[SUDAN]
2020 Programme Support Rationale
[2021-2025]

The Programme Support Rationale (PSR) presents the rationale and objectives for the programming of Gavi support for the upcoming period. It includes the Health System Strengthening (HSS) component and - together with the online vaccine application(s) mentioned below - replaces the previous application forms used to request new support.

- The PSR is developed approximately once every five years based on and in alignment with the Country's health sector strategic plan(s,) the immunisation strategic plan(s) and budgets.
- It incorporates the Joint Appraisal in the year of its review.
- **Stock levels and requests for vaccine renewals or product switches need to be reported on the Gavi Country Portal between late March and 15 May.**
- All required reporting has to be submitted on the country portal, as per the reporting guidelines.
- The PSR builds on robust analysis of country data and evidence of progress made (or persistent challenges) on the coverage and equity situation, in the landscape of country health systems. The HSS component is expected to anchor the full portfolio of requested support to the country health sector context, providing the rationale for the proposed objectives and related activities.
- In parallel to the PSR, the Gavi budgeting and planning template and Gavi grant performance framework (GPF) are completed to complement the objectives presented in the PSR. This should be reflected in the country's own operational budget and workplan.
- The Coordination Forum (ICC, HSCC or equivalent body) is required to endorse the PSR prior to final submission to Gavi.
- Signatures of both the Minister of Health and Minister of Finance or their delegated authority are required to endorse the final PSR before submission to Gavi.
- The PSR will be reviewed by members of the independent review committee (IRC) who will make a recommendation to Gavi on the full portfolio of support for the duration of the PSR, including any current support that needs to be renewed.
- Following the independent review there will be a period for countries to respond to any 'issues to be addressed' ahead of final Gavi approval and disbursement.
- **It is recommended that this process be initiated 15-18 months prior to expected grant disbursement.**
- **Vaccine support is a key component of the full portfolio. Specific vaccine applications are developed via Gavi's online country portal and submitted for review and approval 15 to 18 months before the planned vaccine launch or campaign.**
- On an annual basis the budget will be reviewed and updated to take into account implementation progress and any new information from the joint appraisal.

Visit Gavi's website (http://www.gavi.org/support/process/apply/) for available programmatic and process guidance to support the development of the PSR and vaccine applications. For a **list of mandatory documents** to be submitted together with this PSR, please refer to Annex 1 of the Application guidelines.

Part A: Overview of portfolio of support

All grey boxes to be pre-filled by the Gavi Secretariat
All white boxes to be filled by Country

1. Vaccines: Gavi support requested and projected country co-financing for current and new Gavi-funded vaccines

1.1. Current Gavi-funded vaccines: co-financing estimates

Programme and type of support		Estimated projections[1]				
		Year 2021	Year 2022	Year 2023	Year 2024	Year 2025
Pentavalent routine	Country co-financing (US$)	$1,120,641	$1,307,855	$1,526,268	$1,780,843	$2,077,251
	Gavi support (US$)	$4,756,315	$4,656,285	$4,526,042	$4,359,862	$4,151,253
PCV routine	Country co-financing (US$)	$2,801,601	$3,269,637	$3,815,670	$4,452,109	$5,193,129
	Gavi support (US$)	$11,012,114	$10,749,004	$10,410,214	$9,981,549	$9,446,899
Rotavirus routine	Country co-financing (US$)	$1,473,389	$1,719,533	$2,006,697	$2,341,406	$2,731,116
	Gavi support (US$)	$5,757,792	$5,618,921	$5,440,245	$5,214,300	$4,932,621

[1] These estimates provide visibility to the total funding needs that a country should plan to complement the Gavi financing. These estimates are projections and may differ from actual commitments, which are calculated year-by-year and reflected in Gavi decision letters. The source of these estimates are the latest input received from country, with adjustments performed by the Gavi Secretariat (eg price updates, supply constraints, etc.)

IPV routine	Country co-financing (US$)	0	0	0	0	0
	Gavi support (US$)	$2,805,011	$3,261,406	$3,348,684	$3,104,871	$3,186,963
Meningitis A routine	Country co-financing (US$)	$221,485	$258,486	$301,653	$351,968	$410,550
	Gavi support (US$)	$950,679	$931,067	$905,485	$872,801	$831,730
Yellow Fever routine	Country co-financing (US$)	$432,448	$411,420			
	Gavi support (US$)	$2,278,830	$1,831,980			
a) Total Country co-financing for current vaccines (US$)		**$6,049,564**	**$6,966,931**			
b) Total Gavi support for current vaccines (US$)		**$27,560,741**	**$27,048,663**			
c) Total cost of current vaccines (a+b) (US$)		**$33,610,305**	**$34,015,594**	**$**	**$**	**$**

If applicable, list additional vaccine support that might have been approved, but not yet introduced.

1.2. New vaccine support to be requested: presentation and implementation dates

Country to complete all columns for each new vaccine introduction and campaign planned over the duration of the PSR and for which the country seeks support.

Programme and type of support	Preferred presentation[2]	Target submission date of request	Desired date for vaccines to arrive	Planned launch date	Support requested until[3]
Hep B zero dose	10 doses	January 2021	Dec 2021	June 2022	2025
MR routine	MR, 5 doses/vial, lyophilized	Sep 2020	June 2021	Jan 2022	2025
MR Catch-up	10 doses	Sep 2020	March 2021	May 2021	2021

[2] For vaccine presentations, please refer to the detailed product profiles available here: https://www.gavi.org/about/market-shaping/detailed-product-profiles/

[3] For routine vaccine introduction, support is usually requested until the end of the country's valid cMYP, as per the guidelines and may be extended in the future. If you wish to request Gavi support for a shorter time period than the end of your cMYP you may do so. For campaigns the "support requested until" field will normally be the same or one calendar year from the launch date, but can be extended for a phased campaign.

1.3. New vaccine support to be requested: summary of targets, co-financing and Gavi support

For types of vaccine support and guidelines, please refer to http://www.gavi.org/support/process/apply/vaccine/)

Programme and type of support	Year	Year 2021	Year 2022	Year 2023	Year 2024	Year 2025
MR for routine	Population in the target age cohort (#)	1,746,575	1,794,482	1,843,806	1,894,590	1,946,882
	Target population to be vaccinated (first or only dose) (#)	1,571,918	1,615,034	1,677,863	1,743,023	1,810,600
	Target population for last dose (#)	1,484,589	1,525,310	1,585,673	1,648,293	1,713,256
	Estimated wastage rates[4]	30%	30%	30%	30%	30%
	Country co-financing (US$)	$1,639,052	$1,559,629	$1,869,049	$2,233,525	$2,668,895
	Gavi support (US$)	$3,257,918	$2,492,266	$2,353,355	$2,154,126	$1,890,161
MR Catch up campaign	Population in the target age cohort (#)	9 months to 15 years old				
	Target population to be vaccinated (first or only dose) (#)	19,086,590				
	Estimated wastage rates	20%				
	Country co-financing (US$)	$	$	$	$	$
	Gavi support (US$)	$17,096,132	$	$	$	$
Hep. B zero dose (no Gavi guidelines available as yet on this; hence, no basis for calculating estimated costs)	Population in the target age cohort (#)	1,954,968	2,008,513	2063640.422	2120399.189	2178839.96
	Target population to be vaccinated (first or only dose) (#)	#	1,205,107.87	1,258,820.66	1,314,647.50	1,372,669.17
	Estimated wastage rates	%	%	%	%	%
	Country co-financing (US$)	$	$	$	$	$
	Gavi support (US$)	$	$	$	$	$
a) Total Country co-financing for new vaccines requested (US$)		$1,639,052	$1,559,629	$1,869,049	$2,233,525	$2,668,895
b) Total Gavi support for new vaccines requested (US$)		$20,354,050	$2,492,266	$2,353,355	$2,154,126	$1,890,161

[4] *For indicative wastage rates for preferred presentations (%), please refer to the detailed product profiles available here: https://www.gavi.org/about/market-shaping/detailed-product-profiles/*

c) Total cost of new vaccines requested (a+b) (US$)	**$21,993,102**	**$4,051,895**	**$4,222,404**	**$4,387,651**	**$4,559,056**

1.5 Request for vaccine presentation switches[5] for current support (if applicable)[6]: Please note that this requires further documentation containing cold chain capacity, stock levels of the current product, and a costed activity plan (to be submitted via the Country Portal, here: http://www.gavi.org/support/process/country-portal/ in the Supporting Documents section).

Current presentation	Desired new presentation	Desired switch month and year	Rationale for the switch in presentation including any anticipated impact on coverage and equity	Do you request a product switch grant in the vaccine renewal request on the country portal?
…	…	…	…	YES or NO
…	…	…	…	YES or NO

2. Financial support requested

2.1. Currently active Gavi financial support (only grants already approved but not yet closed)

Type of support	Amount committed	Amount approved	Amount disbursed	Year(s) of support
HSS2	$33,231,766	$33,231,766	$14,652.846	2014-2020
PBF-3- 2016	$1,584,000	$1,584,000	0	2019-2020
PBF 4-2017	$3,168,000	$3,168,000	0	2019-2020
PBF 5 2018	$1,584,000	$1,584,000	0	2020-2021

2.2. New financial support requested: Country to complete table below. For all types of vaccine support and guidelines, please refer to: http://www.gavi.org/support/process/apply/

Target start and end date for financial support:	**Start date July 2021, End date June 2026**

[5] Gavi aims to meet country's preferences on vaccine presentation to the extent possible. When there is not enough supply of a desired product to meet country demand, Gavi will consider the rationale for the switch in order to prioritise supply between countries.

[6] For a detailed description of the vaccine product profiles, please see here: https://www.gavi.org/about/market-shaping/detailed-product-profiles/

Please note the **country's total HSS ceiling** for the coming 5 years: (US$ ceiling amount)	**Indicative estimates** See document in PDF submitted by FMOH/GoSudan					
	Year 2021	**Year 2022**	**Year 2023**	**Year 2024**	**Year 2025**	**Total**
Health Systems Strengthening support (HSS)						
Objective 1: ***To sustain and improve immunization services with focus in the low performing localities, inaccessible areas of the country and special groups***	3,165,340	2,999,549				12,893,327
Objective 2: ***To support capacity building, production, equitable distribution and retention of a multi-tasked facility and community health workforce to meet immunization and PHC needs***	114,659	182,110				563,817
Objective 3: ***To strengthen effective vaccine and cold chain management through improved HR, logistics, capacity building, data systems, infrastructure and systems***	685,865	489,819				2,539,940
Objective 4: ***To strengthen the current immunization systems to achieve an integrated, comprehensive, efficient and sustainable health information system in support of evidence-based policy and planning***	547,821	779,712				2,620,731
Objective 5: ***To strengthen the programme management and improve health financing systems for effective planning with efficient resources allocation and implementation a at national and sub-national***	1,382,755	1,562,459	(for purpose of calculating total HSIS requested support, average of last 3 years of HSS = $4,029,971	$4,029,071	$4,029,070	5,382,185
Objective 6: ***Program Management***	0	0	0	0	0	
Total HSS (US$)	**5,896,439**	**6,013,649**	For 2023 to 2025:	**Total 3 years :**	**12,089,912**	**24,000,000**
Cold Chain Equipment Optimisation Platform (CCEOP) **Not Applicable**						
CCEOP Gavi joint investment						
CCEOP country joint investment						

• National funds							
• Gavi HSS (with this amount clearly budgeted for within the HSS ceiling to avoid double counting)							
• Other partners							
Total CCEOP (US$)							
New vaccine support (vaccine introduction grants, or operational support for campaigns, or switch grants) (as per type of support requested in table 1.2)							
MR VIG	Surviving	1,746,575	1,794,482	1,843,806	1,894,590	1,946,882	
	Gavi Support (US$)	$1,222,603		$	$	$	
MR catch-up campaign	Population in the target age cohort	19,086,590	#	#	#	#	
	Gavi Support (US$)	$10,497,624	$	$	$	$	
Hep B	Live births	1,954,968	2,008,513	2,063,640	2,120,399	2,178,840	
	Gavi Support (US$)						
Total Gavi support: VIGs, OPS, switches (estimate)		$ 11,720,227					
Total HSIS support requested (US$)		**$ 65,531,457**	**$ 35,554,578**				

2.3. Data verification option for calculating HSS/Performance Based Funding (PBF) payments

Country to indicate one data verification mechanism among the proposed ones (please mark with an "X" in the relevant box. Please note that the selected option will be utilized for the whole duration of the HSS grant.

Use of country admin data	**X**	**Use of WHO/UNICEF estimates**	**…**	**Use of surveys**	**…**

2.4. Country health and immunisation data and national health planning and budgeting cycle

Country to complete table below

Country health and immunisation data - All figures in US$	**2018**	**2019**
Total government expenditures (past year)	$ 5,986,392,873.20	Not available
Total government health expenditures (past year)	$ 594,659,418.86	Not available

Immunisation budget (past & current year)	$ 58,466,206.09	$ 98,510,846

2.5. National health planning and budgeting cycle, and national planning cycle for immunisation

National cycles	From	To
Years of National Health Plan	2020	2022
Years of immunisation strategy (e.g. cMYP)	2021	2025
Start and end dates of fiscal period	January	December

Part B: Situation analysis

Part B contains the situation analysis, on the coverage and equity of immunisation in the country and the key health system and programmatic drivers[8] (section 3), as well as the performance of past Gavi support (section 4).

→ ***This section is the basis for the identification of objectives, to be defined in Section C, for future programming including Gavi support.***

→ ***It replaces the Joint Appraisal for this year.***

This section explains over and under achievement of goals and targets, programmatic strengths and implementation challenges, the background for further planning. The review should focus on the evolution/trends observed and lessons learnt over the past two to three years and particularly on changes since the last Joint Appraisal took place.

Information in this section will substantially draw from the analysis recommended in the Joint Appraisal analysis Guidance (http://www.gavi.org/support/process/apply/report-renew/) as well as from other analyses and reviews of the country's health sector as opportune. It is expected to provide key information and make exact reference to other documents and reports provided as annexes (e.g. national strategic documents and review reports) or through the Gavi country portal (e.g. the updated grant performance framework, financial reports, data quality assessment etc.)

3. Situation analysis of health systems for sustainable immunisation coverage & equity

Provide national and sub-national data on the coverage and equity related to immunisation and key health system and programmatic drivers of the levels and trends described.

In tables 3.1 and 3.2, identify trends in coverage and equity, across geographical areas, economic status, populations and communities, including urban slums, remote rural settings and conflict settings (consider population groups under-served by health systems, such as slum dwellers, nomads, ethnic or religious minorities, refugees, internally displaced populations or other mobile and migrant groups). Relevant information includes: overview of districts/communities which have the lowest coverage rates, the highest number of under-vaccinated children, disease burden: number and incidence of vaccine preventable diseases (VPD) cases as reported in surveillance systems in regions/ districts, etc.

Among sources available, consider administrative data, immunisation coverage surveys, DHS/MICS, equity analyses, Knowledge-Attitude-Practice surveys, disease patterns (e.g. for measles), health sector / systems reviews or routine reports.

Please also refer to the guidance on gender related barriers to immunisation (https://www.gavi.org/support/process/apply/additional-guidance/#gender)

Please clearly reference the source(s) of the data used in this section.

→ ***This section is key to determine the targeted / prioritized fields of activities, geographies and/or population groups for Gavi HSS investment***

[8] *Programmatic drivers: = related to EPI programme management (e.g. staffing on the EPI office)*

Health system drivers = related to broader health system issues (e.g. HR strategy deficient or unfunded …)

3.1. At the national level: (Include data source & year for each)

Coverage: DTP3, MCV2, etc.	The Republic of the Sudan lies in Sub-Saharan Africa is the third largest country, with a land area of 1,886,068 square kilometres (728,215 square miles) and has an estimated 2019 population of 42,596,589[9]. It has a coastal line along the Red Sea and shares borders with seven countries: Egypt, Eritrea, Ethiopia, South Sudan, the Central African Republic, Chad, and Libya, most of them are high risk countries for Vaccine Preventable Diseases (VPDs). Sudan is a multiracial, multicultural nation distributed along 18 states and 189 localities only three of them, which completely closed because of conflict, lies in South Kordofan state. Most of the Sudan's population is rural; with an urban population of just 32.9% and 4% are pastoralists. There are 1,578,663 internally displaced people, and refugees from neighbouring countries amount to another 1,086,034, 75% of (south Sudanese refugees) out of camps. Currently, Sudan is witnessing growing transformation towards urbanization. The population's growth rate is 2.4 % with a total fertility rate of 4.5 and the family size ranges from 5-6 members. Children less than 5 years old represent 15.2% of the total population amounted to 7,570,397 under-five children and 1,635,788 infants, while those less than 18 years old represent 50.6%. About 46.5% of the population lives below the poverty line earning less than $1 a day, with 8% living in extreme poverty. Disparities between rural, semi-rural and urban areas are evident with a poverty rate of 67.4% in semi-rural and 64.8% in rural areas and 8% are nomads. The country ranks 165th on the Human Development Index (HDI). The adult literacy rate in Sudan is 69% and 45.2% among women aged 15-24 years. The primary education enrolment is 46%; with 82.2% of the cohort entering primary school completing primary education. Sudan health challenges are considerable and services are particularly limited in conflict zones such as Darfur, South Kordofan, and Blue Nile. Between 2018 and 2019, only 51% of pregnant women received the minimum of four antenatal care visits, and just 23% of deliveries took place in a health facility. Maternal and infant mortality rates are among the highest in the region, at 311 per 100000 livebirths and 51·2 per 1000 livebirths, respectively[10]. Still functioning as a vertical program, EPI is generally considered one of the most well performing programme. This verticality in addition to high dependency on donors funding jeopardize its sustainability and affect the coverage. However, the programme is not well functioning in local settings characteristic with extremely weak health system, and this led to clear drop in the overall performance and the coverage. Despite this, Sudan succeed to sustain high Penta 3 coverage over the last ten years as per the administrative and the WUENIC reports. Nevertheless, the following factors have been repeatedly identified as weaknesses of the administrative coverage data: 1. The denominator is not well defined as the last census in Sudan was conducted in 2008, and no proper vital statistic system in place. 2. Calculation of target depends on assumption and when the coverage of Penta 1 achieved is higher than the projected target, operational target is used (i.e. taking the total number of children vaccinated as a denominator), which led to coverage above 100% in many localities. 3. Open borders and no separate registration for the refugees. 4. Triangulation of coverage and surveillance data usually show disparities as some of the states that reported VPDs outbreaks also reported high coverage

[9] *Central Bureau of Statistic Official Website (www.cbs.gov.sd). Accessed 18th May, 2020.*

[10] *Sudan National Health Policy 2017-2030.*

5. Variation between and within states which obscuring the overall national coverage
6. Sudan represents a model of all special groups, nomads' that change their routes regularly, refugees, IDPs, closed and post conflict areas which all considered as underserved population.

Despite these weaknesses, it is generally believed that administrative coverage is high since:

1. EPI program is well structured and organized at all level.
2. Sudan is polio free since 2009 despite the risk from surrounding countries and free cross borders movement.
3. Regular updated 5 years cMYP which gives the program a chance for analyzing the situation and updating operational targets.
4. Documented impact of many antigens e.g. reduction of gastroenteritis cases after Rota introduction, zero cases of Meningitis A after MenAfriVac, and no yellow fever outbreak after YF vaccination.

Analysis of the coverage of the last five years from the WUENIC reports showed that despite Sudan has sustained high Penta 3 coverage but still not achieved their 95% target as per the cMYP, which means still there are 6-8% of children not reached with Penta 3 vaccine[11]. Moreover, the country is more far from measles and neonatal tetanus elimination.

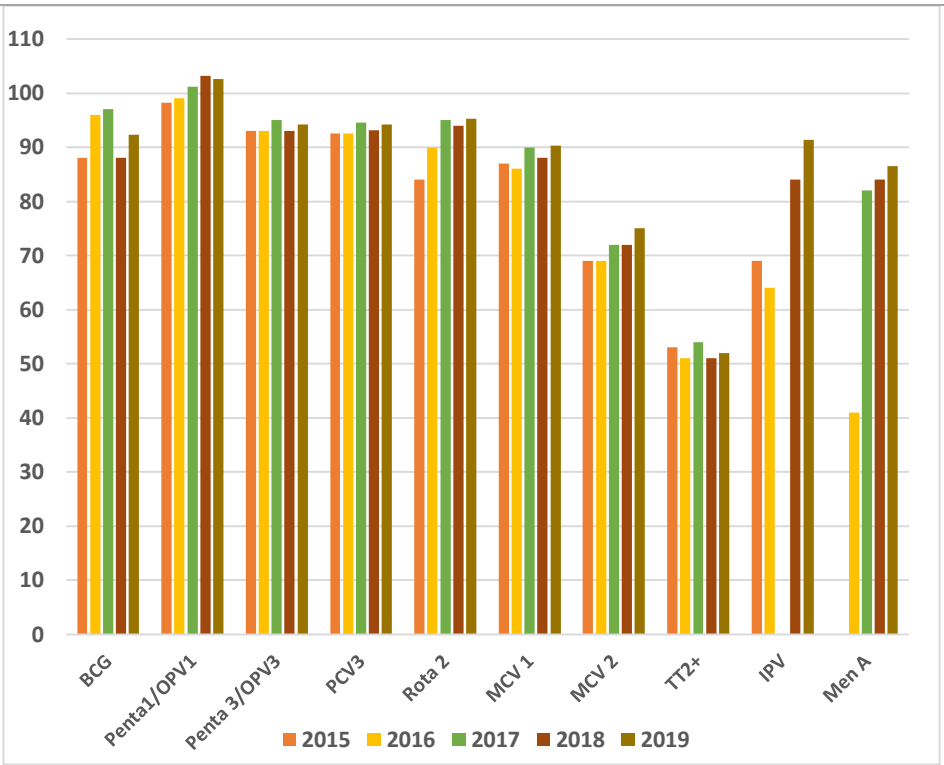
The last National Immunisation Coverage Survey[12] was conducted in 2015, in which the national Penta1 coverage was 90%, Penta3 was 84.2% and MCV1 was 80.6%, which was far from the reported administrative coverage, even when looking to penta3 coverage per state compared to the same year of the survey, ten states were far below 90% coverage which was not the situation with the reported coverage. It is clear that verification of the coverage by coverage survey is very critical for Sudan. The planned 2019 Coverage Survey was significantly delayed as a result of the country's political instability and economic downturn. However, arrangements to conduct the survey in the 2nd half of 2020 are currently ongoing between FMoH, CBS, and WHO. The results are not likely to be received until 2021 at the earliest, which will inform redirection as appropriate.

Figure 3.1.1: Immunisation coverage in Sudan 2015-2019 (JRF 2015-2019)[13]

[11] *WHO-UNICEF Estimate of National Immunization Coverage, 2015-2018*

[12] *Immunization Coverage Cluster Survey (Routine Immunization) in Sudan, Semifinal report, 2015*

[13] *Sudan JRF, 2015-2019*



Special groups

Nomads, Internally Displaced Persons (IDPS), refugees, closed and inaccessible children are considered as special groups in Sudan. These groups have special plans as part of the microplanning and separate reports. Coverage is closely monitored, evaluated and corrected during periodic planning (microplanning and mid-year review).

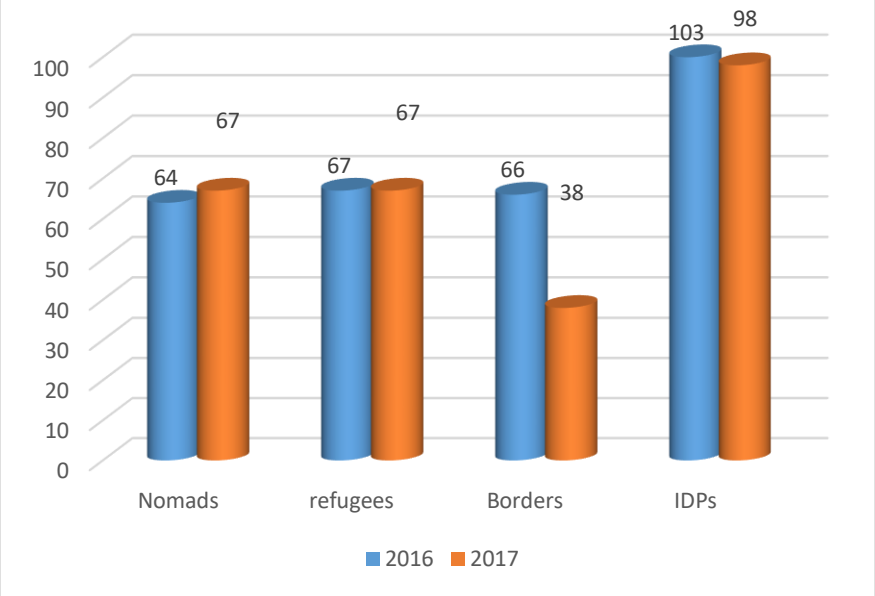
Table 3.1.1: Demographic characteristic of special groups (EPI Microplans, 2019)[14]

	#	# of State	# of localities	Demographic Data					
				Pop	% total pop.	Under 1yrs	Under 5yrs	Under 15yrs	Preg.
Refugee Camps	162	12	55	2,304,752	4.8	86,960	373,859	919,679	305,518
Checkpoint & borders	90	13	43	-	-	-	-	-	-
Nomads		17	115	2,032,547	4.2	87,729	362,755	877,354	126,511
Hard to reach		17	66	1,737,594	3.6	57,642	264,894	611,092	197,720

Figure 3.1.2 Penta3 coverage for special groups 2016-2017 (EPI Annual Report, 2016-2017)[15]

[14] *EPI Microplans, 2019*

[15] *EPI Annual Report, 2016-2017*



Nomads

Despite that nomads represent only 4% of the total population, they are distributed in 17 states and 106 localities. In addition, they regularly change their routes looking for better pasture and water. This group is usually covered by mobile teams and requires regular follow-up and update of their routes and contact information.

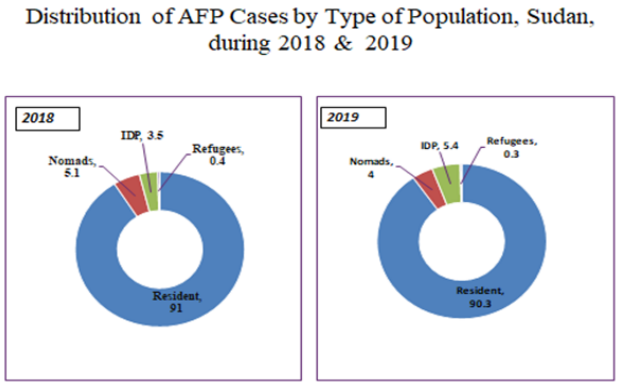
Table 3.1.2: Demographic characteristic & distribution of nomad by state (EPI Microplans, 2019)[16]

State	Loc.	Demographic Data				
		Pop	under 1yrs	under 5yrs	under15yrs	Pregnancy
S Dar.	18	444,929	16,178	75,547	194,746	26,389
N.Dar	5	118,688	4,350	20,219	52,875	4,866
E.Dar	5	125,118	4,558	21,258	54,627	5,130
W.Dar.	5	39,670	1,190	6,347	17,455	12,819
C.Dar	9	39187	1351	6270	17140	1528
White Nile	5	174,345	6,483	29,520	79,510	7,169
B. Nile	7	457,138	19,343	70,505	188,090	24,113
Algazira	6	38,021	1,380	6,334	15,760	1,498
Sinnar	5	38,182	2,393	6,428	17,037	2,704
Algadarif	9	73,175	13,306	45,613	37,573	20,809
Red Sea	6	22,419	683	2,706	8,261	741
Kassalla	7	267,210	8,991	41,631	109,235	10,101
S.Kordfan	3	27,023	948	4,450	12,334	1,071

[16] *EPI Microplans, 2019*

Nomads represents important group in the EPI that is usually considered as part of the microplanning for routine and SIAs as well as in all VPDs surveillance (example of presence of EPI functions at special groups' setting is shown in figure 3.1.3 below).

Figure 3.1.3 Distribution of AFP cases in 2018 & 2019 (EPI Annual Report, 2019)[17]



Internally Displaced Persons (IPDs)

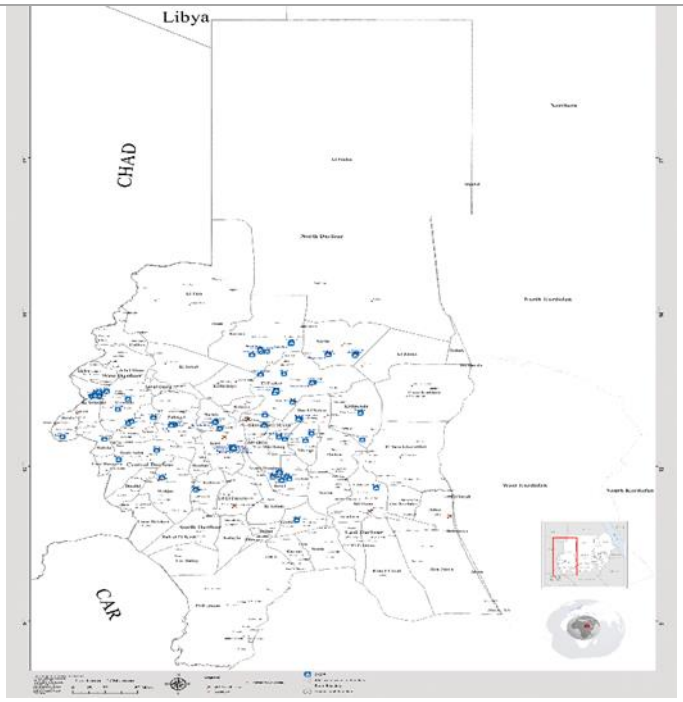
Armed conflict in Darfur has subsided but many parts of the region remain precarious because of the proliferation of arms and banditry. Government services, especially health, have been overloaded or stopped. The conflict damaged and destroyed infrastructure, seriously affected health service and resulted in internal displacement of millions of people. Based on the microplans of Darfur states for 2020, there are around 1,578,663 persons (51,526 under 1 year children) living in 99 IDPs camps in 32 localities[18]. Routine immunization services in Darfur states are almost covering less than 25% of the target. Service provision depends mainly on acceleration campaigns that conducted in rounds by end of the year. Hence the risk of VPDs outbreak remains very high throughout the year due to low immunity. Establishing sustained routine immunization services and phasing out of the acceleration campaigns is on the top priorities of the EPI program in the coming five years.

Figure 3.1.4 Distribution of IDPs camps in Darfur states[19]

[17] *EPI Annual Report, 2019*

[18] *Darfur States 2019 Microplans*

[19] *Darfur States 2019 Microplans*



Refugees

As per UNHCR reports, the country hosts an estimated 1,086,034 refugees and asylum seekers from South Sudan, Eritrea, Syria, Yemen, and Chad. More than 800,000 are South Sudanese refugees[20]. 12% of them are under five, living in 38 camps distributed in 17 localities in White Nile, Gezire, Gadarif, Kassalla, South Kordofan, Khartoum and West Kordofan. EPI program considers these refugees during the microplanning. Moreover, immunization fixed posts are allocated within every camp in coordination with WHO, UNICEF and INGOs/NGOs who usually supported these camps e.g. MSF in White Nile State. The risk coming from the fact that South Sudanese refugees which represented the bulk, have the rights of free movement within the country, taking into consideration that the EPI program in South Sudan has a very low coverage as DPT3 and OPV3 not exceed 50% as per WHO VPDs monitoring system 2019 global summary. Additionally, most of the new vaccines that introduced in Sudan EPI program are not yet introduced in South Sudan e.g. Rota, PCV, MenA, MCV2 and yellow fever. This brings the risks of low immunity foci and VPDs outbreak despite the efforts to strengthen the performance of the immunization posts in these camps and ensure functioning surveillance.

Figure 3.1.5 Refugees and asylum seekers and their age groups[21]

[20] *Sudan Population Dashboard : Refugees and Asylum-seekers, UNHCR-Sudan, February 2020*

[21] *Sudan Population Dashboard : Refugees and Asylum-seekers, UNHCR-Sudan, February 2020*

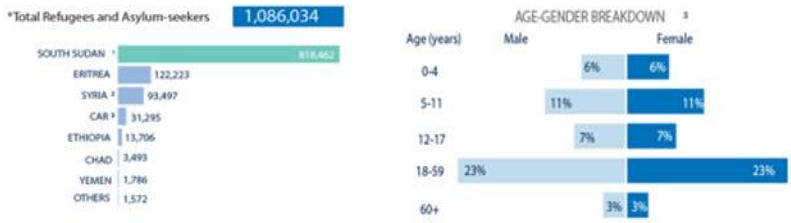
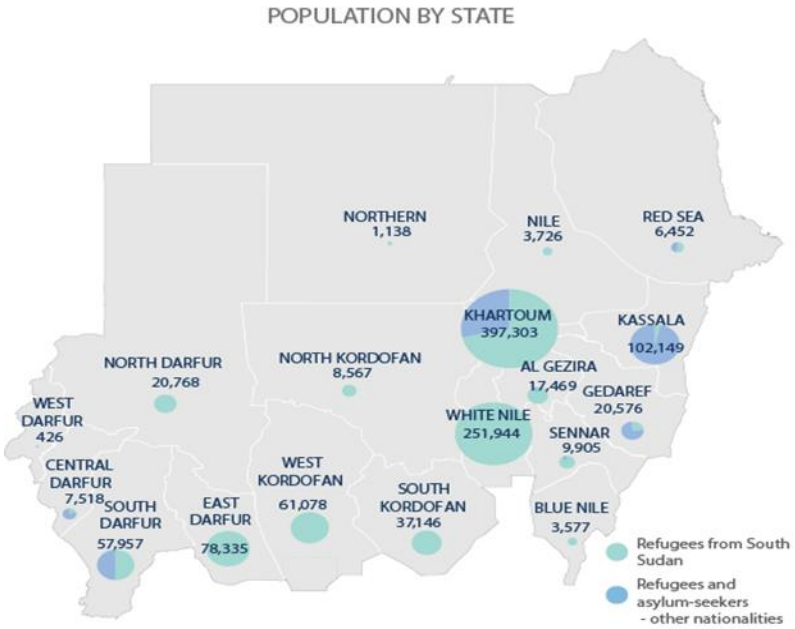


Figure 3.1.6 Number & distribution of refugees and asylum seekers by state[22]



Ports and Entry points

Sudan being bordered with seven countries; EPI usually considers the entry points and ports during the planning to ensure continuous service provision. Provision of immunization services at entry points and ports is on the top of the EPI agenda to avoid cross borders transmission of the VPDs.

Table 3.1.3 Number & distribution of entry points by state (EPI Microplan, 2019)[23]

[22] *Sudan Population Dashboard : Refugees and Asylum-seekers, UNHCR-Sudan, February 2020*

[23] *EPI Microplans, 2019*

State	Loc	No of check point and entrance	International boarder with
South Dar	5	8	(2) Boarder with S. Sudan
North Dar	1	1	(1) Boarder with Chad and CR
West Dar.	7	20	(14) Boarder with Chad
East Dar	3	8	(4) Boarder with S. Sudan and chad
Central Dar	4	15	(15) Boarder with Chad and CAR
White Nile	2	3	(2) Boarder with S. Sudan
Blue Nile	5	10	(2) Boarder with S. Sudan and 3 Ethiopia
Al Gadarief	3	3	(1) Boarder Ethiopia
Red Sea	2	2	(2) Boarder Egypt
Kassala	3	10	(1) Boarder with Ethiopia and Eretria
Northern	1	2	(1) Boarder with Egypt
West Kordofan	4	4	(2) Boarder with S. Sudan
S. Kordofan	3	4	(2) Boarder with S. Sudan

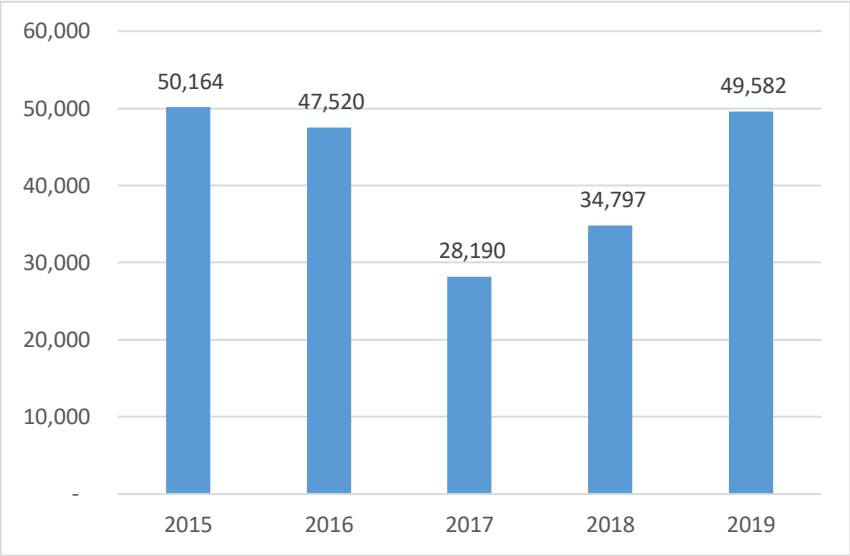
Coverage:

Absolute numbers of un- or under-immunised children

Reports of the administrative coverage are submitted on monthly basis from all levels. National EPI program analyse the coverage and identify low performing localities which will then receive special corrective measures. Number of unvaccinated children is calculated by subtracting those received Penta 1 from the total number of survived children. Analysis of the of distribution of unvaccinated children over the last years reflects critical finding that states reported high coverage are those characteristic with weak health system, weak EPI performance and reported high incidences of VPDs outbreaks. This reflects the challenges facing the health system regarding vital statistics and data quality and mostly these states either over reported their coverage or vaccinated children not part of their target. Number of survived children (target/denominator) is estimated from 2008 census projections and population growth rates. In some states due to conflicts and population movement, the estimated denominators could be inaccurate and below the actual population size. In such cases, for example when the coverage of DTP1 achieved is higher than the projected target, operational target is used (i.e. taking the total number of children vaccinated as a denominator). The programme is calculating the total country denominator based on these mixed procedures (census projection + operational targets). The planned coverage survey will provide accurate coverage data and will redirect the implementation of the activities as appropriate.

Figure 3.1.7 Trends of unvaccinated children in Sudan, 2015-2019 (EPI Annual Reports, 2015-2019)[24]

[24] *EPI Annual Reports, 2015-2019*



Dropout rate between Penta 1 and Penta 3 is within the acceptable limit, below 10%. National DOR (Penta1-Penta3) for 2019 was estimated at 6.2%. While Penta1-Penta3 DOR measures delivery effectiveness of the programme, MCV1-MCV2 DOR measures dropout over a longer time interval between doses including the second year of life, hence thought to be a better measure of overall programme effectiveness. National DOR MCV1-MCV2 was 20.7, 19.3, 17 and 16.9 for 2016, 2017, 2018 and 2019 respectively, which support the need for robust measure to ensure improved and sustainable delivery of immunization services in the 2nd year of life.

EPI program regularly uses the surveillance data to assess the routine coverage, as part of the weekly surveillance meetings the immunity status of all cases discussed and coverage survey around the case. Considering the zero dose as indicator for risk ranking for the localities is strongly applied in Sudan, and close monitoring for the locality performance usually taken.

Equity:

- Wealth (e.g. high/low quintiles)
- Education (e.g. un/educated)
- Gender
- Urban-rural
- Cultural, other systematically marginalised groups or communities e.g. from ethnic religious minorities, children of

Vaccination trends by wealth, education and urban-rural:

Recent data regarding trends in vaccination coverage by wealth, education and urban-rural characteristics of the targeted population is from the last round of the Multi Indicators Cluster Survey conducted in 2014 (MICS 2014)[25]. While a slight difference had been found in the coverage of BCG and Penta3 With females' coverage higher than males, a high association was visible between coverage rates and residence (urban/rural), level of mothers' education and economic status of the household as shown on table 3.1.4 below.

Table 3.1.4 Vaccinations by background characteristics (MICS2014)

Background characteristics		BCG	Penta3
Sex	Male	**83.7**	**72.6**
	Female	**86.9**	**75.2**
Area	Urban	**92.0**	**82.1**
	Rural	**82.8**	**70.8**
Mother's education	None	**76.6**	**63.2**
	Primary	**88.9**	**77.6**

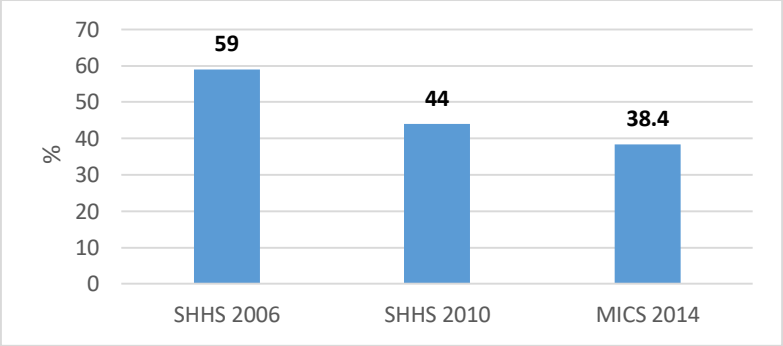
[25] *Sudan Multiple Indicator Cluster Survey, 2014*

female caretakers with low socioeconomic status, etc.

	Secondary	**94.1**	**85.9**
	Higher	**92.5**	**82.9**
Wealth index quintile	Poorest	**68.0**	**50.3**
	Second	**79.8**	**63.2**
	Middle	**91.6**	**83.1**
	Forth	**94.0**	**86.7**
	Richest	**94.6**	**88.7**

Comparing the MICS 2014 findings with Sudan Household Surveys 2006 & 2010 shows a decreasing trend in coverage difference between the lowest and highest wealth quintiles (figure 3.1.8 below), which is still far beyond meeting the minimum equity benchmark (20%).

Figure 3.1.8 coverage gaps between highest and lowest wealth quintiles



Currently, the country is planning to conduct another round of the MICS in collaboration with UNICEF. This will provide updated information on overall coverage rates and on different immunization-related indicators.

Vaccination trends by gender:

Sudan is a diversified country and certain degree of gender disparities could not be ruled out. There is no documented evidence to conclude existence of gender-based disparities in accessing PHC/immunization services in Sudan, and the existing routine immunization data for Penta3 coverage in 2019 shows that, it is almost equal percentage of vaccinated children, where males is (49%) and females is (51%). BCG coverage shows same trends i.e. slightly more for females. Furthermore, in areas that have certain norms related to limiting women contact with outsiders especially males (e.g. Eastern zone of Sudan), vaccination teams are usually selected (i) from within the local communities, and (ii) female volunteers as much as possible in order to ensure overcoming gender and culture-related barriers to vaccination.

3.2. At the sub-national level identify the target areas and groups of low coverage and equity: (Include data source & year for each)

→ ***Identified target groups to be used in subsequent sections for tailored interventions***

Coverage by geographies / population group: DTP3, MCV2, etc.	Last year showed a slight drop in the national as well as state and locality coverage of most of antigens as shown above in figure 3.1.1. This decline is attributed mainly to the country's political instability and economic downturn that resulted in severe cash and fuel shortage since January 2019. All public health interventions have been negatively

affected. In the last quarter of 2019 the programme conducted an in-depth analysis of coverage by localities and found that 92 localities were not achieving their annualized coverage for Penta3. Accordingly, the programme moved to implementation of acceleration campaign supported by WHO and UNICEF which led to the achievement of the targets by the end of the year.

2019 administrative coverage showed that 9% of the localities lies in the red zone of 50-less than 80% Penta 3 coverage[26]. These localities are from two states, South Darfur (16 localities) and West Darfur (one locality). This explains the reported Diphtheria outbreak during the last quarter of 2019 from South Darfur with almost all the probable cases were not vaccinated. The remaining states, all localities lie between the yellow and green margin that is above 80% to above 90%. To some extent this data is close to reality as these states did not report any VPDs outbreak with exception of measles which is expected as they are far below the target (Figure 3.2.1 & 3.2.2)

Figure 3.2.1 reported Penta 3 coverage by locality 2019 (EPI Annual Report, 2019)[27]

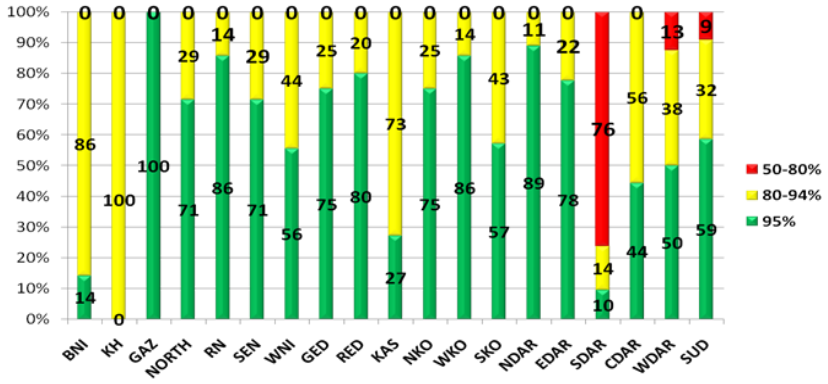
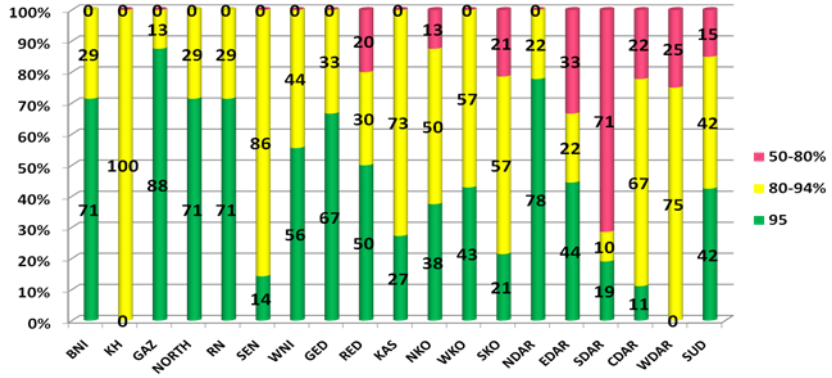


Figure 3.2.2 reported MCV1 coverage by locality 2019 (EPI Annual Report, 2019)[28]



During the last 3 years Diphtheria outbreak was reported in 21 states accumulatively. Khartoum, North Kordofan and West Kordofan continued reporting every year during this period, while North Darfur reported an outbreak in two consecutive years (2016-2017). Other states mainly are Darfur states, Gezira, Northern, River Nile, Sennar, White Nile and Kassala. South Darfur state that showed low coverage during the last three years reported one outbreak in 2016 and again in 2019, in which 98 cases were reported (97 from Alsunta locality and 1 case from Merchang locality) with CFR of 12.3.

[26] *EPI Annual Report, 2019*

[27] *EPI Annual Report, 2019*

[28] *EPI Annual Report, 2019*

National coverage with MCV1 reached 90% for the first time in 2017 as well as 2019. South Kordofan and South Darfur reported 70% & 72% MCV1 coverage respectively in 2019. South Darfur repeatedly reported MCV1 coverage less than 80% for the last four years. At locality level, 29 reported < 80% MCV1 coverage in 2019, 22 of them from Darfur. 43, 55 and 53 localities reported MCV1 coverage less than 80% in 2016, 2017 and 2018, 71%, 52% and 60%of them from Darfur states[29]. This reflect the need to strengthen routine immunization through improving social mobilization and defaulters tracking focusing on Darfur and South Kordofan.

Although national MCV2 coverage improved from 61% in 2014 to 74% in 2019 but is still low and far from the target for measles elimination. Aggregate coverage data at state level showed that 11 states reported < 80% with South Darfur, South Kordofan and West Darfur reported the lowest MCV2 coverage in 2019. At locality level 54% reported MCV2 coverage < 80% in 2019 compared to 74%, 64% and 64% in 2016, 2017 and 2018 respectively[30]. The cause behind that is MCV2 is the only second year immunization in Sudan, even the other growth monitoring is low in the second year. This indicates the need to strengthen second year immunization using integration of immunization in 2YL with IMCI, Nutrition, and Malaria programs. Increasing community awareness, building capacity of care providers especially in interpersonal communication and enhancing health information system are of high importance. Without improving second-year immunization it'd be extremely challenging to achieve measles elimination targets or even control the long ongoing measles outbreaks.

During the last three years (2016-2018), two states reported measles outbreaks every year, these are Kassala and North Kordofan states. Four states reported outbreaks in two years South Kordofan, West Kordofan, Red Sea, and Khartoum. Interestingly, South Darfur state that showed low coverage during the last three years was not reporting measles outbreak. This indicates the need for further in-depth analysis of the reported coverage and surveillance system.

Coverage by geographies / population group: Absolute numbers of un- or under-immunised children

The table below shows the number and distribution of unvaccinated and under vaccinated children per states and for Sudan for 2019.

Table 3.2.1 Unvaccinated children (Penta1) per state (EPI Annual Report, 2019)[31]

State	Unvaccinated children				
	2015	2016	2017	2018	2019
Blue Nile	1202	2126	3,345	1,990	3,004
C. Darfur	3579	0	-	-	-
E. Darfur	4597	0	-	-	-
Gezira	0	0	-	-	331
Gadaref	0	0	-	-	-
Kassala	1905	1137	-	1,779	1,368
Khartoum	10328	9801	6,948	8,158	22,458
N. Darfur	7212	1072	-	931	-
N. Kordofan	0	0	-	-	-

[29] *Sudan JRF, 2016-2019*

[30] *Sudan JRF, 2016-2019*

[31] *EPI Annual Report, 2019*

Northren	0	389	-	-	-
Red Sea	910	172	1,186	412	160
River Nile	0	0	-	-	74
Sennar	0	0	-	-	-
S. Darfur	8053	22521	7,681	8,839	13,557
S. Kordofan	11720	10303	9,029	12,094	8,630
W. Darfur	0	0	-	-	-
W. Kordofan	657	0	-	594	-
W. Nile	0	0	-	-	-
Sudan	**50,164**	**47,520**	**28,190**	**34,797**	**49,582**

Table 3.2.2 Undervaccinated children (MCV1) per state (EPI Annual Report, 2019)

State	# Under immunized children (from MCV1)				
	2015	2016	2017	2018	2019
Blue Nile	4,587	7,651	6,644	5,251	6,007
C. Darfur	12,479	6,325	5,215	9,895	7,608
E. Darfur	17,032	8,261	8,517	5,888	7,209
Gazira	-	3,474	1,547	3,861	4,682
Gedaref	3,738	3,681	7,328	1,480	2,769
Kassala	11,089	11,454	6,384	11,613	8,295
Khartoum	15,181	16,527	15,023	16,559	31,167
N. Darfur	27,511	24,507	16,313	32,221	1,236
N. Kordofan	5,909	7,536	3,454	6,219	6,062
Northren	507	1,768	842	253	8
Red Sea	3,446	2,619	5,161	3,415	3,022
River Nile	-	97	190	1,039	1,122
Sennar	7,654	10,392	5,443	5,244	9,264
S. Darfur	28,196	42,801	31,242	34,571	44,680
S. Kordofan	22,025	21,446	15,985	22,853	18,704
W. Darfur	6,876	8,952	6,561	8,694	11,104
W. Kordofan	9,354	5,280	8,163	12,297	1,879
W. Nile	6,909	14,769	11,041	10,067	5,439
Sudan	**182,493**	**197,540**	**155,054**	**191,421**	**170,256**

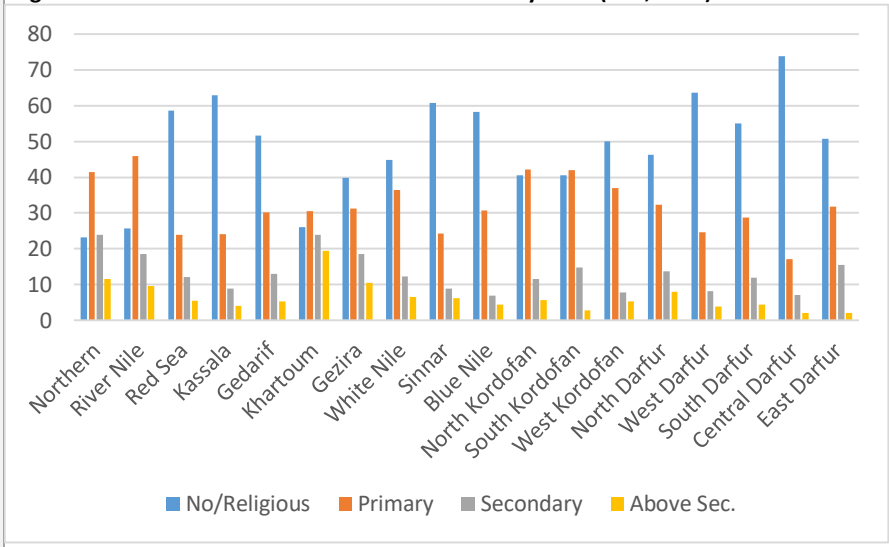
DOR DTP1-DTP3 at state level ranged between 0.5-10% in 2016, 2017, 2018 and 2019, with the only exception of South Darfur (19.9, 14.2, 18.1% and 21% respectively). West Darfur reported alarming DOR DTP1-DTP3; (9.5, 13.3, 10 and 12 in 2016, 2017, 2018 & 2019) which require more attention and focus to improve program performance and efficiency.

Equity by geographies / population group:

- Wealth (e.g. high/low quintiles)
- Education (e.g. un/educated)

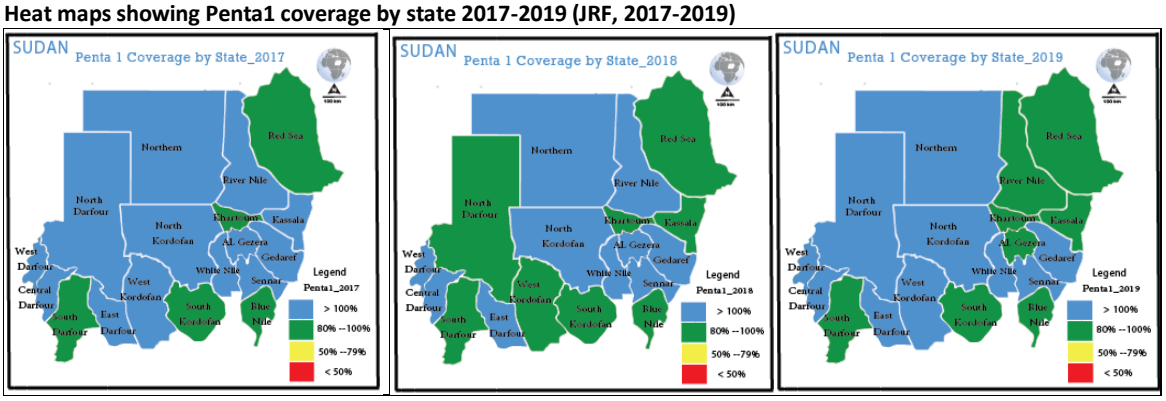
At state and locality level, and as mentioned above, data on vaccination coverage by equity components are available from MICS 2014. Central Darfur, West Kordofan, Blue Nile, East Darfur, Gadaref, Kassala, South Kordofan and South Darfur showed the lowest percentage literate.

Similarly, Malaria Indicators Survey 2016 found high percentage of household heads (no disaggregation by sex) with either no education or only religious education (> 50% in Red

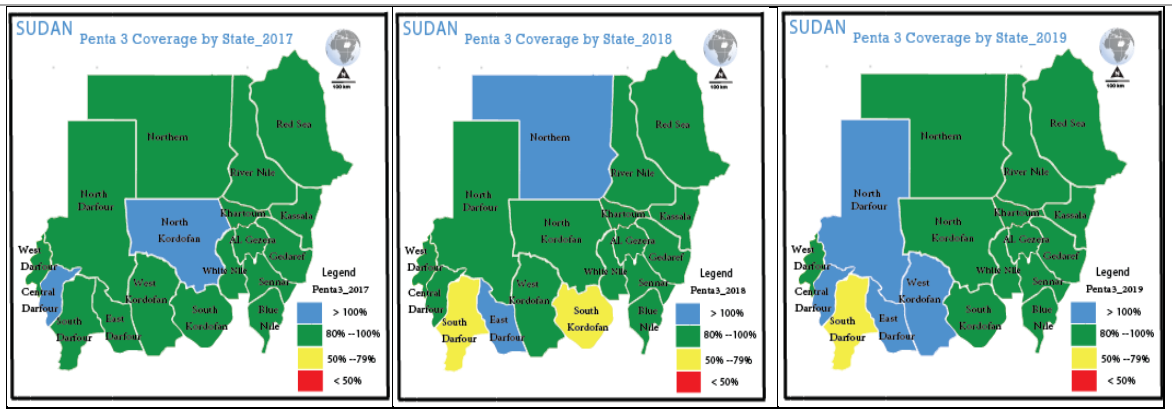
• Gender • Urban-rural • Cultural, other systematically marginalised groups or communities e.g. from ethnic / religious minorities, children with low socioeconomic status, etc.	Sea, Kassala, Gadaref, Blue Nile, Sinnar, W. Kordofan and Darfur states) which might contribute to the barriers to immunization (figure 3.2.3 below). However, from general observations over the years, caregivers with no or low education levels at rural areas show better acceptance to immunization services (routine and SIAs) with exception of certain ethnic groups at Eastern zone. The mentioned states will be focused at with interventions to increase community awareness and social mobilization. **Figure 3.2.3 Education status of households' head by state (MIS, 2016)** 

To further elaborate on sections 3.1. and 3.2 above, **countries are strongly encouraged to include heat maps or similar to show immunisation coverage trends over time**, and to reference the source of data. Examples of such analysis are available in the Joint Appraisal Analysis Guidance (http://www.gavi.org/support/process/apply/report-renew/)

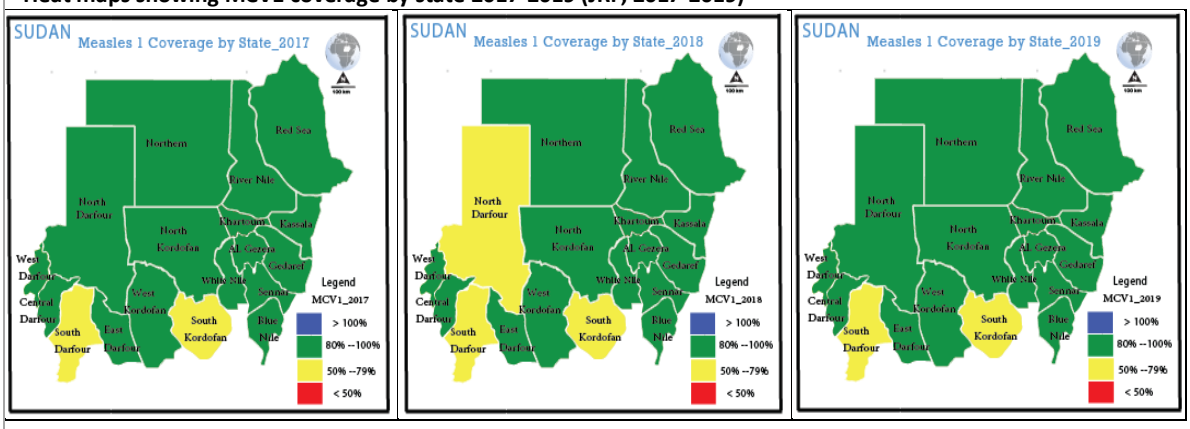
Heat maps showing Penta1 coverage by state 2017-2019 (JRF, 2017-2019)



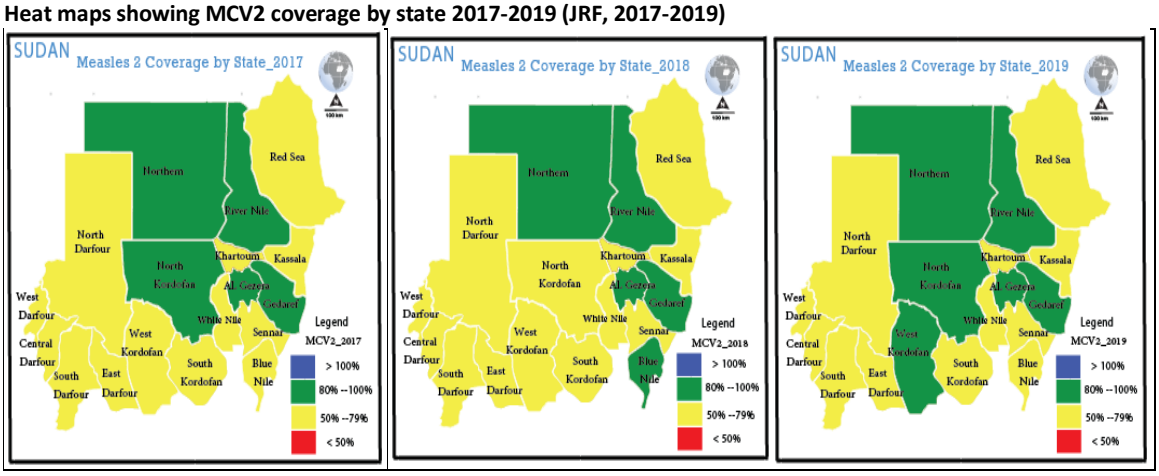
Heat maps showing Penta3 coverage by state 2017-2019 (JRF, 2017-2019)



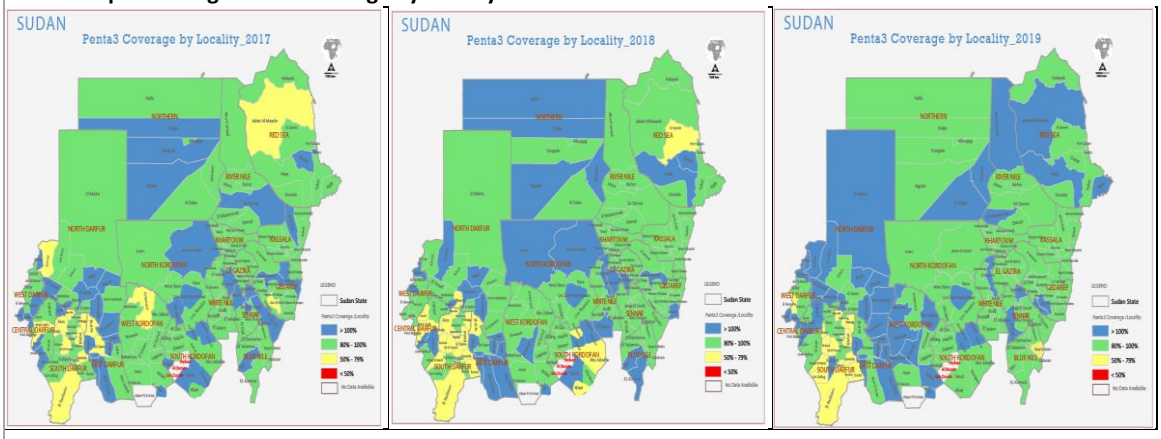
Heat maps showing MCV1 coverage by state 2017-2019 (JRF, 2017-2019)



Heat maps showing MCV2 coverage by state 2017-2019 (JRF, 2017-2019)



Heat maps showing Penta3 coverage by locality 2017-2019



Summary

The priorities set by the country in close consultation with partners for the coming five years, are as the following:

1. As the special groups distributed all over the 18 states, the prioritization will focus on the groups rather than geographical areas:

- Nomads
- Refugees
- IDPs

2. Sustain the high achieved routine coverage and improve uptake of low coverage antigens e.g. MCV1 and DT
3. Reach the 6-8% children not reached over years (unvaccinated)
4. Strengthening routine EPI service and phasing out of the acceleration campaigns in Darfur states
5. Reaching the unreached children in the three completely closed conflict areas in South Kordofan states in case of peace agreement and partially closed areas in South Kordofan, Blue Nile and Darfur states.
6. Improving cross borders coordination, immunization and surveillance activities.
7. Strengthening demand generation and social mobilization activities at state and locality levels

3.3. Key drivers of sustainable immunisation coverage and equity at service-delivery level

Please highlight the key **drivers – strengths and challenges – of immunisation coverage and equity at service delivery levels**: what is needed to immunise children, what is there and working, what needs improvement.

Please list the issues below, prioritising and ranking – to the extent possible – the 3-5 biggest issues affecting immunisation.

Up to 500 words

Key Drivers

1. **Accessibility and equity:**

- PHC services in Sudan covers around 60% of the population
- Percentage of districts reported less than 80% Penta3 coverage were 8%, 12.4% and 10% in 2017, 2018 & 2019 respectively.
- Lack of updated data on accessibility by catchment area as per standard definition (5 Km from their residence).
- No equity studies, no gender analysis

2. **Human resources**

- According to immunization policy there should be at least 2 vaccinators per HF in Sudan, however, data shows this not applied in most of the areas
- In compliance of the vaccinators to the national policies e.g. unopen vial policy especially of measles and meningitis vaccine (fear of vaccine wastage).
- Availability of guidelines, protocols and SOPs for all activities at service delivery levels, refresher training with any new vaccine introduction and SIAs, strong commitment and ownership of the vaccinators, and management at all levels are among strengths observed.
- Shortage in staff and dependency on volunteers.

3. **Population characteristics and lifestyle e.g. settled, nomads, slums, refugees, IDPs.**

- Urban population in Sudan constitutes 32.9%, and nomads are around 4%.

- Absence of recent population census (last census was in 2008), continuous population movement between Sudan and neighbouring countries and between states including high influx of refugees (lack of cross notification).

4. **Service delivery**

- EPI programme in Sudan provides its services through 2,031 fixed sites, 4,668 outreach and 333 mobile teams. This covers around 80% of the population. 20% of population are not covered by any type of immunization services.
- Another threat that faces service delivery is late availability of funds and irregular flow of funds which might endanger conducting critical operational activities like outreach, mobile and surveillance.
- Given the challenge reaching many populations, an integrated approach is critical
- Identifying major pockets of unreached children

5. **Security and closed areas.**

- Disruption of the immunization services in Darfur states and provision of services as acceleration campaigns
- Security closed areas in three localities in south Kordofan state and complete short of VPDs surveillance data

6. **Community awareness and demand**

- Limited health education and promotion activities and weak social mobilization for routine immunization (campaigns and SIAs specific).

3.4. Key drivers of sustainable immunisation coverage and equity at the programme management level

Please highlight the key **health system and programmatic drivers of the levels of immunisation coverage and equity**. Consider both national and sub-national levels.

Reflect how the immunisation programme is progressing toward maturity within the country's health systems: what are the drivers, current strengths, challenges, developments or shortfalls. How the immunisation programme is able to protect the country population against vaccine preventable diseases.

Please list the key issues, prioritising and ranking – to the extent possible – the 3-5 biggest issues and how they are currently addressed (including other external support). Provide evidence and lessons learned from previous activities.

- **Preface**

The political situation has changed dramatically during the 2019 last year, which witnessed the start of the protests, and the progress into complete revolution. With the establishment of the transition government in August 2019, the EPI conducted rapid assessment to the administrative coverage using Penta 3 and MCV1 as indicators to prioritize the localities , the program performance was highly affected by the situation in the country such as the ongoing economic and fuel shortage crisis, 92 localities in all states were identified as far from reaching the targeted children by the end of the year, with WHO and UNICEF technical and financial support , acceleration campaigns were implemented and children covered

Sudan used to be hit by many disease outbreaks that have an impact on the Epi program as example Cholera outbreak in 2019, by beginning of the 2020 and part of the COVID pandemic, the EPI program as part of the whole country was affected.

The COVID-19 pandemic has implicated seriously on the government, health system as well as the development of the PSR. WHO has described four levels of COVID-19 transmission, Sudan has passed the 4 stages where the first phase there was no cases reported, few sporadic cases all cases were linked to travel

from cases coming from affected neighbouring countries. The current situation is that Sudan is passing through community transmission and entering the high wave of the pandemic.

2289 cases were reported mainly in Khartoum state as well as other affected states. The government declared a complete lockdown which had a serious implication on the day to day work as well as long term. Routine services were compromised, reprioritization of services and all senior policy makers were solely devoted to the COVID pandemic work which had the implication on the other competing priorities. EPI program updated national guidelines for the immunization services during COVID with technical support from WHO and UNICEF, the guidelines was disseminated to all states but still the services affected for many reasons, the availability of the PPE for the vaccinators and the fear from the care taker this led to reduction of immunization services and utilization. In addition to that as per government instruction of reduction of the workforce and lockdown the routine work of the EPI program was highly affected e.g. the supportive supervision, the VPD surveillance, implementation of planned activities e.g. IPV campaign and introduction of yellow fever in routine. Yellow fever introduction in routine services planned first of July and postponed due to COVID to January 2021, it will increase the risk on the country as it surrounded by ongoing outbreak in South Sudan and Ethiopia. Even the delay of the implementation of the IPV campaign for the missed cohort may affect the immunity against polio.

The VPDs surveillance also affected by the pandemic of the COVID19, as the lockdown affected case reporting, notification, sample collection and transport. lack of PPE affected the sample collection especially the oral and nasopharyngeal samples

The immunization services started to improve with the advocacy from H/E minister of health when he strongly mentioned the importance of completion of the child vaccination, the program used the opportunity of the world immunization week to advocate for child vaccination during COVID 19, accelerated defaulters registration and procurement of the PPE for the EPI staff at all levels.

EPI program formulated technical committee from MOH, WHO and UNICEF working on development of plan of action for catch up campaign for defaulters after COVID19

- **Health Work Force**: availability, skill set and distribution of health work force at national and sub-national levels. Human resource management and development.

Availability, skill set and distribution

HRH functions are largely decentralized particularly, for PHC and frontline workforce. Discrepancy in the capacities between and within states and localities resulted in great variation in availability and distribution of HRH workforces and therefore, on the ability to provide basic health services that include immunization. Density of physicians, nurses and midwives is 9.8 per 10.000 populations. The distribution of health workers in Sudan is uneven, number and type of health workers differ from state to another. Despite over 70% of the population resides in rural areas, 70% of health workers are located in urban areas with 38% in the capital, Khartoum. The great majority works in the public sector and 9.3% works exclusively in the private sector, however, dual practice is quite common among public sector employees. Migration of professionals is a major issue facing the health system in Sudan. For instance, 60% of physicians and 25% of pharmacists leave the country.

HRH stakeholders and partners are numerous. These include government entities such as MOH, Ministry of Higher Education, Ministry of Labour; HRH regulatory bodies (Sudan Medical Council and National Medical and Health Professionals Council); Universities and training institutions (public and private); Professional associations; partners and donors (GAVI, GF, ADB, WHO, WB and Carter centre).

FMOH established HRH Forum to improve coordination and synergies between HRH stakeholders however, this forum is not fully functioning.

World Health Organization (WHO) is supporting Sudan's HRH initiative, which focuses on developing HRH policies and strategies as well as strengthening HRH information system and nursing initiative. Furthermore, the African Development Bank (AfDB) supported HRH in two projects, one for building capacity for inclusive service delivery project that started in 2016 and the other is to improve health access and system strengthening that started in 2018. Additionally, The Carter Centre (TCC), through Sudan Public Health Training Initiative (SPHTI), is providing support for an innovative approach for capacity building of the health workforce.

According to the Joint Annual Health Sector Review (JAR) 2017[32], HRH information system is weak and fragmented. Key gaps include lack of accurate, complete, continuous flow of HRH data and the dichotomy between service delivery and HRH planning. Although some efforts have been carried out in these areas by establishment the HRH information registry and HRH Observatory, gaps still exist in development of HRH information system aligned with the National Health Workforce Account (NHWA). Moreover, the absence of 10-year HRH projection strategy addressing the issues of production of HRH including for immunization, in terms of numbers and distribution is quite critical. Development of HRH 2020-2030 strategic plan is regarded as the main priority for 2020.

Production of HRH has increased significantly over the past few years due to establishment of training institutions (Universities and Academy of Health Sciences). Key challenge include lack of systematic linkages between production and health system needs, skill mix imbalance, absence of academic quality assurance measures and adequate capacities of faculties.

During the last five years, government has established PHC Expansion project in 2015 to ensure provision of basic services to the underserved population. Key challenges of PHC expansion are the low enrolment rates, particularly for community health workers and community midwives. Further, huge portion of the trained cadre are yet to be absorbed in the health system and utilized in the provision of PHC services including EPI services. No impact assessments were done for the training and HRH programmes.

EPI has satisfactory structure distributed at all levels including defined positions of EPI Managers at federal and states level, the locality operations officers at community level, the AFP and VPD surveillance officers, the supply chain officers and admin staff[33]. At facility level vaccinators are the core cadre who provide immunization services. Gavi Programme Capacity Assessment conducted in 2018 revealed that there is no comprehensive skills and training needs assessment for EPI at all levels especially state and locality. Training and capacity building activities are adhoc and lack quality assurance, no comprehensive training plan is available.

Despite the availability of adequate number of human resources for EPI, there are major issues and concerns regarding their equitable distribution. For example, in South Darfur State (one of EPI low performing states), there are (375) vaccinators to cover 239 health facilities, but still many localities do not have sufficient number of cadres to cover their facilities[34]. This is also observed in different states and localities. Inequitable HRH distribution is mainly due to inadequate capacities in HRH management, lack of attractive and retention mechanisms in rural and remote areas in addition to feminization of HRH.

According to 2019 micro plans, 50% of EPI vaccinators are volunteers, which in turn jeopardize the overall sustainability of the programme services. This mainly due to lack of job titles for vaccinators in many states, some of the states and localities do not have the capacity of enrolment of employees in addition to lack of attractive measures for working in remote and rural areas. EPI workforce is displayed in table 3.4.1 below.

[32] *Sudan JAR, 2017*

[33] *Sudan Final Report on Programme Capacity Assessment, Gavi Alliance, 2018*

[34] *WHO Assessment of functionality of local health system, 2019*

Table 3.4.1: EPI Human Resources: Numbers and Distribution across Levels[35]

Staff Categories	Targeted	Current	Permanent staff	Temporary staff
Federal EPI Staff (technical staff)	58	49	40	9
States EPI staff	90	88	88	0
Locality Operation Officers	189	185	185	0
IVPDs Surveillance officers	203	203	203	0
Vaccinators (service delivery level)	6829	6809	3353	3456

Reportedly, vaccinators in fixed sites are dominantly females (81%) while mobile teams are mainly males due to the nature of this mission that requires traveling for days in addition to cultural and security issues. Furthermore, volunteers providing routine and supplementary immunization services are also predominantly females similar to other health workforce. Feminization of health workforce, including EPI, limits the ability to address the inequitable distribution of health workforce particularly, in rural and hard to reach areas.

Continuous professional development for HRH is a national priority. FMOH has established CPD Centres in all states supported by Gavi and other partners to provide in-service training for staff at different levels. EPI staff technical competencies at federal level are considered adequate, however, capacities of the staff at state, locality and service provision levels, require strengthening especially in areas of cold chain management, vaccination practices and community mobilization[36].

Furthermore, there is no pre-service training programme for vaccinators in the Academy of Health Sciences. Different training packages are available and frequently conducted targeting all EPI staff at the different levels, nevertheless, most of them were provided on adhoc basis, fragmented and neither timely nor based on Training Needs Assessment (TNA). Recently, FMOH has developed comprehensive TNA framework that was supported by WHO, University of Liverpool (UoL) and Carter Centre.

There is high staff turnover and brain drain (internal and external) at different levels mainly due to changes in the general political context, low wages and salaries, poor working environment, unattractive living conditions (mainly in rural and remote areas), lack of security in conflict affected areas and low chances for career development.

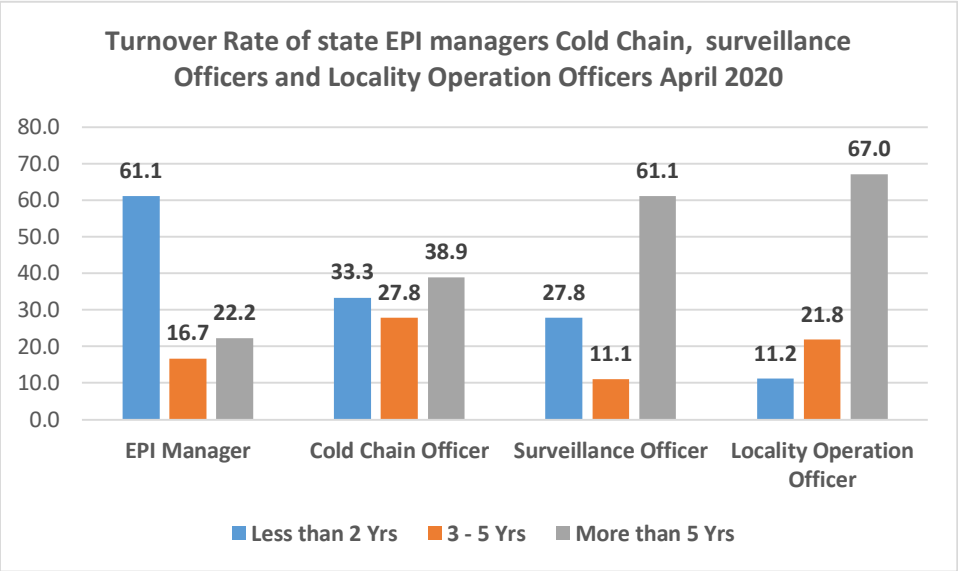
Turnover rate of State EPI managers is 61% (change EPI manager before completing two years). 11% of managers changed twice within the same year. Only 18% of EPI managers completed five years in their positions at state level. At federal level, four managers served the EPI during the past two years. Instability is also observed at technical units' level. 33% of the Cold Chain officers and 28% of surveillance officers left the programme during the last two years for different reasons. Locality Operation Officers are relatively more stable as two thirds (67%) of them completed more than 5 years in their positions. The turnover rate at locality level is 11%. Changes of Locality Operation Officers is associated also with changes at the head of EPI particularly in good performing states.

Figure 3.4.1 Turnover rate of EPI staff at different levels, April 2020[37]

[35] *EPI Microplans, 2019*

[36] *Sudan Final Report on Programme Capacity Assessment, Gavi Alliance, 2018*

[37] *EPI Microplans, 2020*



Several initiatives to retain HRH are being implemented that include earn-marked federal transfers for specialists and midwives; however, no assessment of the impacts of these initiatives was conducted. Retention policy for health sector (all programmes including EPI) is being developed using multi-dimensional package approach. It is planned to be finalized in 2021. Implementation will be phased-out second half of 2021.

- **Service delivery**

Sudan introduced basic healthcare services package to the PHC in 2003. This package included vaccination of children, nutrition, reproductive health (RH), integrated management of childhood immunization (IMCI), management of common diseases and prescribing the essential medications. Health facilities providing PHC basic package have increased from 24% in 2011 to 63% in 2018[38]. This improvement in access to services is due to implementation of the PHC Expansion Project which was adopted in 2012 aiming at delivering health services at all levels to citizens near their places of residence.

The project is progressing well in achieving its targets. For examples, construction of Family Health Centres achieved 100%, basic trainings (pre-service trainings) were completed for 13,161 Community Midwives (98%) and integrated on-job trainings (bridging course) for provision of integrated services were completed for 4,296 vaccinators and nutrition workers including private and CBOs/NGOs (97%). These achievements resulted in noticeable improvement in both geographical coverage with PHC facilities and coverage with the essential PHC package of service.

However, no high reflection in the provision of routine immunization services through fixed sites were noticed since the beginning of the project, as only 2031 HFs, out of more than 6,000, provides fixed immunization services which represents 40.6% of overall immunization posts. The project is considered as a great opportunity to ensure sustainability of immunization programme through decreasing dependency on outreach, mobile services and acceleration activities and increasing utilization of PHC fixed facilities. One third of existing facilities including those newly constructed under PHC expansion project are either non-functioning or do not provide immunization services. Therefore, it is important to conduct analysis on how the EPI could benefit from the expansion project. Reasons for non-functionality of some of the health facilities include inadequate engagement of EPI and other related departments in planning and implementation of PHC project (constructions, trainings, equipment, etc.) to increase ownership and efficiencies. Additionally,

[38] *Expansion Project Annual Report, 2018*

HR and operational cost issues and arrangements are also considered hindering full functionality of the constructed facilities.

A comprehensive mapping and assessment of the distribution and service provision (all types including private sector and NGOs facilities) by catchment area and population is currently ongoing with financial support from Gavi and technical support from WHO. The result of this mapping will facilitate the development of national plan to expand fixed immunization sites in full alignment with the national PHC expansion project and the cMYP.

Figure 3.4.2 comparison between immunization fixed sites, outreach sites & mobile sessions over the last 5 years (EPI Annual Report, 2015-2019)[39]

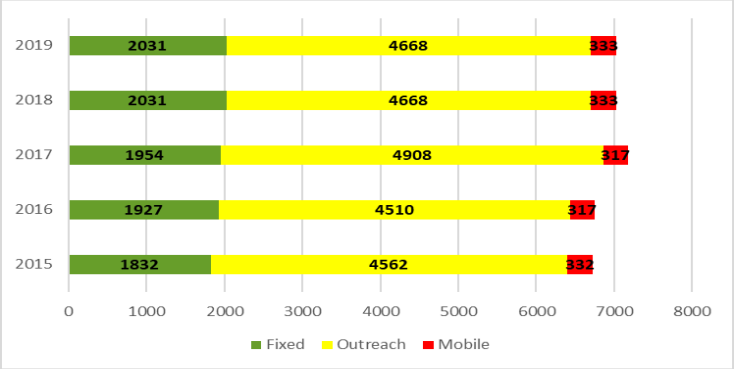


Figure 3.4.3: % of contribution of EPI delivery strategies in Penta 3 coverage, 2015-2019 (EPI Annual Reports, 2015-2019)[40]

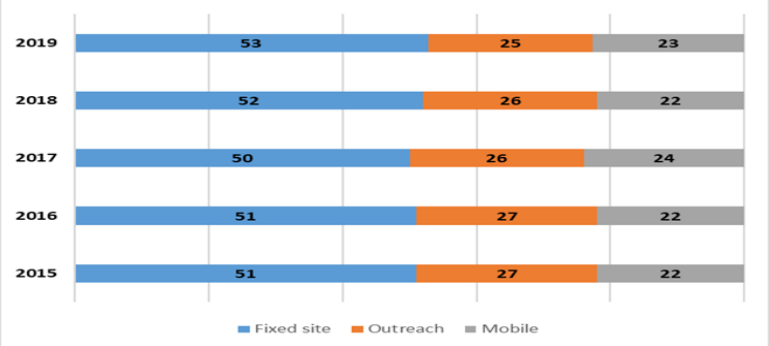
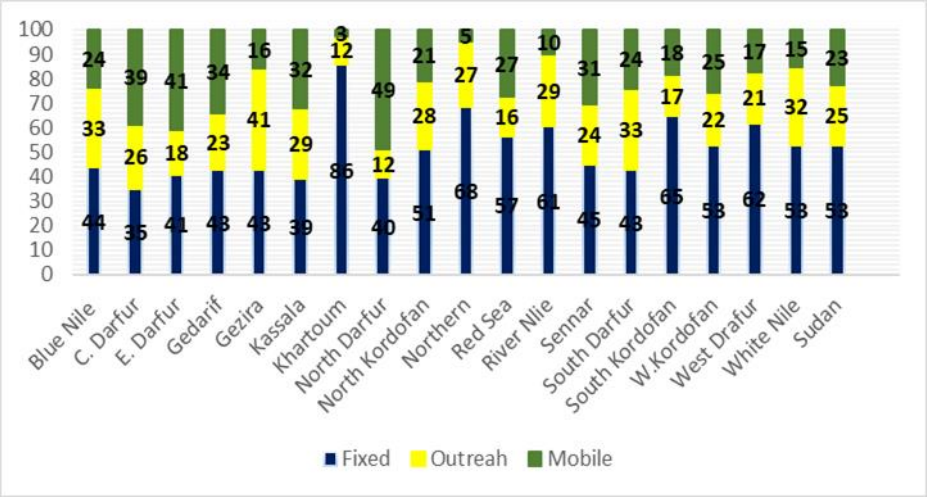


Figure 3.4.4: contribution of each immunization delivery strategy in delivering Penta3 in 2019 by % population & state (EPI Annual Report, 2019)[41]

[39] *EPI Annual Reports, 2015-2019*

[40] *EPI Annual Reports, 2015-2019*

[41] *EPI Annual Reports, 2015-2019*



Immunization services in Darfur states

Immunization services in Darfur states was disrupted by the conflict as part of the overall health system. The routine immunization services are almost covering less than the 25% of the target, the service provision depends mainly on acceleration campaigns that conducted in rounds by end of the year. This endanger Darfur states and the risk of vaccine preventable disease outbreak remains very high throughout the year due to low immunity. Establishing routine immunization services and phasing out of the acceleration campaigns is on the top priority of the EPI program in the coming five years.

Inaccessible areas (South Kordofan and Blue Nile States)

Nuba Mountains in South Kordofan and parts of localities in Blue Nile State encountered humanitarian crisis since the eruption of conflict following cessation of South Sudan in 2011. The war forced most of the population to flee their homes searching for safer places. The remaining estimated population in Nuba Mountains is 1.8 million and 36,000 in Blue Nile State. Three localities in South Kordofan continue to be totally inaccessible; Umdoren, Alburam and Heban. Dalami locality in the same state becomes partially accessible since 2018. In addition, Elkormuk, Baw and Tadamon localities in Blue Nile are also partially inaccessible. There is lack of credible information about the situation in these areas. According to the authorities in control in Nuba Mountains, Sudan Relief and Rehabilitation Agency (SRRA), there are (5) hospitals, (28) PHC Centres and (74) PHC Units. The health workforce is 2,400, majority are Community Health Workers and nurses working on voluntary bases.

UN inter-agency rapid needs assessment was conducted in the two areas on December 2019 and January 2020 with participation of WFP, WHO, UNICEF, OCHA, FAO and UNHCR. The assessment revealed that visited facilities lack basic infrastructure and equipment. Essential medicines were not available with only few items. Immunization services are not regularly provided and no data on previous coverage. There is no supply system or cold chain in place. The authorities reported some of the death cases linked to the pregnancy complications, as the area has difficult terrain especially during rainy season, and as EmNMOC services are available in only few hospitals that are not easily accessible. No outbreaks reported recently (last one was measles outbreak in 2015, and Acute Watery Diarrhoea caused by Rota Virus as confirmed by an INGO).

There are few national and international NGOs operating in these areas and supporting basic services. These agencies could facilitate scaling up of humanitarian response and provision of immunization and other basic health services as peace negotiations between the new government and Sudan People's Liberation Movement Army (SPLM/A-North) make progress.

Role of the private sector in ensuring equitable coverage:

Private providers have been critical in filling gaps in government services in hard-to-reach areas and among marginalised populations, thus reducing inequities to access. Fifty-five per cent of private health facilities in Sudan (411 out of 752) provide immunisation services, with 75% (307 out of 411) based in Khartoum state and Darfur region. In 2017, private providers administered around 16% of all Penta3 vaccine to children (Ahmed et al, 2019)[42].

Public health sector, especially at the state level, is collaborating closely with the private providers by supplying vaccines, injection devices and in some cases, cold chain equipment free-of-charge and vaccinators. Sudan's public–private sector engagement also represents an efficient approach and possible cost savings to the government (through provision of facilities, cold chain equipment and human resources).

Currently there is no overall policy framework for the government's engagement with the private sector on provision of immunization services. A recent study conducted by UNICEF concluded that the development and implementation of a specific policy for private providers could be a mechanism to help ensure that quality immunization is taking place and that the cold chain is maintained adequately[43]. This policy should outline the expectations for private providers in terms of quality of care, cold chain management, and reporting as well as the roles of supervision and monitoring from the government. The study also recommended to develop a guidelines on cold chain equipment requirements for private sector facilities since most equipment is purchased directly by those facilities. These recommendations will be considered within this PSR.

- **Demand Generation**

Communication and social mobilization are key components in the EPI. They are deeply impeded in the program since its early start, and it became well formulated with the commitments towards disease elimination and eradication targets for which the multi strategies implemented, especially for polio end game and measles elimination initiative. This resulted in strong communication network of volunteers in the ground and good engagement of community leaders. Recently as part of the government movement towards integration of the services, this demand generation function moved to the Health Promotion Department aiming at cost effective use of resources and sustainability. In addition, the decision aimed also to benefit from well-structured presence of EPI at all levels. Unfortunately, weak coordination between the two departments led to obvious weakness in all communication and social mobilization activities during routine as well as the SIAs.

The strengths:

- High support from the government official, pediatric association, religious authorities and community leaders.
- Strong community trust.
- Good mothers' knowledge of the Immunization schedule of their children.
- Mothers are aware of minor side effects and how to deal with.
- Committed care providers at immunization post and with all strategies for routine services as well as all supplementary immunization activities.

On the other hand, the country must consider the main challenges for communication: open borders, inter countries population movement, multi-ethnic with big cultural disparities, different local languages and relatively high illiteracy and poverty rates, scattered population and presence of special groups. The socio-demographic picture shape the community's behaviour, attitudes and beliefs, along with the environmental conditions. All of these influence the uptake of EPI services and consequently affect the coverage with

[42] *Ahmed N, DeRoeck D, Sadr-Azodi N. Private sector engagement and contributions to immunisation service delivery and coverage in Sudan. BMJ Glob Health 2019;4:e001414. doi:10.1136/bmjgh-2019-001414*

[43] *Sudan Case Study on Private Sector Engagement in Immunization, UNICEF, 2018*

different antigens. The weak interpersonal communication of the vaccinators and the root causes behind it must be strongly considered during all the effort to improve the communication and social mobilization for better utilization.

The last EPI coverage survey conducted in 2015 showed that fully immunized children were **72.8%**, partially immunized were **19.3**%, while the not immunized were **7.9%**. Reasons for not immunized were divided into four groups[44]:

(1) **Lack of knowledge about vaccination**: including:
- Not know importance of vaccination
- Fear of side effects
- Wrong information on contraindications
- Lost trust of vaccination

(2) Obstacles due to **time and place**: including:
- Doesn't know place & time of vaccination
- Vaccination place far away
- Postponed dose to later date
- Vaccination time not suitable
- Long waiting

(3) Absence of vaccines or vaccinator

(4) Family reasons: including:
- Mother busy
- Family problem (mother or child illness)

Lack of knowledge about vaccination was the most important reason for non-immunization (34.8%), about one third of the children. Family reasons was second with almost one-quarter of the cases (23.1%). Most of the states were divided two main reasons, the lack of knowledge and the family reasons. Table 3.4.2 shows the states linked to one or the other reason.

Table 3.4.2: Reasons for not vaccinated by state (EPI Coverage Survey, 2015)

Lack of Knowledge	Family reasons
Northern	Gadaref
Red Sea	Khartoum
Kassala	Gezira
North Kordofan	White Nile
South Kordofan	Sinnar
West Kordofan	Blue Nile
North Darfur	
West Darfur	
South Darfur	
Central Darfur	
East Darfur	

Barriers to Immunization Study conducted in 2018 in eight states by FMoH in collaboration with Al Neelain University and UNICEF revealed the followings as the main barriers to immunization[45]:

1. Myths and misconceptions in community, distrust on immunization
2. Refusal and reluctant families as well as non-acceptance by community
3. Low demand generation and develop ownership feeling for RI
4. Fear of AEFI, un-aware about the immunization benefits

[44] *Immunization Coverage Cluster Survey (Routine Immunization) in Sudan, Semifinal report, 2015*

[45] *Barriers to Immunization, 2018*

5. Drop-out, left-out children and partially immunized children
6. Programmatic error (gaps in planning implementation of C4D interventions by health promoters, gaps in Plan Vs Held RI out-reach/mobile session, vacant positions and high turnover of technical staffs, etc.).

Communication Multi Year Plan for EPI 2019-2022 stressed the need strengthen health promotion at state and locality levels as well as coordination within the health ministries and with the other related sectors in order to strengthen communication and social mobilization for immunization[46]. This PSR will support implementation of priority interventions in the plan to address identified barriers and ensure improved coverage.

- **Vaccine management system and supply chain**: integration, procurement planning and forecasting, key insights from latest EVMs and implementation of the EVM improvement plan, and progress on the five supply chain strategy fundamentals.[47] This subsection might be informed by available dashboards and tools, for example the Immunisation Supply Chain Management Dashboard that links EVM, Maturity Scorecard and DISC (Dashboards for immunisation Supply Chain) indicators.

Background about Sudan iSC

The Immunization Supply Chain operates a vertical supply chain system on 4 levels (a) 1 Central vaccine store, (b) 18 State vaccine stores, (C) 185 locality vaccine stores, and (d) at least 2,031 Health Facilities**.** All vaccines, injection supplies, and most of the cold chain equipment for EPI that are co-financed by UNICEF, GAVI HSS and Government of Sudan are procured through UNICEF procurement system. EPI with partners systematically develop and revise five-year forecast for vaccines, injection supplies, and cold chain equipment. Since 2008, the EPI has built significant cold chain capacity largely through procurement of refrigerators and cold rooms for the states. As part of the CCEOP and HSS2 reprogrammed budget for CCE, total of 1,487 new cold chain equipment will be procured, deployed and installed during 2020 to strengthened iSC. Based on the calculated future cold chain need and after the full deployment of CCEOP and Non-CCEOP including UNICEF forecasted support, and also based on the PHC expansion project, there will be a need for additional 3,752 cold chain equipment to expand fixed immunization services and to cover all health facilities (Cold chain investment 2015-2019 document)[48].

EPI is currently planning to integrate its dry supply chain system with NMSF at the level of storage and distribution based on the recommendations of a study on optimization of Immunization Supply Chain (iSC) conducted by UNICEF in 2017[49].

The comprehensive cold chain inventory assessment conducted in October 2016 and updated in August 2018, showed that 23% of the CCE are obsolete (more than 10 years of age), and 1,559 (45%) are PQS pre-qualified equipment and out of which, 1,321 are functional[50].

EVM assessment

Three rounds of EVM Assessments were conducted. The first EVM assessment was conducted in December 2013 with overall score of 79%, the second EVM assessment was conducted in 2016 showing significant improvement with overall score reached 89%[51]. During February - March 2020, third round of EVM

[46] *Communication Multi Year Plan for EPI, 2019-2022*

[47] *More information can be found here: http://www.gavi.org/support/hss/immunisation-supply-chain/*

[48] *Cold Chain Investment 2015-2019 document*

[49] *Optimize Immunization Supply Chain in Sudan, UNICEF, 2017*

[50] *Inventory of Cold Chain Equipment, 2018*

[51] *Sudan EVM Assessment Report, 2016*

assessment was conducted using the updated EVM 2 tools. The overall score showed significant drop in EVM performance to only 69%[52]. The key identified gap areas (based on the debriefing report) are related to (a) Human resources for iSC in term of numbers, motivation, training and retention, (b) Equipment reliability, poor cold chain buildings (c) Poor storage capacity of the dry stores, and (d) Poor vaccine management.

EVM-IP:

2020 EVM2 found that only 55% of the previous EVM-IP was implemented. Poor implementation of 2016 EVM-IP has resulted in low performance of iSC system during the last 3 years. The main reasons for low implementation include underfunding for maintenance systems, rapid and high staff turnover that affects capacities at the state and locality levels. Workshop to develop comprehensive multiyear EVM IP was held with participation of all EPI managers and cold chain staff from all states. The proposed plan covers all identified gap areas with aim to modernize and improve iSC using combination of classical and innovative activities. Main focus areas are iSC system strengthening through staff capacity building, gradual integration with NMSF, introduction of LMIS in collaboration with NMSF and UNDP, build robust cold chain Maintenance system and provision of standardized PQAs cold chain equipment. The key identified areas are all addressed through this submission to complement CCEOP, HSS2 and UNICEF investment in iSC strengthening, and will be part of the 2020 EVM-IP.

In addition, the country has started the process of CCEOP implementation this year and expected to finalize installation early 2021. Based on successful deployment of cold chain equipment by 2021, the country will apply to the coming window of support offered by CCEOP-2 in 2022.

Cold Chain Maintenance

Maintenance is one of the weakest points of iSC during all EVM assessment rounds. With support from Gavi and UNICEF, maintenance system/plans has been designed to cover equipment preventive maintenance, curative maintenance and equipment decommissioning[53].

Preventive maintenance plans at each level will address frequencies, timelines and who shall conduct preventive maintenance for the cold chain equipment at each level according to the standard WHO guidelines. Immunization and cold chain officers/users at each facility will be trained both under the CCEOP service bundle as well as by the cold chain technicians to conduct these activities.

Situation analysis:

The situation analysis displayed the major bottlenecks in iSC performance and gaps in system structure and organizations. It is obvious that the last mile is the most challenging level in the system due to lack of infrastructure (distribution, warehousing, power supply, transport means, waste management, and security), weak health management and administration, financial constraints, and interrupted human capacity building.

Plans are underway to review the supply chain distribution system after the expansion in order to optimize the design of the distribution system by introducing vaccine stock management software system into sub-national vaccine stores and partnering with NMSF and UNDP to include immunization supplies in the design and implementation of eLMIS system in selected states and later to be rolled out to all levels by end of 2025. Provision of refrigerated trucks has also been recommended to improve the supply chain system.

HRH distribution for iSCM

Human resources, such as logisticians, EPI and Cold Chain managers, data managers, drivers and warehouse workers are the backbone of supply chain and logistic system. During the last three years and with support

[52] *Sudan EVM Assessment Report, 2020*

[53] *Building Maintenance System for EPI Sudan, September 2019*

from UNICEF and Gavi, 75 cold chain technicians were trained in preventive and curative cold chain equipment maintenance. The trained technicians are selected proportionally from all states and 3 from the federal level, these trained technicians will cover the need of the state level maintenance workshops as identified in the new developed Cold Chain Maintenance System leaving gap of 189 technicians and assistant technicians for locality level at locality level and regional cold chain hubs who will carry small repair, preventive maintenance and regular filed monitoring. It is planned that by the end of CCEOP cycle, all states and districts will have enough technicians and supply chain personnel to effectively meet EPI supply Chain demand.

Temperature monitoring and information management

Cold Chain technicians from all States have been recently trained on temperature mapping and temperature monitoring during vaccine transportation. Two rounds of training for Cold Chain technicians were conducted, with support from UNICEF in collaboration with Soba Solar Institute and Renewable Energy Research Centre.

Temperature monitoring devices are needed to keep track of the temperature to which the vaccines and diluents are exposed. Online inventory dashboard for cold chain maintenance does not exist currently, but proposed to be included as part of the developed cold chain maintenance system and will be considered in the partnership with NMSF and UNDP in eLMIS.

……

- **Leadership, management and coordination**: please describe strengths and challenges related to management of the immunisation programme. This include structure, staffing, capacities and performance of the EPI teams / health teams managing immunisation at national and sub-national levels; use of data for analysis, management and supervision of immunisation services; coordination of planning, forecasting and budgeting, coordination related to regulatory aspects; coordination within the primary health care / basic services; and broader health sector governance issues. Use the outcomes of the Programme Capacity Assessment and/or other assessments.

  This also includes effective functioning of the relevant Coordination Forum (including links with the health sector / MoH coordination mechanisms and alignment to Gavi guidance[54]

Immunization has been accorded high priority at the political level as this was evident from being key component of National Health Sector Strategic Plan (NHSSP), Public Health Laws & Sudanese Child Health Law all emphasising immunization. Immunization is one of the core components of the Essential Health Service Package (EHSP) provided at PHC level which was mainly based on the country burden of diseases.

Structurally, EPI program is under the Maternal and Child Health Department, one of four departments under the Primary Health Care Directorate with direct supervision of the Undersecretary at the federal level.

There is a clearly defined organogram and structure covering all immunization services with clear ToR. These structures are well occupied at federal level (98%) but there are staffing gaps and low capacity observed at localities and health facilities level. Moreover, the continuous change in number of states & districts is creating a major challenge to the national immunization programme.

There are no mechanisms and tools to regularly review and consequently update the structures of EPI and other related programs to ensure that their structures are fit for purpose and they are aligned with the cMYP and other strategic plans. In addition, the programme suffers from weak coordination within its own directorate and others beyond PHC Directorate such as Disease Surveillance and CPD.

[54] *Gavi guidance on Coordination : http://www.gavi.org/support/process/apply/additional-guidance/ under the heading 'Leadership, management and coordination*

Staff technical competencies for immunization at Federal level are considered adequate, however, staff capacities at states, localities and service provision levels, need to be strengthened both in terms of number of staff and skills. According to PCA, training and capacity building activities are usually adhoc and lack quality assurance. Training Needs Assessment (TNA) framework was developed and introduced by PHI and CPD, with the support of donors and partners including GF, WHO, University of Liverpool, JICA and AfDB. TNA for EPI staff is being planned as part of the Partners Engagement Framework- Targeted Country Assistance (PEF-TCA). 33% of the vaccinators are volunteers, which is considered as one of the key challenges that may affect sustainability of the services.

Supportive Supervision system is in place at the 3 decentralization tires as there are manuals, checklists and guidelines. The implementation of the supervision plans has been affected by many factors. For instance, a considerable challenge last year was the country financial downturn that led to significant shortages in cash and fuel hindering the operation of services. Specific supervision activities are conducted for cold chain, surveillance, etc. The Integrated supervision is not fully implemented due to lack of capacities and resources at state and locality levels as these levels rely mainly on federal transfers (donor supported).

Health programmes, including immunization, has been given high political commitment. Coordination is one of the key guiding principles of the NHP (2017-2030) and is ensured through several bodies and mechanisms. The National Health Sector Coordination Council (NHSCC) was established as the highest governing body for health providing strategic direction and oversight of all initiatives supporting the health sector. This council was chaired by the president of the Republic of Sudan and currently by the Prime Minister. Its membership includes all line ministers and States Governors. The main mandate of NHSCC is to ensure government policy coherence through endorsing health policies; facilitating coordination between federal and state level; providing a platform for inter-sectoral collaboration; and holding all committed sectors accountable to the health agenda.

The National Health Sector Partners' Forum is an effective inclusive coordination mechanism for all the health sector partners under Humanitarian Development Peace Nexus approach. This forum is unifying different fragmented coordination structures and guards Sudan health compact commitments and ensures operationalizing it through the development of a clear action plan and implementation modalities. The membership of the forum includes government, UN agencies, civil society and private sector senior representatives. Functionality of this forum is ensured by the four technical committees that were established under the umbrella of the forum.

Additionally, FMOH has adopted "One Plan, One Budget, One Report" approach to ensure alignment and harmonization of different plans and projects supported by government and donors and to improves efficiency and ensure value for money. All activities supported by Gavi are integrated and aligned with existing strategies and plans. Moreover, the government and its partners believe that Gavi support has been catalytic in mobilizing additional resources, including domestic, and in evidence generation, that guides the health sector reform[55]. Another breakthrough in terms of improving effectiveness's is the organization of JANS (that included cMYP) and the Joint Financial Assessment in 2016 with support of seven key donors and partners. Furthermore, the Joint Annual Review (JAR) is being institutionalized with the support of key partners. The aim of the JAR is to address multiple fragmented review processes, reduce transaction cost and enhance accountability.

Regarding Gavi coordination mechanisms, ICC and HSSCC were unified and merged into one body under the Health Sector Partners Forum to ensure harmonization in planning, implementation and monitoring of HSS and immunization activities supported by both GF and GAVI. Discussions are ongoing to link HSSCC to the Development Committee of the Health Sectors Partners Forum. National Immunization Technical Advisory Group (NITAG) is another coordination body for the EPI to decide on the programmatic technical decisions

[55] *Gavi HSS End of Grant Evaluation Report, 2014*

and interventions such as introducing new vaccines. Recent assessments recommended to expand the scope of NITAG and improve the existing linkage with NHSCC and other coordination and oversight structures[56]. WHO EMRO in consultation with WHO CO and MOH intends to undertake, Critical appraisal of Coordination Mechanisms for Health/Multi-sectoral coordination platforms for promoting PHC approach and GAP in 2020.

Coordination bodies are replicated at state level yet, it is not effectively functioning at this level and there are fragmented coordination linkages between state councils and CSOs and other partners. Moreover, EPI plans and review reports are not well communicated at higher exiting coordination structures. There are no oversight plans and tools such as dashboards and scorecards. Monitoring & Evaluation (M&E) and supervisory plans are developed routinely, however, these plans are not implemented as schedule.

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- **Data / Information system:** Strengths and challenges related to the immunisation data (routine data collection and reporting system, integration within the health information system, regular surveys, targeted surveys, quality of data, use of data. Links with the surveillance system). At national and at sub-national levels.

HMIS

Health information system is mainly based on health facility reporting supplemented by surveys. While HIS policy had been developed at 2013, it is not updated or endorsed yet. An integrated Health Management Information System model has been designed and is being implemented. A standard, integrated, aggregated one health facility reported format was developed, adopted and rolled out to facilities. The DHIS is rolled out in all states and localities except Khartoum state, however, complete roll out is still challenging and progress is slow. The monthly reporting rate of health facilities through the integrated HMIS/DHIS2 is about 62.2%[57]. Reporting rate at state level shows remarkable variation. While Gezira, Blue Nile and Gadaref managed to noticeably improve reporting rates (98.8%, 96.7% and 93.4% respectively), Central, East and South Darfur are lagging behind (8.3%, 17.9% and 24.5% respectively)[58]. Lack or inadequate availability of the electricity and internet services (connectivity) compromise the functionality of the DHIS2 system and contribute to under-reporting.

Additionally, NHRRP-SP 2020-2022 identified additional limitations that include fragmented collection and reporting by vertical programmes, limited data quality assessment, one-way flow of data and limited feedback to relevant decision makers at different levels, and uncaptured private sector data. The other major challenge related to strengthening HIS is inadequate and un-motivated staff at all levels to oversee data entry processing, reporting, sharing and use.

Immunization information system

Immunization information system includes coverage and disease data, supply chain/vaccine management data and communication data. Data reporting is monthly from locality to state, the locality holds a monthly meeting with the health facilities to review reports before submission to the State, while the State consolidates and reports also on monthly basis. In addition, the state prepares a consolidated written report on quarter basis containing recommendations for addressing challenges and submit it to the State Director General of the Ministry of Health with a copy to the Federal EPI. Federal EPI reviews submitted reports and recommends actions to State and partners (i.e. WHO and UNICEF) who provide technical support to State EPI units.

The official national immunization coverage figures are based on administrative reported data produced at the facility and outreach services level. WHO conduct a Data Quality Self (DQS) Assessment in March 2020

[56] *Sudan Final Report on Programme Capacity Assessment, Gavi Alliance, 2018*

[57] *National Health Information Center Annual Report, 2019*

[58] *National Health Information Center Annual Report, 2019*

which reviewed there domains; accuracy, supervision and feedback and immunization data management. Final report is expected to be released in May 2020. Preliminary results show that at state level 3 out of the 18 states had either under or over reporting, 6 out of the 18 had timelines less than the recommended target of 80% and 2 states had a problem in completeness. At locality level there were problems with human resources; motivation, retention and training[59].

National communicable Surveillance system

National surveillance system is a sentinel sites based surveillance system with standardized reporting mechanisms, standardized case definitions, and 25 diseases reported weekly, 11 of them have to be reported immediately within 24 hours. Sentinel sites covered currently 1761 health facilities. During outbreaks, reporting is extended to all health facilities within a defined area and daily zero reporting is applied.

Currently FMoH is working, with technical support from WHO and GF, to implement an Integrated Disease Surveillance and Response System (IDSRS). A road map has been developed through technical support from WHO and includes developing minimum data sets for each of the identified priority health condition, and how the information will be collected and reported, developing/adapting surveillance tools, standards, guidelines and policies, developing policies and framework for National Laboratory.

In addition, IDSR plan includes expansion of sentinel sites with provision of training, reporting materials and communication devices, establishing electronic surveillance functioning at all levels integrating surveillance of specific diseases, strengthening community base surveillance system (support by WHO) through inclusion of communities with no access to health facilitates (i.e. due to conflict and/or natural disasters), building capacity of public health staff at the local level on reporting and analysis of surveillance data (support partial by GF). In order to successfully implement an IDSR, commitment from different programmes is crucial. Securing needed financial resources as well as human resources are critical elements towards functioning integrated system. Other challenges include expansion of sentinel sites, quality of reporting, capacity building, coverage and quality of telecommunication network, reporting rate from non-selected health facilities during emergencies/outbreaks and involving the private sector in the system.

This PSR will support implementation of the IDSR Plan in expansion of sentinel sites and strengthening laboratory capacity. This will complement efforts and support of GoV and other partners including WHO which support strengthening community base surveillance system and the Global Fund which support capacity building at local level o reporting and analysis.

Vaccine-Preventable Diseases (VPD) Surveillance

Polio and Measles and Rubella case-based surveillance form the backbone of VPD case surveillance and are an absolute requirement in disease eradication and elimination programmes. On this basic surveillance infrastructure, other VPD case reporting were established and maintained with a need for improvement and strengthening, including MNT, diphtheria, pertussis and congenital rubella surveillance. As the reporting of AEFIs follows the same basic structure as case-based surveillance, AEFI reporting is integrated in overall case reporting systems.

Yellow fever surveillance lies within the Directorate General of Emergency and Epidemic control as part of Viral Hemorrhagic Fever and Arboviral Diseases surveillance and not part of the VPD of the EPI. The guidelines recommended that any suspected cases to be test for yellow fever. Ministry of Health with WHO technical and GAVI financial support formulated a technical committee revised Yellow fever surveillance system in Sudan, surveillance guidelines, including laboratory and management parts was updated and the guidelines were approved by all technical partners including the professional associations. WHO with GAVI support

[59] *Sudan Immunization Data Quality Assessment Draft Report, 2020*

conducted assessment for the laboratory capacity for yellow fever, October 2018, based on the findings Sudan apply for yellow fever diagnostics support opened by GAVI.

Table 3.4.3: VPDs surveillance system

Surveillance	Type	Geographical coverage
Acute Flaccid Paralysis (AFP)	Cased based & lab based	Nationwide
Measles and Rubella		
Diphtheria, Pertussis		
Rota gastroenteritis and Meningitis		Sentinel sites in 3 states
Pneumonia	Cased based & lab based	Sentinel sites in one states
Neonatal Tetanus	Cased based	Nationwide
Adverse Events Following Immunization (AEFI)		

The global and regional Polio and Measles Rubella laboratory networks in Sudan, have established an excellent record of providing rapid confirmation of case-based suspected disease occurrences. This existing network infrastructure and expertise were expanded into integrated disease surveillance. And the lab bases surveillance is providing best evidence bases VPDs information.

For the new vaccines introduced, disease burden and programme impact is mainly measured through a laboratory-based sentinel hospital surveillance system. Sudan as a member state in the EMR has joined the BMS and Rotavirus surveillance network since 2007. Surveillance is based on a sentinel surveillance which provides general disease information. Currently, 3 sentinel surveillance is being put in place since to monitor bacterial meningitis and one bacterial causes of pneumonia and detect the circulating strains for new vaccines and to serve as a baseline data to assess the impact of introduction of these vaccines. The data generated by the program is used for decision making for the new vaccines introductions and will be used to monitor the trend of the VPD.

National EPI is providing leadership in the adoption of an integrated approach for VPDs surveillance through program design and implementation at national level, this approach needs further enforcement at state, locality and reporting site levels. The integration is important to overcome the challenges and constrains for individual disease surveillance. This integrated approach is designed to unify the existing fragmented surveillance units, maximize the utilization of available resources, and to improve the knowledge and skills of surveillance staff and enhance the exchange and dissemination of data. The integrated system is based on building the surveillance capacity to make use of data at all levels, monitoring and supervision of all surveillance activities and resource mobilization to support surveillance activities.

Nevertheless, the EPI is challenging by the high turnover of expert surveillance officers especially at the State level. There is also low reporting frequency for AEFI cases. In addition, maintaining laboratory supplies and procurement of sample collection kits and reagents kits represents another reason for low reporting of confirmed cases. This PSR will support strengthening VPD surveillance capacity through capacity building, evidence generation and provision of needed reporting materials and supplies.

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- **Gender-related barriers** faced by caregivers : Please comment on what barriers caregivers currently face in bringing children to get vaccinated and interventions planned or implemented (through Gavi or other funds) to facilitate access to immunisation services by women for their children. (For example: flexibility of immunisation services to accommodate women's working schedules, health education for women on the importance of vaccination and social mobilisation targeting fathers, increasing the number of female health workers etc.).

According to MICS 2014, pooled data did not show substantial sex discrepancies between girls and boys. Nevertheless, further analysis according to subgroups (such as poor households or lowest quantile) was not conducted. Reportedly, immunization rates according to mothers' education was found to be significant. For instance, Penta 3 coverage in children with illiterate mothers was 76.6% which increases dramatically to 94.1% in mothers graduated from secondary school and surprisingly it slightly reduces to 92.5% in university graduate mothers. On the other hand, service providers (vaccinators) sex was reported to be more likely females (51.5%). This increase significantly at some subnational levels according to cultural issues as mothers are not allowed to deal with male providers. Vaccination teams are usually selected from the local communities' female volunteers as much as possible in order to ensure gender equity during the vaccination campaigns.

Qualitatively, a study on barriers to immunization services was conducted in 2018 in five states that reports low immunization coverage, namely, Kassala, White Nile, North Darfur, West Kordofan and Red Sea states[60]. The study used A multi-method qualitative approach that includes focus group discussions with mother and caregivers of children and with groups of fathers and grandmothers, in-depth interviews with members of the focus groups, key informant interviews with key community leaders and community influencers (religious leaders) including service providers, and exit interviews with a number of mothers/caregivers of children to assess quality of immunization service.

Results revealed that almost all respondents agreed that mothers are the ones' taking the child for vaccination as the main caregiver. However, mothers are not the main decision makers in this matter as they have to take permission and approval from the fathers before taking the child to immunization. This may increase defaulters' rates as the fathers are always busy and their perceptions on the importance of immunization is different.

Based on the results of the study, a comprehensive communication strategy for EPI has been developed with support from Gavi and UNICEF. Nonetheless, more evidence-generating studies on equity determinants such as gender are generally needed to inform decisions on immunization as well as other PHC services.

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- **Other critical aspects**: any other aspect identified, for example based on the cMYP, EPI review, C&E assessment, PIE, EVM or other country plans, or key findings from available independent evaluations reports[61].

1. …
2. …
3. …

[60] *Barriers to Immunization, 2018*

[61] *If applicable, such as Full Country Evaluations (relevant for Bangladesh, Mozambique, Uganda and Zambia) and Technical Assistance evaluations (conducted for Gavi Partners' Engagement Framework tier 1 and tier 2 priority countries).*

3.5. Immunisation financing

- **Availability of national health financing framework and medium-term and annual immunisation operational plans and budgets,** whether they are integrated into the wider national health plan/budget, and their relationship and consistency with microplanning processes
- **Allocation of sufficient resources in national health budgets for the immunisation programme/services,** including for Gavi and non-Gavi vaccines, (integrated) operational and service delivery costs. Discuss the extent to which the national health strategy incorporates these costs and any steps being taken to increase domestic resources for immunisation. If any co-financing defaults occurred in the last three years, describe any mitigation measures that have been implemented to avoid future defaults.
- **Timely disbursement and execution of resources:** the extent to which funds for immunisation-related activities (including vaccines and non-vaccine costs) are made available and executed in a timely fashion at all levels (e.g., national, province, district).
- **Adequate reporting** on immunisation financing and timely availability of reliable financing information to improve decision making.

Not exceeding 250 words

Availability of national health financing framework and medium-term and annual immunisation operational plans and budgets

Sudan spends almost 4.78 % of its GDP on health[62]. There is a significant increase in government health expenditure from 7.2% in 2016 to 9.9% in 2018, however this is less than the Abuja target of 15%. Yet, almost 69.2 % of total Current Health Expenditure (CHE) is Out-Of-Pocket (OOP)[63]. National Health Insurance Fund (NHIF) coverage is around 66.8%[64] of the total population, while 88% of poor families were covered through subsidies from the government.

In 2016 the country adopted a National Health Financing Policy (NHFP) and a new Health Insurance Act (HIA) to guide major financing system reform addressing system fragmentation and inefficiency. The NHFP reset government financing priorities toward preventive health services and NHIF was obliged to cover all population with an Essential Basic Benefit Package (EBBP) including vaccination, yet currently not fully implemented.

The annual MOH plans generated within the frame of the National Health Strategic Plan (NHSP) 2017-2020. They clearly stated immunization in their priority agenda while the government budget, which in a transition towards results-based budgeting, classified EPI in its budget lines.

Allocation of sufficient resources in national health budgets for the immunisation programme

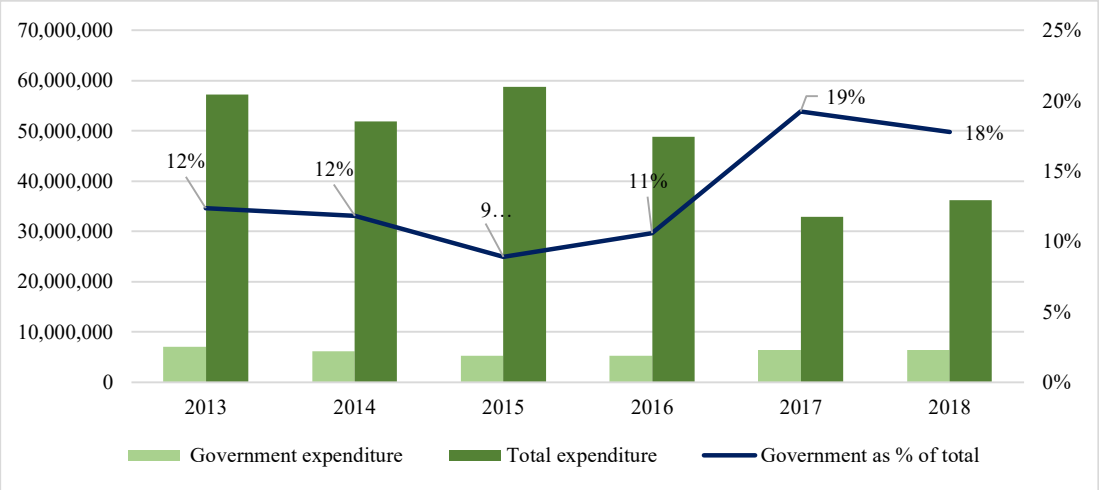
The EPI in Sudan is funded by the government of Sudan complementary from international donors and private sector (for profit and not for profit). The domestic funds (public and private) used mainly to cover staff overhead costs besides establishing EPI fixed services points.

Figure 3.5.1 Financing routine immunization (including vaccines and operational cost)

[62] *Sudan System of Health Account, 2018*

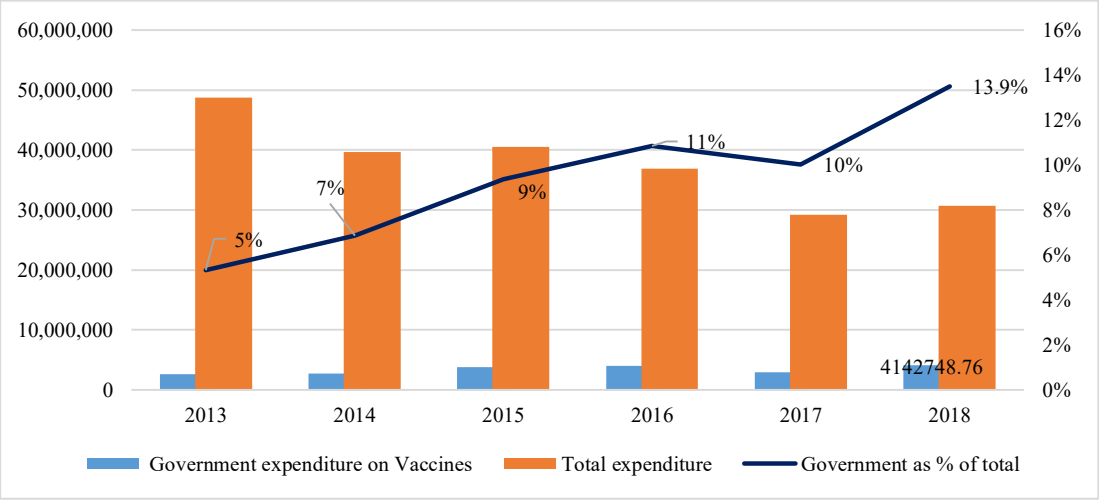
[63] *Sudan System of Health Account, 2018*

[64] *National Health Insurance Fund Annual Report, 2018*



In addition, the government has considerable share in the vaccines supply (traditional and new) which has incrementally increased from 5% in 2005 to 13.9 % in 2018.

Figure 3.5.2 Financing of vaccines (traditional and new), government co-financing (2013-2018)



Nevertheless, the EPI remains a program that heavily depends on international donors' funds (mainly Gavi, UNICEF and WHO) to support its operational costs and vaccines supply (more than 75.7%)[65]. Although in 2019 the government budget approved for EPI has increased about 9%, still the financing shares skewed towards donors' funds and consequently threatening the overall program sustainability and definitely query the government capacity to supersede and overcome donors' funds quitting or transitioning in the near future.

According to cMYP costing (2017-2021), in 2019 the total EPI required cost was 98,510,846 USD with 89% gap from the secured funds as the government share is only 1%, however, with donors funds the gap decreases to 9%. Given the country fiscal prospects, the probability of fully transitioning from Gavi support is considered challenging.

Table 3.5.1: Summary of EPI baseline expenditure and projections 2016-2021 (cMYP 2017-2020)

Year	Vaccine & logistics	Service delivery	C4D	M&E & surveillance	Program mngmnt	SIAs	Total direct costs
2016	41,634,655	3,004,010	358,000	1,906,956	7,771,835	14,023,219	68,698,675
2017	62,385,108	2,976,211	358,000	1,170,391	3,267,590	45,250,831	115,408,132

2018	66,388,521	3,031,754	358,000	1,264,032	3,409,405	36,639,656	111,091,368
2019	68,841,415	2,217,421	70,000	1,366,795	3,794,911	21,523,312	97,813,853
2020	71,457,051	2,323,005	70,000	1,479,542	4,102,558	16,305,665	95,737,821
2021	3,008,325	2,124,519	0	179,537	571,892	0	5,884,273
Total	**272,080,419**	**12,672,911**	**856,000**	**5,460,296**	**15,146,356**	**119,719,464**	**425,935,446**

Economically, Sudan used to be categorized as middle-income country (2,899 US$ GDP per capita in 2017). However, in 2018 the country economy went through several financial crises manifested in the high inflation rates (more than 60% in 2018), devaluation of the national currency with scarcity in hard cash and the GDP per capita fell to 1229 US$ which re-categorized Sudan as Low-middle income country (Ministry of Finance and Economic Planning)[66].

Timely disbursement and execution of resources

The newly developed National Health Recovery and Reform Policy & Strategic Plan (NHRRP-SP) (2020-2022) provides a unified framework through which all health programs are expected to be executed. To assist in ensuring resources are used for intended purposes, a key goal under the strategy is to ensure that the financial management system meets national and international standards, and produces reports appropriate for decision-making, oversight and analysis.

Funds from the FMoF disbursed on monthly bases to cover salaries, goods and services as approved in the annual budget of the FMoH. For programs such EPI, disbursements executed based on specific program requests and agreed upon schedules. International donors' funds usually planned for two or three years and implemented on annual bases with quarter disbursements.

However, timely disbursement and execution of funds remain a concern. This happens due to many reasons according to the fund source, for instance Gavi transfers sometimes faces delays due to previous US sanctions on Sudan and economic instability. For domestic resources, governmental share may be delayed and sometimes approved budgets might not fully disbursed.

Adequate reporting

Prompt and proper reporting on immunization financing is one of the main constrains of the program. This may be due to the fact that reporting is based on line-items not on project bases, which did not allow linkages between project attainments and planning. Project- based reporting started in 2019 and is expected to improve future financial reporting.

Despite many challenges, FMOH has conducted several rounds of health accounts, including lastly System of Health Accounts for the year 2018. This helped to harness a strong capacity for providing accurate and timely information to support decision making, including for vaccine-preventable diseases and immunization.

Ensuring the financial sustainability of immunization program in Sudan to meet transition goals requires securing new domestic resources for immunization and strengthening the planning, budgeting, and financial management capacity of immunization programs.

[65] *Sudan System of Health Acount, 2018*

[66] *Ministry of Finance & Economic Planning, 2019*

3.6. Polio transition planning (if applicable)

If transitioning out of immunisation programme support from other major sources, such as the Global Polio Eradication Initiative, briefly describe the transition plan. If none exists, describe plans to develop one and other preparatory actions.

Not exceeding 100 words

At global level, 16 countries receive more than 90% of GPEI support globally; these countries have been identified as priority countries for polio transition. Four out of these 16 countries are in the Eastern Mediterranean Region including Afghanistan, Pakistan Somalia and Sudan. In addition to the four global priority countries, EMRO have identified 4 countries in the region that have been classified as regional priority countries. These include Iraq, Syria, Yemen and Libya.

Sudan already developed polio transition plan aligned with thirteenth general program of work 2019-2023. The country recently developed implementation framework in order to identify key activities and defined timeline for monitoring.

In follow up of earlier work, a Joint Country Support Visit to Sudan on Polio Transition convened from HQ, TIMB, EMRO and Amman Hub 01-05 December 2019. The objectives of the mission were:

- Review and update key elements of the national polio transition plan for integrated programmes to ensure effective polio transition
- Discuss progress and timelines of the implementation of the polio transition plan.
- Review of country-level financing opportunities and financing gaps and explore resource mobilization efforts
- Consult with stakeholders to raise awareness of transition plans and funding requirements

The mission concluded that Polio and EPI is one program in Sudan, no demarcation was observed between them, integration at the field level between EPI (including polio), Emergency, Epidemiology and HSS exists, reporting-weekly and monthly meetings are led from the Central Surveillance Unit to collate all VPD surveillance data.

AFP surveillance was expanded to include all VPDs in immunization system. It involves all states, localities, vaccination posts and sentinels sites in one integrated surveillance system and sustains laboratory networks. VPD surveillance is currently part of EPI while the Epidemiology department of Federal Ministry of Health manages other disease surveillance. FMoH vision is to have integrated surveillance system for communicable disease on the long run.

Currently, there are 7 polio funded staff in Khartoum and 29 SSAs at all states except Northern, Sennar and White Nile. The key function of them continues to be AFP surveillance and Polio SIAs (55%) in addition to providing extensive support to VPD surveillance, outbreak management and routine immunization (45%). They are also considered as key technical resource person for support of planning and training and implementation of non-polio campaigns and capacity building

The country office through support from WHO regional and headquarter inputs had completed the following activities:

- Human resource mapping updated and completed
- Physical assets mapping updated and completed
- Intangible assets mapped
- Risk assessment completed
- Transition scenarios, and their feasibilities drafted

The way forward for polio transition planning in the country are:

- Transition to become an agenda point in the National Health Sector Coordination Committee, which will guide transition at country level
- A coordination and oversight team to be established and meet once in a month (It is preferred to use an existing coordination forum)
- WHO Integrated Public Health Team to provide monthly updates on polio transition to Regional Working Group on Polio Transition
- The country team to explore in-country financing opportunities

It is recommended that the updated version of the plan including the budget to be endorsed by the transition governing body of Sudan by Q1 2020

4. Past performance of Gavi support, implementation challenges and lessons

Briefly comment on the performance of the vaccine support and health systems and immunisation strengthening support (HSS, Ops, VIGs, CCEOP, transition grants) received from Gavi.

4.1. Programmatic performance of Gavi grants, in terms of:

- Achievements against agreed targets
- Overall implementation progress, lessons learned and best practices
- Progress and achievements specifically obtained with Gavi's HSS and CCEOP support
- Usage and results achieved with performance based funding (PBF)
- If applicable, implementation progress of transition plan, implementation bottlenecks and corrective actions

Not exceeding 500 words

Overall EPI coverage and equity targets of the grant have been achieved and maintained through addressing the health system issues.

Targets such as reporting rates from health facilities, PHC expansion project coverage, training for health cadres and reforms in planning and governance were achieved throughout the years and have shown steady improvement (Figures 4.1.1, 4.1.2, 4.1.3 and table 4.1.4).

Figure 4.1.1 Percentage of districts or equivalent administrative area with Penta3 coverage greater than 80%[67]

[67] *Gavi HSS2 GPF*

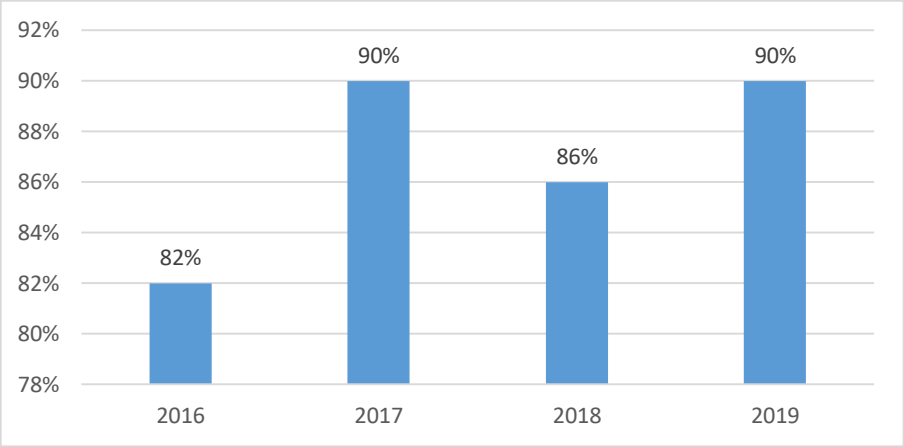


Figure 4.1.2 National HMIS Reporting Rate[68]

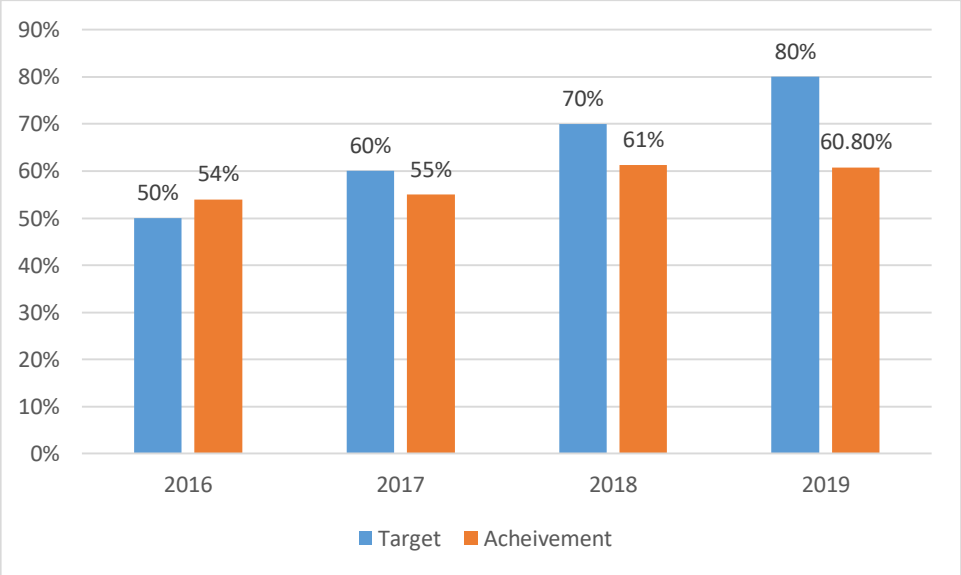


Figure 4.1.3 Community Health Worker Training- National PHC expansion achievement[69]

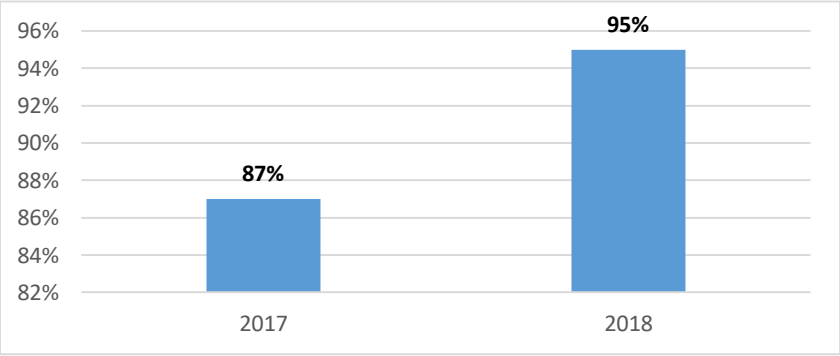


Table 4.1.4 Gavi HSS2 grant selected intermediate indicators and their achievements[70]

Indicator	Result			
	2016	2017	2018	2019
Percent of health facilities that submit EPI reports in time according to standards	97%	98%	94%	90%

[68] *Gavi HSS2 GPF*

[69] *Gavi HSS2 GPF*

[70] *Gavi HSS2 GPF*

Percent of PHC facilities providing the essential package of services including immunization	63%	63%	62%	NA
Percent of states implementing the revised organizational structure	88%	83%	83%	62%
Number of states with at least 90% functional cold chain equipment at all levels	8	10	7	7
Percent of underserved/disadvantaged population covered by DTP3	63%	72%	52%	74%

Other achievements and progress in HSS includes:

- General improvement in the HIS related in the use of the national M&E framework from the state. Improvement in reporting from the state level through the DHIS. Gavi supported DHIS2 introduction, through training of the core staff, monitoring and supportive supervision activities, and support the health observatory.
- Establishment and functionality of the Health Partners Coordination Forum.
- Capacity building for CSOs in areas of community engagement, resources mobilization and program management.
- Routine immunization, home visits, mobile session activities and outreach activities targeting special population and security compromised areas. Together with health promotion activities lead to maintain national coverage of DPT3 above 90% throughout the years.
- Cold chain equipment's inventories gap had been identified in 2018 for all states. HSS2 resources were used for the CCEOP co-payment for the first two years, the gap in the equipment's that was not covered by CCEOP will be covered through the Solarization project from the same grant.

Challenges faced the grant and resulted in delay of the implementation and absorption:

The HSS2 had faced many challenges at different levels (GAVI/PMU/IUs/Country level).

Political instability, security issues, economic downturn were the main reasons that affected the grant assumptions and consequently the implementation as well as the outbreaks and health emergencies. Following the establishment of the transitional government and the on-going reforms so far, we are optimistic that many of the challenges will be addressed.

During the last years of the grant, the implementation faced many challenges due to the country political situation such as high inflation rate, lack of cash, and scarcity of oil in the hall country in 2018-2019. In the top of that during the whole of 2019, a significant civilian revolution has been going on along with the insecure situation in every single part of the country. This revolution ends-up with a major change in the Sudan government after thirty years. Due to all these reasons, the country requested No-cost extension for the grant two times. However, to reach the grant targets and accelerate the implementation, a desk review and reprograming for the remaining activities were taken. For example, one of the measures that taken to accelerate the implementation and increase country' absorption capacity is Solar energy project for health facilities. This project will help in increasing the capacity for health facilities in the remote area to provide the essential PHC package including the immunization. Preparation and the initial facility assessment for this project were successfully implemented by the ministry of health, the list of the selected facilities based on the assessment is ready for the installation. The total amount of this project approximately one-third of the remaining budget.

In the other hand, after the Audit mission in 2016, some activities including procurement-related activities were postponed by GAVI until an independent assessment was conducted. Fulfilment of the audit recommendations took considerable time. Also, there was some delay in disbursement of fund to the country.

PBFs:

Demand generation for health services including vaccination were covered through PBFs that focused on supporting development of national strategy for health promotion in addition to capacity building of health promoters at states level. At the time of the campaigns those health promoters work as social mobilizers through coordination between different departments.

First PBF supported mainly cold chain and routine EPI activities in low performing localities. Second PBF supported mainly EPI surveillance system, demand generation, decentralized health system strengthening, while relevant technical assistance were maintained through other Gavi supports (PEF-TCA).

4.2. Financial management performance, in terms of:

- Financial absorption and utilisation rates
- Compliance with financial reporting and progress in addressing audit requirements
- Major issues arising from review engagements (e.g. Gavi cash programme audits, Gavi programme capacity assessments, annual external/internal audits, etc.) and the implementation status of any recommendations
- Financial management systems, including any modifications from previous arrangements

Not exceeding 500 words

Main sources of funds received by the Ministry of Health for immunization are:

1. Governmental fund based on the annual budget of the FMoH. These are allotted as monthly transfer from the Ministry of Finance.
2. Funds received through PMUs which are remitted by the Global Fund and Gavi. Each donor fund is managed through a separate bank account.
3. UN agencies (WHO, UNICEF, UNFPA) and other donors.

Absorption and Utilization

Reportedly, absorption and budget utilization rate are 92% of the received fund and around 60% of the total allocation. The second tranche of Gavi beginning 2014 for 5 years total budget was 33,240,000 USD. Total amount received since 2014 until December 2018 for HSS was 14,158,354 USD. This in addition to 2,577,589 for PBFs giving a total of 16, 735,943 USD.

Compliance with financial reporting and progress in addressing audit requirements

Financial reports are submitted on monthly, quarterly and annual basis to PMU manager and Gavi secretary. Then the frequency of reporting to Gavi had changed from quarterly to biannual basis. Additionally, the PMU reports annually to the National Auditor Chamber (NAC). As an audit requirement for strengthening internal accountability, Gavi has recently contracted the GFA company to undertake further final verification of any financial transaction processed by the PMU as a precondition before effecting any payment.

Financial management systems, including any modifications from previous arrangements

Regarding the financial management system, It used to be manual until the financial year 2014. Since 2015, Tally financial accounting software has been introduced and functioning for Gavi funds. However, since the first licencing in 2015, the software has not been updated, which should have been done on annual basis. The regular update of the system accounting provides remote web-based access and online system solutions. To make the maximum use of the latest system updates, a request is included in the new grant.

Part C: Planning for future Gavi support[71]

Section C details the new vaccine support and health system strengthening support requested for the upcoming 3-5 years, including strategic considerations and prioritized activities. Operational details are presented in the **Gavi budgeting and planning template** and performance measurement is presented in an updated **grant performance framework**.

If you plan to request new vaccine support (routine introductions and/or campaigns**) in the upcoming 3-5 years,** please fill in section 7 below.

If you plan vaccine routine introductions and/or campaigns in the next 18 months, in addition, please fill in the relevant vaccine specific request, on the Country Portal, here: http://www.gavi.org/support/process/country-portal/

5. Planning for future support: strategic approach, coordination and alignment

5.1. Strategic approach of Gavi investments requested for the next 3-5 years

From the situation analysis in Part B, describe the rationale for Gavi investments requested for HSS, CCEOP and (new) vaccine supports and expected achievements.

Describe synergies across Gavi support, including planned introductions or campaigns. If relevant, comment on capacity and appropriate systems to introduce multiple vaccines. Also describe how the country will mitigate any programmatic and financial risks associated with multiple introductions.

Explain how the requested support will be used to **improve the coverage and equity of routine immunisation.**

Approx. 500 words

Expanded Program on Immunization is one of the most effective public health programs in Sudan, the program functioning through three levels; national, state and locality having well-established systems that succeed to achieve most of its target e.g. polio eradication and control of most of vaccine preventable disease despite the challenges facing the program that summaries as follow:

1. High turnover and brain drain among the EPI staff at management and care delivery levels.
2. The denominator is not well defined as the last census in Sudan was conducted in 2008, and no proper vital statistic system in place.
3. Sudan has a coastal line along the Red Sea and shares borders with seven countries: Egypt, Eritrea, Ethiopia, South Sudan, the Central African Republic, Chad, and Libya, most of them are high risk countries for Vaccine Preventable Diseases (VPDs).
4. Sudan represents a model of all special groups, nomads' that change their routes regularly, refugees, IDPs, closed and post conflict areas which all considered as underserved population

The EPI program has strong governmental commitment, community/public trust, and effective partners mainly WHO, UNICEF, PEI, GAVI and Rotary. Gavi supported Sudan since 2002, the support was well acknowledged in building strong EPI system at all level, sustain high national immunization coverage over years, successful introduction of new vaccine namely; Penta, Pneumococcal, Rotavirus, Meningitis A, IPV, Yellow fever, support implementation of many VPDs campaign to ensure the immunity and filling the routine immunization gap as well as strengthening health system.

This PSR has been developed aiming to attain UHC, and reach all unreached children, it will focus on strengthening the system to sustain the routine immunization coverage, reach the 6-8% of the

[71] *The duration of Gavi funding should be discussed in consultation with the Gavi Secretariat to align to the extent possible to a country's strategic period. For Measles Rubella the high-level plan with coherent and integrated measles and rubella disease control activities is expected to cover the next5 years, regardless of the duration of the national strategy.*

children left behind over years, improve the coverage of lagging behind antigen e.g. measles and tetanus and ensure control/elimination of VPD in Sudan. In-depth analysis of the situation and up to date coverage was used to identify system issues affecting the program performance and special groups. Challenges and obstacles were identified, and interventions is designed in prioritized manner to address these challenges and achieve the desired objectives. Accordingly, the requested support will be used to achieve:

- Improved access to quality integrated Primary Health Care services including immunization through prioritizing expansion of immunization fixed sites, ensuring continuous quality improvement of both immunization programme and service, ensuring available and functional cold chain equipment and timely maintenance all over the country.
- Equitable coverage and utilization of PHC services including immunization through identifying and targeting localities with low coverage, high number of unvaccinated children or high dropout rates, targeting and responding to the needs of special population (pastoralists, refugees and IDPs), planning to partner with local CSOs/NGOs to ensure provision of immunization services at hard to reach and inaccessible areas, improve social mobilization and demand generation to increase service utilization.
- Assured government commitment for adequate and equitable allocation of financial resources for health and immunization and reduced inefficiencies in resources utilizations through generation of evidences and continuous advocacy and engagement.
- Resilient and sustainable health and immunization systems are in-place through addressing system issues related to governance and leadership, human resources and data.

5.2. Alignment

How does Gavi support align with the country's national health and immunisation strategies including multi-year plans (e.g. Health Sector Plan, cMYP)?

- Explicitly address how Gavi support will complement, both financially and programmatically, the achievement of objectives set out in the most recent strategic multi-year plan (e.g. cMYP).
- Given the immunisation strategies proposed in this PSR, explain and show how these will contribute to the implementation of the national health strategy and priorities, including the country's approach to primary health care and universal health care, or if there are gaps, describe what needs to be done to address these.
- Describe the extent to which Gavi's support proposed in this PSR (in areas such as data, supply chain, etc.) will be implemented through national routine systems and processes or explain the steps that are being taken to achieve integration.

Not exceeding 250 words

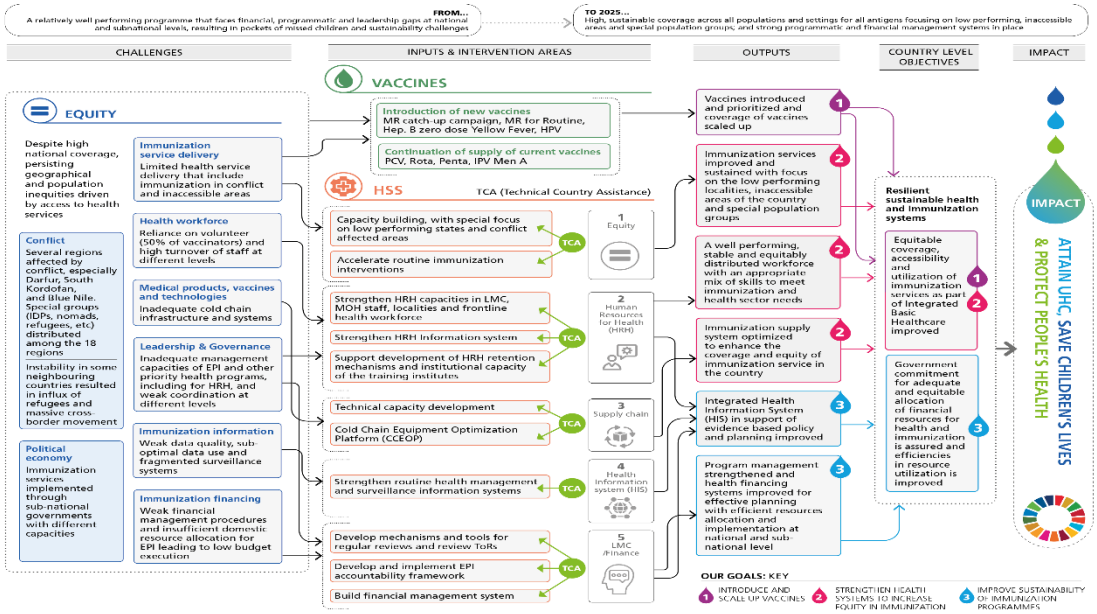
Explicitly address how Gavi support will complement, both financially and programmatically, the achievement of objectives set out in the most recent strategic multi-year plan (e.g. cMYP).

The overall goal of the cMYP 2021-2025 is to enhance immunization throughout the lifespan, reducing vaccine preventable diseases morbidity and mortality contributing to universal health coverage for Sudanese population. This aligned with National Health Recovery and Reform Policy& Strategic Plan (NHRRP-SP 2020-2022) goal of efficient delivery of accessible, equitable and quality health services is prerequisite for achieving Universal Health Coverage and meeting SDGs targets therefore; FMoH is responsible for improving health services at all levels (primary, secondary and tertiary). GAVI support will be complement the efforts of the government, WHO , UNCEF, PEI , Global Fund and all other immunization and health system partners to achieve this goal through complementary effort to strengthen health system and achieve UHC to reduce infant and under five mortality, prevent VPDs outbreaks, meet routine vaccination coverage targets at national, state,

locality and community levels, meeting national control and elimination targets, sustaining Sudan polio free status, introducing new vaccines and technologies of national priority, and strengthening immunization programme system and ensuring sustainable funding and quality supply. The guiding principles of the plan are ownership, equity, partnership, evidence-based policy & planning, integration, accountability and sustainability.

This PSR will be implemented based on a theory of change that defines long-term goals to attain UHC and to save children lives and protect people's health. The TOC identify the key challenges facing immunization and health systems to meet the five strategic objectives of the PSR. The model addresses the main inputs and outputs to reach the desired outcomes for each area of the health service strengthening elements of the immunisation programme at all levels. It supports understanding how change occurs and generate co-ownership of the programme.

Theory of Change



Explain and show how immunisation strategies proposed in this PSR will contribute to the implementation of the national health strategy and priorities, including the country's approach to primary health care and Universal Health Coverage, or if there are gaps, describe what needs to be done to address these.

The immunization strategies proposed in this PSR targeted strengthen health system for sustainability of the immunization coverage achieved over years, reached unreached children, focus on special groups e.g. nomads, IDPs, refugees, children in conflict/closed areas. The strategies of this PSR focused on supporting ministry of health in solving the main obstacles facing it in reaching its strategic National Health Recovery and Reform Policy& Strategic Plan (NHRRP-SP 2020-2022) that aiming to strengthening governance systems of the decentralized health sector at all levels (federal, state and local) through revisiting health system structures including, roles and responsibilities of all bodies at different levels, and building capacities towards achieving Universal health coverage. It will focus on sustaining and improve immunization services with focus in the low performing localities, inaccessible areas of the country and special groups, expand the fixed services versus the mobile and outreach, establish routine immunization services in Darfur states versus phasing out the acceleration campaigns, establishing health services including immunization in the three completely closed areas in South Kordofan State. This PSR will support in capacity building, production, equitable distribution and retention HRH, to ensure expansion of PHC services to wards UHC. The PSR will support the NHRRP in strengthening the health Information management system and integrating EPI information within the overall systems. It will also support in availing of system

for effective vaccine management at all levels and will be focus on the coming 5 years to ensure financial sustainability of the immunization program in Sudan.

Describe the extent to which Gavi's support proposed in this PSR (in areas such as data, supply chain, etc.) will be implemented through national routine systems and processes or explain the steps that are being taken to achieve integration.

All proposed activities will be implemented using national routine systems, for efficient use of resource, ministry of health will look for integration of the health services, and efforts were done in identification of the essential health package at every level, to be availed through fully integrated and complementary efforts from all partners and stakeholders led by MOH. (i) Service delivery activities will be implemented through public health facilities, NGO/CSO facilities and private for profit facilities; (ii) UNICEF will be responsible for procurement of CCE and associated equipment in line with existing MoU with FMoH and all other activities will be implemented by the Ministry; (iii) With regard to data, training, actual data collection and data analysis will be done by the FMoH, SMoH and LHMT. Technical support from the WHO will be received in areas like DHIS2 (iv) All activities under management, leadership and coordination will be implemented by the FMoH with technical support from partners mainly WHO, UNICEF and World Bank; and (v) FMoH will also be responsible for demand creation and supply chain activities at different levels with technical support from UNICEF.

5.3. Coordination

What steps were taken to ensure complementarity, coherence and technical soundness of Gavi's support across government and stakeholders?

- What role was played by the national coordination forum (ICC, HSCC or equivalent) and the national immunisation technical advisory group (NITAG) in the development of the PSR?

Not exceeding 250 words

In the PSR kick-off, the PMU invited the NHSCC for a meeting to discuss the overall guidelines of the new Gavi support and also to identify the modality of developing the new grant proposal. The 1st meeting came out with clear guidelines for the proposal development methodology and also determined the representation of the thematic groups' members from the different partners and stakeholders. Key partners were involved in comprehensive situation analysis, identification of the gaps, priority setting and interventions. However, each thematic area in the developed a technical working group had involved members from the key partners such as WHO and UNICEF and national stakeholders. The key donors that have a significant support for health system in Sudan such as GF are also involved to ensure the complementary and coherence in the area of alignment eg (health information system, disease surveillance, strengthening the capacity of health workforce beside strengthening decentralized health management system. On the other hand, an orientation meeting conducted with all international donors that work in the health system in Sudan to ensure complementarity and coherence across them.

New vaccines that requested in this proposal such as (MR, HepB zero dose) are approved by the NITAG. HPV was thoroughly discussed, and all available data was revised the decision was to use the coming years for availing strong evidence through the centres of the cervical cancer screening to guide the country decision. Nevertheless, the NITAG have been involved from the beginning of the PSR process and the main challenges were identified, and as part of the NHSCC for the final revision and approval.

To ensure the alignment with government priorities and strategic direction, the technical working group considered the newly developed reform policy and strategic plan as one of the reference documents.

The final proposal was shared with members of NHSCC and Sudan Health Sector Partners Forum (SHSPF) as well as the undersecretary council for their review and comments and consensus.

5.4. Harmonisation and synergies with other Global Health Initiatives

How is the requested support complementary and creating synergies with the support of other Global Health Initiatives, such as the Global Fund and Global Financing Facility (GFF)?

Not exceeding 250 words

The Strategic Plan (NHRRP-SP 2020-2022) and EPI cMYP 2021-25 will guide the work of the government and its partners within the coming years. The Global Health General Directorate in the MOH, being looking to all global health initiatives and fund will be responsible for ensuring the synergy and complementary of all technical and financial support to the ministry of health. Many coordination mechanisms (e.g. NHSCC, HPCF) are in place to ensure this. The development of this PSR applied an inclusive and participatory approach where all relevant stakeholders participated and provided valuable inputs through all stages. Stakeholders include different departments within FMoH, FMoF, NMSF, NHIF, NMPB, States MoH, WHO, UNICEF, UNDP, World Bank, and Sudan Network for Organizations Working in Health.

Despite the efforts that taken still managing GHIs remains fragmented, however, there is an agreement to merge the PMUs of Gavi and GF under one joint PMU. This will help in increase the harmonization, alignment, efficient use of resources and improve synergies. With WHO support "cross programmatic efficiency analysis" is planned to be undertaken, subject to ease of situation of COVID 19 in early 2021. This will lead to exploring policy options for making the support from various partners and GOS contributions is utilized more efficiently.

As mentioned earlier, the implementation of immunisation services contributes significantly towards reducing child mortality:

- It will complement the efforts by the Global Fund for strengthening the health system (HSS).
- It will match its resources with the HRH Initiative supported by WHO for the development of a National Health Workforce Retention Strategy
- It will complement the work of the Sudan Public Health Training Initiative (SPHTI) by the Carter Centre for strengthening the PHC health workforce, particularly in terms of the institutional capacity assessment and expanding support down to states and localities with special focus on the frontline EPI health workforce.
- It will match resources for upgrading the Midwifery Programme supported by UNFPA.

The donor mapping review identified a number of organisations which have significant collaboration with the FHOM in the area of capacity building, solar energy and developing policies and strategy to strengthen the immunisation services. The main contributors are the WHO, UNICEF, the African Development Bank and the Italian Agency for Cooperation and Development (AICS)[72].

5.5. Financial Sustainability

Discuss the financing-related implications of the new vaccine support requested, particularly how the government intends to fund the additional co-financing obligations.

Not exceeding 250 words

[72] *Donors Mapping, Sudan, 2019*

Ministry of Health has an agreement with ministry of finance on the annual payment of the vaccine co-finance. Ministry of health with technical support from its partners, namely GAVI, WHO and UNICEF conducted many orientations and updating session for the ministry of finance higher officials and technical staff. Ministry of health usually closely follow up with the ministry of finance during the annual budgeting and financing revision and planning to ensure the approval of the required fund for the co-finance payment with its annual increase. Ministry of Finance is fully updated on any plan of introduction of new vaccine and the co-finance issues, through their membership in the NHSCC, the committee responsible of approval of any proposal, the signature of the minister of the MOF is a guarantee of his approval and commitment of co-finance. Sudan had fulfilled the required co-finance without experience of any defaulting within the last years, except in 2012 and this has been evaluating by WHO and clear recommendation was issued, since that time, Sudan used to pay the co-finance timely.

During the last two years when Sudan entered the transition phase, many orientation session were conducted by the joint appraisal team, representing all partners to higher officials in MOF for advocacy for the immunization financing and sustainability of the program. Transition steering committee headed jointly by FMoH & MoF were established to raise the awareness of the decision maker on the importance of the country preparedness for transition of traditional vaccines, GAVI and polio transition. However, due to the decline of Sudan's GNI in 2019, the country was out of transition.

6. Programmatic description of Gavi supported HSS investments

6.1. Objectives and priority activities for Gavi financial support

Given the target geographic and population groups identified and key national and sub-national bottlenecks determined in **Section B**, this section asks you to strategically consider these findings, and develop the **3-5 key objectives and specific activities within these to be supported by Gavi and the rationale for choosing these**. The link between data and evidence and proposed interventions must be clear. **The activities listed here are to be costed in Gavi's budgeting and planning template.**

The activities proposed must contribute to sustainable improvements in coverage and equity. For **Programming Guidance** for targeting interventions in each of Gavi's strategic focus areas (i) leadership, management and coordination, (ii) supply chain, (iii) data (iv) demand promotion, and (v) immunisation financing, please see the Gavi website here: http://www.gavi.org/support/process/apply/hss/

To apply for CCEOP support, include CCEOP as one of the activities under a supply chain objective. For countries in the accelerated transition stage, dedicate one objective to those activities specific to appropriate transition planning.

Objective 1 (Equity):	**To sustain and improve immunization services with focus in the low performing localities, inaccessible areas of the country and special groups**
Timeframe:	2021-2025
Priority geographies/population groups or constraint(s) to coverage and/or equity to be addressed by the objective: → ***List to match those identified in Section B***	Following population groups and geographical areas where the low coverage and high number of zero dose children and missed communities are targeted through this PSR. 1. As the special groups distributed all over the 18 states, the prioritization will focus on the following groups: • Nomads • Refugees • IDPs 2. Sustain the high achieved routine coverage and improve uptake of low coverage antigens e.g. MCV1, MCV2 and DT 3. Reach the 6-8% children not reached over years (unvaccinated) 4. Strengthening routine EPI service and phasing out of the acceleration campaigns in Darfur states 5. Reaching the unreached children in the three completely closed conflict areas in South Kordofan states in case of peace agreement and partially closed areas in South Kordofan, Blue Nile and Darfur states. 6. Improving cross borders coordination, immunization and surveillance activities. 7. Strengthening demand generation and social mobilization activities at state and locality levels
Describe the tailored interventions to address this constraint and provide evidence of efficacy of the intervention. Describe the critical national capacities that will be established or strengthened as a result of this investment.	
1. Expansion of EPI service through fixed sites as per the findings of the health mapping	

This intervention aims at sustaining the current high coverage with EPI services in Sudan. FMoH adopted the integration concept aiming at ensuring efficiency and sustainability of health services, including immunization. This is very much in line with the National Health Policy 2017-2030 which calls for expansion of integrated PHC services to improve both access and utilization. Under this intervention, special emphasis will be given to addressing the programme dependency on acceleration and mobile activities as a result of the inadequate capacity of public health facilities to satisfy demand which represent real threat to programmatic and financial sustainability.

The planned activities are aimed at addressing this issue by gradually expanding the number of fixed sites based on a comprehensive mapping of health facilities using GIS and development of national expansion plan, provision of equipment, and training of health care providers in order to avail integrated PHC services at both health facility and community level, and thus increasing the coverage with EPI services as well as improving both geographic and socioeconomic equity in immunization coverage. 110 fixed sites will be targeted including 15 at the two inaccessible areas. Needed investment will include construction/rehabilitation, provision of needed human resources (these two will be supported from the Government resources) and provision of cold chain equipment (Refrigerator, cold box and vaccine carrier). This PSR will support procurement of needed CCE in addition to capacity building of the staff.

2. **Strengthen both RI services for special groups (borders, IDPs, refugees' camps and for nomads) and cross border collaboration**
3. **Increase the children reached by routine immunization service in Darfur states from 25% to 100% and phasing out the acceleration campaigns**

Frequent and large-scale population movement from neighbouring countries as well as across states represents considerable challenge to the provision of integrated PHC services in the country. Open border and provision of health services for all policies add extra burden to the country already stretched health system. Sudan faced VPD outbreaks of Cholera and Measles in the last two years and large proportion of vulnerable infants and children were at risk of death. Although situation at conflict affected states improved, dependency on acceleration activities continues which raised concerns on becoming a culture that would jeopardize routine activities. Moreover, ability of locality health management teams to resolve bottlenecks onsite is generally weak. In addition, there is key challenge of high staff turnover at all levels, which hindered continuity and sustainability of program activities.

All these factors necessitate the need to strengthen quality routine immunization focusing on disadvantage and underserved population, reduce unnecessary expensive activities, nurture the capacity and responsiveness of lower-level structures to own immunization programme and mobilize communities to share responsibilities and establish system for continuous quality improvement within the programme. Therefore, regular field supervision, establishment of new fixed immunization sites, capacity building of staff through induction and refresher trainings will be carried out at prioritized population including nomads, refugees, borders and IDPs. a Continuous Quality Improvement concept will be adopted aiming at improving and sustaining programme functionality through implementing activities to assess, improve and continuously follow up immunization programme and services in an effective and sustainable manner to achieve targets.

Sudan is one of the six countries at risk of importation of Polio in Eastern and Mediterranean Region (EMRO). Special population groups such as nomads and refugees/ IDP reported as susceptible to risk of acquiring and spreading Polio. Central Darfur and South Kordofan States identified as susceptible to polio risks due to population movement and active conflict warranting intensive surveillance[73]. This PSR will support strengthening cross border collaboration in terms of information sharing, joint review and exchange of best practices.

[73] *Bi-regional Meeting to Strengthen Cross Border Collaboration of Sudan and its Neighbouring Countries, November 2018, Final Report*

4. **Using the results of the EPI coverage survey and/or other relevant data to identify the localities with low coverage and accelerate the routine immunization to reach the 6-8% 0f children not reached[74]**

5. **Strengthen social mobilization and community awareness intervention to ensure demand generation and increase utilization especially for low utilized vaccines e.g. MCV and DT**

This intervention, aims to engage and empower the community as a key actor in enhancing the health seeking behaviour of its members. Currently, most of the social mobilization activities are Supplementary Immunization Activity (SIA) and campaign specific. For routine immunization no social mobilization activities are undertaken and without increasing the demand for services, programme's target may not be achieved. With support from Gavi and Unicef, a social mobilization strategy has been developed and endorsed.

This PSR will support the effective and timely implementation of the strategy aiming to increase demand as well as promote meaningful community engagement. This will be achieved through strengthening capacity of health promotion staff, increasing commitment of national, state, local, and religious/ community leadership through effective engagement and continuous consultation, production and broadcasting of Media, social media and IEC materials and strengthening communication data management system to ensure effective and timely monitoring and evaluation of the demand interventions.

6. **Establish routine immunization service in the three completely closed conflict areas in South Kordofan states in case of peace agreement**

Current political situation in the country is expected to evolve and the transition government is fully dedicated to achieve peace in all conflict affected areas. Current negotiations between repellent groups and political parties is progressing positively as many positive signs were declared such as ceasefire and cessation of hostilities. This progress is expected to result in peace agreement followed by opening closed area and restoring of services provision. This will require special consideration to provision of comprehensive health services to the population on those areas including immunization. As information on status of health facilities, human resources, availability of medicines and information system are currently limited, a contingency plan will be developed after a rapid assessment of services availability and readiness including construction/rehabilitation of health facilities, provision of equipment, training of health care providers at facility and community level and provision of performance-based incentives, ensuring un-interrupted supplies of medicines and vaccines, and increasing knowledge and awareness of communities on health related issues including immunization.

List approximately five (5) specific activities to be undertaken to achieve this objective:
→ ***Reflect these activities in the budget & planning template***

1. Establish 95 new EPI fixed sites in 5 Darfur states aiming at phasing out dependence on acceleration activities.
2. Support provision of outreach and mobile services with focus on hard to reach, IDPs and disadvantaged populations.
3. Provision of basic training courses for EPI vaccinators in the new fixed sites.
4. Conduct supervision visits to the states to monitor and improve performance, focusing on low performing states.
5. Monthly incentive for EPI staff

Update the GPF to propose indicators to monitor progress toward this objective: These provide a means to assess achievement of intermediate results and activity implementation.
→ ***Reflect these in the Grant Performance Framework***

[74] *Results of the planned coverage survey (expected on 2021) will be used to re-direct the programme performance*

Indicator	Definition	Base line	year	Target 2021	Target 2022	Target 2023
Percentage of population received Penta3 vaccine at fixed sites	Numer. = Number received Penta 3 dose at fixed sites, Denom. number received DTP3 dose multiply by 100	53%	2018	60%	70%	80%
Percentage of defaulter children traced and vaccinated	Proportion of defaulter children traced and vaccinated in a defined area (catchment area targeted by HSS) during the reporting period out of the total number of defaulter children identified from this defined area at the beginning of the reporting period	84%	2018	89%	91%	93%
Number of new EPI fixed sites established in 5 Darfur states	Number of new EPI fixed sites established in 5 Darfur states, including with appropriate cold chain equipment (solar refrigerators, cold boxes, etc.)	NA	NA	30	30	35 (Total to be established: 95)
Percent of districts with >80% immunization activities implemented	Percent of districts having implemented >80% of the immunization activities contained in the district health operational plan/microplan	NA	NA	100%	100%	100%
Number of home visits for defaulter tracing and raising awareness	Number of home visits for defaulter tracing and raising awareness completed, out of planned	73.4 %	2019	100%	100%	100%

Technical Assistance: List the anticipated TA needs and timelines required to support this objective and plans for securing it (e.g., Gavi HSS, PEF/TCA, other sources?)

1. Building capacity at all levels
2. Long term technical assistance through zonal coordinators to support planning at the state level (6 coordinators)
3. Support country in strengthening 2-year immunization and expanded immunization services in closed and inaccessible areas
4. Support in cross bordering coordination and sharing information
5. Support in establishing the EPI service in conflict and post conflict areas

Financing: Justify any requests for Gavi to support major recurrent costs (e.g. human resources) regardless of transition stage.

→ ***Countries in the preparatory and accelerated transition phase are restricted from using Gavi funds for recurrent costs*** *(please refer to the Guidance on supporting countries' HR capacity, available here:* http://www.gavi.org/support/process/apply/additional-guidance/).

It is important to provide performance based incentives to EPI staff to motivate and retain them. For the past five years, the programme has experienced high human resources turnover and loss of staff with high capacity looking for greener pastures. To sustain current high immunization coverage and improve equity through reaching unreached children, the staff at EPI need to be motivated in order to retain them. Performance based incentive will be provided once the targets as set in the GPF have been met.

How much HSS budget is allocated to this objective: → ***Reflect the details in the budget and planning template***	**Years 1-2**	**US$ 6,164,888.88**
	Years 3-5	**US$ 6,728,438.22**

Please also provide details on the key cost drivers, inputs and assumptions required for the main activities of this objective, here:

Key cost drivers	**Inputs**	**Assumption**
Capacity building and training	• Daily subsistence allowance • Fuel • Transport cost • Refreshment package • Stationery • Conference package	Most activities will involve human resource and training: • Basic training to 817 vaccinators in 24 training workshop over 3 years, 7 trainings in year 1, 14 trainings in year 2 and 7 trainings in year 3 • Training to improve micro-planning at locality level, 30 participants form all EPI health facilities in each district, community leaders and key stake holders to improve EPI performance at community level, 36 districts will be conducted each year. • To provide vaccine management training to state and locality cold chain officers, 2 training sessions in year1, 4 follow-up trainings in year 2 and 4 trainings in year 4 • MLM training course for new EPI at federal level for planning & evaluation • To provide MLM training to state and locality operation officers, 2 training sessions in year1, 4 follow-up trainings in year 2 and 4 trainings in year 4 • Conduct 1 workshop at federal level for quality of supervision and data analysis DQS (36 participant from states 2 from each state , 6 facilitators, 3 days (one in class and 2 days field work and feedback). • Development of Continuous Quality Improvement Plan including elements of service delivery, human resources, logistics & supply, planning, M&E, coordination, communication and documentation. Conduct 1 workshop at federal level for planning & evaluation, 54 participants in each states for 3 days Update and distribute planning guidelines. • Workshop training for 20 participant (1from each state and 2 from national)to strengthen social mobilization and community awareness intervention to ensure demand generation and increase utilization especially for low utilized vaccines e.g. MCV and DT
Procurement	Transportation service fees	Transportation of equipment from Khartoum to states

		- 18 state * 4 trucks per state (14 tons) including Darfur zone and Red Sea
Supervision	• Daily subsistence allowance • Fuel • Car rental • Stationery	Conduct 62 visits to the states per year according to performance (divided the states into 3 categories for good performing (2 visits per year), for moderate performance 3 per year and for low performing 4 per year), visits by car (4 groups- 20 visits) to Darfur zone by air, fuel for internal supervision 140 per visits, State supervisors (2 per visit) 62 visits
Meetings	• Daily subsistence allowance • Fuel • Transport cost • Refreshment package • Stationery • Conference package	This includes: • Strengthening cross border coordination meetings with bordering countries, and NGO's who are working across borders, annually (border districts FP, States FP and National EPI FP) • Planning workshop for micro planning at state level, 225 participants form all districts in each state including community leaders and key stakeholders will receive training, guidelines of the micro-plans to improve EPI performance.
Health promotion	• Daily subsistence allowance • Fuel • Transport cost • Refreshment package • Stationery	Implement evidence based C4D/ health promotion Interventions at school level (20132 SESSION , 1 teacher
Routine immunization • Outreach sessions • Mobile teams	• Daily subsistence allowance • Transport cost • Fuel • Rent cars	To conduct 14,078 monthly outreach session to cover outreach targets of 445,145 children under one year in 18 states, vaccinator will receive 200 SDG (about 4 USD) as DSA per session as well as 200 SDG for transportation cost to reach the location where the outreach session. For mobile, 346 mobile units operates covering monthly targets of 387,052 children from hard to reach areas, out of 346 mobile unit 177 government car is used and 169 units covered by rented cars mainly in Darfur in hard to reach and security compromised areas. DSA for mobile vaccinators is 250 SDG (about 5 USD) and 300SDG for mobile team leader with overnight sleep. In year 2 & 3 mobile units planned to be decreased from 346 to 270 mobiles by open new fixed sites.
Incentives	Monthly incentives	Provide monthly incentive to EPI officers at states level and locality level, and key staff at national level.

Objective 2 (HRH):	**To support capacity building, production, equitable distribution and retention of a multi-tasked facility and community health workforce to meet immunization and PHC needs**
Timeframe:	2021-2025
Priority geographies/population groups or constraint(s) to	**HRH Constrains:** 1. The presence of numerous HRH actors and stakeholders that are not well coordinated;

coverage and/or equity to be addressed by the objective: → ***List to match those identified in Section B***	2. Weak capacities for HRH management particularly, at subnational levels to effectively manage health workforce including for immunization; 3. Weak and fragmented HRH information system that is not supporting evidence-based based planning and decision making especially in inaccessible areas (two areas); 4. Lack/incomplete HRH sub policies and strategies (e.g. HRH strategic plan, retention strategic plan, etc.); 5. High dependency of EPI on volunteers (50%) that constitutes a sustainability risk for the programme; 6. Poor linkages between health system needs and HRH production in terms of numbers and qualifications in addition to lack of HRH projections; 7. Inadequate capacities of faculties and lack of quality assurance system in the training institutes (AHSs, CPDs, PHI); 8. Inequitable distribution, deployment and coverage of front line health workforce including EPI staff, especially in rural, remote and underserved areas; 9. Lack of comprehensive skills and training needs assessment for front line health workforce including for EPI at all levels; 10. High HRH turnover including EPI staff particularly, at sub-national levels with no clear retention strategies.

Describe the tailored interventions to address this constraint and provide evidence of efficacy of the intervention. Describe the critical national capacities that will be established or strengthened as a result of this investment.

1. **Provide support to strengthen HRH capacities in leadership, management and coordination at national and sub-national levels**

Building and strengthening the capacities of programme managers including EPI managers in HRH management through training programmes and development of HRH manuals and guidelines will assist in addressing HRH challenges at different levels. The priority will be given to low performing states and localities and areas affected by emergencies and conflicts to address inequitable distribution of HRH and volunteerism.

Recognizing that developing and implementing effective health workforce interventions require adequate governance capacity, therefore, this PSR aims to optimize and support the development and implementation of policies, strategies and sub policies at national and subnational levels. The HRH in Sudan faces major challenges in terms of lacking policies that are essential to be developed, updated and implemented. Laws and regulations are usually non-evidence based as there is no integrated, concrete information system in place, in addition to poor enforcement and implementation of those laws, regulations and standards, and HRH projection.

A coordination mechanism for HRH partners exists; nevertheless, there is inadequate communication, weak commitment in implementing the agreed plans among the different HRH stakeholders and partners. Enhancing HRH coordination will result in policy coherence particularly among government sectors (MOH, Ministry of Higher Education, Ministry of labour and HRH regulatory bodies). This PSR shall enforce and strengthen coordination mechanisms among HRH partners and relevant stakeholders including EPI partners through development of oversight tools and procedures and enhancement of communication and information sharing among HRH actors. The forum will ensure alignment of stakeholders' support with the national priorities and complementarity of partners' support including in humanitarian settings. The support will include establishing mechanisms to follow and monitor implementation of the recommendations of HRH coordination forum.

2. **Capacity building of HRH with more focus on states MOH staff, localities and front line health workforce including for EPI**

Program Capacity Assessment (PCA) 2018 recommended undertaking training needs assessment of health providers involved in immunization service provision, identify the gaps and develop a costed plan for implementation. It was also recommended to develop and implement a quality assurance plan to ensure quality training.

Other key activities include development of pre-service training programme for vaccinators in AHS; refresher trainings for PHC workforce that will be deployed for the newly constructed health facilities by UHC expansion project in addition to building capacities of EPI staff focusing on cold chain management, vaccination practices and community mobilization.

Building and strengthening the skill and competencies of front line health workers and managers at sub-national level will help in scaling up and improving the quality of health services including immunization. This will also assist in increasing the number of functioning health facilities and number of facilities that provide PHC minimum package.

3. **Strengthening HRH Information System and health workforce observatory to improve monitoring of EPI and other PHC workforce**

Availability of accurate, quality and timely HRH data are critical to inform planning and decision-making as well as will address the inequitable distribution of HRH workforce including, for immunization. This intervention will support regular monitoring of EPI and other PHC workforce in terms of completeness of the structures and rends in HRH availability particularly in low performing states and localities including the inaccessible two areas. Key activities include support development of the National Health Workforce Account; provision of IT equipment for HRH observatories at national and priority states (low performing states and localities and areas affected by emergencies and conflicts); support production and dissemination of regular HRH reports and bulletins in addition to development of HRH 2030 projections to guide production and distribution of front line health workforce including for immunization programme. Well-functioning HRH observatories will ensure availability of HRH data to all stakeholders for effective planning and monitoring. PSR support will complement other partners' effort. WHO will provide technical assistance to address key gaps in HRH information system in collaboration with FMOH, Sudan Medical Council, Sudanese Medical and Health Professions Council and Ministry of Higher Education.

4. **Support development and enforcement of HRH retention mechanisms and reduce EPI dependency on volunteers focusing on underserviced, rural and remote areas**

High HRH turnover including EPI staff particularly, at sub-national levels with no clear retention strategies is one of the key HRH challenges. Furthermore, 50% of vaccinators are volunteers.

Creating jobs for the EPI volunteer vaccinators is the responsibility of the government to ensure sustainability of the programme. PSR support will be used to generate evidence and advocate addressing challenges related to volunteerism and other HRH retention measures.

Interventions include support finalization of HRH retention strategic plan and strategy; advocacy among government officials and other partners to support implementation of the retention arrangements that include financial and non-financial measure; create jobs for the EPI and other front line health workforce focusing on underserved areas and low performing states; develop a strategy to address volunteerism in immunization programme; encourage community engagement and participation in adoption of innovative approaches to attract and retain HRH in rural and remote areas (e.g. provide housing to health workers by the local communities as an attractive measure).

5. **Strengthen the Institutional Capacity of the Training Institutes for PHC health workforce**

Recognizing the key role played by training institutions and the centrality of HRH in strengthening the health system in the country, it is crucial to continue enhancing the capacity of those institutes focusing on states affected by emergencies and conflict in addition to low performing states. The Academy of Health Sciences at all States are responsible for production of nurses, midwives, medical assistants, CHWs and other allied health professions. CPDs provide training for all health professionals across Sudan. Since 2013 CPD trained 4296 joint cadre (vaccinators and nutrition educators) through the Expansion project using task shifting approach. GAVI supported the training of 21% of targeted health cadres. Furthermore, the Public Health Institute (PHI) is contributing to strengthen the capacities of health managers and workers at different levels of the decentralized health system through postgraduate programs in public health and health system areas. PHI provides training for EPI programme staff at various care levels.

Institutionalizing and enhancing the capacity of these institutes is of paramount importance. PSR will support strengthening the institutional capacities of AHS and CPD in priority areas (two areas and low performing states) to improve production of PHC front line workforce including vaccinators. The support will be for the first two years then government will take over to ensure sustainability. Key activities under this PSR include support revision and update of training programmes of front health workforce (Medical assistances, CHW, Midwives and joint cadre); strengthen the capacity of faculty members (CPDs, AHS, PHI); provision of skill labs and training aids and materials to support EPI staff training (AHS, CPD, PHI); establishment of quality and post-training mentoring approach in addition to evaluations of training programmes focusing on Community Health Workers, Community midwives, medical assistances and the joint cadre.

Complementarity and synergies with other partners

As highlighted in the donors' mapping report, several partners are contributing to attain the goal of "well-performing, stable and equitably distributed workforce with an appropriate mix of skills to meet health sector needs". For example, WHO is supporting implementation of Sudan's HIR initiative that focuses on developing IHR key policies and strategies; improving HRH information system, strengthening HRH governance and regulatory mechanisms and enhancing nursing and midwifery[75]. Another example is projects supported by Carter Centre in eight States (Gezira, White Nile, Sennar, Northern, River Nile, North Kordofan, West Kordofan and South Kordofan). Key activities include pprovision of skill labs; assessment of the quality of education; in-service training (community health workers, midwives, medical assistance, sanitary over seer, theatre attendant and anesthesia assistant) and institutional capacity assessment. Other key partners and stakeholders include TGF, EU, Italian Cooperation, JICA, INGOs (in conflict affected and humanitarian settings), AfDB and WB[76].

This PSR is fully aligned with the HRH national priorities and is complementing support provided by other stakeholders. Donor mapping was conducted as part of the PSR development process to ensure synergies and harmonization in terms of geographical coverage and programmatic support. Implementation will focus on priority states, which are EPI low performing states and areas affected by conflicts and instability that include the two areas. The target states are South Kordofan, Blue Nile, South Darfur, North Darfur, East Darfur, Central Darfur, West Kordofan and Red Sea States.

List approximately five (5) specific activities to be undertaken to achieve this objective:
→ ***Reflect these activities in the budget & planning template***

1. Support development of HRH strategic plan and relevant policies and strategies (retention strategic plan, voluntarism strategy, etc.)

[75] *Roadmap for the implementation of Sudan's HRH Initiative, FMoH and WHO, 2019*

[76] *Donors mapping, Sudan, 2019*

2. Conduct refresher trainings for PHC workforce that will be deployed to work in the newly constructed health facilities by UHC expansion project;
3. Support National Health Workforce Account (NHWFA)
4. Provide support for the HRH observatory and build capacity of staff on information management, research and M&E system focusing on underserved and low performing states.
5. Conduct HRH projection exercise to inform HRH production, policies and strategies
6. Support in developing a strategy to address volunteerism in immunization programme;

Update the GPF to propose indicators to monitor progress toward this objective: These provide a means to assess achievement of intermediate results and activity implementation.

→ ***Reflect these in the Grant Performance Framework***

Indicator	Definition	Base line	year	Target 2021	Target 2022	Target 2023
Turnover rate of EPI staff	Turnover rate of EPI staff (change of state EPI managers, Cold Chain, surveillance Officers and Locality Operation Officers before completing two years)	61%	2020	15%	10%	5%
Number of managers at federal, state and locality levels trained on new HRH management manual and procedures	Number of managers at federal, state and locality levels trained on new HRH management manual and procedures	NA	2019	40%	70%	100%
proportion of PHC facilities with an adequate number of trained health workforce according to the standards	Number of PHC facilities including trained PHC worker (Trained workforce refers to staff trained on the target package according to the standards) divided by total number of PHC facilities	69%	2019	75%	85%	98%
Proportion of health facilities that used as EPI fixed sites with adequate number of trained health workforce according to the standards	number of health facilities that used as EPI fixed sites with adequate number of trained health workforce according to the standards (pre-service & refresh training)	74%	2019	80%	85%	90%

Technical Assistance: List the anticipated TA needs and timelines required to support this objective and plans for securing it (e.g., Gavi HSS, PEF/TCA, other sources?)

1. Support development of HRH Strategic Plan 2030
2. Provide TA to assess the HRH information system
3. Conduct assessment of the feminization in health system and support development of Female friendly policy

4. Development of the tools for training impacts assessment
5. ToT for faculty staff in PHI, CPD and AHA
6. Review of pre and in-service curricula

Financing: Justify any requests for Gavi to support major recurrent costs (e.g. human resources) regardless of transition stage.

→ ***Countries in the preparatory and accelerated transition phase are restricted from using Gavi funds for recurrent costs*** *(please refer to the please refer to the Guidance on supporting countries' HR capacity, available here:* http://www.gavi.org/support/process/apply/additional-guidance/).

…

How much HSS budget is allocated to this objective: → ***Reflect the details in the budget and planning template***	**Years 1-2**	**US$ 296,768.64**
	Years 3-5	**US$ 267,048.43**

Please also provide details on the key cost drivers, inputs and assumptions required for the main activities of this objective, here:

No big budget individual activities in this objective, as the majority of activities intended to strengthen HRH systems, institutions and process.

Key cost drivers	**Inputs**	**Assumption**
Capacity building and training	• Daily subsistence allowance • Fuel • Transport cost • Refreshment package • Stationery • Conference package	Most activities will involve human resource and training: • HRH Observatory focal persons in (18) states will be trained in data analysis and information management. The training will cover also use of data to develop HRH policy briefs to inform planning and decision making to address HRH retention and EPI volunteerism • Facilitators and faculty members in Academies of Health Sciences AHSs, CPD and PHI will be trained in innovative teaching methodologies to enhance their skills and capacities to deliver training programmes for front line health workforce including vaccinators. Training will cover also quality improvement and monitoring of the training programmes in addition to mentoring of the trainees. • Trainings will be provided targeting PHC workforce in newly constructed/re-opened PHC health facilities to support expanding the network of facilities that provide basic health services that include immunization. Priority will be given to low performing states and areas affected by conflict and instability. • EPI managers at state and locality level in addition to Locality Health Management

		• Teams and directors in SMOH will be trained on leadership, supportive supervision, cold chain management, vaccination practices and community mobilization. These trainings will complement support provided by WHO, GF and other partners. Gavi support will focus on EPI low performing states. • Six facilitators will receive advanced training on innovative teaching methodologies in an international specialized institution. Those facilitators will then carry internal trainings for the faculty members n Academies of Health Sciences AHSs, CPD and PHI.

***Template for Supply Chain** (Applicable even if country is not applying for CCEOP):*	
Objective 3	**To strengthen effective vaccine and cold chain management through improved HR, logistics, capacity building, data systems, infrastructure and systems**
Timeframe:	2021-2025
Priority geographies/population groups or constraint(s) to coverage and/or equity to be addressed by the objective: → ***List to match those identified in Section B***	**Priority geographies** Conflict affected areas, areas currently covered by mobile and outreach services, areas lacking qualified HR for supply chain and areas with low cold chain functionality will be prioritised. By provision of new equipment, replace the obsolete and deploy qualified HR for supply chain and strengthen ISC, service will be available for more targeted population, equity and quality will be posted and long-term result will be achieved and maintained

Describe the tailored intervention to address the particular supply chain constraints and provide evidence of efficacy of the intervention:

To overcome the identified bottlenecks in the supply chain mentioned in section B, a need to plan for, implement and monitor key four interventions is critical to strengthen the immunization supply chain these key interventions are:

1. Phased integration of immunization supply chain within the national health supply system.
2. Support innovative direction on supply chain management through coordination with UNDP and NMSF to include immunization supply chain management as part of the eLMIS project that currently under process to modernize iSC.
3. Establishment of operational cold chain maintenance and decommissioning systems
4. Standardize CCE used at all levels through implementation of CCEOP, solarization project and support from government and other partners to ensure and maintain optimum CCE functionality
5. Support implementation of EVM_IP and vaccine management related studies with aim to strengthen the logistics and supply chain management system at different supply levels

The first intervention will address the iSC verticality and help changing the program into more efficient and sustainable programme through established accountability framework and gradual integration. While the second intervention will ensure that all equipment coming from different sources including private sector will be standardized, installed and monitored maintained and decommissioned according to the national system. Handling equipment through it is life cycle, ensuring vaccine potency and the role of preventive maintenance will be insured through the third intervention while the fourth intervention will provide chance to strengthening the iSC in term of other pillars including

supply distribution, system design, data management and innovation. These interventions will reduce the risk on iSC by better planning to accommodate new vaccines, increased vaccine volume and the use and adopt of new policies and technologies and will provide chance to address all iSC issues related to the five Gavi supply chain fundamentals then vaccine will be available potent, and system will efficient helping in vaccine coverage and equity and ultimately reach the goal of under-five mortality rate reduction.

List priority activities for each of the five supply chain fundamentals:

Describe the activities related to supply chain fundamentals – for those planned in years1-2 and those planned in the outer years (3-5).

→ ***These activities should be linked to the latest EVM Improvement Plan and be reflected in the operational workplan & budget***

1. Continuous Improvement

First two years (Years 1-2)

- Assess the capacity of current national health supply system and iSC to explore gaps and weaknesses to be addressed
- Develop integration strategy for iSC with national health supply system
- Support the establishment and operationalization of Cold Chain Maintenance and Decommission Systems for effective maintenance of cold chain and iSC related equipment at all levels, including establishment and equipping state level maintenance workshops
- Train 75 cold chain technicians for regional and locality level maintenance hub based on the newly developed maintenance system.
- Support the role-out of preventive maintenance training at service point level for cold chain and solar electrification equipment
- Strengthen the monitoring and information management for vaccine, cold chain and solarization including living LIMS and online dashboard.
- Support implementation of comprehensive supply chain improvement plans including EVM-IP
- Strengthening the National logistic working group to support implementation and oversight for EVM-IP, CCEOP, Solarization and iSC related fundamentals

Outer years (Years 3-5)

- Support assessment of the impact of CCEOP, solarization project and partner investment on iSC
- Conduct internal Effective Vaccine Management (EVM) assessment using the most updated EVM version
- support upgrading to the current Cold Chain inventory and transform the available data into monitoring dashboard
- Provision and prepositioning of CCE spare parts based on the needs, type of equipment and locations
- Support implementation of second study on Temperature Monitoring for vaccine throughout the iSC.

2. Management/Leadership

First two years (Years 1-2)

- Conduct competency mapping exercise for iSCM to develop capacity development plan using appropriate competency framework
- Support strategic capacity development of supply chain leaders at national and state levels through internal or external training based on the competency mapping exercise.
- Conduct strategic in-country training to strengthen the capacity of human resources at mid-level for iSCM management both in government and private sectors

Outer years (Years 3-5)

- Support implementation of Organisational Behaviour and Change Management Framework
- Develop iSCM performance management guidelines and HR capacity development plan
- Strengthen the role of the National Logistics Working Group to fully perform oversight role on public health supply chain planning and monitoring

3. Data for Management

First two years (Years 1-2)

- Provide technical and financial support to strengthen the use of data and dashboards in iSC with focus on online inventory, maintenance and web-based supply chain
- Establish an electronic Integrated Logistics Management Information System (LMIS) for MOH in collaboration with NMSF and UNDP to include iSC, other essential medical supplies and logistic entities at national level, all localities, health facilities
- Support systematic analysis for iSC data and performance indicators to inform forecasting and continuous improvement of vaccines and cold chain management

Outer years (Years 3-5)

- Support strengthening quality of data management and utilization of routine and real time data in polices and planning services at different iSC levels
- Support establishment of oversight committee to oversee data collection, integration and long-term data use

4. Cold Chain Equipment (including maintenance)

- How will the country ensure that aspects of maintaining the cold chain are addressed (e.g. preventive and corrective maintenance, monitoring functionality, technicians, financing for maintenance, spare part procurement etc.)?
- What is the frequency of preventative and corrective maintenance that the country commits to (supported by partners)?
- How will the country monitor the completion of preventive and corrective maintenance?
- Indicate the sources of funding for planned maintenance activities
- How will the country dispose of obsolete and irreparable equipment replaced by new equipment?

The Country will receive support through CCEOP, Solarization project, UNICEF and PHC expansion plan to modernize and expand its cold chain system during the coming two years. To ensure this investment will be maintained for the next decades, investment in cold chain maintenance has been carried out by UNICEF through capacity building for 93 cold chain technicians who will train all vaccination service providers on preventive and first line maintenance. They will perform cold chain curative and planned maintenance as well. Cold chain maintenance and decommissioning system were developed to support maintained cold chain investment with at least 90% CCE functionality at any point in time.

The country is currently in the process of establishment and equipping cold chain maintenance and workshops for corrective maintenance and spare parts as part of HSS2 reprogrammed fund and through different partners support including PSR window. Government budget during the period 2020-2025 will be used to contribute the end-users training, EPI technicians will carry out a comprehensive and systematic Inspection and Preventive Maintenance (IPM) programme for health facilities in localities, whereby user-training is of key importance. Managers of health facilities are responsible for ensuring that equipment under their care is subjected to IPM, to ensure that all equipment is operational, reliable and safe to use.

The Cold Chain System that currently under operationalization include the frequency of the maintenance, monitoring frame work, Key Performance Indicators (KPIS) and the required budget to undertake the maintenance activities at various levels. The new system will address the weakness on non- standardized CCE maintenance, Cold Chain Decommissioning and Safe Disposal.

First two years (Years 1-2)

- Support defining the needs, acquisition, deployment, commissioning, maintaining and decommissioning of grade A cold chain equipment for extension, replacement and expansion of cold chain system
- Provide support to construct 18 cold chain maintenance workshops (one per/state)
- Provide support to integrate and expand the dry supply stores at state and locality levels

Procure and distribute cold chain spare parts

Outer years (Years 3-5)

- Maintain cold chain buildings in in 10 states level
- Provide support to integrate and expand the dry supply stores at state and locality levels
- Support deployment of refrigerated vehicles for vaccine transportation

5. System design (all countries should answer) *If the country is applying for CCEOP, also indicate how system design considerations impacted the choice of CCE for which the CCEOP support is requested.*

During the CCEOP application, integration with NMSF was considered to strengthen the distribution and storage system for the dry supplies in the first phase of the integration with Health Supply chain. The programme and through this window of support will work with NMSF and UNDP to include immunization supply chain component as part of the LMIS piloting and roll out during the coming years. Supply chain redesign consider omitting some of the locality supply level and reduce the storage need at some localities. The equipment selection considers the new equipment become available and with less cost through CCEOP, the selection also considers the national guidelines, new vaccine introduction, vaccine presentation, and outreach and campaigns and other strategies used by the immunization programme

First two years (Years 1-2)

- Provide support to redesign the supply distribution system to consider the volume and desired coverage at various levels and possibility to scape of locality distribution level
- Provide support to include iSC component as part of the LMIS system design, piloting and roll out

Outer years (Years 3-5)

- Provide support to scale-up and maintain iSC redesign to cover all state
- Support identification and establishment of warehouse and supply hubs based in the evidence, geographical and logistic locations.
- Support system design to reduce the cost needed to move the programme coverage and equity at the planned levels

Describe how the sustainability of these activities will be ensured in the future:

Advocacy with stakeholders will be part of the PSR endorsements and approval process. the Programme and the oversight committees including NHSCC, NITAG and iSCL will advocate and ensure that immunization supply chain need is planned for, included in the government budgetary process and fund is allocated as per the plans to iSC planned activities. Proper management and utilization of the resources will be ensured through the design of the system, leadership, capacity building and continuous programme monitoring.

List indicators to monitor progress toward objective:

→ ***Reflect these in the Grant Performance Framework***

If requesting CCEOP support, include mandatory indicators (please refer to the programming guidance, here: http://www.gavi.org/support/process/apply/hss/)

Indicator	Definition	Base line	year	Target 2021	Target 2022	Target 2023

CCEOP Maintenance	Cold chain functionality at locality level: Numer= the number of localities with functional cold chain equipment at 80% and above. Denom= total number of localities	**Numer** 7 **Denom** 18	39%	2018	**Numer** 12 **Denom** 18	67%	**Numer** 14 **Denom** 18	78%	**Numer** 18 **Denom** 18	100 %
CCEOP Additional	% of state using integrated LMIS for iSC monitoring Numer= Number of state using integrated LMIS for iSC monitoring, Denominator = total number of states	**Numer** 0 **Denom** 18	0%	2019	**Numer** 2 **Denom** 18	11%	**Numer** 6 **Denom** 18	33%	**Numer** 10 **Denom** 18	56%
CCEOP Additional	% of new fixed sites established in previously not served communities with sustainable immunization services. Numer = Number of new fixed sites established in previously not served communities with sustainable immunization services Denominator = total number of new fixed sites established.	**Numer** 0 **Denom** 15	0%	2019	**Numer** 0 **Denom** 15	0%	**Numer** 10 **Denom** 15	67%	**Numer** 15 **Denom** 15	100 %

Detail TA needs required to support this activity and clarify how much is <u>not</u> covered by PEF/TCA.

- TA to support assessment of the national health supply system and iSC to explore gaps and weaknesses required to be address and develop integration/optimization strategy for iSC with national health supply system
- TA to conduct Training in Immunization Supply Chain Management and review and upgrade iSC SOPs
- TA to design and customize integrated information system with monitoring dash board that suitable to the country context
- TA to implement training in Preventive Maintenance of CCE and other Equipment with post training support
- TA to implement EVM Assessment in 2021
- Technical assistance to support national cold store in iSC strengthening and build the capacity in forecasting and cost benefit analysis

How much HSS and CCEOP budget is allocated to this objective → ***Insert here same figures as in table 2.4. and also reflect these in the***	**Years 1-2**	**US$ 1,175,684.17**
	Years 3-5	**US$ 1,364,256.03**

budget and planning template		

Please also provide details on the key cost drivers, inputs and assumptions required for the main activities of this objective, here:

Key cost drivers	Inputs	Assumption
Procurement and supply chain	• Cost of establishment 110 fixed sites	Through the PSR, the total equipment that will be procured for are all for facility level investment. Total of equipment will be 110 to cover 110 new facilities. The Type of equipment needed are • Ice Lined Refrigerators (ILRs), a combined refrigerator/freezer AC type and • Solar Direct Drive (SDD), vaccines refrigerators, combined refrigerator/freezer. Models that will be provided in the budget sheet as follow: (1) For ILRs, the unified model will be VLS064, RF, AC, from Vestfrost Solutions. The unit price is 1,319.74. Please include 8% procurement fees, 15% freight cost and 6% of the equipment cost freight) as buffer budget as the procurement will be the PS modality through UNICEF (2) For SDD, the unified model will be HTCD 90 SDD, from Haier Medical. The unit price is 3,950 Please include 8% procurement fees, 15% freight cost and 6% of the equipment cost freight) as buffer budget as the procurement will be the PS modality through UNICEF
Procurement and supply chain	• Building rehabilitation for 10 maintenance building • Procure and distribute maintenance toolkits • Procure and distribute preventive maintenance aid kits	Establishment and equipping state level maintenance workshops through rehabilitation of 10 maintenance buildings and procure and distribute of maintenance and preventive maintenance kits will insure effective maintenance of cold chain and iSC related equipment in addition to establishment of good decommission system for safe and environmentally friendly disposal of cold chain equipment.

Objective 4 (HIS):	**To strengthen integrated health information and surveillance systems ensuring data quality in support of evidence-based policy and planning**
Timeframe:	2021-2025
Priority geographies/population groups or constraint(s) to coverage and/or equity to be addressed by the objective: → ***List to match those identified in Section B***	**Constraints:** 1. Fragmented HIS, with vertical programs implementing their own information sub-systems which resulted in inefficiency, duplication and increased workload at facility level. 2. DHIS2 is still in initial phases and not yet fully rolled out. HR capacity and connectivity continue to affect functionality of the system. 3. Utilization of the information especially at locality and facility level through its own planning and monitoring process is weak except for EPI. 4. VPD surveillance system is not integrated with the national surveillance system. **Priority geographies:** Interventions in this objective will be implemented nationwide. While customization of DHIS2 and introduction of new modules is mainly supported by Global Fund, GAVI has considerable share. DHIS2 expansion, in terms of capacity building and provision of basic equipment and connectivity is supported by GF, and GAVI by 70% and 30% respectively. Supervision and review meetings cost will be distributed equally between GAVI and GF. Printing of HIS records will mainly be funded by the Government and GF.

Describe the tailored interventions to address this constraint and provide evidence of efficacy of the intervention. Describe the critical national capacities that will be established or strengthened as a result of this investment.

1. Strengthen routine health management information system including EPI

The health information collection and reporting remained fragmented as the parallel information generation and reporting by vertical programs continued. The monthly reporting rate of health facilities through the integrated HMIS/DHIS2 is about 63%. VPD surveillance system is not fully integrated in the routine integrated surveillance system. To address these challenges there is dire need to invest more in strengthening the integrated routine health information system through continuous revision and updating of tools and records, printing of revised tools and records, conduct periodic review and coordination meetings with stakeholders and levels and provide continuous technical support to state, locality and facility levels. These activities will be used as vehicles to completely roll out DHIS2 and improve reporting rate and quality. A peer education approach will be implemented where states managed to improve reporting rate through DHIS2 will support states with lower reporting rates.

2. Support Expansion and Implementation of District Health Information System (DHIS2) with special focus on data quality and verification

Upgrading and expanding the implementation of dhis2 is highly recommended in this time, in order to reach complete integrated system towards 100% reporting rate. Recently The coverage of DHIS2 at locality level is 63.4% due to lack of connectivity and other infrastructure. Re enforcing implementation of the integrated health information system including IDSR through support the use of the dhis2 is critical to ensure effective and efficient use of resources. In addition, Data completeness and timelines (41.2%) are still low due to difficulties in reports submission and under capacities of staff, investment is needed in terms of training and supervision.

3. Strengthen Vaccine Preventable Disease information system and surveillance management

VPDs Surveillance is an essential sensitive indicator for the overall EPI performance as the burden of VPDs is measured through disease morbidity and mortality. Nationwide case based lab based surveillance system represent best evidence based information case bases. This intervention will support the surveillance data quality, capacity building of surveillance and enforcing data integration and outbreak investigation between laboratory and surveillance department to improve data quality and lab efficiency. VPDs targeted here are Measles, Rubella, Diphtheria, Pertussis, Neonatal Tetanus, Bacterial Meningitis, Rota Gastroenteritis, Pneumonia, Congenital Rubella syndrome and Adverse Events Flowing Immunization Surveillance.

4. Support strengthening VPDs laboratories capacity

Among the surveillance types lab-based is the highest and strongest evidence based data. AFP, Meningitis, Rota, Measles and Rubella surveillance have high quality Laboratory capacity proved by several external evaluations. The main challenges facing VPDs in general and laboratory part specific is high dependency on donors funding. Stocks out of supplies was experienced during 2017 due to lack of funding. Currently Gavi is supporting Measles, Rubella, Diphtheria and Whooping cough lab supplies. This intervention will aim at supporting the high evidence for EPI and maintaining laboratories capabilities through building capacity of staff at different levels and provision of needed supplies. In addition, provision of evidence on VPDs burden (morbidity and Mortality) and circulating geno-types of VPDs will assist planning of new vaccine introduction. While availing data for evaluating of vaccine effectiveness and efficacy and disease trend will use for monitoring.

List approximately five (5) specific activities to be undertaken to achieve this objective:
→ ***Reflect these activities in the budget & planning template***

1. Review meetings with states MOH heads of health information and M&E
2. Print and distribute all EPI routine and surveillance printing martials for 18 states , 186 localities
3. Training on new DHIS2 modules and data quality for EPI and Surveillance officers.
4. Support periodic data quality review, including EPI data, meetings at different levels.
5. Provision of computers and accessories to support the implementation and expansion of the DHIS2
6. Avail VPDs laboratory supplies (collection kits, and testing reagents)
7. Support avail budget for Samples collection and transportation

Update the GPF to propose indicators to monitor progress toward this objective: These provide a means to assess achievement of intermediate results and activity implementation.
→ ***Reflect these in the Grant Performance Framework***

Indicator	Definition	Base line	year	Target 2021	Target 2022	Target 2023
Percentage of states achieving indicator on measles/rubella discard rate (VPD surveillance)	Percentage of states achieving 2/100,000 for the non-measles non rubella reporting rate (fever and rash cases that are not measles or rubella per 100,000 population).	33%	2019	-	80%	-
Percent of health facilities (hospitals, Primary Health Care and family	Number of health facilities that submit regular integrated reports according to	61.9%	2019	80%	90%	95%

health units) submitting regular integrated reports according to standards using DHIS2	standards using DHIS2divided by the total number of health facilities					
Percent of facilities that submit HMIS data reports to the next highest level by a given deadline (HMIS timeliness) using DHIS2	Number of health facilities that submit regular integrated reports according to standards by giving deadline divided by the total number of health facilities	40%	2018	55%	59%	63%
Percent of suspected Measles cases with adequate investigation	Percentage of all suspected Measles cases that have had an adequate investigation. Adequate investigations include completing a case investigation form, collecting a specimen.	95	2019	95%	95%	95%
Percent of suspected Measles cases with lab-tested specimen	Percentage of suspected Measles cases with at least one specimen collected for laboratory testing;	92	2019	93%	94%	95%

Technical Assistance: List the anticipated TA needs and timelines required to support this objective and plans for securing it (e.g., Gavi HSS, PEF/TCA, other sources?)

1. Long term technical assistance for the full roll-out of the DHIS2 including EPI module.
2. TA to conduct external EPI assessment/coverage survey.

Financing: Justify any requests for Gavi to support major recurrent costs (e.g. human resources) regardless of transition stage.

→ ***Countries in the preparatory and accelerated transition phase are restricted from using Gavi funds for recurrent costs*** *(please refer to the please refer to the Guidance on supporting countries' HR capacity, available here:* http://www.gavi.org/support/process/apply/additional-guidance/).

…

How much HSS budget is allocated to this objective: → ***Reflect the details in the budget and planning template***	**Years 1-2**	**US$ 1,327,532.88**
	Years 3-5	**US$ 1,293,197.80**

Please also provide details on the key cost drivers, inputs and assumptions required for the main activities of this objective, here:

Key cost drivers	Inputs	Assumption
Review meetings	• Daily subsistence allowance • Fuel • Transport cost • Refreshment package • Stationery • Conference package	Biannual meeting at state level to explore the relevant problems and suggest solution (4 days meeting * 60 non-resident participants + 10 resident participants)
Capacity building and training	• Daily subsistence allowance • Fuel • Transport cost • Refreshment package • Stationery • Conference package	Most activities will involve human resource and training: • Refresher trainings for the statisticians to update and maintain the system will be conducted annually in the 5-year period (18 training per year * 30 participants) • Trainings on DHIS2 modules will be conducted on biannual basis to ensure the real expansion of it (twice per year * 7 resident participants)
Supervision	• Vehicle rent • Fuel • Daily subsistence allowance	Regular supervisory visits to ensure the running of system and stability and to identity the problems at the real ground (18 visits*5 none resident participants* no of days according to no of localities* 2 vehicle rent)
Printing and distribution for RI	Printing all reporting forms for RI • Child immunization card • Women vaccination card • Permanent register for children • Permanent register for women • Form one • Tally sheets • Monitoring chart	Provision of updated immunization Forms with consideration of;- • New vaccines or newly introduced dose for available vaccine if any. • Estimation for all 18 states according to the target of the specific year and recommended buffer.
Procurement of VPDs laboratory supplies	• Number of estimated kits and reagents • Price per unit	Needed kits and reagent for lab based VPDs surveillance provided according estimated number of samples per targeted year. Procurement cycle according to

		shelf life of the needed lab supplies.
Printing and distribution for EPI VPD surveillance	Printing and distribute VPD surveillance forms • Immediate notification form • Investigation form • Lab request form • Follow-up form • Clinical log book • Lab log book • Line list	Provision of updated VPDs Surveillance (Measles, Rubella, Diphtheria, NNT, Pertussis, Invasive Bacterial Diseases, Rota virus GE and AEFI) according to type of surveillance nationwide or Sentinel sites. Calculation of amounts based on average cases per specific year.

Objective 5 (LMC/Finance):	**To strengthen the programme management and improve health financing systems for effective planning with efficient resources allocation and implementation a at national and sub-national**
Timeframe:	2021-2025
Priority geographies/population groups or constraint(s) to coverage and/or equity to be addressed by the objective: → ***List to match those identified in Section B***	*Constraints* • Incomplete EPI organogram at state and locality levels and absence of regular review and update at all levels; • Inadequate leadership and managerial capacities particularly, at sub-national levels; • Weak linkages and coordination between EPI and other departments in addition to insufficient utilization of existing coordination platforms (NHSCC, HSPF, etc.); • NITAG scope and ToRs lacks comprehensive regular review, update and enforcement; • NHSCC, Partners Forum and NITAG are not fully replicated or functioning at the states level to lead issues related to inter-sectoral, partners coordination and immunization technical decisions; • Program and Partners Forum appropriate M&E and oversight mechanisms and tools (e.g. dashboards) are not existent/fully functioning; • M&E and supervisory plans are not carried out as planned, in addition to weak and interrupted supportive supervision; • Economic crisis manifested by high inflation rate and devaluation of local currency; • Lack of economic analysis skills to inform advocacy and more resource mobilization and evidence on the effect of economic crisis on health; • Inefficient financial management system (weak planning, budgeting and reporting); • Lack of evidence on reforming essential health services package to introduce preventive and primary care services including immunization under health insurance coverage.
Describe the tailored interventions to address this constraint and provide evidence of efficacy of the intervention. Describe the critical national capacities that will be established or strengthened as a result of this investment.	

1. **Develop mechanisms and tools for regular reviews and update of EPI structures, mandate and ToR, complete the structure and ensure that the programme is fit for purpose**

Availability of a clearly defined organogram and structure covering all immunization services with clear ToRs for the units and staff is considered to be one of the organization strengths. However, although these structures are almost completely occupied at federal level (98%), staffing gaps and low capacity are clearly observed at lower levels especially at the level of localities and health facilities in which the immunization services and operations are provided. Moreover, despite the cMYP, conducted every five years, reviews these structures, lack of mechanisms and tools to regularly review and consequently update the structures of immunization services is considerable.

Regular reviews and update of organograms and ToR is considered a significant management exercise that can be conducted to support immunization services proper planning and high-quality delivery systems. This PSR will ensure the availability and operation of mechanisms and tools to facilitate and institutionalize and standardize the review process on regular basis with sufficient internal capacities that should be built during the transition phase.

2. **Develop and implement EPI accountability framework that includes roles and responsibilities of different stakeholders**

Development of accountability framework will make the roles and responsibilities of different stakeholders well defined in order to facilitate follow up of activities within EPI department and corresponding actors and departments. It is the obligation to demonstrate and take responsibility for performance in light of commitments and expected outcomes. This PSR will support developing strong accountability frame is aligned with the National Partners Forum goals and mandates. EPI can be one model and can be highlighted as a successful case demonstrating strong coordination mechanisms, enforced accountability measures and strengthened monitoring and close follow up for all partners and stakeholders.

3. **Increase efficiencies and effectiveness through adoption and scaling up of One Plan, One Budget and One Report approach at different levels.**

This PSR will supports the adoption of One Plan, One Budget and One Report approach to ensure that different stakeholders are working towards collective outcomes, alignment and harmonization of different plans and projects and eliminate/reduce the risk of duplication and fragmentation. FMoH as a lead of the health sector is adopting this approach for the past four years and will continue to advocate for this approach for other sectors. Despite EPI microplanning is considered to be bottom-up approach starting from the catchment area to higher levels; it noticeably lacks comprehensive inclusiveness of other departments and stakeholders. So, all activities supported by Gavi in this PSR should concretely integrated and aligned with existing strategies and plans. This is also as commitment to signature of Paris Declaration IHP+ agreement signed by Sudan with other committed countries in 2016. Additionally, delays and lack of timely implementation of some of the plan activities requires proper analysis of the barriers and root causes. Furthermore, the noticeable dichotomy between state localities timely plans in addition to the overall weak planning and management capacities. These weak areas should be tackled by this PSR and reformed in the upcoming phase to ensure quality and sustained immunization services.

4. **Review and update the scope and TORs of the existing coordination fora and enhance coordination through establishing of linkages with the unified coordination and oversight mechanisms.**

Establishing linkages within the existing fora is essential to foster coordination function. Due to the absence of the oversight plans and activities, introducing of oversight mechanisms is crucial to improve coordination and oversight of EPI and other health programmes. Moreover, although the immunization program is structured within the same General Directorate with key department such as MCH, PHC expansion and Health Promotion, to ensure continuous coordination, yet the program still suffers from weak coordination mechanisms with these departments and others beyond PHC

Directorate but within the ministry such as Disease Surveillance and CPD. This PSR shall strengthen the overall coordination mechanisms with relevant departments as well.

5. **Develop and implementing M&E framework, and plans.**

Several assessments revealed that the state and locality health management teams are not able to conduct regular supervisory visits, however, despite availability of detailed supervision manual, implementation is considered to be challenging during the past few years. This was reported to be due to many reasons. For instance, a considerable challenge last year was the country financial downturn which led to significant shortages in cash and fuel hindering the operation of services. Specific supervision activities are also conducted for cold chain, surveillance, etc. However, internal audits are not sufficiently conducted at federal level. Currently, there is no operation manual for the program and it is crucial to be developed and implemented. Provision of transportation can aid integrated supervision, supply, surveillance, and monitoring & evaluation. Previous investments in this area reflected in the improvement of performance of LHMTs however, capacity is still considered deficient. This PSR will ensure sustainability of this intervention through adopting the integrated approaches such as pooling of human and financial resources, to use this opportunity as catalytic approach. Moreover, vehicles will be provided by GAVI support to some localities while government provides for the rest complementing each other.

6. **Undertake comprehensive evidence-based health finance analysis with emphasis on EPI to enforce the decision of having a sustainable and adequate government expenditure on health and immunization up to Abuja target 15 % of the TGE**

This PSR will support ensuring the financial sustainability of immunization program which requires securing new domestic resources for immunization. The financing of the current health system is characterised by a high proportion of out of pocket expenditure (79%) which implies lack of equity within the system. Although the Government Expenditure on Health (GHE) has increased during the past few years (from 14.94% in 2015 to 24% in 2018), and also the government immunization co-financing has increased (from 9% in 2015 to 18% in 2018), nevertheless, the country will likely face challenges in scaling up the financing of vaccines and related activities given its indebtedness, relatively low growth projections and low tax base. This in turn highlights the need to comprehensively conduct evidence-based financial analysis to assess the government ability to generate more resources and expand the fiscal space for health and assess the feasibility of covering additional costs from domestic sources for immunization program.

Sudan has committed to UHC, nevertheless, UHC is known to be costly and ensuring adequate financial resources for UHC requires sufficient budgetary room, or fiscal space, to expand and maintain coverage without jeopardizing the sustainability of the government's finances. Within health budgets, EPI program requires adequate allocations for purchase of vaccines, injections, and cold chain equipment; in addition to managing and transporting vaccines; and delivering immunization services.

This PSR will support also advocates for developing immunization investment case is essential and is expected to enrich the advocacy and promotion among high political levels and local partners. Additionally, the country has witnessed economic downturn during the past few years and this is expected to also aggravate by the current change in the government, transitional period and economic uncertainty. However, the potential negative effects of the economic crisis on macro fiscal context and health sector are overlooked requiring the generation of concrete evidences to inform funding and investment strategies.

7. **Provide evidence to support expansion of health insurance benefit package to include preventive intervention including immunisation services according to HF Policy (2016)**

According to the NHP (2017-2030), Health Finance Policy (2016) and the National Health insurance Act (2016), wide health financing reform is undergoing to achieve Universal Health Coverage (UHC). For instance, NHIF is the self-financed mechanism for health system in Sudan and will be the single

purchasing agency reforming the current health financing system through prepayment and moving from input-based system to output-based system.

One of the National Finance Policy directions is the expansion of NHIF package to introduce preventive services including immunization services as one of the basic benefit package components. However, the basic benefit package is not yet designed or costed, which necessities generating robust evidence on the feasibility and costing of the designed benefit package in addition to modalities of reforming the current provider payment system to increase efficiencies, enhance providers' performance and improve quality of services. This PSR will recommends to conduct an actuarial study to inform NHIF introduction of the preventive basic package using a comprehensive methodology for the purposes of meeting key aims; assessing the financial impact of the introduction of the proposed package including immunization as core component (through the actuarial model), assisting in developing baseline estimates of the cost, reviewing the financial consequences and significant impact of the current economic situation.

8. **Building a strong EPI financial management system at all levels and enhance the capacity and accountability**

According to the PCA (2018), the overall financial management capacity for EPI is considered weak which is crucial for ensuring the financial sustainability of immunization program to meet the sustainability goals. In addition to securing new domestic resources, strengthening the planning, budgeting, and financial management capacity of immunization program within the wider health system, generating more resources and providing enough transparency and flexibility and to increasing the overall system efficiencies is vital. As a result of the current inefficient system, governments and partners have limited ability to calculate accurate cost estimates of current service delivery since this requires knowing how much was accurately spent on service provision compared to the coverage obtained. There is also limited understanding at the lower levels (states and localities) about immunization delays, leakages and reallocations that could impede service delivery, and must be promptly identified and resolved in order to achieve immunization goals.

This PSR will highlights the importance of having an effective financial and management system in place for the EPI program and the overarching MoH systems and supports its implementation to be able to robustly monitor how immunization resources flow through the system and are then used efficiently at the point of service delivery. Although Gavi PMU is using an electronic financial system (TALLY), this is not used at FMoH system or EPI financing unit which limits the usefulness of this electronic system.

List approximately five (5) specific activities to be undertaken to achieve this objective:
→ ***Reflect these activities in the budget & planning template***

1. Training in planning, management and leadership including EPI staff at different levels
2. Long term technical assistance (13) through zonal coordinators to support planning at the state level
3. Strengthening cross border coordination meetings with bordering countries, annually (border districts FP, States FP and National EPI FP).
4. Establish and support coordination mechanism between local authorities in the closed areas (Sudan Relief and Rehabilitation Agency (SRRA)), national and international NGOs and other stakeholders;
5. Conduct comprehensive **costing** of immunization programme, including capacity building of government officials. This will include both vaccine and operational cost (full cost analysis).
6. Perform immunization **projections** based on costing for both vaccines requirements and operational cost, including capacity building of relevant government officials.
7. Conduct a study on potential **operational efficiencies** to improve cost effectiveness. This will include areas like procurement, service delivery and areas that can arise during implementations.

8. Develop a strategy to include immunization as part of the BP in an incremental manner. A **policy** will determine the services that will be considered as minimum to be included in BBP.
9. Building the capacity on financial management at all levels
10. Strengthening financial management of immunization program through introducing electronic financial and managerial system

Update the GPF to propose indicators to monitor progress toward this objective: These provide a means to assess achievement of intermediate results and activity implementation.

→ ***Reflect these in the Grant Performance Framework***

Indicator	Definition	Base line	year	Target 2021	Target 2022	Target 2023
Percent of localities with functional health management teams	Number of localities that have functioning health management teams (they can perform basic functions which include: operational plan, supervision, regular reporting, adopting approved organization structure, positions filled according to the state organizational structure) divided by the total number of localities.	40%	2019	60%	70%	80%
Accountability framework assessment	Number of accountability framework assessment conducted annually	0	2019	0	2	4
% of NHSCC & NHPF meetings that discussed immunization and sustainability progress/update	Number of NHSCC & NHPF meetings that discussed immunization and sustainability divided by the total number of NHSCC & NHPF meetings	0	2019	>50%	>50%	>50%
% of government health expenditure as % of total government expenditure	total amount of government health expenditure divided by the total government expenditure	7.2%	2018	9.2%	11.2%	13.2%
Cumulative HSS grant expenditure reported as % of cumulative HSS grant disbursed	Cumulative HSS grant expenditures reported/Cumulative HSS grant disbursements	NA	NA	20%	30%	20%

Technical Assistance: List the anticipated TA needs and timelines required to support this objective and plans for securing it (e.g., Gavi HSS, PEF/TCA, other sources?)

1. TA to support development of accountability framework
2. TA to develop mechanisms and tools for regular reviews and update of structures, mandate and TOR of MOH departments and units
3. TA to support development of oversight tools for the coordination fora (dashboards, oversight visits/supervision tools, etc.)
4. Embedded TA to support planning department and other key FMOH directorates to strengthen planning functions

5. TA to support development of cMYP 2021 – 2025 in line with the national health sector policies and strategies
6. Fiscal space assessment
7. TA to conduct assessment of NHIF institutional readiness to include immunization
8. TA to conduct actuarial study (forecasting)
9. TA to carry out costing for NHIF benefit package including immunization
10. Reform of Provider Payment Mechanisms (PPM)

Financing: Justify any requests for Gavi to support major recurrent costs (e.g. human resources) regardless of transition stage.
→ ***Countries in the preparatory and accelerated transition phase are restricted from using Gavi funds for recurrent costs*** *(please refer to the please refer to the Guidance on supporting countries' HR capacity, available here:* http://www.gavi.org/support/process/apply/additional-guidance/).

How much HSS budget is allocated to this objective: → ***Reflect the details in the budget and planning template***	**Years 1-2**	**US$ 2,945,213.46**
	Years 3-5	**US$ 2,436,971.49**

Please also provide details on the key cost drivers, inputs and assumptions required for the main activities of this objective, here:

Key cost drivers	Inputs	Assumption
Capacity building of human resources	• National TA fees	Long term technical assistance (13) through zonal coordinators to support planning at the state level
Training	• Daily subsistence allowance • Fuel • Transport cost • Refreshment package • Stationery • Conference package	Training in planning, management and leadership including EPI staff at different level
Review and assessment	• Daily subsistence allowance • Car rent • Refreshment package • Stationery	Organize and conduct annual JAR review through supporting data collection at state and federal level, data analysis, consensus and endorsement meetings

7. Description of requested support for new vaccines

More specific planning needs for new vaccine support, listed in table 1.2, are described here. Greater details on activities needed to prepare for the vaccine introduction and/or

Delete boxes below that are not relevant

campaign (addressing the programmatic challenges and bottlenecks outlined above) should be reflected in the country's annual EPI work plan.

Exclude here vaccines that were already approved by Gavi, even if not yet introduced.

Hepatitis B Birth dose	**Anticipated introduction date:** June 2022
	Describe the **broad strategy for introduction** (including target population, potential multi-age cohort vaccination in year 1, potential regional roll-out etc.).
	Hepatitis B birth dose: introduction of hepatitis B birth dose was identified by Sudan National Health Sector Strategy on Viral Hepatitis 2019 – 2025 as one of the essential interventions needed for control of the viral hepatitis, as Sudan is the second country out of the five countries contribute to 85% of the Hepatitis B burden in the EMR and the occurrence of Hepato-cellular Carcinoma (HCC) in young individuals because of the vertical transmission of HBV in the country. In addition to WHO resolution (2009) which advised the countries to expand hepatitis B vaccination programme to include providing a birth dose of vaccine to all infants within the first 24 hours of life. Hepatitis B vaccine: WHO position paper, July 2017, recommended Birth dose for all children worldwide. Looking at all evidence of country, regional and global situation and WHO recommendation, NITAG recommend the introduction of HB vaccine birth dose in routine immunization, considering all obstacles expected to face the introduction. Live births will be the target population. The issue of high percentage of home deliveries highly considered but as the vaccine expected to be licensed as Controlled Temperature Chain (CTC), that will bring advantages for Hep B-BD in the following settings: • Outreach activities that reach babies born outside of health facilities or those discharged early before vaccination can be given; • Provision of Hep B vaccine in small rural facilities without cold chain equipment. Comprehensive introduction plan covering all aspect of new vaccine introduction such as cold chain capacity assessment, Birth register and community birth notification including tracking home birth, advocacy and community sensitization using the experience from other countries. Workforce must be will addressed in the introduction plan as the vaccine will be given by the midwives, so the program must build their Knowledge and skills by training and supportive supervision, task shifting/multitasking. Inclusion of Hep B birth dose vaccination in the comprehensive multi-year plans (cMYP), Routine infant immunization with high coverage in the first 6 months of life, Provision of a birth dose of Hep B within the first 24 hours of life, Catch-up vaccination of children < 5 years of age after introduction of the vaccine, Ensuring vaccine effectiveness, finally Advocacy and social mobilization.
	Describe the **steps to finalise the introduction** strategy and to engage key stakeholders
	1. Decision making: NITAG approved the introduction of hepatitis B birth dose 2. Submission of GAVI proposal to ensure vaccine availability and VIG 3. Development of guidelines, protocol and update of the training and registration materials 4. Health workforce: will be the midwife, as new cadre to be used for child vaccination, these steps will be taken:

- Raising awareness among the care providers e.g. GPs, midwives, paediatrician and Obstetrician Low awareness, fear of AEFI, traditional practice, addressing refusal
- Build the knowledge and skills of the midwife on hepatitis B vaccine
- Supportive supervision
- Task shifting/multitasking Service delivery
- Access to skilled care during childbirth
- Integration of birth dose with maternal and new-born care in health facilities
- Linkage between EPI and private sector
- Options to reach new born of home delivery

5. Technologies relevant to the vaccine and Sudan

- Vaccine distribution and storage
- Potential use of CPAD/UnijectTM
- Availability of monovalent Hep B vaccine for Controlled Temperature Chain (CTC) to suit with Sudan situation

6. Registration and reporting systems strengthening

- Birth register and community birth notification including tracking home birth
- Incorporation of birth dose and its timing within vaccination records
- Definition of timely birth dose coverage

7. Social mobilization and community awareness

- Raising awareness among the care providers e.g. GPs, midwives, paediatrician and Obstetrician Low awareness, fear of AEFI, traditional practice, addressing refusal
- Leadership and governance
- National policy and guideline

Describe how the **future HSS investments** will strengthen the quality of the hepatitis B birth dose introduction (e.g., through focus on critical demand generation, civil society engagement, adolescent health platforms for integrated service delivery, etc.)

The HSS investment will strengthen the quality of hepatitis B birth dose introduction through:

i. Expanding Immunization service delivery
ii. Capacity building of multitasks PHC health cadre
iii. Strengthening of health information system
iv. Ensure effective vaccine management at all levels including the community
v. Demand generation
vi. Strengthening partnership and coordination

Technical Assistance: List the anticipated TA needs and timelines required to support this activity and plans for securing it (e.g., Gavi HSS, PEF/TCA, other sources?)

- Support country in preparation of proposal for introduction of Hepatitis B birth dose in routine immunization program
- Support preparation for introduction of hepatitis B birth dose in routine immunization

To encourage a complete and longer term planning approach to measles and rubella for programmatic and financial sustainability, a **country's cMYP or equivalent multi-year plan attached to this PSR must include a comprehensive situation analysis and a 5 year plan on measles and rubella.** If the current cMYP or equivalent multi-year plan does not contain

Measles / Measles Rubella *(routine and campaign/s)*	all the required information, a cMYP addendum needs to be developed and submitted with the PSR as an attachment. To develop your comprehensive situation analysis and 5-year plan for measles and rubella, please use the **Gavi template** available here: http://www.gavi.org/library/gavi-documents/guidelines-and-forms/m-r-situation-analysis-and-5-year-plan-for-cmyp/ Provide a **technical justification** for each type of support requested for Measles / Measles Rubella in the next 5 years and indicate for when each introduction or campaign is planned
	Sudan plan to introduce measles and rubella in routine, so the plan is to request MR in routine and catch up campaign. Sudan can achieve measles and rubella/CRS elimination instead of eliminating Measles only by introduce RCVs. Measles vaccine delivery strategies provide an opportunity for synergy and a platform for advancing rubella and CRS elimination. According to WHO guidance for MR introduction the NITAG discussed the issue of introduction of MR into the RI, after reviewing the WHO position papers regarding global situation of measles and rubella diseases and the global measles and rubella strategic plan 2012-2020 and there is the opportunity of using existing well-established measles immunization programs the NITAG made the decision of introducing MR by switching from MCV to MRCV. The vaccine will be in the same schedule of measles first and second dose at 9 and 18 months The EPI should plan well regarding the six strategies to introduce RCV. Which can be implemented in phases. The Initial phase is Wide age range immunization campaigns/SIAs, Introduction of RCV into the routine immunization schedule as MRCV. Both MCV doses should be in combination with rubella vaccine, MRCV, Strengthening of Fever and Rash Surveillance for both Rubella with Measles disease in addition to CSR surveillance to provide data to measure vaccine effectiveness. The Subsequent phase Follow-up MRCV SIAs to maintain high (> 95%) coverage, as RCV is combined with MCV, and lastly Fill the immunity gaps in older population by implementation of catch up campaign using MRCV targeting children >15years is recommended according to surveillance data.
	List the **Technical Assistance** needed to support the introductions and/or campaign(s) outlined in your 5-year plan. Describe how you plan to secure it and by when.
	• Support country in preparation of proposal for introduction of MR in routine immunization program and catch up campaign • Support planning, implementation and monitoring of the introduction of MR in routine and catch up campaign
	Describe how the health systems strengthening support requested in this Programme Support Rationale will contribute to **MCV1 and MCV2 routine immunisation** strengthening and to **measles, rubella and congenital rubella syndrome surveillance** strengthening.
	The HSS investment will contribute to MCV1 and MCV2 routine immunisation strengthening and to measles, rubella and congenital rubella syndrome surveillance through: • Expanding Immunization service delivery (fixed service and reach children in closed areas) • Strengthening measles, rubella and congenital rubella syndrome surveillance

	• Strengthening of health information system • Ensure effective vaccine management at all levels • Demand generation
HPV	Human Papilloma Virus: introduction of the HPV was discussed by NITAG, the global and regional situation was discussed. The national situation and the data reflecting the magnitude of the disease in the country still limited. According to National Cancer Registry (NCR) 2009 indicate that the most common cancer were Breast cancer, Leukaemia and Cervical cancer, with increase in the number of deaths during 2012 – 2018 and number of new cases by 30% from 833 to 1084 per 100 000 in 2018 and this number expected to be double by 2040. NITAG held many meeting, Sudanese association of Gynaecologist and Obstetrician was invited, the current situation of the cervical cancer in Sudan was discussed, all available data was revised, WHO position paper was discussed and GAVI policy. The Sudanese association of Gynaecologist and Obstetrician confirmed that screening centres for conduction of pap smear and identification of the genotype of the virus was established in 5 states and planned to be expanded to new three states next year to avail data to assess the burden of the disease, the project planned for 3 years 2020-2022. Considering the shortage of enough evidence showing the disease burden, the cost of the vaccine, HPV is very expensive vaccine with finance ,and country entering graduation, NITAG declared the importance of HPV and need but the decision was to postpone the request for introduction build the case on solid data
	List the **Technical Assistance** needed to support the introductions and/or campaign(s) outlined in your 5-year plan. Describe how you plan to secure it and by when.
	• TA is needed to support generating more data
Booster Doses	WHO recommendation for Diphtheria vaccine booster dose is to give three booster doses, which should preferably be given: • during the second year of life (12-23 months), • at 4-7 years, and • at 9-15 years of age. Ideally, there should be at least 4 years between booster doses. To further promote immunity against diphtheria, combined diphtheria and tetanus toxoid vaccine (Td or TD) should be used rather than tetanus toxoid alone. This can be used in pregnancy as well as following injuries. As the country started facing outbreak of diphtheria it is highly recommended to consider introduction of booster doses in routine schedule. The program has to consider strengthening second year vaccination as a priority for the coming five years and must be integrated with other health interventions. The programme is currently planning to strengthen coordination with Ministry of Education for sensitization and strengthening use of complete vaccination card as one of the required document for school entry. For this purpose, domestic support will be used to establish and maintain coordination forum with Ministry of Education.

Part D: Signatures – Endorsement of the Programme Support Rationale

Government signature form

The Government of Sudan would like to expand the existing partnership with Gavi for the improvement of the immunization programme of the country, and specifically hereby requests Gavi support for the portfolio as outlined in this Programme Support Rationale (PSR):

The Government of Sudan commits itself to the continued development of national immunization services on a sustainable basis in accordance with the national health and immunization strategic plans. The Government requests that Gavi and its partners contribute financial and technical assistance to support immunization of children as outlined in this application.

The Government of Sudan will fulfill the co-financing commitments set out in this PSR as expressed in doses or the equivalent dollar amount in Part A above.

We, the undersigned, affirm that the objectives and activities in this request are fully aligned with the national health and immunization strategic plans (or equivalent), and that funds for implementing all activities, including domestic funds and any needed vaccine co-financing will be included in the annual budget of the Ministry of Health.

We, the undersigned, further affirm that the requested funding for salaries, salary top-ups/allowances, per diems and incentives does not duplicate funding from other sources (e.g. from other donors).

We, the undersigned, further affirm that the terms and conditions of the Partnership Framework Agreement between Gavi and the Country remain in full effect and shall apply to any and all Gavi support made pursuant to this application.

Minister of Health (or delegated authority)		Minister of Finance (or delegated authority)	
Name	Dr. Akram Ali Altom	**Name**	Dr. Ibrahim Ahmed El Badawi
Date	12.5.2020	**Date**	14.5.2020
Signature		**Signature**	

وزارة الصحة الإتحادية
Federal Ministry Of Health
الوزير
MINISTER

Republic Of Sudan
Ministry Of Finance And Economic Planning
Date