 1. Current administrative structure of health services, Rwanda

S. No	Administrative level/ structures	Number	HSS Structures	Number
1.	Villages / Imidugudu	14,837	CHW	45,516
2.	Cells / Akagari	2,148	Health Posts	476
3.	Sectors / Imirenge	416	Health Centers	499
4.	Districts/Uturere	30	District Hospitals District Pharmacies	36 30
5.	Provinces (including the City of Kigali)	5	Provincial Hospitals	4
6.	National		National Referral and Teaching Hospitals	8
7.	Referral systems		Ambulances / SAMU	225
8.	Registered Private HF's	250		

Source: HMIS 2016-2017.

The MoH is closely linked to the other line ministries and or departments and specifically those in the social cluster to contribute towards achieving the SDGs; Ministry of Finance and Economy, Education, Climate Change and Environment, Water & Sanitation. There is strong

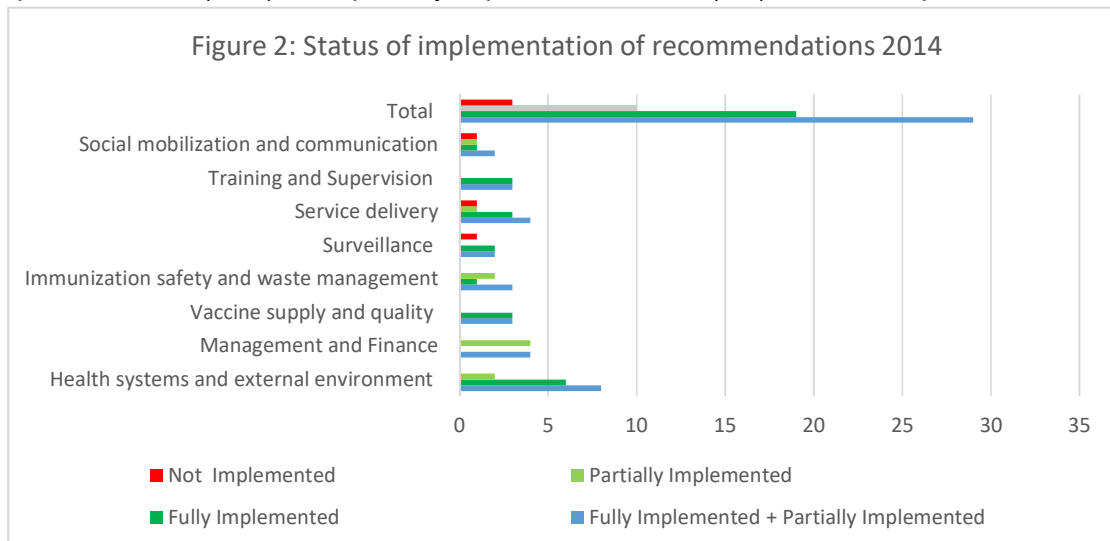
community engagement and partnership with civil societies towards the implementation of HSSP4, which aims to ensure that all persons in Rwanda have access to equitable and quality Maternal, Neonatal, Child & Community Health (MCCH) services and maintain immunization coverage around 95% or more.

Human resource in Health: The sector has attained several HSSP3 targets pertaining to health. For example, they have increased the ration of professionals to population, expanded health professional training, instituted retention strategies, and established a mandatory continuous professional development program for health professionals. Remaining challenges include gaps in skills, high staff turnover, and limited career development opportunities for health professionals at different levels.

4 Immunization programme in the last 5 years

The immunization programme in Rwanda is committed to achieving and maintaining high immunization coverage by making efforts to reach all eligible populations. It also aims to sustain the availability of current vaccines as per recommended vaccination schedule while introducing new vaccines and technologies. The immunization programme works closely with the Epidemic, Surveillance and Response (ESR) division in RBC to maintain a sensitive surveillance system and data quality at all levels to achieve the Global Vaccine Action Plan (GVAP) targets.

In its effort to improve its services, the EPI programme conducted its last comprehensive review in November 2014. The review made a total of 32 key recommendation in the different areas of the programme. Of the total 32 key recommendations, 19 (60%) were fully implemented, 10 (31%) were partially implemented, and 2 (9%) were not implemented. This



indicates that the programme has implemented most of the recommendations showing its attention and effort to improve performance.

Since last review, the programme has introduced new vaccines (MR, HPV and IPV), conducted the cold chain assessment and Effective Vaccine Management Assessment (EVMA). The comprehensive Multiyear Plan (cMYP) for 2017-2021 was also completed. Coverage survey was also done in 2017. This shows that the programme was actively engaged in implementation of planned activities beyond the recommendations.

The current schedule of immunization provides total of 12 antigens in the routine immunization programme as shown below in table 2

Table 2 Immunization Schedule of Rwanda as at the end of 2018

Schedule	Antigen provided
At Birth	BCG, OPV 0,
6, 10, 14 weeks	DTwPHibHepB 1; DTwPHibHepB 2, DTwPHibHepB 3 OPV1, OPV2, OPV3 PCV1, PCV2, PCV3
6 & 10 weeks	Rota 1 & Rota 2 (Rotatrix)
14 weeks	IPV
9 months & 15 months	MR
12 year old (girls)	HPV 1 ; HPV 2 after 6 months of HPV1
15-44 years (pregnant women)	1 st contact TT1 + 1month + 6 months+12 months+ 12 months

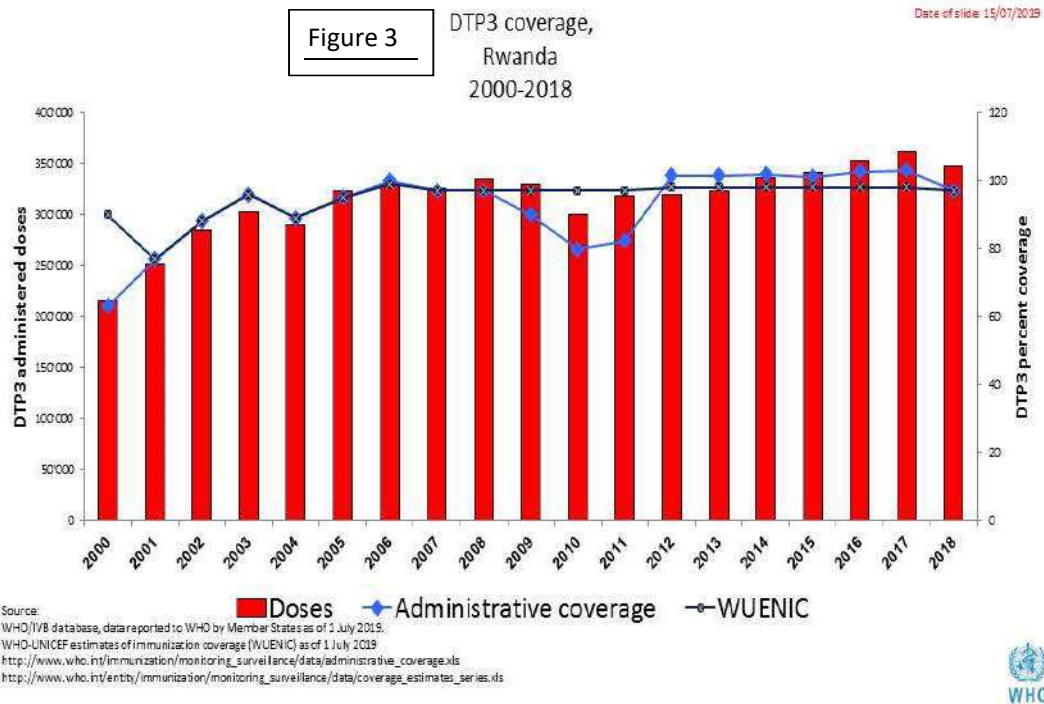
In 2002, Rwandan EPI expanded its immunization schedule to include the pentavalent vaccine, a DPT containing vaccine (DPT-HepB+Hib), given to all children at the same time with oral polio vaccine (OPV). In April 2009, a new vaccine, pneumococcal conjugate vaccine (PCV) was also introduced to National Immunization Program. In 2011; HPV vaccine was added to the routine immunization program, to protect adolescent girls from cervical cancer using a school-based immunization approach at the beginning and shifted to age-based approach (12 years) from 2014. In May 2012, EPI introduced one more life-saving vaccine, the rotavirus vaccine, into its routine program.

In January 2014, Rwanda also introduced a second dose of Measles and Rubella (MR) vaccine into the routine system to accelerate the activities of both measles and rubella elimination goals. The Measles/Rubella (MR) vaccine is given at nine and fifteen months of age. Since 2015, following WHO recommendations, Rwanda switched from 3 doses of HPV vaccine to 2 doses schedule. The school health is used as immunization service delivery point to provide HPV for the targeted cohorts.

The programme switched from using tOPV to bOPV since April 2016 and introduced IPV in April 2018.

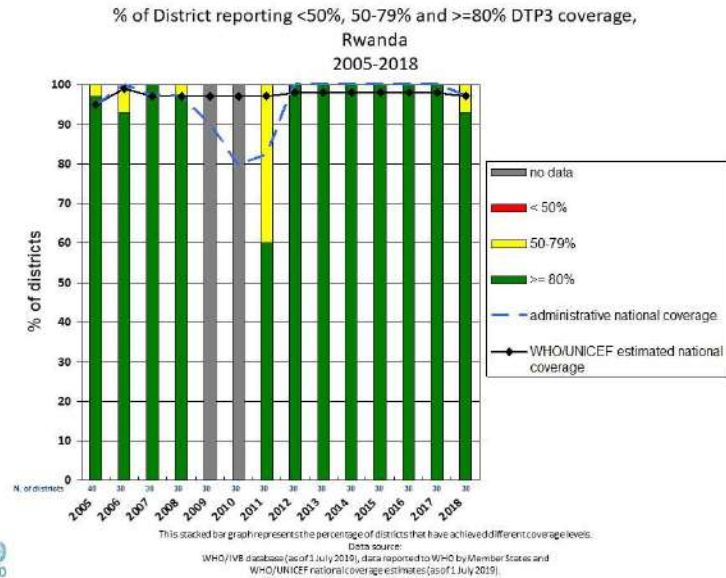
Rwanda plans to move from using Td instead of TT and a total of 6 doses that every child should get before child bearing age group (with three booster doses). Thus, avoiding the need of additional dose during pregnancy unless there is evidence of not completing the schedule.

Target populations are reached using combination of several approaches including fixed sites (health centers) and outreach sessions for the hard to reach areas. More than 90% of Rwandan's children are vaccinated at the fixed sites. The outreach strategy has been revitalized in most health facilities, using financial support made available by the Government of Rwanda and GAVI Alliance. Since 2005, Reach Every District (RED) approach was introduced in all districts and has now moved to Reaching Every Community (REC). The programme has achieved and sustained high DPT3 coverage for more than a decade as shown below. Administrative and WHO and UNICEF estimate coverage show less than 5% difference since 2012.



All districts reported DTP3 coverage of >80% from 2012 except in 2018 when two districts fail to reach 80% coverage (Huye and Nyamagabe Districts)

Figure 4

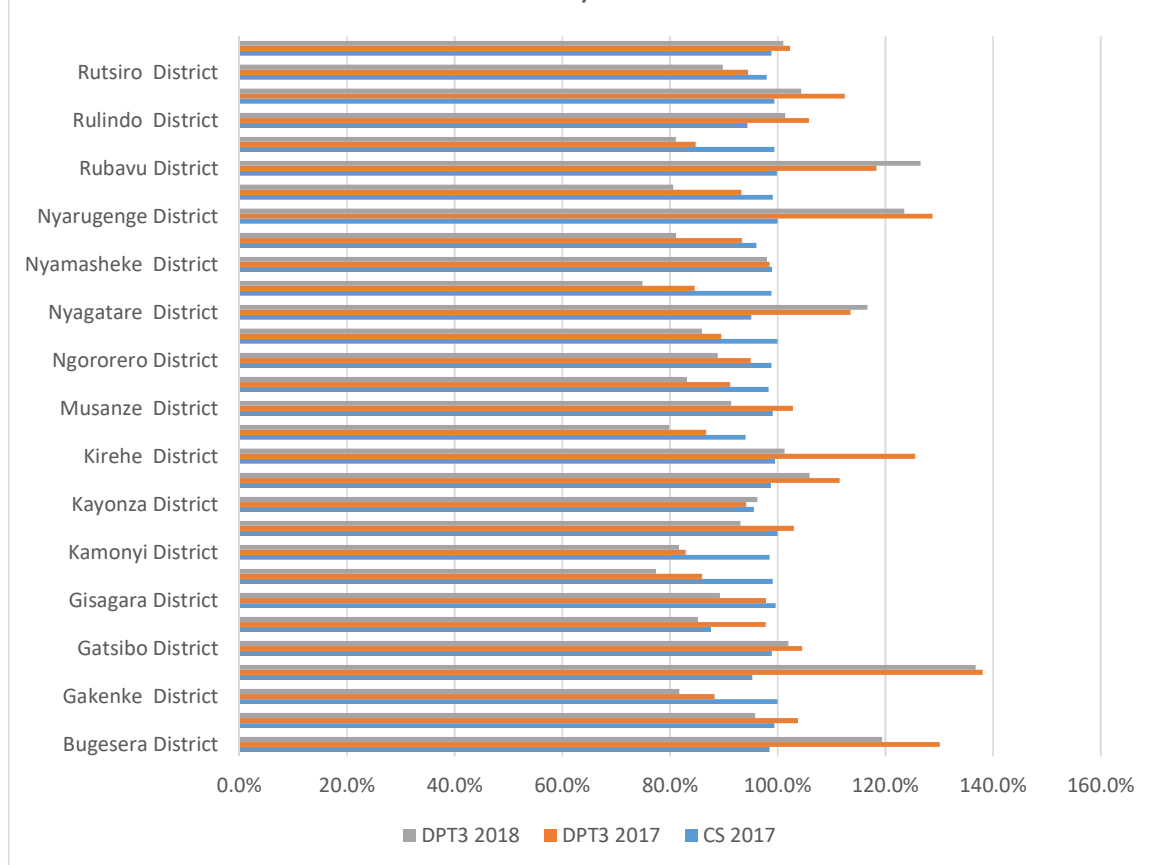


Routine Immunization Coverage Evaluation Survey was conducted from June to August in 2017 through an independent team of consultants from the University of Rwanda, College of Medicine and Health Sciences, School of Public Health (UR-CMHS-SPH). The aim of the survey was to provide a more accurate estimate of the routine vaccination coverage performance.

The results of the survey showed that in general, the Rwandan Expanded Program on Immunization (EPI) is performing well. For all antigens, the crude coverage (data based on evidence by card, recall (history) and registers) ranges from 97.5% (OPV3) to 99.4% (ROTA1). The survey also showed that 94.9% of children aged 12-35 months were estimated to be fully vaccinated, with crude doses.

Although the high performance is verified by the coverage survey, significant proportion of the districts have a reported coverage of 100% through the routine system, exceeding what was found by the coverage survey, indicating data quality issues.

Figure 5: DPT3 Coverage (2017 &2018) JRF and Coverage Survey 2017



4.1.1 Rwanda’s performance towards global/regional targets

The Global Vaccine Action Plan and the Regional Strategic Plan for Immunization (RSPI) 2011-2020 aims to achieve universal immunization coverage globally and within the WHO African Region by 2020. The objectives of the RSPI are:

- To increase vaccination coverage beyond the current levels.
- To complete the interruption of poliovirus transmission and ensure virus containment.
- To eliminate measles and advocate for the elimination of rubella and congenital rubella syndrome.
- To attain and maintain elimination/control of other vaccine-preventable diseases (Hep B elimination, Men A elimination, EYE)

As shown in table 4, Rwanda has achieved all the regional/global immunization targets indicating the high level of performance and effectiveness of the EPI programme. However, investment and efforts should continue at the same or improved levels for the new cohorts of live births every year.

Table 3: Rwanda performance towards global/regional immunization targets as of 2018

	Target	Performance	Remarks
Polio Eradication	0 case with good surveillance maintained	National surveillance targets met	Last confirmed WPV in 1993
Global /Regional elimination targets Measles	<1 case /million by 2020; MCV1 and MCV2 Coverage 90%	Proportion of districts meeting target Accredited National Lab	National Measles laboratory Verification Committee is established Number of measles cases increasing
Global/District elimination targets MNTE	<1case/1000LB per district	Skilled delivery >95% PAB (TT2 +) > 95% 6 dose schedule prior to adult	Achieved & sustained MNT elimination TT switch to Td
Meeting vaccination targets in every district	DTP 3 – 90% National & at least 80% Districts	Attained for the last 10 years but In 2018, 2 districts did not achieve 80%	Need improvement in the two districts
Introduce new vaccines & technologies	At least 1 or 2	Attained	PCV, Rota, IPV, HPV Electronic register is being rolled out
Exceed MDG target of Under-five Mortality	target 50.1/1000 live births	35.3 /1000 live births (world bank estimate for 2018)	Achieved

Rwanda has performed very well in terms of achieving the regional targets consistently through the years as shown in table 5. However, the dip in the number of districts reaching 80% coverage and the proportion of districts with >95% coverage is a reminder that the programme needs to maintain its high performance.

Table 4: Immunization indicators reported through Joint reporting form from EPI programme to WHO & UNICEF, 2014–2018

Indicator	2014	2015	2016	2017	2018
Does the country has MYP for immunization?	Yes	Yes	Yes	Yes	Yes
# of districts with micro-plans	30	30	30	30	30
Proportion of Districts with DTP3 \geq 80%	100%	100%	100%	100%	93%
Proportion of districts with MCV1 \geq 95%	53%	60%	60%	67%	47%
Does the country have Vaccine AEFI committee?	No	No	No	Yes	Yes
Is there a national system to monitor AEFI?	No	No	No	Yes	Yes
% of immunization expenditure financed, using Government funds	11	20	10	15	14
Does the country have functional National immunization technical advisory group?	No	No	No	No	Yes

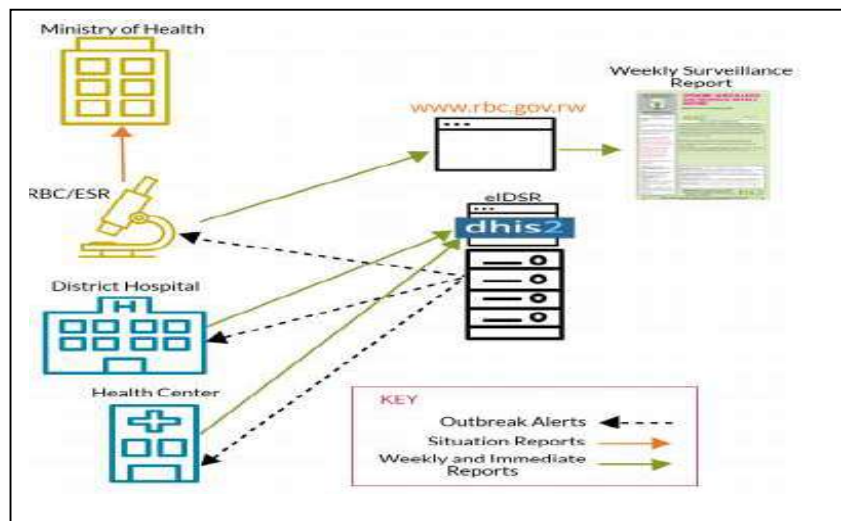
4.1.2 Vaccine Preventable Disease Surveillance System

The Epidemic Surveillance and Response (ESR) Division coordinates all activities relating to the prevention and control of communicable diseases including vaccine preventable disease surveillance.

The ESR Division of the MoH's Rwanda Biomedical Center (RBC) and USAID's Rwanda Health Systems Strengthening (RHSS) Project, used the District Health Information Software (DHIS-2), an open source platform that Rwanda uses for reporting, analysing, and disseminating routine health data. The eIDSR system is now fully integrated into the DHIS-2 in Rwanda for reporting and response action.

Staff at district hospitals and health centers enter data into the eIDSR system for 24 diseases, some of which are reportable to WHO according to the IHR. Once the number of cases for a specific disease reaches a defined threshold, the eIDSR system sends an outbreak alert to district hospitals, health centers, and the ESR team of the RBC. When an outbreak is detected, district focal points supported by the ESR team of RBC investigate suspected cases and confirm whether they are one of the 24 diseases under surveillance. The RBC and ESR share situation reports with the MoH and other authorities as appropriate, and publish a weekly surveillance report on the RBC website

Figure 6: The e-IDSR data flow in Rwanda ²



The eIDSR system collects data through immediate, case-based data entry into DHIS-2 and aggregate weekly reporting. The eIDSR system users collect detailed patient data regarding demographics, geolocation, disease classification (confirmed or suspected), vaccination history, symptoms, patient care status, and other types of information. The system requires users to follow up initial case entries with data on: lab test request, lab test result, case status updates and contact tracing.

The eIDSR has enhanced the real time reporting and has improved notification of disease conditions, including timely outbreak detection and response.

Case-based reporting of acute flaccid paralysis (AFP), measles and rubella, and neonatal tetanus are included in the IDSR. Rotavirus diarrhoea and paediatric bacterial meningitis are monitored through sentinel surveillance monitoring.

From 2016-2019, key performance indicators for AFP surveillance have been met at the national level.

Table 5: AFP surveillance indicators at national level

Indicator	2013	2014	2015	2016	2017	2018	Sep 2019
NPAFP /100,000 < 15 years old (Target >=2)	2.8	2.9	3.9	3.6	3.5	3.5	3.3
% Stool adequacy (Target >= 80%)	87	85	85	88	88	89	87

However, at subnational level, there are some districts that did not achieve the targets. Some of the districts as shown in table 6, are having the problem more than once in the last 3 years. This is an evidence that shows the importance of subnational data analysis

² Rwanda Health Systems Strengthening (RHSS) Project: Technical Highlight, March 2018

Table 6: AFP Surveillance indicators at district level 2016-2018

		NP AFP Rate			Stool Adequacy		
District Name	District Population	2016	2017	2018	2016	2017	2018
Gatsibo	194,559	3.7	3.2	1	100%	83%	100%
Kayonza	154,632	1.3	2.7	1.9	100%	100%	100%
Kirehe	152,930	8.1	0.7	3.3	83%	100%	100%
Nyagatare	209,312	0.5	1.5	3.3	100%	67%	100%
Rwamagana	140,840	2.2	4.4	1.4	100%	83%	100%
Gasabo	237,936	6.9	1.7	1.7	94%	100%	100%
Nyarugenge	127,855	2.4	1.6	0.8	100%	100%	100%
Gicumbi	177,749	3.5	2.3	2.8	33%	100%	80%
Nyabihu	132,429	2.3	1.6	2.3	100%	50%	100%
Rusizi	180,108	1.7	0.6	5	100%	100%	78%
Rutsiro	145,869	1.4	1.4	4.1	100%	100%	83%
Rubavu	181,368	4.5	3.4	2.2	75%	100%	100%
Nyanza	145,449	7.1	2.8	0.7	100%	75%	100%
Gisagara	144,904	2.1	2.1	2.1	100%	100%	67%
Kamonyi	152,990	2	2	2.6	67%	100%	75%
Nyamagabe	153,434	2.7	1.3	2	100%	100%	100%
Nyaruguru	132,246	1.6	6.2	2.3	100%	100%	100%
Ruhango	143,727	1.4	1.4	4.2	100%	100%	100%

The laboratory has the capacity to process specimens (measles/rubella) properly with proficiency test achievement of 100%. It is currently using Uganda Viral Research Institute (UVRI) to process AFP specimen for polio tests. There is good coordination with UVRI and AFP specimens are processed on time.

5 The Review

5.1 Objectives

The EPI programme in Rwanda has achieved the targets set by the WHO with high vaccination coverage rates and surveillance targets for polio eradication, measles and NNT elimination. The WHO recommends to conduct comprehensive national immunization programme review every 5 years to assess the strengths and weaknesses of the programme at national, subnational and service delivery levels. In spite of the very good performance, the EPI programme in Rwanda made the decision to conduct the review as the last review was in November 2014.

Specific objectives of this comprehensive review are:

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- Conduct a comprehensive assessment of the immunization programme within the context of the health sector and external environment in Rwanda
- Assess the organization and the implementation of vaccine preventable diseases (VPD) surveillance (with specific focus on AFP, measles and AEFI at all levels in Rwanda
- Identify strengths, gaps and opportunities
- Propose ways of strengthening the system
- Develop an action plan to address the findings and recommendations
- Use review findings as evidence for advocacy to immunization and surveillance stakeholders

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Specific objectives of this comprehensive review are:

5.2 Methods

The comprehensive review included an in-depth review of relevant documents prior to and during the field activities. The field activities were preceded by adapting the standard WHO questionnaires to the country's context. The field activities included visits to health facilities

and interviews of key personnel using the adapted standard questionnaires for the various levels of health service deliveries.

5.2.1 Desk review

Review of relevant documents was made prior and together with the field assessments. Some of these documents are:

- Fourth Health Sector Strategic Plan (2018-2024)
- Comprehensive Multi Year Plan (2017-2021)
- Rwanda Routine Immunization Coverage Survey (2017)
- EPI Comprehensive Review Report 2014
- Demographic and Health Survey (2014-2015)
- EPI Guideline
- Standard Operating Procedures in EPI
- Rwanda: Joint Appraisal report 2017
- Rwanda: Joint Reporting Formats 2015-2018
- Rwanda: WHO and UNICEF estimates of immunization coverage: 2018 revision
- 7 Years Government Programme National Strategy for Transformation (NST1) 2017 – 2024
- electronic Integrated Disease Surveillance and Response (eIDSR) system: Rwanda Health Systems Strengthening Project
- WHO vaccine-preventable diseases: monitoring system. 2019 global summary
- Regional Strategic Plan for Immunization 2014 – 2020
- Global Vaccine Action Plan 2011–2020

The findings from the desk review of these documents is incorporated in this report within the various sections and background.

5.2.2 Tools:

Standard questionnaires from WHO guideline were adapted and used to gather information at National, Districts, Health facilities, and relevant departments in RBC and immunization partners at national level.

The adaptation and orientation process took place in Kigali on 27-28 September 2019. The process included all the external and internal reviewers. The background, objectives and methods for the review were presented for discussion. Particular emphasis and ample discussion was made on the data collection tools (questionnaires). After the review of the questionnaires, the tools were adapted and the reporting format from the field was agreed upon. Orientation on the use the Open Data Kit (ODK) software was done during the orientation session. The ODK was used for ease and facilitation of reporting and collation of the data.

The data collected included information from key Informant interviews using standard questionnaires; availability and content of guidelines, plans, operating procedures, Information Education and Communication (IEC) materials; cold chain assessment at all levels and observations of vaccination sessions and care giver interviews.

5.2.3 Selection of districts

Districts were strategically selected to include those that were considered high, average and poor performing. At least one district from each province was included.

Another important factor in selecting districts was routine immunization data 2015 – 2018 by District from the JRF. Two measures were used to select districts were coverage (Penta 1, Penta 3, and MCV1 coverage) and dropout rates (Penta 1 – 3 and, Penta 1 – MCV1 DoR).

Districts' performance was then given scores on their performance on coverage

- >100% coverage 4 points (worst performing)
- < 50% coverage 3 points (bad performing)
- 50 - <80% coverage 2 points (average performing)
- 80-100 coverage 1 point (best performing)

Dropout rates

- Negative DOR = 4 points (worse performing)
- DOR > 15 % = 3 points (bad performing)
- DOR 10 – 14% = 2 points (average performing)
- DOR 0-10% = 1 points (best performing)

The scores were added to get a total score from which four quartiles were categorized. The number of districts in each quartile was counted to determine the proportion of districts to be selected randomly to represent districts with varying performance. Ten districts were selected using the random selection but additional two were added.

There was no district from the Northern Province and hence, the team decided to include Rulindo district in the review.

Rubavu district was also added as this district borders DRC, has high population movement along the border, was recently affected by measles outbreak and is at high risk for importation of priority VPDs.

At the end, a total of 12 districts from all the provinces with different performance level were selected for the review.

Units (DHU) have been established in all districts to coordinate the decentralized health system. Outstanding challenges include limited capacity of DHUs in ensuring effective coordination and monitoring of the decentralized health services.

6.1.1 Strengths

There is strong leadership and political support by the highest officials in the government to the EPI programme. This is exemplified by the high profile engagement of the First Lady during the HPV vaccine introduction.

The 4th Health Sector Strategic Plan (2018-2024) identifies the EPI programme as an important programme with targets of maintaining high coverage for fully immunized children (>93%) and contributing to the reduction of infant and child mortality. It also depicts the increase in the domestic budget allocated to the immunization program and maintenance of high and effective coverage of immunization services as its strategies.

The country has completed the comprehensive Multi Year Plan (cMYPs 2017-2021) that articulates the targets, strategies and activities to maintain the high coverage, service delivery and introduction of new vaccines.

The Interagency Coordination Committee (ICC) for EPI is active and meets regularly (quarterly) to review performance and provide guidance to the programme. It has always been chaired by the Minister of Health.

The National Immunization Technical Advisory Group was formally established at the end of 2017 but started functioning since the beginning of 2018. It is now actively supporting the programme in reviewing evidences for new vaccine introduction. It has received requests on introduction of Hepatitis B birth dose, switch from Tetanus Toxoid (TT) to Tetanus and Diphtheria (Td) and typhoid conjugate vaccines. It has a good multi-disciplinary mix of experts.

The Polio Committees (certification, expert and containment task force) are all active and committed in supporting the Polio Eradication activities in the country.

Integrated supportive supervision is conducted twice a year using integrated checklist that is intended to support many programmes and services delivered at health facilities. Feedback is provided after each support

The Maternal Child and Community Health division conducts quarterly integrated coordination meetings with all districts to review programme performance. At this coordination meeting, achievements and progress are assessed and plans for the next quarters agreed up on. This is also an important forum for the division to provide feedback to the districts.

At district level

There are regular monthly and quarterly EPI coordination meetings with heads of health centers and immunization focal persons at the health centers respectively. During ISS written feedback are provided to the health facilities. The districts have relevant guidelines such as district health plan, vaccinator's manual, district outreach plan, supervision plan, and dedicated cold chain. There was no supply stock out or shortage.

There exists a robust relationship between the Education and Health units at the district level, this is being harnessed especially during implementation of HPV vaccination and school health programmes.

6.1.2 Areas that need improvement

Although the partnership between EPI, WHO and UNICEF is commendable, there is no regular meeting to discuss performance. This may be because there were no major problems in the programme and hence not many issues to discuss. Moreover, the good working relations and adhoc meetings between the EPI officers in the partner agency did not make the need for the meeting very evident. However, an EPI Technical working group that meets regularly (every month) to assess progress will add to the improvement of performance.

In the districts, it was observed that there is no robust district Health Plan with budget and EPI components. The population figures that are used are projections from 2012 census data. This projection may not reflect the true picture at cell and village level and hence it may lead to some errors in data reporting.

In some districts there was also inadequate means of transport for effective integrated supportive supervision by the various teams.

6.1.3 Recommendations:

The partnership between the technical agencies and EPI programme can be strengthened with a regular monthly meeting to review performance and to plan upcoming activities.

During the quarterly coordination meetings, districts need to be supported on the planning and monitoring of EPI activities based on the national annual plan. This forum should also consult the relevant statistical expertise and advise districts on the use of the projected population figures at cell and village level.

6.2 Human resource management

The EPI in Rwanda is in the Maternal, Child and Community Health (MCCH) Division under the RBC. It currently has 6 staff members under the RBC structure and one position (epidemiologist) is not filled. The number of the core staff remained the same despite the expansion of the immunization programme in all its system components.

6.2.1 Strengths

There are structured positions for all posts in the health system at all levels. The health workers are highly committed and motivated. Although overwhelmed by the number of activities and responsibilities, at least two nurses provide vaccination services in fixed sessions. There are full-time and dedicated EPI staff (EPI supervisors) who oversee vaccine supply & cold chain, immunization and surveillance in the district hospitals.

EPI Technical guidelines are available at district and EPI staff have training needed to conduct their jobs effectively. Relevant refresher training to cover EPI and surveillance has been conducted in the last twelve months.

The salaries of the health workers come from the government and were regularly paid for each month in 2018.

6.2.2 Weakness/threats

Despite the very good achievements of the programme and its expansion of services with introduction of new vaccines, the number of EPI core staff at RBC has not kept pace with the expansion. It looks like the programme is functioning with its maximum efficiency level.

In the districts there is also inadequate staffing with one person at hospital and health facilities for EPI, Surveillance and other public health activities. In 7/12 facilities that were visited there were inadequate number of health workers to provide vaccination services.

There is high rotation of supervisory staff that limits the opportunity to follow up on action points. Moreover, there is limited time for supervisors during ISS to do the supportive part of the supervision as they have to check across many programmes delivered in the facilities. There was no recent training in immunization and surveillance (only 31% reported of attending such a training in the last 12 months).

As services are integrated, there is no designate Focal Person at district level (immunization and surveillance) who will be dedicated solely for immunization and surveillance activities and given clear ToR to ensure adequate time is allocated for quality EPI services.

At district level, there is no clear policy on staff recruitment, replacement, training, rotation and retention to check the frequent staff rotation/turn over which is now a barrier to effective routine immunization

WHO country office has one SSA technical staff to support EPI who is also part of preparedness for emergencies.

6.2.3 Recommendations

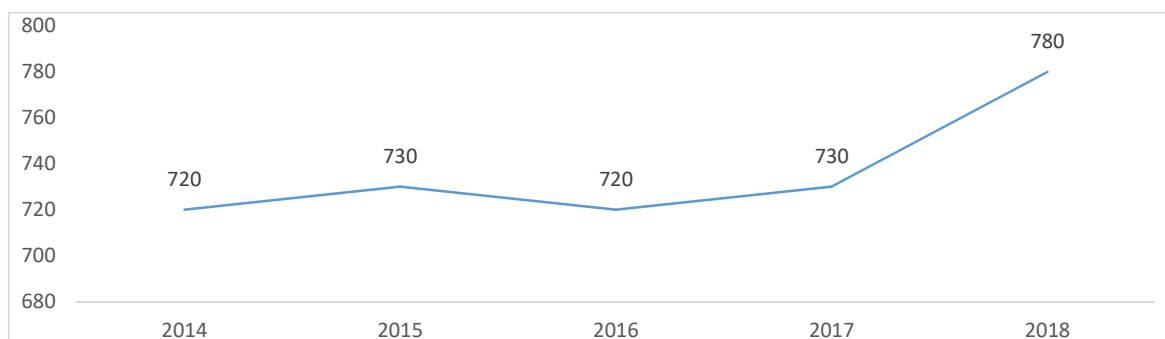
- Review the human resource organogram at RBC to strengthen the capacity of the EPI programme
- RBC to consider elevation of the programme from unit to the next level in its hierarchy.
- Review the impact of the frequent supervisory staff rotation on the quality of service
- MOH to develop proper terms of reference (Job description) for the programme focal persons and Officers, and health care providers
- MOH/RBC to develop a comprehensive capacity building plan in the areas of EPI and IDSR
- Introduce e-learning system (like MLM Online Training,
- Make Guidelines and training material available for references at hospitals and health center levels
- WHO should consider additional support to the current staff with SSA contract and also covers preparedness for emergencies.

6.3 Financing

Rwanda aspires to reach Middle Income Country (MIC) and High-Income Country (HIC) status by 2035 and 2050, respectively³. The Vision to attain the lofty goal is to be achieved through a series of actions contained in the seven-year National Strategies for Transformation (NST 1). The NST1 is broadly underpinned by detailed sectoral strategies that are aimed toward achievement of the SDGs. The NST1 came after the implementation of two, five-year Economic Development and Poverty Reduction Strategies—EDPRS (2008-12) and EDPRS-2 (2013-18), under which Rwanda experienced robust economic and social performances. Economic growth averaged 7.5% over the decade to 2018 while per capita growth domestic product (GDP) grew at 5% annually. Projected economic growth is put at 7.8% in 2019 and 8.0% in 2020⁴, propelled by the country's strong record of implementing reforms to achieve its long-term development goals.

The Gross National Income per capita for 2018 is \$780 which puts Rwanda still at the initial self-financing category for countries receiving support from the Gavi special funding vehicle for immunization.

Fig 8: *The trend in GNI per capita since the last EPI review in 2014*



6.3.1 Planning and Funding Immunization

The overall planning process in the health sector is guided by the Planning Department of the MOH. Specific operational planning at program and health system level in the entire health sector is done annually in line with the annual planning cycle and Health Sector Strategic Plan (HSSP 4) priorities. Furthermore, planning at district level is based on bottom-up approach with input from lower level structures, in line with set financial budget ceilings and priorities in the HSSP4. The District Health Unit is responsible for the development of annual district plans by Health Centers and district hospitals that respond both to the District Development Strategies (DDS) under the responsibility of the vice-mayor, in charge of social affairs, as well as responding to the priorities of the HSSP4.

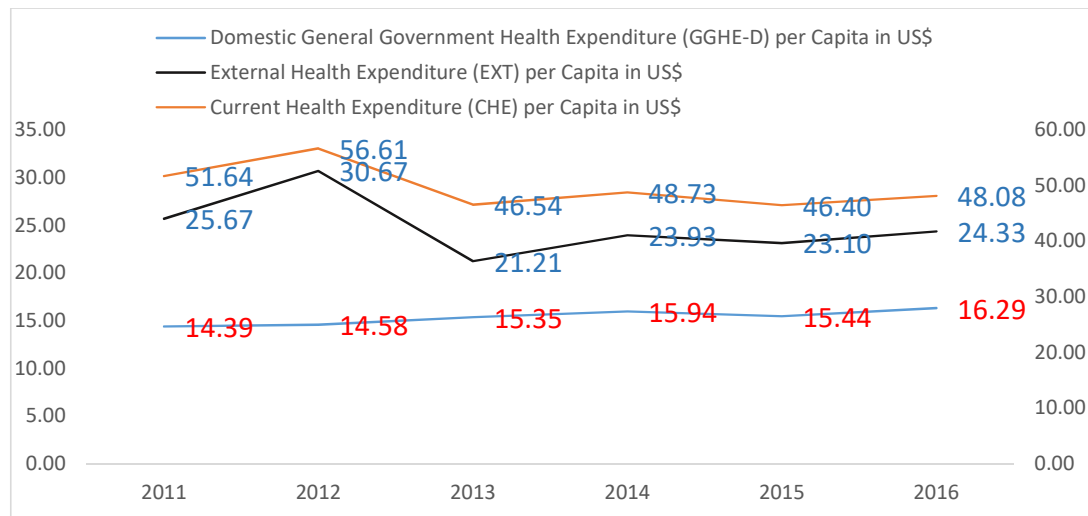
Immunization programme level planning is done within the RBC with support from the Planning, M&E and Business strategy division. Immunization strategies, introduction of new vaccines and technology and its investment requirements has been articulated in the Comprehensive Multi-Year Plan 2017 – 2021.

³ Ministry of Finance and Economic Planning: Budget framework paper 2018/2019 – 2020/2021

⁴ <https://www.afdb.org/en/countries/east-africa/rwanda/rwanda-economic-outlook>

Funding immunization is within health sector funding articulated in the Ministry of Financing and Economic Planning budget framework paper.

Fig 9: The trend for the health sector funding (based on NHA data)



Current health expenditure per capita stands at \$48.1 (2016) while domestic government general health expenditure per capita is \$16.29, a recovery from the decline noticed in 2015.

Government funding is expected to increase as FY 2018/2019 is on track to support the implementation of the government's medium-term fiscal policy objectives, namely: (a) Fiscal and debt sustainability with progress toward the EAC macroeconomic convergence criteria, (b) Reducing the external current account deficit and the reliance on external financing, (c) Further improving prioritization and efficiency of public expenditure, in support of growth, poverty reduction and structural current account improvement⁵.

With a GNI per capita of \$780 in 2018⁶ Rwanda continues to be one of the beneficiary countries of the Global Alliance for Vaccines and Immunization (Gavi, the Vaccine Alliance) in total disbursement of cash grant and product support since 2000 with \$1,454,000.00 for Immunization Systems Strengthen (ISS) coming up to a total of \$159,879,380 by September 2019. Gavi funding support has been and continues to be used to further the achievement of the EPI objectives, including but not limited to new vaccine introductions, operational cost of MR campaigns and Health Systems Strengthening that support increase in immunization coverage and equity as stated in cMYP and other strategic documents. Furthermore, Rwanda has received Gavi Performance Based Financing (PBF) payment of \$2,952,000. A good practice noticed is the way PBF has been applied to support long term systems investment such as construction of EPI Offices and warehouse and procurement of refrigerated vehicles for distribution of vaccines.

There are other partner agencies that continue to support immunization programme technically and with catalytic funds to implement some activities

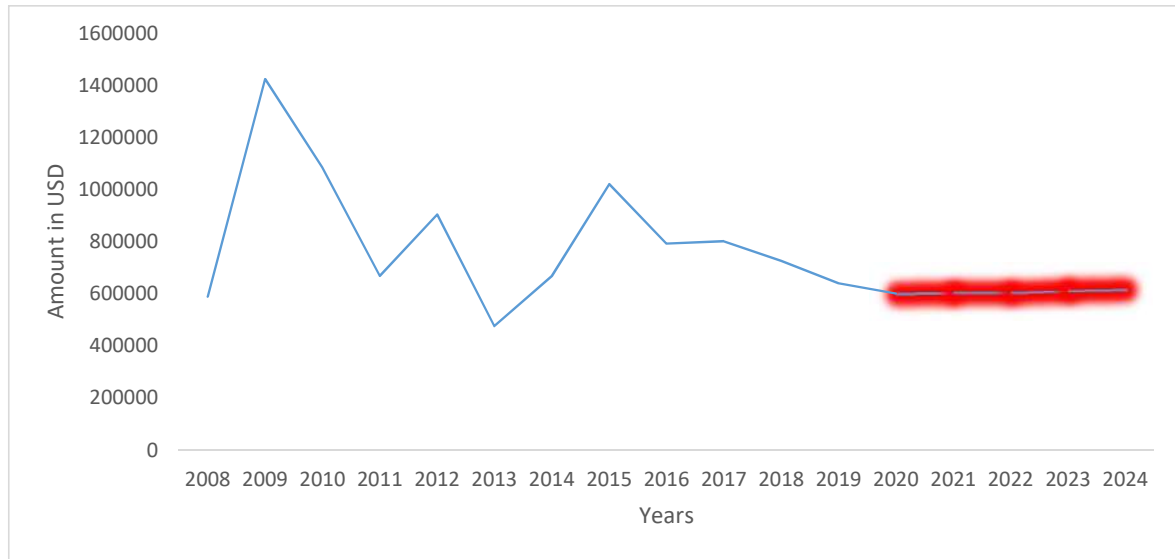
⁵ Rwanda Ministry of Finance and Economic Planning: Annual Economic Report Fiscal Year 2017/18 (Jan. 2019)

⁶ World Bank Indicators GNI per capita, Atlas method (current US\$)

<https://data.worldbank.org/country/rwanda> (Accessed 5 October 2019)

At initial “self-financing phase” within Gavi support trajectory, Government of Rwanda has consistently met her Gavi co-financing commitment haven paid a total sum of \$9,148,000.00 between 2008 and 2018. The amount due for 2019 is \$639,000.00 while between 2020 and 2024 projected co-financing payment will amount to \$3,033,576.007 at current package of HPV vaccine, Penta, PCV and Rota.

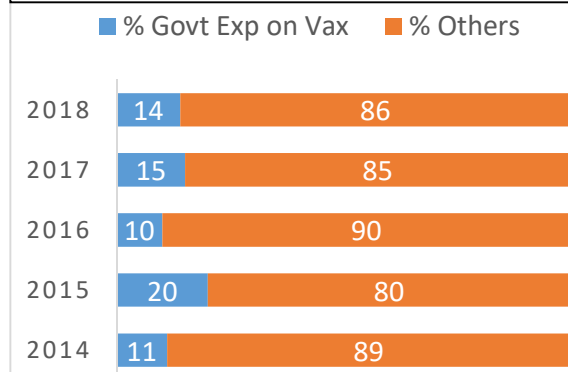
Fig 10: Co-financing data and trends



It is noticeable that co-financing payment has reduced in value from the high \$1,020,000 in 2015 to 600,360 in 2019. As the global market shaping efforts continue to yield results in price decrease for vaccines it is expected that co-financing payment will also respond to such decline.

Within the 5-Year period 2014 – 2018, out of the total payment of \$8,047,592 made for vaccines by government \$4,042,592 representing about 50% had gone into traditional vaccine procurement. As vaccine cost continues to be a major driver of the budget for immunization, a review of MTEF 2016/17 budget by programme indicates that 0.04% of the recurrent budget by programme allocated to Vaccine Preventable Diseases is to be domestically financed⁸. In proportion, government is funding in 5-years (2014 – 2018) less than 20% of the vaccine requirements.

Fig 11: Proportion of Government expenditure on vaccines

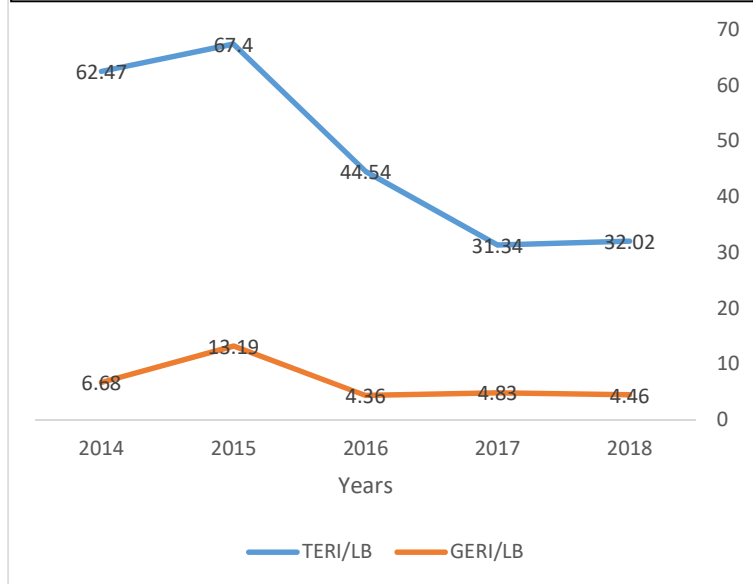


⁷ Gavi co-financing information sheet

⁸ Summary report of the 2016/2017 Forward Looking Joint Health Sector review meeting June 14, 2016

The GVAP has prioritized ownership and sustainability of immunization programme high on the agenda and indicated an increasing trend in domestic expenditure per person target as a measure. Equally Government of Rwanda prioritized sustainability of financing health as indicated in the Health Financing Sustainability Policy developed in 2015. Data from JRF indicate however that total government expenditure on immunization (to include expenditure on vaccines and operational cost) per live birth declined from \$13.19 to \$4.46. This reduction is believed to be due to the reduction in vaccine costs on global market.

Fig 12: Trend in government and total Expenditure (USD) for routine immunization per live birth



6.3.2 Recommendations:

To ameliorate the situation and align with overall government desire for increased sustainability, it is recommended that efforts be made to ensure increased funding from government to immunization.

- Strengthen in-country discussions around the need to continue to prioritize funding immunization within the package of health care.
- Adequate attention be paid to financial incentives for immunization services as health financing and service delivery arrangements become more complex, within the re-energized Health Insurance Scheme,
- Specific efforts be pursued by developing briefing notes, targeting government resources allocation platform for increased funding for EPI programme. Such efforts will be based on locally documented evidence that shows the investment returns in immunization beyond coverage, linking with economic prosperity as a justification for continued and increased investment.
- A resource mobilization framework should be developed that will target the private sector, articulating an investment case for immunization including surveillance.

6.4 Vaccine Supply, Quality and Logistics

6.4.1 Background

Rwanda's immunization supply chain consists of three levels: The national store, district store and health center level which is the service point. Procurement of vaccines and related

commodities is done through UNICEF procurement services. The vaccines and injection devices flow through a three-tiered supply chain comprising of one central vaccines store, 42 district stores and 504 health centers. The national store keeps vaccines for six months and a safety stock of three months while district stores and service delivery health facilities hold one month's worth of stock and 2 weeks of safety stock at maximum. The immunization supply chain currently operates a pull system where districts collect vaccines and supplies from the national store and service level health facilities collect from district stores⁹. Forecasting for vaccines and related supplies is done once every year using the UNICEF forecasting tool and plans for two shipments of each antigen in a year. Clearance of supplies is done by a government contracted clearing agent after which these are delivered at the central vaccines store for safe storage and subsequent distribution. The country electricity coverage is good with 88.3% of facilities having stable access. Cold storage capacity is sufficient at national level. Sub nationally, about 12% of Cold Chain Equipment (CCE) are kerosene based while 87% are WHO PIS compliant and eventually need to be replaced with more efficient technologies. The Program successfully applied for the Gavi Cold Chain Equipment Optimization Plan (CCEOP) support and are in the process of procuring more high performance CCE that will replace obsolete equipment and to a large extent expand capacity at district level. Temperature monitoring system is in place with majority of facilities using the 30-Day temperature recorders (FT2). Stock management is largely by use of manual stock registers and bin cards. The national level also uses the WHO SMT.

FINDINGS

6.4.2 Strengths

- Strong effective vaccine management practices as reported in the EVMA report 2018, with a composite score >80%
- Forecast of vaccines done every year based on projected target population
- Adequate stock management system in place and up to date (manual stock registers, and WHO SMT used at Central level)
- No stock outs experienced in the whole of 2018 at all levels of the supply chain except IPV at CVS which is attributed to global shortage
- All CCE on stable electric energy in all visited facilities, and ongoing electrification initiatives by Government are envisaged to have increased electricity coverage of Health facilities from the 88.3% reported in the 2017 Cold Chain Inventory Assessment.
- Electronic temperature monitoring system is in place to assure vaccine potency is maintained (beyond wireless® at CVS and 30-day temperature recorders at district and health centers)
- District vaccine wastage is regularly monitored and reported to national level on a monthly basis
- Procurement of refrigerated vehicles to support monthly distribution of vaccines from CVS to districts stores.
- Newly established National Regulatory Authority (The Rwanda Food and Drug Authority) that implements quality assurance measures on vaccines and other supplies
- Waste management infrastructure is in place

⁹ Cold Chain Equipment Inventory Assessment Report

- Availability of a cold chain maintenance officer at national and district level

6.4.3 Weaknesses

- In some facilities it was observed that implementation of the Multi-dose Vial Policy was not followed properly
- Wastage monitoring is not differentiated into open and un-open, hence avoidable wastage cannot, currently be monitored
- Lack of an immunization waste management guideline

6.4.4 Recommendations

- The integrated supportive supervision should be enhanced to include checklists and observation on vaccine management so that it can boost practical skills on vaccine management at health facility level
- The EPI programme should make immunization waste management guideline available through close collaboration with environmental health.
- The programme need to monitor and continue the implementation of the 2018 EVMA recommendations for continuous improvement

6.5 EPI service delivery

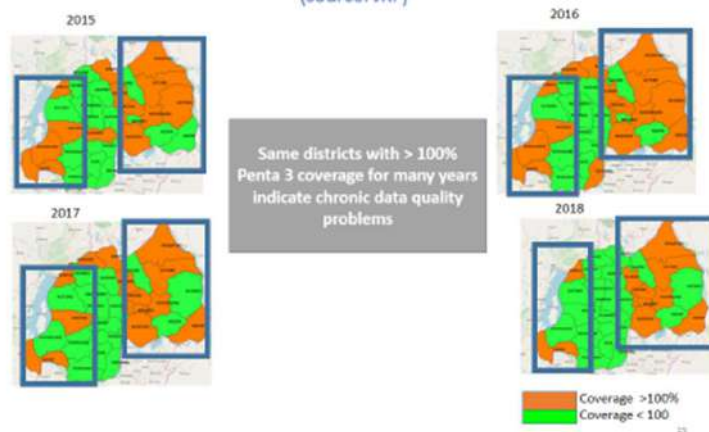
6.5.1 Background

The immunization service delivery in Rwanda is conducted in an integrated health service using the RED/REC strategies components to ensure all eligible children are reached. It involves community participation from planning through to delivery of the service. The system aims at delivery of quality and safe health services so that people receive a continuum of health promotion and disease prevention.

Immunization services are fully integrated into the routine health services within each health facility and are delivered through qualified Nurses that oversee immunization at Health facility level, supervised by the district EPI focal point. The national immunization programme is coordinated by the National EPI manager.

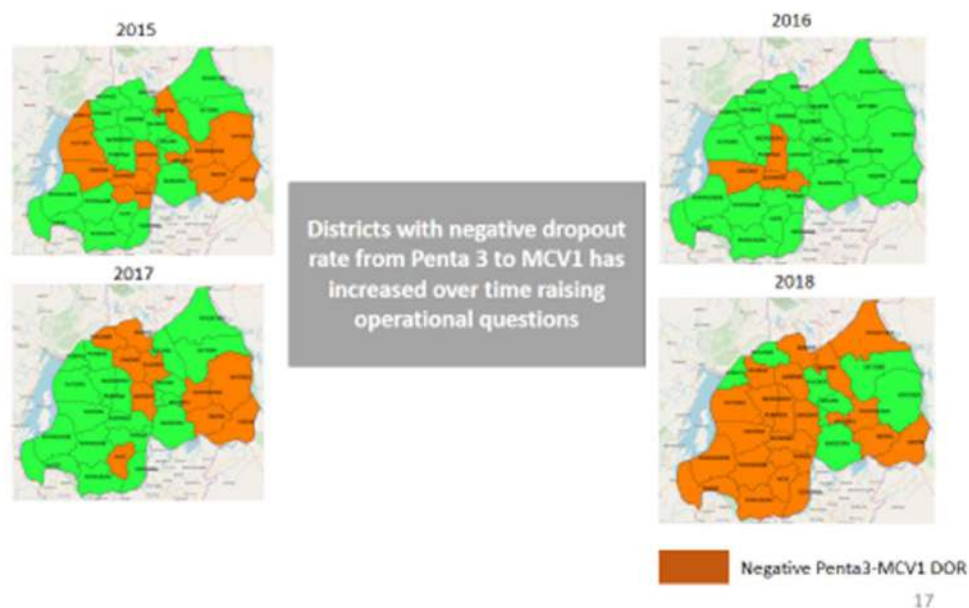
Although vaccination coverage at national level is consistently very good, there are evidences that programme needs to attend to some data quality issues. There were 14 districts (47%) in 2017 and 11 (37%) in 2018 reported a coverage of more than 100% for Penta3. As shown in the figure, there is consistency in the districts reporting coverage >100%, indicating the need to further evaluate the reason for this data quality problem.

Fig 13: Districts with > 100% Penta3 coverage, 2015 - 2018
(source: JRF)



Similarly, some problems were observed with Penta3-MCV1 dropout rates. The number districts reporting negative dropout is increasing in the last 4 years, particularly in 2018.

Fig 14: Districts with Negative Penta3-MCV1 Dropout Rate, 2015-2018
(source: JRF)



Findings:

6.5.2 National level: Strengths

There is a very good immunization coverage that is confirmed by the coverage survey.

The programme has an EPI guideline written in both French and English. Although the guideline has got the technical guidance on immunization service delivery, it will benefit from additional review to include some more details in some sections. The EPI guideline can also be updated to include some policy and standard issues as it is unlikely to have a standalone policy for EPI with the current mode of integration of programmes in RBC.

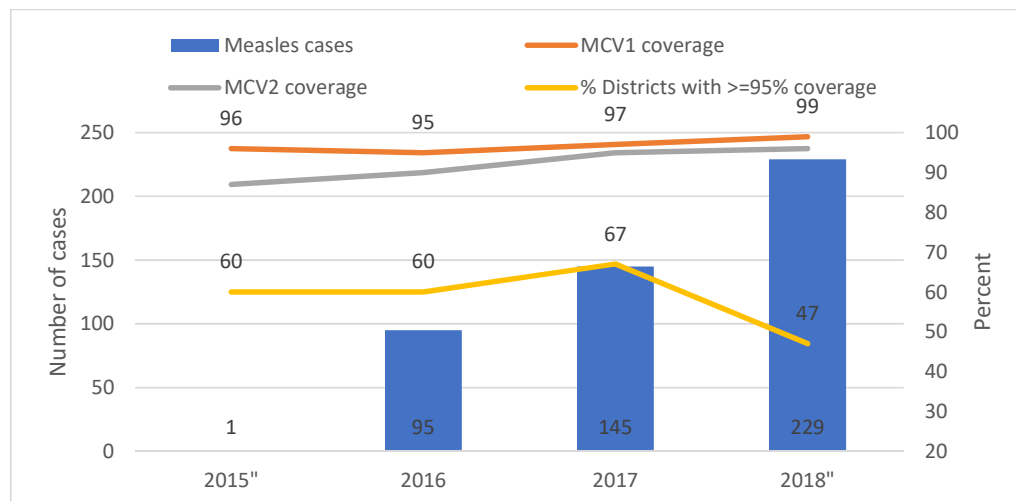
Electronic register to monitor coverage and defaulters is initiated in September 2019 and is going to be gradually rolled out to all districts.

6.5.3 Weaknesses

- There is no EPI policy despite newly introduced vaccines and technologies in use
- There is a decline in % districts with Penta 3 >80% coverage in 2018
- Although REC has been adopted as a strategy, microplanning of immunization at health facilities is not done as per the required standard
- Despite the very good performances of the programme, all best practices are not well documented
- Lack of operational research to address some issues in coverage (e.g. denominator issue)
- Integration of services without proper allocation of resources

As shown in the figure below the coverage of both MCV1 and MCV2 is improving with progressive narrowing of the gap. However, the proportion of districts reporting measles coverage above 95% is relatively low and has significantly dropped in 2018. The number of measles cases also increased during these years against the expectations with the reported high MCV coverage. The calculated rate of measles incidence for 2018 (taking the total population as 12,132,541) is at 18/million which is higher than the expected rate for measles elimination. This warrants a further investigation to find the reasons why this is happening.

Fig15: MCV1 coverage, MCV2 coverage, Percent districts with >= 95% coverage and measles cases in Rwanda, 2015 – 2018 (JRF data)



6.5.4 District level: Strengths

Majority of the districts visited have attained high immunization coverage of above 90%. The number of unimmunized children in Penta 3 and MCV 2 is steadily decreasing to about 5%

and below over the past three years. In the facilities visited, the vaccination sessions were all conducted by trained nurse vaccinators contributing to quality services.

The service is delivered integrated with other health services contributing to reducing missed opportunities for mother and child.

The health providers displayed adequate knowledge and well organized immunization sessions both at fixed and outreach sites.

The EPI programme conducts bi-annual Child health days to vaccinate missed children during routine immunization.

Immunization and surveillance performance review meetings are conducted regularly, and it will help to improve quality of service

The involvement of the local leaders and community health workers play an important role in defaulter tracking mechanism through periodic review of the Primary Health Care (PHC) register. Defaulter tracking of children is an effective mechanism for next visits using appointment cards.

All planned immunization sessions were conducted without any cancellations.

The health provider had a very good relationship with the care givers in most situations, they ensured that IEC was provided prior to commencement of the immunization session and continued during the session.

6.5.5 Weaknesses

The supervision from EPI supervisors was ineffective and inefficient to specifically monitor performance at HC level especially during implementation of sessions.

In those facilities where catchment area maps were available, they did not have all the required information on the community components indicating the need to review and update them.

Some vaccines were placed on the table without ice packs exposing vaccines to heat which could compromise the potency of vaccines.

It was observed that some care givers waited for a long time before they could be attended to, it could take them hours at the HC before they could go back home.

There were times when little information was provided to parents on the potential side effects of immunization, either mild or severe, nor how to appropriately respond in such a situation.

In some situations there were unrealistic immunization targets that made it difficult for coverage targets to be realized.

Shortage of staff is a major challenge in conducting outreach services.

6.5.6 Observations and data collected

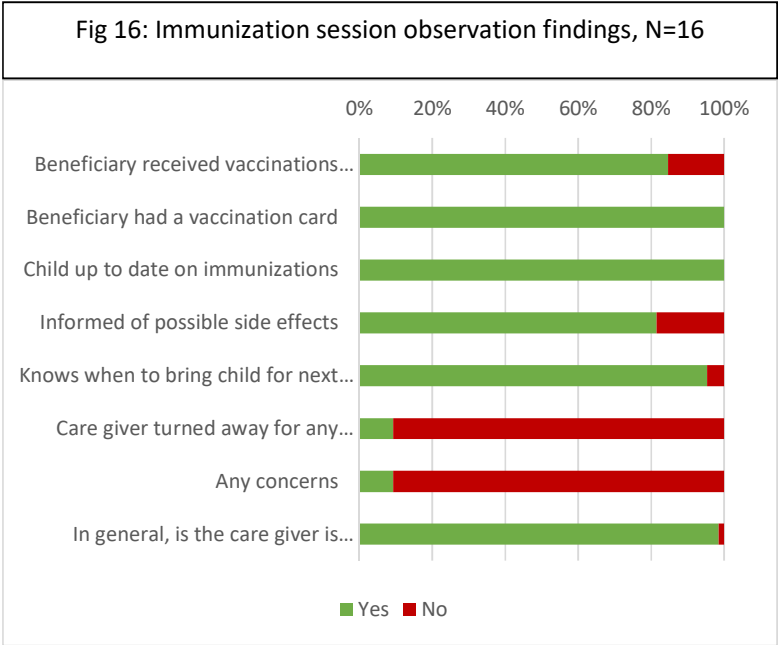
Majority of the HC visited have attained high immunization coverage of above 90%.

The vaccination sessions were all conducted by trained nurse vaccinators contributing to quality services.

The service delivery uses an integration of other health services reducing the chances of missed opportunities for mother and child. There was good organization of the immunization sessions with knowledgeable and dedicated health providers.

The availability of catchment areas maps in HCs made staff clearly understand their catchment areas

and together with the community they are able to identify the high-risk populations and hard to reach areas with strategies in place to guide the execution of the sessions. This has contributed making the services accessible and utilized promoting the strategy of reaching every child.

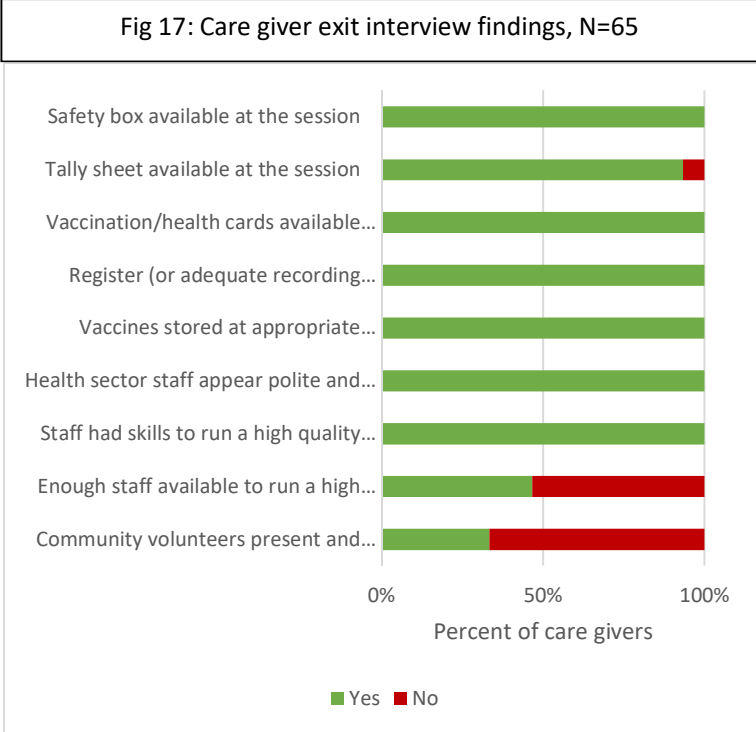


There was good communication between the health care providers and the caregivers.

Health care providers followed injection safety techniques; there was no recapping, safety boxes were available for waste management and disposal

Recording done on the child vaccination card and register
Needles are disposed of immediately after use

Growth monitoring was conducted and advice given appropriately according to the growth pattern of a child.



Best practice noted

There is a frequent and regular tracking mechanism for defaulters.

The non-cancellation of planned Immunization services increases confidence and adherence to schedule by the care takers

6.5.7 Conclusions

The Rwanda EPI program is well managed, owned and supported by dedicated staff, community members and leaders.

The governance structure in Rwanda provides an enabling environment for the delivery and sustainability of the immunization program that includes service delivery models of fixed, outreach and child health days.

While only few mothers (18%) were not informed about potential side effects of vaccination, this should be given the due consideration to improve confidence between the care givers and service delivery. Adequate information should be provided to caregivers and they should also be allowed to ask any questions to address fears to ensure sustained high coverage

The performance of 2 districts being below target and the increasing proportion of districts not attaining MCV1 coverage >95% may continue to result in accumulation of susceptible children that will continue to cause measles outbreaks and will limit the attainment of the elimination goal.

RED/REC micro-plans are not available in all facilities and when they are present, they were not complete.

6.5.8 Recommendations

Key recommendations

The districts should ensure that micro-plans are available both at district and HC level with the active involvement of the community structures in consideration of the RED/REC strategy components to facilitate high level immunization sessions.

The MOH through RBC needs to increase staffing levels so as to improve quality of service and reduce waiting time for care givers.

Other recommendations

Districts should develop a memorandum of understanding for the systematic engagement of the private sector in service delivery of immunization.

The long waiting time by care givers visiting health facilities for immunization services can be reduced by increasing the frequency of fixed sessions in all the health centers.

There is need to organize and strengthen the service delivery supervision especially at HC level

6.6 VPD Surveillance

6.6.1 Background

The Epidemic Surveillance and Response (ESR) Division coordinates all activities relating to the prevention and control of communicable diseases of which vaccine preventable disease surveillance is one. The country has achieved the targets for AFP and Measles surveillance for the last 6 years as shown in figure 18.

Following the successful submission of the polio free certification documentation to the ARCC in 2004, there has been a continuous passive zero reporting surveillance system for poliomyelitis.

Although the performance indicators at national level show very good achievement through the years, the subnational data show some concerning performance in the districts along international boundaries.

The polio certification committee, experts review committee, national containment taskforce and measles elimination verification committee have been established and are actively reviewing the documents for certification and elimination and cases for classification

Looking at the subnational data closely (figure 19), shows that some districts performed below the expected performance targets. Most underperforming districts are along international boundaries and raise a concern on timely detection of importation.

Table 7: National level surveillance indicators

VPD Surveillance Performance indicators adequate at National level

AFP surveillance performance indicators

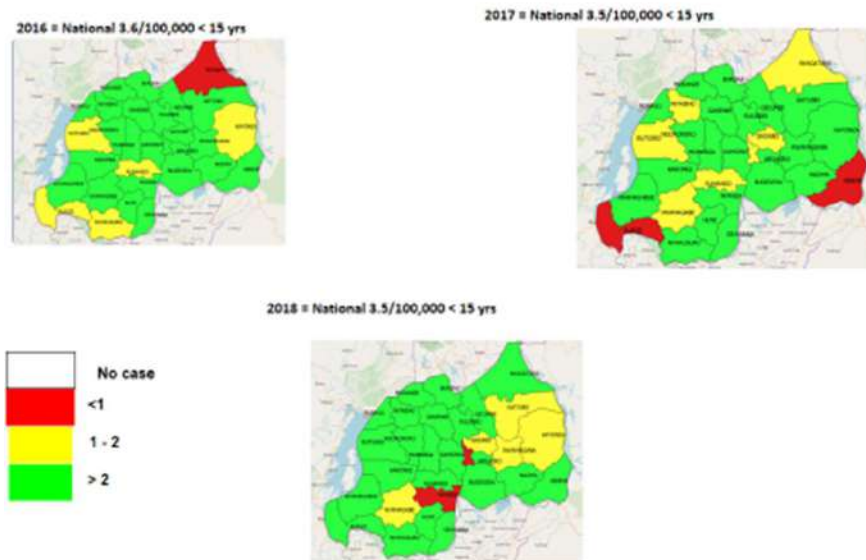
Indicator	2013	2014	2015	2016	2017	2018	Sep 2019
NPAFP /100,000 < 15 years old (Target>=2)	2.8	2.9	3.9	3.6	3.5	3.5	3.3
% Stool adequacy (Target >= 80%)	87	85	85	88	88	89	87

Measles surveillance performance indicators

Indicator	2013	2014	2015	2016	2017	2018	Sep 2019
NMFRI/100,000 population (Target >= 2)	6.6	3.7	3.6	6.9	7.4	7.5	7.4
% Districts that investigated at least one suspect case with blood specimen (>= 80 %)	100	94	94	94	94	97%	94%

57

Figure 18 Rwanda NP AFP 2016 -2018.



Rubavu district in particular is concerning because of its proximity to DRC and the continuous high population movement along the border.

Rwanda was supposed to introduce IPV in 2015. However, due to global shortage of IPV supply, the introduction delayed up to March 2018. Rwanda switched from tOPV to bOPV in April 2016, this situation has created a significant pool of susceptible children who have not been vaccination against type 2 Poliovirus for a period of 2 years. A catch campaign remains a pending issue

6.6.2 National level strengths:

- The country has met the target indicators for NPAFP and NMFRI met at national level for the last 5 years
- The national committees for polio, measles, AEFI are active and members are very committed
- VPD surveillance is supported by national measles laboratory which is functioning well and surveillance focal persons exist in all districts
- Government procured measles testing kits during outbreaks
- Good collaboration with UVRI (the reference laboratory) for confirmatory test for suspected polio cases
- Members for Polio Committees (NCC, NPEC, NTF), MVC and AEFI are functional and they are committed
- Polio committees had successfully overseen the switch validation process
- Containment activities and tOPV switch are very well done

- Polio days celebrated on 24 Oct annually and NCC use this opportunity to visit low performing districts
- AEFI committees classifying severe AEFI cases

6.6.3 National level: Weaknesses

- There are surveillance gaps in districts along international borders that need the attention and focus as there is a risk of importation
- No data harmonization meeting between Laboratory and surveillance teams
- Laboratory personnel are not trained on data management
- Occasional shortage of measles testing kits

6.6.4 District level: Strengths

- Surveillance focal persons exist in all districts
- Written terms of reference for surveillance FPs are available
- 90% of visited districts reported training was conducted on AEFI reporting
- AEFI reporting forms are available in 90% of districts
- Posters/job aids for VPD surveillance are available in > 90% of districts
- Mechanisms for procuring kits and laboratory supplies are available

6.6.5 District level: Weaknesses

- There is no updated list of priority health facilities for surveillance and active surveillance is not conducted
- In 90% of districts, no written schedule for visiting priority HFs
- Most districts don't know minimal expected cases to be detected or target for non-polio AFP cases and non-measles febrile illness
- In 50% of districts, there was no log book to record/report outbreaks and rumors

6.6.6 Surveillance at health facilities: Strengths

- Surveillance focal persons exist in all health facilities
- Most (80%) of surveillance focal persons have written ToR
- Surveillance focal persons know the case definitions for AFP, Measles and NNT
- 70% of HF focal persons had refresher training in the last 12 months
- VPD surveillance guidelines available in > 70% of HFs visited

6.6.7 Weaknesses

- Of 28 facilities visited, 44% not trained on AEFI reporting, 40% had no AEFI guidelines and 45% had no AEFI reporting forms
- Surveillance data available and stored: 90% for measles, 50% for AFP

6.6.8 Surveillance: Laboratory Strengths

- Lab is processing specimens (measles/rubella) properly and timely
- It refers stool samples to Uganda UVRI for polio test; this is going on well
- Scored 100% on recent external quality assurance (Proficiency Test)
- Government procured measles test kits when shortage encountered in mid of measles outbreak

6.6.9 Surveillance Laboratory: Weaknesses

- During the visit, Measles Lab database contains data only from Aug 2019 till to-date
- Sentinel surveillance data for rotavirus and PBM is not shared with WHO
- Shortage of measles test kits
- Measles Lab data managers are not trained on data management
- There is no data harmonization with ESR and Lab

6.6.10 Conclusions

The AFP surveillance sensitivity is optimal at national level. However, there are gaps in some of the districts. This carries the risk for missing or delayed detection of low grade transmission of polio at sub national level especially along the border with DRC.

The confirmed outbreaks of measles in the last 3 years indicate some gap in immunity and detailed investigation of each confirmed case as per the measles elimination guideline needs to be documented with the genotyping of the detected measles virus

6.6.11 Recommendations

- District teams should be trained on VPD surveillance and outbreak investigation
- Ensure that districts know the minimal targets of NPAFP and NMFRI per year and they should be provided performance feedback on quarterly bases
- Intensify surveillance in districts along international boundaries and ensure that such districts have sensitive surveillance in place that meets key performance targets
- WHO IST should train measles (VPD) laboratory personnel on data management
- Update surveillance guidelines and SOPs, prioritization of health facilities for active surveillance

6.7 Coverage monitoring and data verification

6.7.1 Background:

The HMIS collects all routine data from health facilities using DHIS2. Programmatic quarterly coordination meetings with the heads of health facilities have been institutionalized and are held regularly.

The lowest level is the health facility, where there is a data manager whose responsibility is to enter data into HMIS platform (DHIS2). The data manager cross checks with the EPI nurse monthly as a form of validation. There is also a validation meeting between data manager, head of health center and other staff to review the data. All levels – health facility, district, and central – have access to health facility data and conduct data analyses of their respective catchment areas.

Data quality and trends in analyses are reviewed as a monthly meeting with staff at the central level as well as a quarterly meeting with district staff. Additionally, there is a meeting with RBC to review the quality of data. Twice a year the central level conducts Integrated Supportive Supervision (ISS) visits. As a rule, when there are discrepancies <5% there is no problem, 5-10% give verbal warnings, >20% letter from the Minister

6.7.2 Strengths

- Data from Health facilities and districts is complete and timely submitted
- Data managers in place at all levels
- Data reporting and recording tools available at all levels
- Immunization monitoring chart or other means of monitoring available
- Defaulter tracking systems in place to determine dropout or missed children
- Data validation system in place
- Routine meetings occur to review data quality and trends and provide feedback
- Regular data management training occurs at all levels
- One of the district officers is developing a tool that can link the data to indicators and produce a dashboard which will ease the monitoring of performance.

6.7.3 Weaknesses

- EPI target population size at the level of cells and village is not projected from census; there is a risk of over/underestimation
- There are problems identified in data quality (e.g., Penta1 to Penta3 negative dropout rate, MCV1 more than Penta3)
- The chart/graph/table for monitoring priority disease trends are outdated and are not used to interpret the data
- There are discrepancies between summary data, monitoring charts, and tally sheets
- At present, there is no data quality improvement plan but it is under development

- There is heavy workload on the data manager; his responsibilities extend beyond EPI
- There is high rotation of staff, that resulted in lack of institutional knowledge

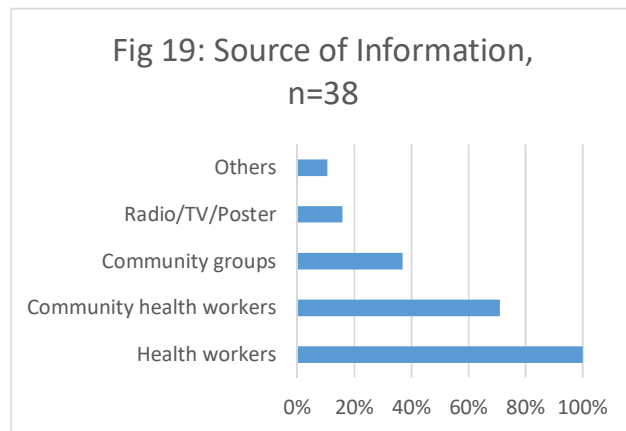
6.7.4 Recommendations

- The integrated supervision checklist should be updated to enable support of staff on data use – analysis and plan for corrective actions at district and facility level
- The programme with support from partner agencies should conduct operational research to address some of the data problems
- Training on data quality self-assessment for health workers and Data focal persons
- WHO should update Routine Immunization Module (RIM3) to avoid double entry of immunization data shared from HMIS (adapt DHIS2 app)

6.8 Advocacy, Communication and Social Mobilization

6.8.1 Strengths

- There is close coordination of the EPI with Rwanda Health Communication Center (RHCC) and communication activities integrated with other programmes
- The RHCC has annual renewable contracts with private print media and radio
- Heads of health centers meet weekly with community leaders to discuss and promote health interventions
- Health worker at health facilities meet frequently with community health workers
- Very high demand for vaccines by communities
- Close coordination and close working relationship with Education and other Sectors



6.8.2 Weaknesses

- There is no strategic communication plan for Immunization at national level
- Knowledge Attitude Practice Behavior (KAPB) study was not conducted, despite being on plan

- There is no action plan for communication activities that were undertaken
- Communication activities are not documented at district level
- There is no evidence for identifying special strategies to reach out hard-to-reach populations

6.8.3 Recommendations

- The RHCC and EPI should develop a strategic plan for communication
- Conduct KAPB study to identify health seeking behavior and bottlenecks to access
- There is a need to document of best practices

7 Conclusions

- The EPI programme in Rwanda is performing very well achieving high coverage and meeting the regional immunization targets
- Sustainability of the high performance requires continuous collaboration and support from all sectors and high officials
- Only 10 EPI technical staff for the last 8 years despite the expansion of the program
- Financial sustainability needs attention as mobilizing funds is becoming increasingly difficult; the programme is seen as well performing and hence priority may shift to other programmes
- The strong networks established between community health centers and community health workers have been identified by this review to be a critical factor in immunization programme success. This structure should also be utilized to strengthen the surveillance in the districts.
- Of the components of RED/REC, microplanning is not done properly while community linkage is well done through the community health workers
- Data quality issues (coverage >100% and negative dropout rate) need to be addressed through DQAS, operational research to find out challenges around the denominator and development of data quality improvement plan
- Surveillance in some districts particularly along international borders need to be strengthened to avoid delays in detection of low grade polio transmission

8 Recommendations:

Recommendation	Responsible (Supported by)	Timeline
1. Programme management and financing		
1.1 Update the EPI guideline to include some policies and standards in immunization as it will not be feasible to have a standalone immunization policy	EPI (WHO)	12-18 months
1.2 EPI programme to document the evidence in support of continued and increased investment	EPI (WHO)	12-18 months
1.3 Develop briefing notes targeting government resources allocation platform for increased funding to ensure increased funding from government to immunization	EPI (WHO/UNICEF)	12-18 months
1.4 Develop a strategy to engage with private sector	EPI (WHO/UNICEF)	12-24 months
1.5 Develop resource mobilization plan	EPI (UNICEF)	Long term
2. Human resources capacity strengthening		
2.1 Review the human resource organogram to strengthen the capacity of the programme;	RBC	12-18 months
2.2 RBC/MoH to explore the possibility of upgrading EPI/Vaccination program to a higher level instead of Unit	RBC	24-36 Months
2.3 Review the impact of the frequent staff rotation/turn over on the quality of service	RBC	1 year
2.4 Introduce e-learning system (like MLM Online Training)	RBC	12-18 months
2.5 Make Guidelines and training material available at Hospitals and Health centers levels	RBC (WHO/UNICEF)	12-18 months
3. SERVICE DELIVERY		
3.1 RBC to strengthen Reaching Every Child strategy in all Health Facilities by systematizing the development and utilization of standard Micro-Plan (all components) and include involvement of the community	EPI/WHO	Within 12 months
3.2 Districts to develop a memorandum of understanding for the systematic engagement of the private health facilities in service delivery of immunization	EPI/RBC/DISTRICTS	6 months-1 year
3.3 Health centers to increase the frequency of fixed session in to reduce the long waiting time by care givers visiting for immunization services	EPI/RBC/DISTRICTS	Long term
4. Recommendations VACCINE MANAGEMENT		

4.1 Enhance support supervision at Health facility level to boost practical skills on vaccine management	RBC/EPI/DISTRICTS	Start immediately but need to be continuous
4.2 Follow up on the 2018 EVMA recommendations for continuous improvement	EPI	Start immediately but need to be continuous
5. VPD SURVEILLANCE		
5.1 District teams should be trained on VPD surveillance and outbreak investigation	ESR/EPI (WHO)	12months
5.2 Ensure that districts know the minimal targets of NPAFP and NMFRI per year and they should be provided performance feedback on quarterly bases	ESR (EPI)	Within 2 months
5.3 Intensify surveillance in districts along international boundaries and ensure that such districts have sensitive surveillance in place that meets key performance targets. Update Health facilities reporting sites categorised by priority to guide active surveillance	ESR (WHO)	Start immediately but need to be continuous
5.4 WHO IST should train measles (VPD) lab personnel on data management	WHO	6 -12 Months
5.5 Update surveillance guidelines and SOPs, prioritization of health facilities for active surveillance	ESR/EPI (WHO)	6 months-1 year
6. DATA QUALITY		
6.1 Ensure data use is included during ISS	RBC/EPI/DISTRICTS	3-6 months
6.2 Operational research to address some of the data problems; denominator triangulation for better estimate of denominator	RBC/EPI/(WHO)	12-24 months-1 year
6.3 Training on data quality self-assessment	EPI/(WHO)	12-24 months
6.4 WHO to update Routine Immunization Module (RIM3) to avoid double entry of immunization data shared from HMIS (adapt DHIS2 app	WHO	12-24Months
7. Advocacy Communication and Social Mobilization		
7.1 Develop a strategic plan for communication	EPI(UNICEF)	6 months-1 year
7.2 Conduct KAPB study	EPI(UNICEF)	7 months-1 year
7.3 Documentation of best practices	EPI(WHO/UNICEF)	Start immediately but need to be continuous

Annex 1: table showing the reviewers, selected districts and facilities visited

Reviewers	Districts	Facilities Visited
Peter Okoth, Irene Mukanyandwi, Laurence Nshimiyimana	Kicukiro, Rulindo Rwamagana	Gishari HC, Nyarugunga HC, Karengye HC, Kabuga Health Center, Buyoga HC, Tumba HC
Bassey Enya Bassey, Yvette Tuyishime, Emmanuel Nzaramba	Rusizi, Nyamasheke, Nyamagabe	Kigeme Health Center, Mbuga Health Center, Giheke Health Center, Gihundwe Health Center, Gatare Health Center, Rusizi Health Center Nyamasheke Health Center
Mekonnen Admassu, Marie Rosette Nahimana, Eraste Rwagitare, Ines Itanga	Rubavu, Ngororero Muhanga	Mudende HC Rubaya health Center Kabari HC Rugendabari Health Center Gasovu HC
Patricia Mwambi, Jane Niyibaho, Claver Kayobotsi	Ngoma District Gatsibo District Nyagatare District	Remera Health Center Bugarura HC Rurenge HC Bugaragara Ruragarama HC Mutendeli HC
Afewerk Assefa, Goitom Weldegebriel, Amos Petu, Brine Masvikeni, Joyce Charo, Jacquelyn S. Lickness	National	EPI, MCCH, RHCC, HR, Planning, USAID, UNICEF, WHO, ESR, Laboratory, National Vaccine Store, HMIS/Data, NITAG, NPEC/NCC, AEFI