REPUBLIC OF SOUTH SUDAN
MINISTRY OF HEALTH

NATIONAL IMMUNIZATION COVERAGE SURVEY FINAL REPORT 2017

South Sudan EPI Vaccination Coverage Survey 2017

Table of Contents

LIST OF ABBREVIATIONS AND ACRONYMS

1. BCG – Bacillus Culmette Guerin
2. CDC/AFENET – Centres for Disease Control/Africa Field Epidemiology Network
3. CEQ – Central Equatoria
4. CI – Confidence Interval
5. EA – Enumeration Area
6. EEQ – Eastern Equatoria
7. EPI – Expanded Programme on Immunisation
8. EPIinfo – Epidemiological Info
9. Gavi – The Vaccine Alliance
10. JON – Jonglei
11. LAK – Lakes
12. MOH – Ministry of Health
13. NBG – Northern Bahr El Ghazal
14. NBS – National Bureau of Statistics
15. NIDs – National Immunization Days.
16. OPV – Oral Polio Vaccine
17. OPV1 – Oral Polio Vaccine 1st Dose
18. OPV2 – Oral Polio Vaccine 2nd Dose
19. OPV3 – Oral Polio Vaccine 3rd Dose
20. Penta –Pentavalent (Diphtheria Tetanus Pertussis, HepB & Haemophilus)
21. PHCC--Primary Health Care Centre.
22. PHCU- Primary Health Care Unit
23. PPS – Probability Proportional to Size
24. RSS – Republic of South Sudan
25. SIAs – Supplementary Immunization Activities
26. TT- Tetanus Toxoid
27. UN – United Nations
28. UNI – Unity
29. UNICEF – United Nations Children's Fund
30. UPN – Upper Nile
31. USAID – United States Agency For International Development
32. WAR – Warrap

33. WBG – Western Bahr El Ghazal
34. WEQ – Western Equatoria
35. WHO – World Health Organization

LIST OF TABLES

LIST OF FIGURES

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MINISTRY OF HEALTH
17 SEP 2018
OFFICE OF THE UNDERSECRETARY
REPUBLIC OF SOUTH SUDAN

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Date 17/09/2018

EXECUTIVE SUMMARY

The Ministry of Health South Sudan through the support of implementing partners UNICEF, WHO and GAVI commissioned the 2017 South Sudan EPI Coverage Survey for assessing Immunization Coverage of children aged 12-23months and mothers of infants aged 0-11 months. The overall purpose of the survey was to validate the quality and coverage of the EPI Program across the 10 Former States (Hubs). Further, the survey was specifically geared towards establishing the immunization coverage for all antigens among children aged 12-23 months, Tetanus Toxoid immunization coverage among mothers of infants aged 0-11 months, the quality and access to immunization services and the factors affecting service provision including the main reasons for immunization failure, card availability rate for both mothers of children aged 12-23 months and 0-11months, enhance capacity to conduct standardized EPI coverage verification surveys, coverage with malaria prevention and control, access of antenatal care services and newborn care after delivery.

The methodology and tools for this survey was adapted from the latest WHO Vaccination Coverage reference Manual 2015 draft .This entailed selection of enumerations areas as a primary sampling units across the 10 Former States (Hubs) based on the probability proportional to size while the secondary sampling units consisted of households with children aged 12-23 months and mothers of infants aged 0-11 months in enumeration areas.

In order to estimate the coverage with a confidence interval the desired number of households per cluster, a design effect (DEFF) of 5.67, Intra cluster Correlation (ICC) of 0.333, desired margin of error of 10% (0.04) with a 95% confidence interval and a non-response rate of 10% were the parameters considered.

The overall sample size was 3000 with a total number of clusters randomly selected being 200 distributed across the 10 Former States (Hubs) proportional to the population size representing the entire population of South Sudan. The enumeration areas ranged from 10 to 30 across the 10 Former States (Hubs). In each of the selected clusters, at least 15 eligible households were visited, interview conducted and the responses documented using the respective questionnaires.

A multidisciplinary team was constituted to form a steering committee to oversee the smooth planning and implementation of the survey. Techman Consultants closely worked with the steering committee during the planning, designing and implementation of the survey. This committee was an Inter-agency committee that drew its members from the government departments (Ministry of Health and other governments),UNICEF,WHO, partners, implementing agencies, NGOs and others key players on Expanded Programme on Immunization.

The training of the survey team was carried out at two levels, with the first training at the national level being conducted between 11th September 2017 to 13th September 2017 where 20 national supervisors were trained. The second level training was a state training that was conducted across 9 States at the state level during the months of October 2017 and November 2017, an exception was Jonglei whose training was conducted at the national level due to security and logistical challenges.

The pretesting of the survey questionnaires was conducted between 31st August 2017 to 2nd September 2017 in Gumbo Payam, Rajaf county in Jubek State (formerly Central Equatoria State). The selected EAs were Gumbo South enumeration area number 920213001101 and Gumbo North enumeration area number 920213001102. Before carrying out pretesting, three days training of the two teams comprising of 15 personnel took place from 26th July 2017 to 28th July 2017. The feedback obtained during pretesting was used to validate the questionnaires and incorporated into the final copy of the questionnaires.

Ethical clearance was obtained from the National Ethical Research Committee, South Sudan before commencing fieldwork. Fieldwork begun on 3rd October 2017 and ended on 8th January 2018 with the last report submitted on 19th January 2018.

Out of the originally selected 200 enumeration areas 10% were inaccessible due to insecurity was replaced as stipulated in the survey protocol.

A team of data entry staff were recruited and trained on EP Info version 7 at the central level in Juba. The data entry was done using EP Info software. Data cleaning which involved double checking for errors, validation and verification was conducted by data management team. Subsequently, the cleaned, verified and validated data was analyzed using EP info software; followed by tabulation of results, presentation and compilation of final report.

During the survey a total of 3000 households were planned for selection, out of this a total of 3382 households were canvassed and found to be occupied and were successfully interviewed for a household response rate of 113%.

Card availability at the national level was estimated at 24.2%. At State level Central Equatoria had the highest card availability at 39.6% while unity recorded the lowest the least at 13.2%. Nationally, crude coverage by card against BCG is at 24.8% 95% CI (21.5,26.2) OPV 3 at 20.2% 95% CI (19.5,22.2), Penta 3 at 20.9% 95% CI(19.5,22.2) Measles at 19.2% 95%CI(18.4,21.0), while vaccination by Card + history against BCG (at birth) is at 52.2% (95% CI), OPV 3 at 49.9 % (95% CI) , Penta 3 at 49.3% (95% CI) and Measles at 48.7% (95%CI). The Percentage of children aged 12-23 months fully immunized (all antigens) by card was 18.9%.

At the national level, the crude coverage (Card + History) is estimated at 49.3% whereas coverage for specific antigens are as follows: BCG 52.2%, OPV0 51.5%, OPV1 52.5%, OPV2 50.3%, OPV3 49.9%, Penta1 51.1%, Penta2 50.2%, Penta3 49.3% Measles 48.7% and IPV 38.7%. In addition, aaccess and utilisation of child immunisation services is still low. The dropout rate is high with the OPV 1-OPV 3 by card at 8.7%, Penta1-Penta3 at 9.7%, BCG-Penta3 is at 8.3%, BCG-Measles is at 13.4% while the Penta1-Measles at 14.6%.

The highest timely vaccination for Polio 1/Penta 1 was recorded in Central Equatoria at 31% whereas the least timely vaccination was recorded in Upper Nile at 17%. Highest Percentage timely penta 2 coverage was recorded in Central Equatoria (32%) whereas the lowest was recorded in Upper Nile (5%) while Highest Percentage timely Penta 3 coverage was recorded in Western Equatoria (33%) and the lowest was recorded in Eastern Equatoria (11%).

The national coverage for simultaneous vaccination for OPV1-Pentavalent1 was 60% with Western Equator having the highest coverage (84%) with the least in former Unity state with only 23.5% for simultaneous vaccination. The OPV2-Pentavalent 2 was 64% while the percentage for in the non-simultaneous was 37%.

The missed opportunity for BCG and OPV 0 was 13%, 6% for Penta 1 and OPV 1, 5% for Penta 2 and 8% for OPV 2, Penta 3 and OPV 3 were 5% and 10% respectively. The highest percentage of visits resulting in missed opportunity for vaccination was recorded for MCV at 51% while the lowest was Penta 3 with 5%.
The counties of Ayod, Canal/Pigi, Lafon, Melut, Nyirol, Old Fangak, Pibor, Pochalla, Rumbek North and Twic East, Ulang, Urol, Wulu, Yirol East were identified as areas with alarmingly low vaccination coverage (100% not vaccinated). Similarly, some counties have low vaccination coverage with unvaccinated coverage ranging as high as 98% in Rumbek Centre to 71% in Wau. Other counties had low vaccination coverage with unvaccinated coverage ranging between 68% in Maridi to 45% in Juba.

The reasons given for non-vaccination were categorized into 4 main groups of reasons*: Lack of Information (42), Obstacles in the health care System (27%), Community or Family Reasons (20%), and lack of motivation (11%).*

The mean distance covered to the nearest facility was 5.1km with the mean Distance (by road) from Cluster Centre to the Health Facility (KM) observed in Jonglei (10km) followed by lakes (6.4km) and Central Equatoria with the least observed in Northern Bahr El Ghazal and Unity State (1km). The

maximum distance covered was observed in Jonglei (8km) with the least in Western Equatoria with less than 1 km.

In all the health facilities assessed, 50% of them had functional refrigerators as an essential commodity for provision of immunization services. Nearly a quarter of the health facilities have no functional refrigerator in place (24%) with 26% of the facilities reported to have vaccine refrigerators that are not functional (broken down).

A large percentage of pregnant women attended antenatal care during the last pregnancy was observed in Upper Nile 93% followed by Central Equatoria with a coverage of 91% and Western Bahr El Ghazal 84% with the least observed in unity (37%). The highest mean of ANC clinic visits among mothers was recorded in Western Bahr El Ghazal with a mean of 4.2 visits followed by Central Equatoria with 4 visits the least of the mean visits was recorded in Jonglei with 2.5 ANC visits. The minimum of ANC visits was 1 visit with a maximum of 8 visits recorded in 6 out of the 8 states.

The proportion of mother who slept under a mosquito net on the survey night was above 90% coverage (94.7%) with the highest in Warrap and Western Bahr El Ghazal with 100% coverage. The lowest coverage was recorded in the Former State (Hubs) of Jonglei (68.9%).

During the survey, it was found out that mothers practice unsafe and unhygienic practices and applied some products to the umbilical cord immediately after the birth of the baby with the leading products being applied *oil (41%), Ash (29%), ointment (20%), butter (6%), other products (5%) and cow dung (2%).* The prevalence of these practices of applying various products to the umbilical cord of the baby immediately after birth was reported in upper Nile (92%) with the least in Warrap (8.3%).

The proportion of children who slept under a mosquito net on the survey night was above 90% coverage (93.2%) with the highest in Warrap and Western Bahr El Ghazal with 100% coverage. The lowest coverage was recorded in the Former State (Hubs) of Jonglei (65.5%). Nationally, 65% of mothers received Intermittent Preventive Treatment (IPT) of malaria during pregnancy.

The highest Vitamin A supplementation coverage by card was in Upper Nile (16%) while the lowest coverage was reported in Jonglei at 2%.Northern Bahr Ghazal, Jonglei and Eastern Equatoria have higher percentage of women not administered with Vitamin A at 55%, 42% and 37 % respectively.

In summary, the EPI coverage survey 2017 shows a drop in coverages across the antigens apart from Tetanus Toxoid 2+ (TT2+) at 15.4% which has a slight increase ,there is a decline in the proportion of children fully immunized. Mothers completing the TT schedule stands at a low 11%. Card availability compared to 2011 ECS is persistently low. Pentavalent 1st dose coverage by card indicates a decline compared to previous ECS denoting poor access to immunization services. High dropout rates observed depict poor utilization as evidence by low penta 3 coverage.

The Survey also assessed health facilities that provide immunization services within the clusters. Out of the 50 percent of the facilities that were assessed, nearly a half (26%) of them had nonfunctional refrigerators. Further, 24% of the facilities had no fridges at all. At state level, all facilities that were assessed in Unity did not have refrigerators hence no cold chain at all. A total of 60% of facilities in Western Equatoria, 7.7% in Warrap and 45% in EEQ had no cold chain. Half of facilities in Northern Bahar El Ghazal and 35 in Eastern Equatoria had nonfunctional refrigerators. Training on cold chain was suboptimal in the states except in Unity where no training has taken place.

The key recommendations from this survey are that the Government of South Sudan need to increase resources for strengthening routine immunization activities in all the states of the country. The Ministry of Health together with the implementing partners (UNICEF/WHO) to set up outreach sites and to restore the broken down cold chain equipment, broken or vandalized cold chain equipment in the conflict affected areas. Social mobilization teams to mobilize communities and families to take their children for vaccinations at the nearest health facilities and also demystify the wrong perceptions about adverse events following immunization, MOH to supply adequate immunization commodities and vaccines to all the PHCC, PHCUs and Hospitals so as to avoid frequent stock outs of these

commodities in the health facilities, Concerted efforts need to be directed towards increasing uptake of the newly introduced vaccine (IPV) which has the lowest coverage across all the states in the country, mothers need to be made aware of the importance of the Immunization cards/documents which serve as a form of evidence for all vaccinations given to a child. Great efforts should be made to address the areas with alarmingly low vaccination coverage.

1.0 INTRODUCTION

1.1 Country Context: South Sudan

Republic of South Sudan has a surface are of 644,329km^2 and is bordered by Sudan to the north, Ethiopia to the east, Kenya to the southeast, Uganda to the south, Democratic Republic of Congo to the southwest, and the Central African Republic to the west.

It has a total population of 8.26 million people (SSNBS 2008 Population census), 16% being under the age of 5 years, with more than half (51%) of the population being below the age of eighteen years. 72% below the age of thirty years. 83% of the population is rural, 27% of the adult population literate, 78% of the households depend on crop farming or animal husbandry as their primary source of livelihood, 55% of the population has access to improved sources of drinking water. (5th Population and Housing Census, 2008)[1].

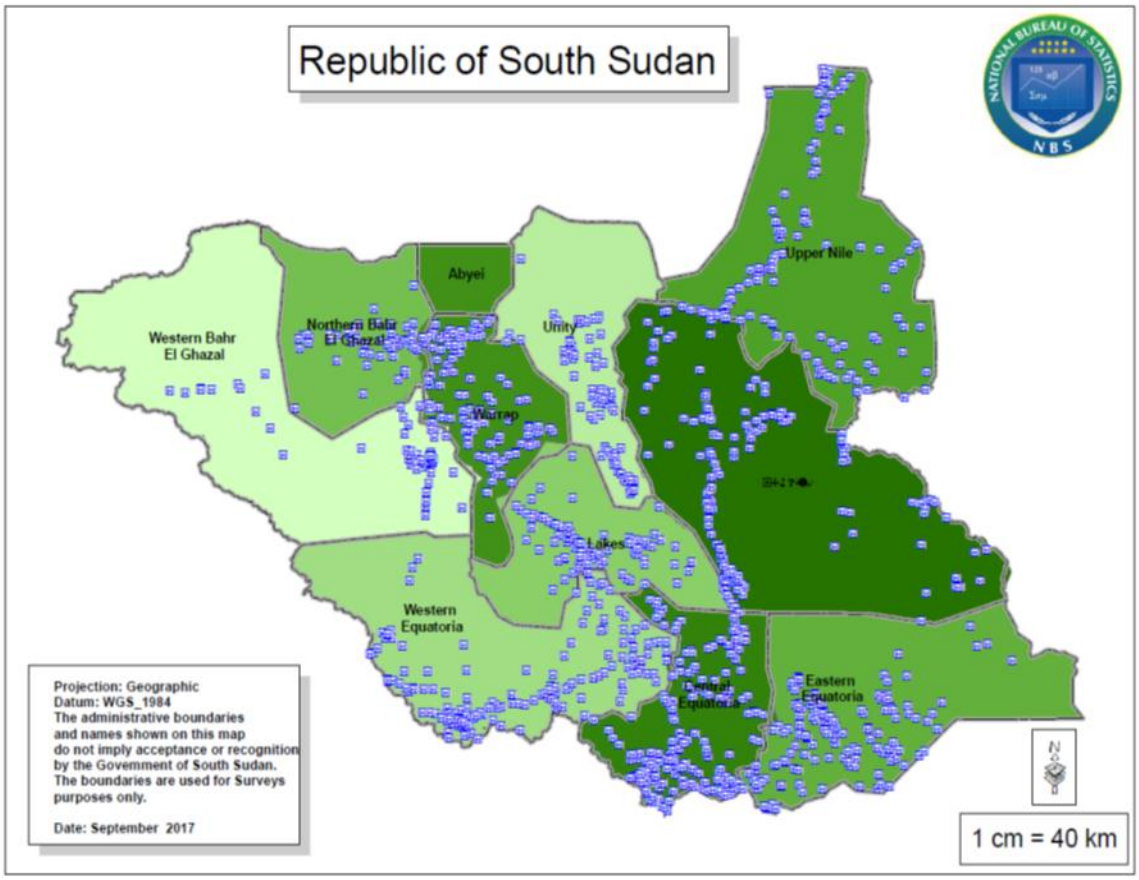


Figure 1. Map of South Sudan**("Map of Republic of South Sudan," n.d.)**

[1] ("southern_sudan_counts_tables_from_the_5th_sudan_population_and_housing_census_2008.pdf," n.d.)

1.2 Background of Expanded Program on Immunization in South Sudan

In South Sudan, a nationwide Expanded Program on Immunization was established in 2005 following the signing of the Comprehensive Peace Agreement (CPA) in the same year. In 2006, the Government developed a "Health Policy, 2007-2011" and the "Basic Package of Health and Nutrition Services". Based on these policy documents of the Ministry of Health, the EPI program with support from the partners prepared a "2007-2011 Comprehensive Multi-Year Plan (cMYP) for Immunization" which formed the basis for upscale of immunization services in the country. An external review of the immunization Programme conducted in October 2011 provided enormous information on best practices, weaknesses, opportunities and lessons learned over the previous 5 years that formed the basis for development of the 1st National Expanded Programme on Immunization cMYP 2012-2016[2] of the newly founded Republic of South Sudan. The multi-year plan EPI in South Sudan (2012-2016) highlighted the areas of focus for the immunization Programme development over the next 5 years based on previous Programme performance, priorities for the health sector as stipulated in the Health Sector Development Plan (2011 – 2015) and the global and regional goals set for child health and survival. The Global and Immunization Vision and Strategy (GIVS), Millennium development Goals on Mortality and morbidity reduction and the WHO Regional Strategic Plans that provided the Overall, strategic framework for development of the plan as well as priorities set in this cMYP

The Expanded Programme for Immunization (EPI) in South Sudan is led by Ministry of Health with assistance from UN (UNICEF, WHO and others), donors (Bill and Melinda Gates Foundation, CDC/AFENET, Rotary International, GAVI, USAID) and other implementing partners.

Immunization services are an integral element in the health system of the Republic of South Sudan (RoSS).The 2006 service delivery guidelines for Primary Health Care Centres (PHCC) and Hospitals provide for three categories of immunization services: (i) Standard immunization of children and Vitamin A supplementation; (ii) Immunization of pregnant women to protect them and their babies from tetanus; and (iii) Supplementary immunizations in effort to eradicate specific diseases (e.g. polio) or to control epidemics (e.g. meningitis; hepatitis). Overall Coordination and Implementation of all immunization services in RoSS is under Ministry of Health -Expanded Program on Immunization (EPI) with technical and financial support from government, WHO, UNICEF, Bill and Melinda Gates Foundation (BMGF), CDC/AFENET, Rotary International, GAVI, USAID and other implementing partners.

1.3 National immunization program strategic plan

1.3.1 Immunization schedule for south Sudan

The goal of EPI is to contribute to the overall health sector objective of reducing morbidity, mortality and disability; with a specific focus on vaccine preventable diseases. The mission of the program is to ensure that every child and other high-risk groups are fully vaccinated with high quality and effective vaccines against the target diseases according to recommended strategies. To realize this, routine immunization services for children and pregnant women are provided through static, outreach and mobile sites and occasional special acceleration campaigns.

The current immunization schedule for children in Republic of South Sudan is in line with global guidelines from the World Health Organization (WHO) and United Nations Children's Fund (UNICEF). It provides for all children to receive a total of 10 doses of vaccination before they are 1 year old. Table 1 presents details on the immunization schedule for children.

[2] ("cmyp_2012-2016_south_sudan.pdf," n.d.)

Table 1. Current Immunisation Schedule showing route of administration

Antigen	Minimum Age	Dose to be administered	Route of Administration
OPV 0	At birth	2 drops	By mouth – use provided dropper
BCG	At birth	0.05 ml (infants 0-11 months) 0.1ml (children above 11 months)	Intra-dermal (within the skin); Left forearm
PENTA 1	6 weeks	0.5 ml	Intramuscularly in the upper outer part of the thigh
OPV 1	6 weeks	2 drops	By mouth – use provided dropper
PENTA 2	10 weeks	0.5 ml	Intramuscularly in the upper outer part of the thigh
OPV 2	10 weeks	2 drops	By mouth – use provided dropper
PENTA 3	14 weeks	0.5 ml	Intramuscularly in the upper outer part of the thigh
OPV 3	14 weeks	2 drops	By mouth – use provided dropper
IPV	14 weeks	0.5ml	Intramuscularly in the upper outer part of the thigh
Measles	9 months	0.5 ml	Measles vaccine is given subcutaneously in the upper outer aspect of the deltoid muscle (Lt) at 9 months. However, during supplemental immunization activities the target age may increase to 15 years as advised by WHO.

Introduction of New Vaccines into Routine Immunization in South Sudan

a) Five-in-one Pentavalent Vaccine

Pentavalent Vaccine was introduced into Routine Immunization in South Sudan in 2014 as part of the Governments efforts towards Millennium Development Goal 4 and per the country's immunization multi-year plan (cMYP) for 2012-2016.

This vaccine was introduced to replace trivalent vaccine traditionally known as DPT, which was used as a proxy indicator for completeness of routine immunization coverage in the country.

The official launch of pentavalent vaccine was done in July 2014. Despite the continued instability in some areas of the country, the MOH officially launched the vaccine in 7 of the 10 states and by 2016,introduced in all the 10 states.

b) Inactivated Polio Vaccine (IPV)

Inactivated Polio Vaccine was introduced into routine Immunization in December 2015 as part of the Government's concerted efforts through the Ministry of Health to eradicate Polio under the Global Polio Eradication Initiative in line with the Polio end game Strategy. The introduction of IPV before the tOPV-bOPV switch aimed at priming the immunity of the birth cohort in mitigation of the risk of VAPP after OPV2 cessation and further ensure that the dose of IPV given will reduce risks associated with OPV2 cessation and lower risk of re-emergence of type 2 polioviruses, facilitate interruption of transmission with the use of monovalent OPV2 if type 2 outbreaks occur and finally boost immunity against types 1 & 3 thus hastening polio eradication.
IPV reduces risk of development of VAPP as it boosts both humoral and mucosal immunity against type 1, 2 and type 3. IPV is a trivalent vaccine administered by injection at 14weeks and confers humeral immunity against Type 1, 2 and 3 but is not eliminated through the stools (gut). It is therefore recommended that a single dose of IPV be given at 14 weeks or first contact afterwards, or with DTP3/OPV3 or for countries administering a birth dose of OPV, at the time of the OPV4 dose.

1.4 Expanded Program on Immunization (EPI) Services In South Sudan

The Ministry of Health of the Republic of South Sudan through the Expanded Program on Immunization provides routine immunization services to all target population in all the health facilities providing immunization services. These services are provided through static, outreach and mobile sites and occasional Supplemental Immunization Activities (SIA) like National Immunization Days (NIDs). Other methods adopted in South Sudan have been Periodic intensification of routine immunization (PIRI) based on data generated from counties/locations with low coverage. In the current stale mate there is no county that can be deemed peaceful as nearly all states have unstable localities.

Immunization services are provided at service delivery points and data is recorded for every session, compiled, summarized and submitted on monthly basis to the national Level.

Reported immunization figures are aggregated for the entire country each year, and compared to the total number of children and women of childbearing age in the country who should have been reached with immunizations each year. The coverage reported from this proportion is known as administrative EPI Coverage because it is based on figures in the routine MoH administration system. Since 2005 (when the Comprehensive Peace Agreement was signed), reporting of routine EPI performance has relied on a system that still has many weaknesses. It is plagued by huge shortfall in staffing of the health sector at all levels, deficient skills in data management, incomplete reporting, inadequate supportive supervision, monitoring, and inadequate feedback.

Evidence based and data-driven micro planning is crucial for decision making, to attain the ultimate objective of the Programme.

According to EPI monthly reports, immunization coverages for routine immunization are relatively higher in the 7 stable states as compared to the conflict affected states. The conflict-affected states have much lower coverages due to interrupted implementation, widespread insecurity, broken cold chain system, poor infrastructure, limited mobility of people and natural barriers.

1.5 Background of the EPI Coverage Survey 2017

The Expanded program on Immunization (EPI) coverage survey 2017 was conducted between the months of June 2017 and March 2018 in the former 10 states of South Sudan. This was part of an overall review of progress in implementation of the first EPI Multi-Year Plan for South Sudan. The first EPI coverage survey was conducted in South Sudan was in 2011/2012. The results of the 2011 survey indicated that the fully immunized children were 7.3% with the coverage for specific antigens being as follows; BCG (28.3%), DTP-1(25.9%), DTP3 (22.0%), Measles (16.8%). The dropout rate between the first and third doses of DTP was 21.3%. Immunization coverage estimates based on card and history were higher, at 45.7% for DTP-3, 45.8% for MCV and 32.2% for full immunization immunizations (80.8%) were received at health facilities compared to community service points (19.2%).

The major reason for missed immunizations was inadequate information (41.1%). The report concluded that the proportion of card-verified, fully vaccinated among children aged 12-23 months was very low at 7.3%. Based on the report analysis above it was strongly recommended that future efforts be doubled up to improve vaccination quality and coverage. The areas that were of high priority were training of vaccinators, strengthening of routine immunization, revamping surveillance systems and strong investment on EPI Cold chain systems in the country.[3]

The Ministry of Health and its development Partners recognized that an immunization coverage survey, clear in concept and implementation, would help establish a reliable baseline on which a new multi-year plan will be developed and implemented.

1.6 Rationale /Justification of Conducting EPI Coverage Survey

Immunization coverage surveys are usually conducted from time to time, based on a sample of households to represent a given geographical area. Such surveys give coverage information on all children; compared to administrative coverage data, which only includes children who get in contact with the health care system. Some children (like in the case of South Sudan) may not have any contact with the health care system and thus can only be included through population-based coverage surveys.

The major reasons for conducting the EPI coverage survey in South Sudan are as follows:

1) The survey was conducted to serve as a supplemental information to compare with administrative coverage reports, i.e. to assess the quality of reports on vaccinations done routinely in health facilities and outreach centers and provide additional information on the true immunization coverage achieved in the population. Also to check on reliability and completeness of reports as well as why there are no routine immunization reports in certain areas.
2) To provide information for service assessment: assess the quality of immunization services, including access to different population groups, timeliness of protection and providers of immunization.
3) To assess the change in coverage over time: To provide information that can be compared to previous levels of immunization coverage. For surveys designed to assess change over time it is important to ensure that key variables such as age groups of children, immunization schedule, and catchment area are comparable.
4) To assess the coverage achieved through accelerated routine immunizations, mass measles or polio campaign, or intensified TT immunization to eliminate neonatal and maternal tetanus.

[3] (Mbabazi et al., 2013)

5) Providing EPI coverage information demanded by support agencies: For reporting and accountability required by funding agencies, government offices and other supporters.
Therefore, this EPI coverage Survey 2017 report will be used to validate administrative coverage calculated from administrative data collected from immunization in all health facilities and service delivery points which is normally summarized at the National EPI Program.
The coverage will also provide an opportunity for the health workers to identify children and women who are not receiving or completing their immunization series – and possibly other health services and reasons for not completing immunizations as per national schedule of immunization and to link them up with the necessary services.

1.7 Survey Objectives

1.7.1 Survey purpose and objectives

The overall purpose of the coverage survey was to validate the quality and coverage of the EPI Programme in all counties and States of South Sudan. In the specific
The specific objectives of the survey were to establish:

- The immunization coverage for all antigens among children aged 12-23 months
- Tetanus Toxoid immunization coverage among mothers of children aged 0-11 months
- The proportion of children protected at birth from tetanus
- The quality and access to immunization services and the factors affecting service provision; including the main reasons for immunization failure
- The card availability rate for both mothers of children aged 0-11 months and children aged 12-23 months
- Enhanced capacity to conduct standardized EPI coverage verification surveys at national and state levels
- Coverage with malaria prevention/control (IPT, ITN), Antenatal Care and newborn care after delivery as part of Health Basic Package Integrated to immunization such as IPT, ITN, ANC visits, Practice after delivery & newborn care.

2.0 METHODOLOGY AND CHARACTERISTICS OF THE SAMPLE

South Sudan Government in collaboration with UNICEF, WHO and other implementing health development partners conducted a national and state-level EPI coverage survey between June 2017 and March 2018 with the field work taking place between October 2017 to January 2018.

2.1 Sampling Methodology

The methodology used was be guided by a statistician from the South Sudan National Bureau of Statistics with reference to WHO Methodology guidelines described in the 2015 WHO manual titled 'Vaccination Coverage Cluster Survey – Reference Manual Draft'[4]. This method was recommended to reduce biases, improve survey accuracy and overall quality, promote better use of survey results through comprehensive reports, and provides a methodology that is more aligned with well-accepted household cluster survey methods.

This method was the main references for implementation of the 2017 EPI Cluster Survey in South Sudan. The 4 main stages in the survey process that formed the core framework for implementation of this survey were namely;

1. Planning for the immunization coverage survey.
2. Conducting the immunization coverage survey.

[4] ("Vaccination_coverage_cluster_survey_with_annexes.pdf," n.d.)

3. Processing, interpreting and presenting coverage survey results.

4. Communicating coverage survey results and using immunization coverage survey results.

The EPI Coverage Survey was conducted in the ten Former State (Hubs)s of South Sudan based on the existing 2008 Population and Housing Census Sampling frame of South Sudan[5]The study sample therefore is representative of the republic of South Sudan since all sampled households are from the whole nation.

2.2 Characteristics of the sample-Sample Design

The target population was children aged 12–23 months and mothers of children aged 0-11 months.

The sampling frame is based on 2008 Census consisting of the 10 Former State (Hubs)s and therefore the survey is being carried out across the 10 Former State (Hubs)s in the Republic of South Sudan in the sampled households.

The Primary Sampling Units (PSU) consisted of Enumeration areas selected across the states.

The Secondary Sampling Units (SSU) were second-stage sampling units formed of households with children aged 12–23 months and mothers of children aged 0-11 months in enumeration areas selected during the first sampling phase.

2.3 Determination of Sample Size

The Republic of South Sudan adapted the cluster survey methodology described by the World Health Organization guidelines manual for 2015. The decision to use the cluster survey methodology was determined by the fact that this method has validated the administratively reported routine Penta-3 immunization coverage for the 2016 calendar year of 45 **%** at national level. The method enabled the country to conduct state-specific coverage surveys in all 10 Former States (Hubs) of South Sudan with limited resources in an access-restricted context of the country.

To estimate the coverage with a confidence interval with respect to a threshold, the required numbers of households were selected based on a number of parameters to yield enough eligible respondents to meet the survey's inferential goals.

The desired number of households per cluster was based on the design effect (DEFF) of 5.67 and Intra-cluster correlation (ICC) of 0.333, desired margin of error 10% (0.04) with a 95% confidence interval and 10% non-response rate.

The overall sample size was 3000 with a total number of clusters randomly selected being 200 distributed across the 10 Former States (Hubs) proportional to the population size representing the entire population of South Sudan. In each of these selected clusters, at least 15 eligible households per cluster were visited and field enumerators completed a questionnaire for each eligible respondent.

Two stage-stratified cluster Sample design was adopted for the selection of households in the EPI Coverage Survey, 2017.

In the first stage of selection, the Enumeration Areas (EAs) were preselected by using Systematic Probability Proportional to the size of households (PPS) and in the Second stage unit, the households were selected by using Systematic sampling after listing all the households in sampled Enumeration Areas.

5

Table 2. Shows Sample allocation of Households and EAs for EPI Coverage Survey, 2017 in the 10 Former States (Hubs).

SC	State	Sample Households	Sample EAs/clusters	Households per EA
71	Upper Nile	270	18	15
72	Jonglei	375	25	15
73	Unity	210	14	15
81	Warrap	450	30	15
82	Northern Bahr El Ghazel	360	24	15
83	Western Bahr El Ghazel	150	10	15
84	Lakes	270	18	15
91	Western Equatoria	255	17	15
92	Central Equatoria	360	24	15
93	Eastern Equatoria	300	20	15
	Total	**3000**	**200**	

Source: South Sudan EPI coverage Survey 2017

2.4 Sample Selection

The Selection of the Enumeration Areas (EAs) was conducted across the 10 Former States (Hubs) based on systematic sampling method with a probability proportional to size. The EA maps of the selected enumeration areas were provided by National Bureau of Statistics to guide in identification of the EAs.

Since the sampling frame (2008 Census) was not up to date, a new listing of households was conducted in all the sampled enumeration areas prior to selection of the selection of households. The Household listing form were used to do the listing of households within the selected EAs.

Upon completion of household listing exercises the team used a table of Random number in identifying the first household and the subsequent sampling interval through the assistance of National Bureau of Statistics at Former States (Hubs) level (hub). Eligible households were visited and mothers or caregivers for the targeted children were interviewed. Abandoned and unoccupied households were excluded and not numbered during household listing.

The eligible respondents in randomly selected household were recruited and interviewed.

2.5 Data Collection Tools

Four data collection forms were used during data collection for this survey:

- Survey data collection form for children aged 12–23 months and mothers of children aged 0-11 months questionnaire
- Immunization supplies and services assessment form
- Survey summary form
- Household list form

Survey data collection form for children aged 12–23 months and mothers of children aged 0-11 month questionnaire

This form was used to document the interview response with eligible respondents.
It is composed of the following sections:
Part I: Consent form for the survey.
Form 1A: Infant immunization – child aged 12-23 months.
Form 1B: Infant immunization follow up questions– child aged 12-23months.
Form 2A: TT immunization for mothers of child aged 0-11 months.
Form 2B: TT immunization follow up questions of mothers of child 0-11 months.
Immunization supplies and services assessment form:
This form was used to document the interview response with health worker at the nearest health facility within the cluster.
Survey summary form – survey summary form 1A:
This form was used to summarised the findings documented in survey data collection form for children aged 12–23 months and mothers of children aged 0-11 months questionnaire.
Household listing form:
This form was used to document house-listing exercise in each of the selected enumeration areas.

2.6 Training of Survey Teams

Training was carried out at two levels. The first level of training was a national level training conducted between 11th September 2017 to 13th September 2017, where the 20 national supervisors were trained at the national level.
An exception is parts of Jonglei state where the state supervisors were flown to the national level and their training conducted at the national level due to security concerns.
State level training was conducted at different dates during the month of October and November with part of Jonglei being the last one to complete training based on logistical availability of flights to respective states.

2.7 Pretesting of Survey Tools

Pretesting of the survey tools to assess consistency of the questions - 31st August 2017 to 2nd September 2017.
Pretesting was done in Jubek state, formerly Central Equatoria State, Rajaf county Gumbo.
The selected Eas were Gumbo South (Enumeration Area Number 920213001101) & Gumbo North (Enumeration Area Number 920213001102).
The two teams consisting of 15 personnel were trained for three days between 26th July 2017 to 28th July 2017 before being despatched to conduct the pre-test.
The teams did household listing and randomly selected household to be interviewed, eligible children aged 12-23months, and mothers of children aged 0-11 months were interviewed.
The feedback obtained were utilised to further validate the questionnaires and incorporated into the final copies of the survey questionnaire.

2.8 Field Work

Ethical clearance was obtained from the National Ethical Research Committee before commencing fieldwork.
Fieldwork began on 3rd October 2017 and ended in 8th January 2018 across various states.
The last report was received on 19th January 2018 from Khorflus in formerly Jonglei state.
Out of the total 200 selected EAs about 10% were inaccessible EAs was about 11% and were replaced as provided by survey protocol in situations of inaccessible clusters; the highest being in UNITY – 10 out of 14 Eas were inaccessible and were replaced (Insecurity being major concern), 4 Eas in EES, 2 Eas in CES, 2 Eas in WES, 1 Ea in Warrap and 1 EA in Jonglei.

2.9 Data Management

2.9.1 Data Entry

Data entry clerks were recruited and trained on EPIinfo Version 7 for 7 days at Central Level in Juba.

The data entry for all 10 states was performed using EPIinfo 7 software and the files merged, cleaned and verified.

2.9.2 Data cleaning, Validation and Analysis

Data cleaning exercise was conducted by the data team and the process involved double-checking for errors and cleaning of data entries where needed at completion of the data entry process.
Data validation being done by cross checking every variable in the questionnaire & its consistence to the database.
Unique identifiers (Enumeration areas numbers) were used for each questionnaire to prevent double entries.
This was followed by analysis using EPI info, tabulation of results, presentation and final report preparation.

2.9.3 Weighted and unweighted Analysis of the survey samples

The samples for the EPI Coverage survey 2017 were weighted and the results have been incorporated into the main report. (See the detailed unweighted and weighted analysis report).

2.9.4 Sample Coverage & Characteristics of Households Respondents

Table 3. Sample of Households and Response

Former State	Total Household (SSBS)	Sample	Occupied	Household Interviewed	% Household response rate
Central Equatoria	1,485	360	1553	174	48.3
Eastern Equatoria	6,107	300	2278	159	53
Jonglei	5,735	375	3030	300	80
Lakes	2,398	270	1558	264	97.8
Northern Bahr El Ghazal	3,617	360	2485	313	86.9
Unity	1,888	210	1716	213	101.4
Upper Nile	4,128	270	1201	162	60
Warrap	4,352	450	2484	362	80.4
Western Bahr El Ghazal	1,627	150	1424	150	100
Western Equatoria	2,549	255	1180	128	50.2
South Sudan	**33,886**	**3,000**	**18,909**	**2,225**	**74.2**

Source: South Sudan EPI coverage Survey 2017

During the 2017 survey a total of 3000 households were sampled for the coverage survey. In the actual implementation of the survey, a total 3382 households were surveyed and eligible children were interviewed resulting to household response rate of 113% as shown in the table below. The number of household sampled were met in all the states except Central Equatoria where 89% of households were sampled

Table 4. Sample of Households and Mothers Interviewed

Former State	Total Household (SSBS)	Total Children 12-23 months seen	Mothers/caretakers interviewed 12-23months	Total Children 0-11 months seen	Total Mothers/caretakers interviewed	% of mothers
Central Equatoria	1,485	174	174	147	321	89
Eastern Equatoria	6,107	159	159	150	309	103
Jonglei	5,735	300	300	71	371	99
Lakes	2,398	264	264	78	342	127
Northern Bahr El Ghazal	3,617	313	313	123	436	121
Unity	1,888	213	213	104	317	151
Upper Nile	4,128	162	162	118	280	104
Warrap	4,352	362	362	156	518	115
Western Bahr El Ghazal	1,627	150	150	76	226	151
Western Equatoria	2,549	128	128	134	262	103
South Sudan	**33,886**	**2,225**	**2,225**	**1,157**	**3,382**	**113**

Source: South Sudan EPI coverage Survey 2017

Equity in vaccination of children aged 12-23 months

Table 5. Gender of Children 12-23 Months

RI.4. Sex	Frequency	Percent	Wilson 95% Conf Limits	
			Lower Limit	Upper Limit
1-Male	1175	52.81	50.73	54.88
2-Female	1050	47.19	45.12	49.27
Total	2225	100	47.925	52.075

Source: South Sudan EPI coverage Survey 2017

The table above presents frequency of vaccinations in both male and Female with a slight higher proportion of male children surveyed 53%) as compared to female children(47%).There is no significant differences in coverage have been observed with regard to gender or other variables.

Table 6. Child Health Cards Availability

RI.6. Child Health Card Seen	Frequency	Percent	Wilson 95% Conf Limits	
			Lower Limit	Upper Limit
No	1596	72.60	69.82	73.56
Yes	629	27.40	26.44	30.18
Total	2225	100	48.13	51.87

Source: South Sudan EPI coverage Survey 2017

Nationally the card availability was 27.4% (CI, 26.44%-30.18%) with 72% (CI, 69.82%,73.56%) of mothers and caregivers assessed and found not having immunization cards.

Table 7. Children aged 12-23 months surveyed with their mother still alive

Mother living Status (Alive)	Frequency	Percent	Wilson 95% Confidence Limits	
			Lower Limit	Upper Limit
No	47	2.11	1.59	2.8
Yes	2178	97.89	97.2	98.41
Total	2225	100	49.4	50.6

Source: South Sudan EPI coverage Survey 2017

The table above shows the majority of children 12-23 months of age assessed were taken care of by their mothers who were still alive at 97.8%(97.2,98.4).Children aged 12-23 months who were taken care of by other primary care givers were 2.1% (1.5,2.8) of the total children surveyed.

3.0 IMMUNIZATION COVERAGE OF CHILDREN AGED 12-23 MONTHS

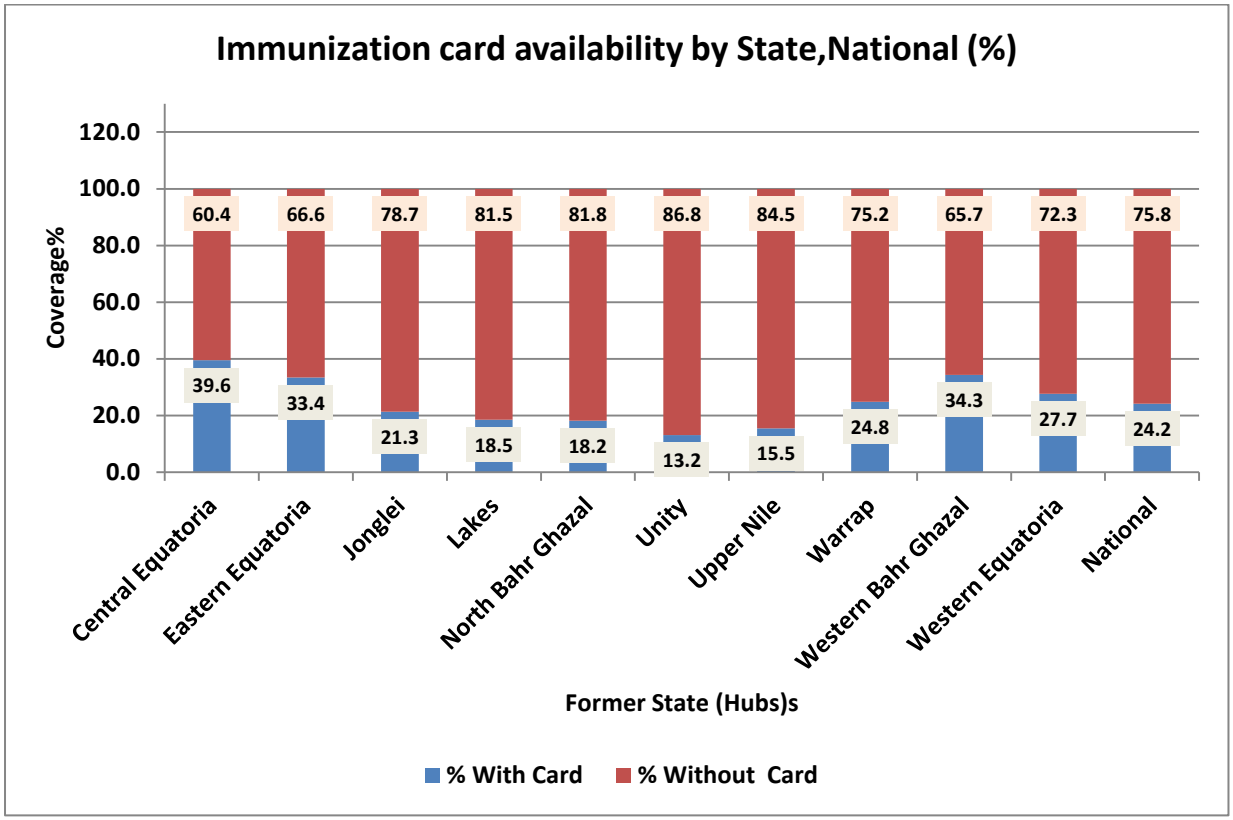
Survey Objective 1: The immunization coverage for all antigens among children aged 12-23 months

This section illustrates the national and state vaccination coverages for all antigens based on the EPI coverage survey that was conducted in all the sampled households within the Enumeration areas in the former 10 states of South Sudan. The data was analysed to provide the findings as follows:

Availability of Vaccination Cards (child Health Card) during the survey

Vaccination cards (child health cards) play an important role in documenting Immunisation services received by individuals and form part of a child's medical history aiding health care providers and professionals to make clinical decisions. These cards are usually provided at services delivery points and form the basis of providing evidence in the EPI coverage survey to estimate the vaccination coverage by card.

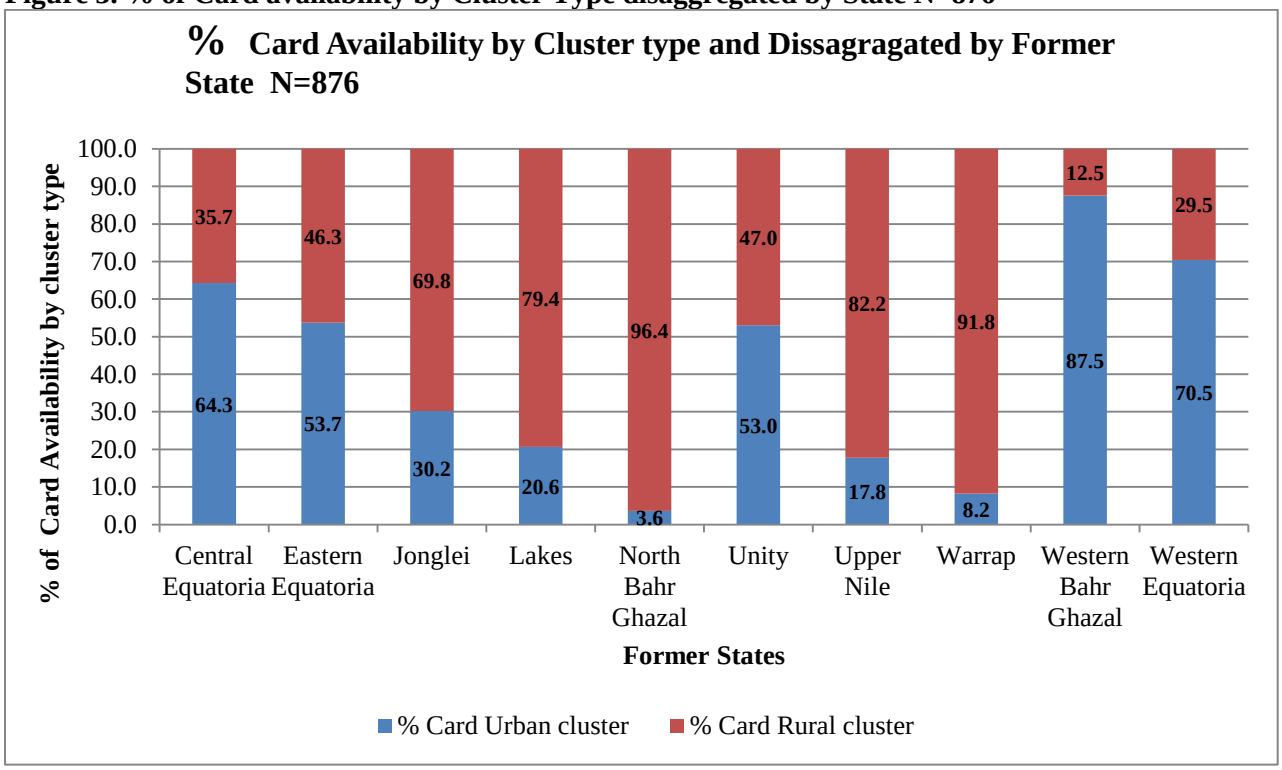
Figure 2. Immunization Card availability disaggregated by State and National, EPI CS RSS 2017



Source: South Sudan EPI coverage Survey 2017

The figure above shows that the proportion of children who had vaccination cards during the survey were 24.2%.This clearly shows that majority of the children (75.8%) did not have their vaccination cards at the time of the survey based on various reasons given to the survey teams.

Figure 3. % of Card availability by Cluster Type disaggregated by State N=876



Source: South Sudan EPI coverage Survey 2017

The card retention by cluster varied by State with Central Equatoria, Eastern Equatoria ,Western Bahr El Ghazal having higher card retention rates in the urban areas as compared to those in rural clusters. However, this could be interpreted with caution since no statistical tests was conducted to determine the association of cluster type and card retention rates

Table 8. Card availability Comparison by Cluster Type

	RI.6. Child Health Card Seen		
HH.57. Cluster Type	**Yes**	**No**	**Total**
1-Urban	182	275	457
2-Rural	400	1365	1765
TOTAL	582	1640	2222

**** p< .05 ** p< .001*** [OR =2.3 95%CI[1.86-2.86], p = <0.001).

Source: South Sudan EPI coverage Survey 2017

Participants with a child health card were 2.3 times more likely to ever have been residing in the rural areas as compared to urban areas. Bivariate analysis on comparison of cluster type and child health card seen noted significant findings (p = <0.001).

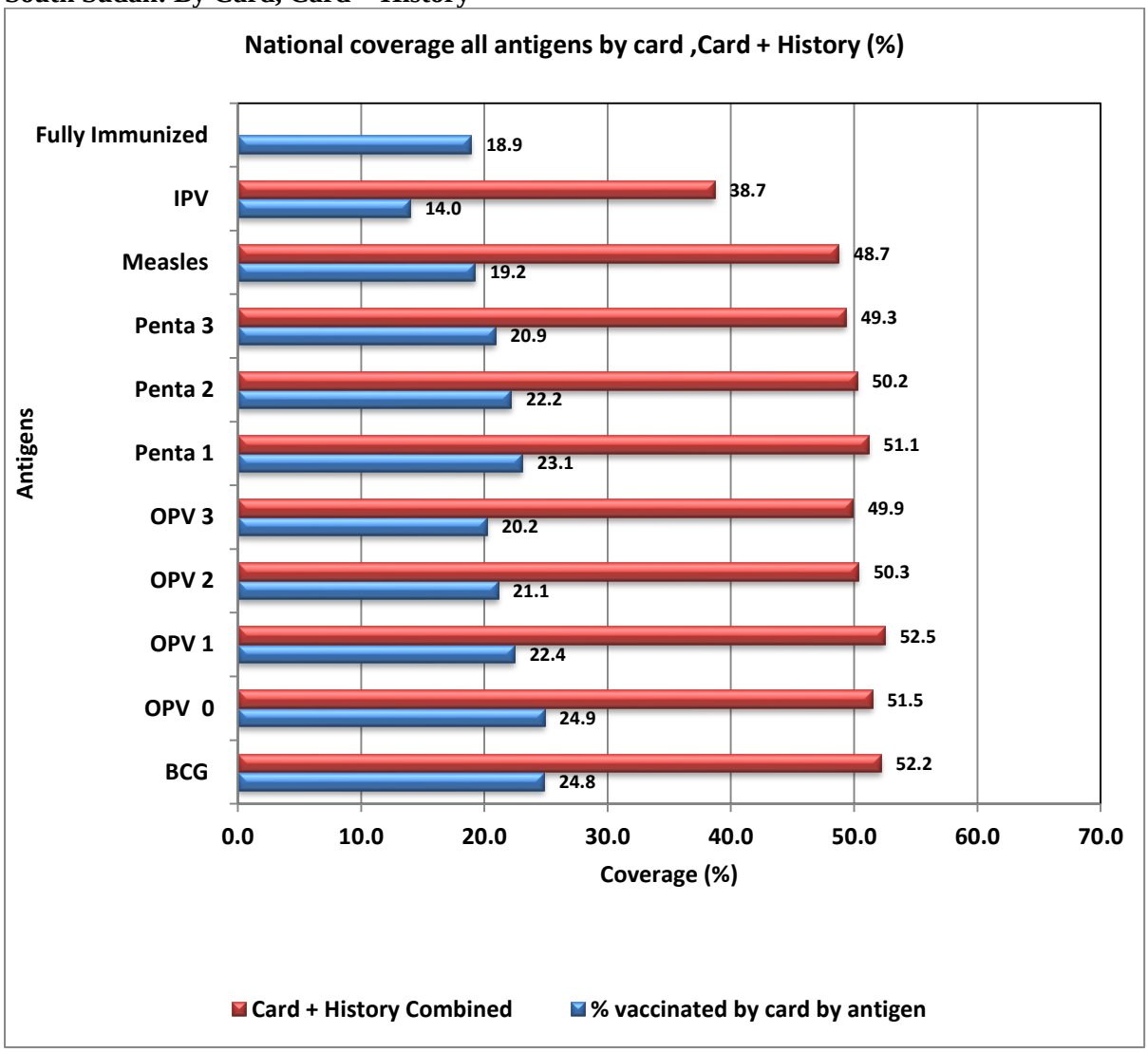
Table 9. Vaccination Status by Antigen by card or history, EPI Coverage Survey 2017

	Coverage among children aged 12 - 23 months by card and history, disaggregated by vaccine N=3194										
	BCG	**Polio**				**Pentavalent**			**Measles (MCV1)**	**IPV**	**Fully**
		OPV Birth	**OPV1**	**OPV 2**	**OPV 3**	**1**	**2**	**3**			
# Vaccinated by Card	875	784	806	767	736	816	776	738	697	493	667
# Vaccinated by History	963	982	1018	1013	1025	977	969	938	1015	710	
Total vaccinated card+history	1838	1766	1825	1780	1761	1793	1745	1675	1712	1203	667
% vaccinated by History	52.4	55.6	55.8	56.9	58.2	54.5	55.5	56.0	59.3	59.0	52.4
% vaccinated by card by antigen	27.3	27.9	29.3	28.7	29.0	27.8	27.8	27.6	28.9	20.3	27.3

Source: South Sudan EPI coverage Survey 2017

More than half respondents who indicated to be fully vaccinated indicated that their children had received all vaccination based on the history they gave (52.4%) as compared to 27.3% who provided the evidence with child health card as shown in the table above.

Figure 4. Percentage coverage among children aged 12–23 months, disaggregated by vaccine in South Sudan: By Card, Card + History

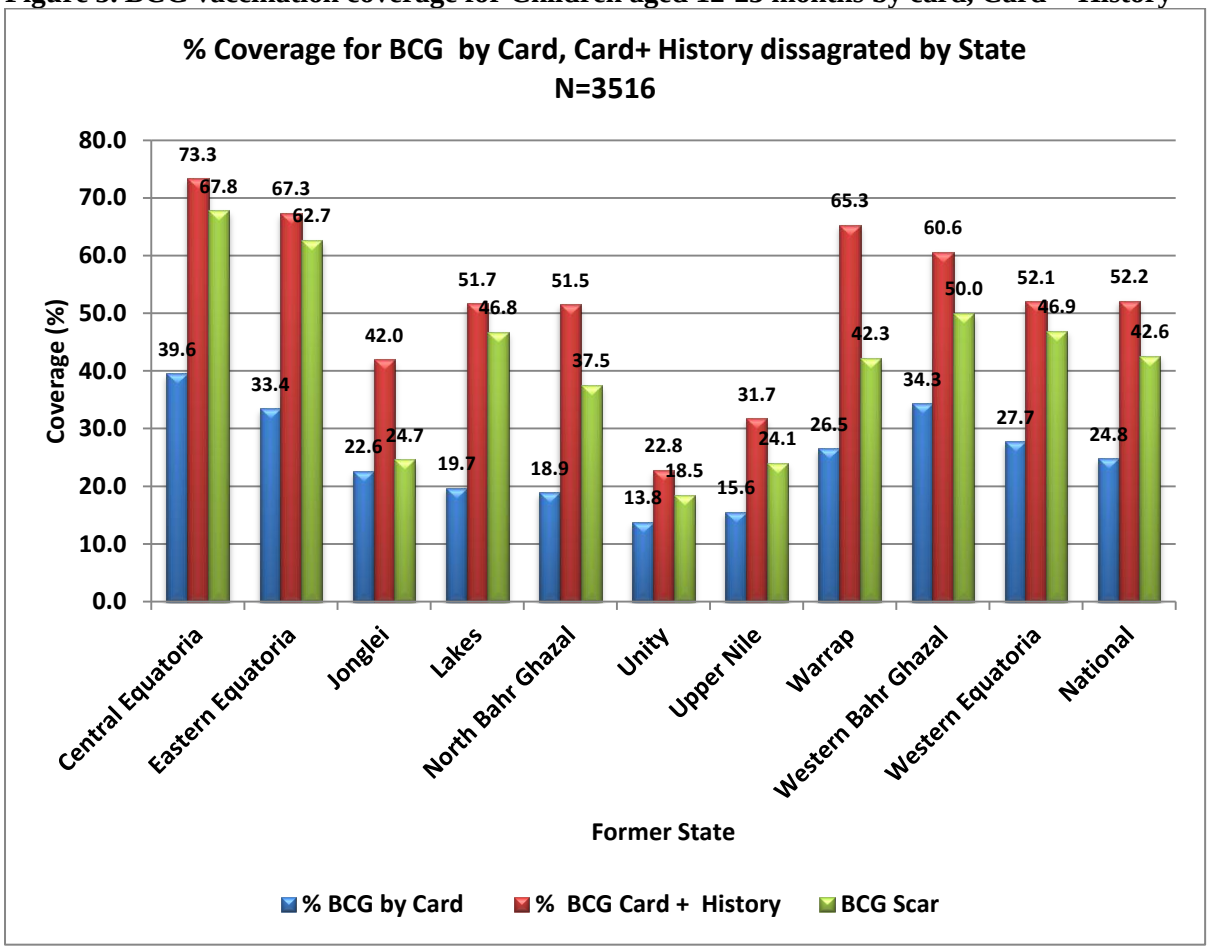


Source: South Sudan EPI coverage Survey 2017

The figure above shows the coverage of basic immunizations as per the national Immunization Programme in South Sudan. BCG and Penta 1 coverage is estimated at 24.8% and 23.1% which implies that Access to basic immunization among children aged 12-23 months is 23-24%%. The National immunization Coverage (Penta 3) is 20.9%95% CI (19.5,22.2).Coverages for the basic immunizations by card is as follows BCG is at 24.8% 95%CI (19.5,22.2), OPV 3 20.2% 95% CI (19.5,22.2), Penta 3 at 20.9% 95% CI (19.5,22.2) IPV at 14.0% 95% CI (13.4,21.0),Measles at 19.2% 95% CI (18.4,21.0), while vaccination by Card +history BCG (at birth) is as at 51.2%,OPV 3 (49.9%) , Penta 3 at 49.3%,IPV at 38.7 % and Measles at 48.7% as can be seen in the figure above. The figure also shows that the proportion of children aged 12-23 months who had completed their immunizations before their first birthday was 18.9%. At the national level, 51 percent of eligible children age between 12 to 23 months did not receive any vaccinations.

Coverages of Various Vaccines in the Former States (Hubs) in South Sudan

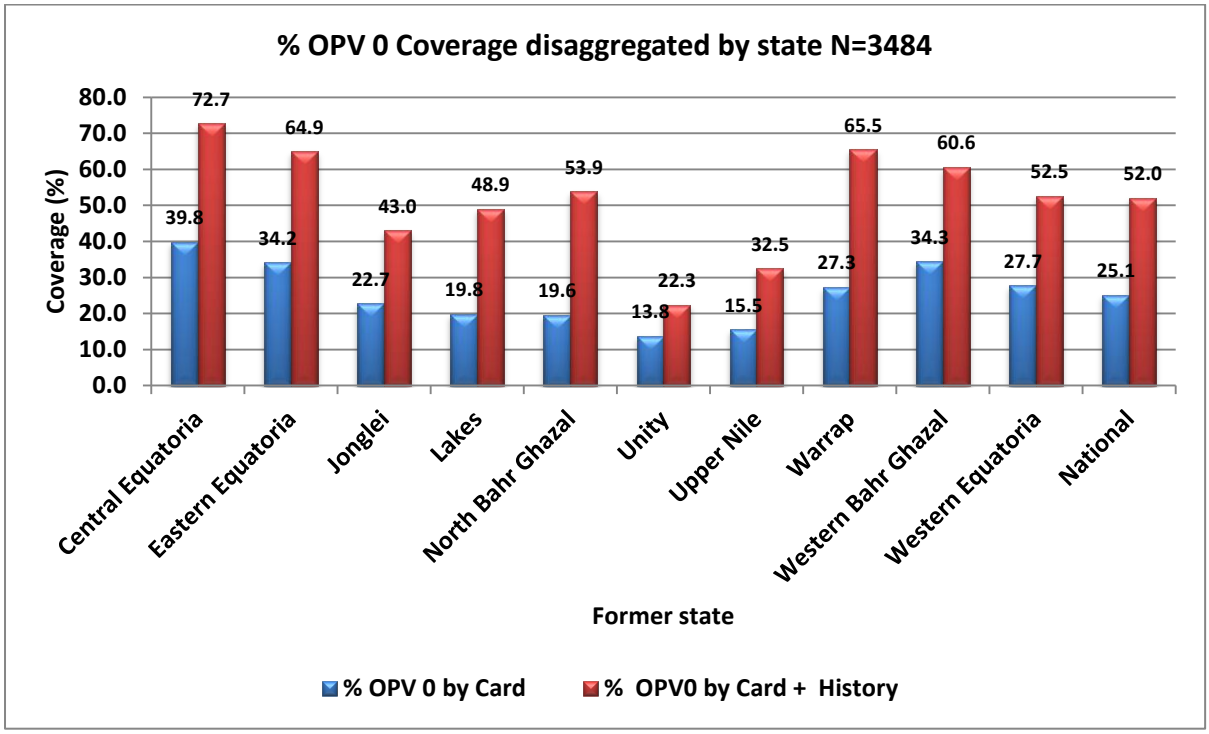
Figure 5. BCG vaccination coverage for Children aged 12-23 months by card, Card + History



Source: South Sudan EPI coverage Survey 2017

The figure above shows that BCG National coverage by card was 24.8% 95%CI (21.5,26.2) and Card + History was 52.2%.Proportion of Children aged 12-23 months vaccinated with BCG and showed BCG scar was 42.6%.The Figure also shows BCG coverages by card + History for Former Central Equatoria, Eastern Equatoria and Warrap state hubs as the highest at 73.3%, 67.3% and 65.3% respectively. Low coverages are observed in former state hubs of Jonglei, Upper Nile and Unity at 42.0%,31.7% and 22.8% respectively.

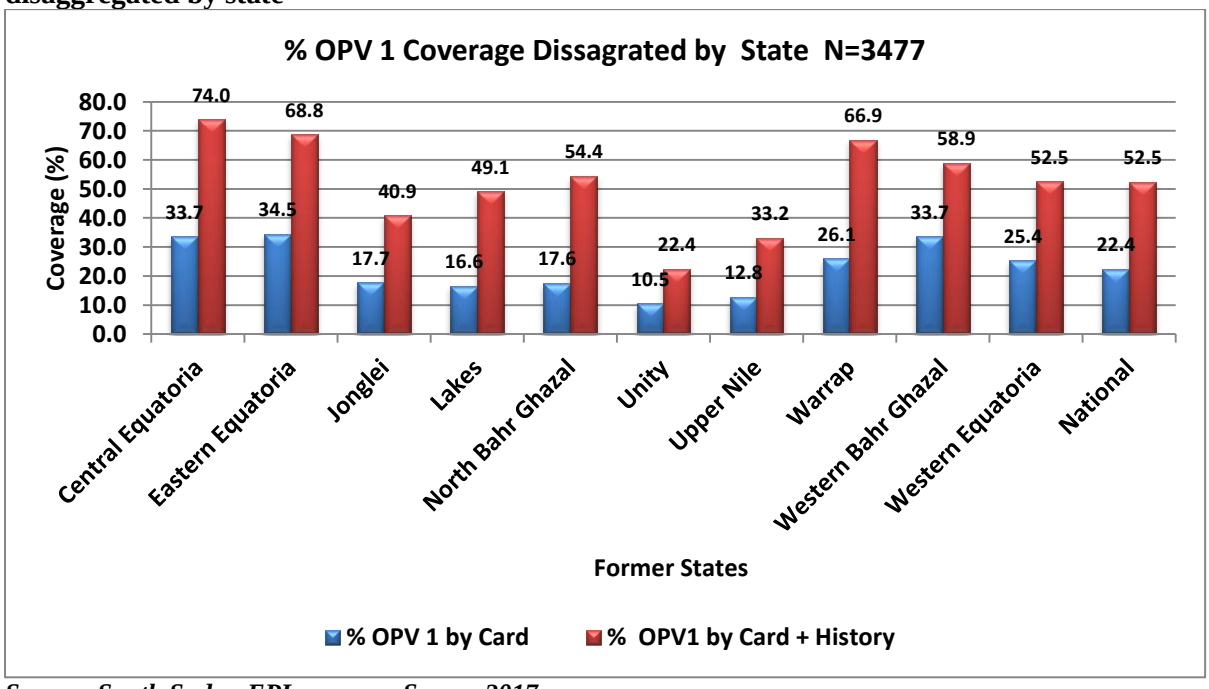
Figure 6: Percentage Coverage Oral Polio Vaccine 0 by Card, Card + History disaggregated by State



Source: South Sudan EPI coverage Survey 2017

In the Figure above, OPV 0 coverage by card is 25.1% 95% CI (23.8, 26.6) and by Card + History was 52.0%.Central Equatoria was observed to have a higher coverage 72.7% by card + History as compared to former Unity hub at 22.3%.

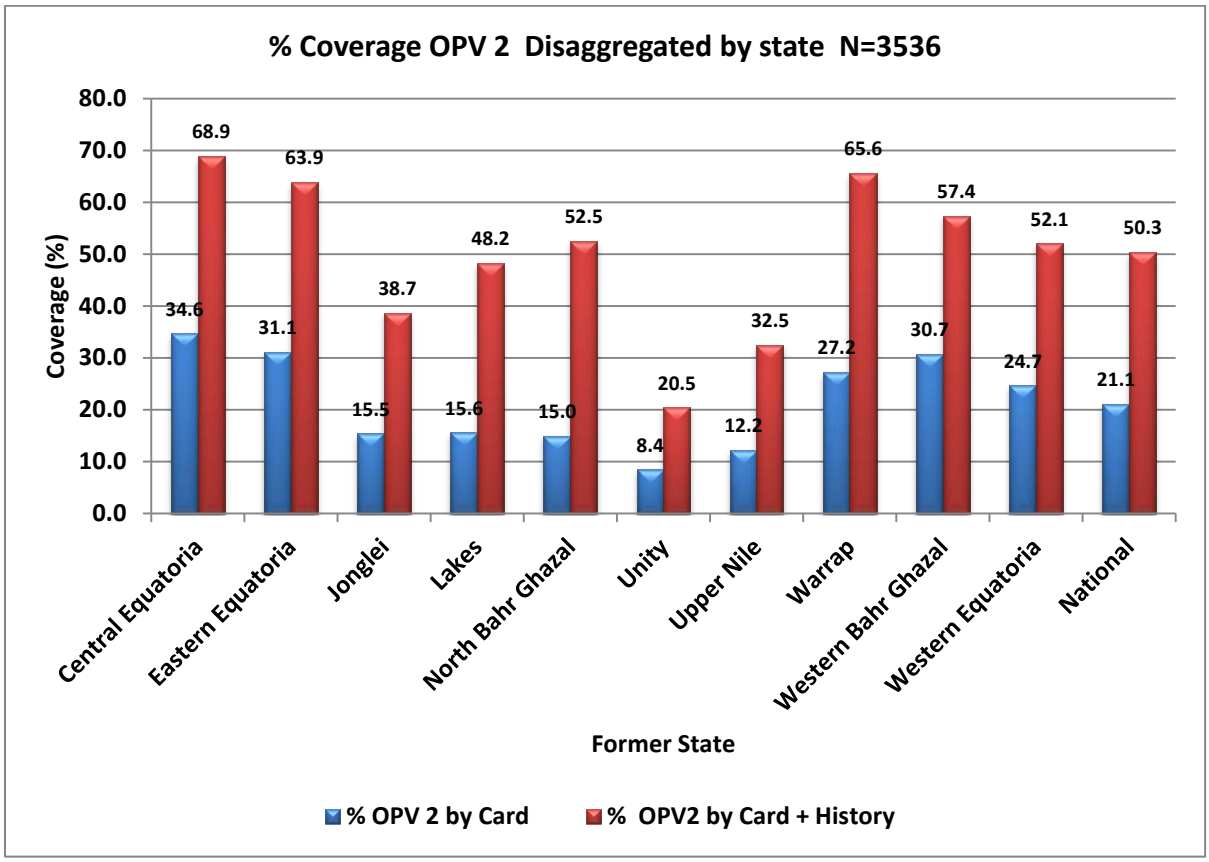
Figure 7. Percentage Coverage Oral Polio Vaccine 1st dose by Card, Card + History disaggregated by state



Source: South Sudan EPI coverage Survey 2017

OPV1 coverage by card was 22.4% 95% CI (21.5, 24.2) and by Card + History was 52.5%. Coverages by card + History in former Central Equatoria hub was higher 74.0% as compared to former Unity Hub at 22.4%.

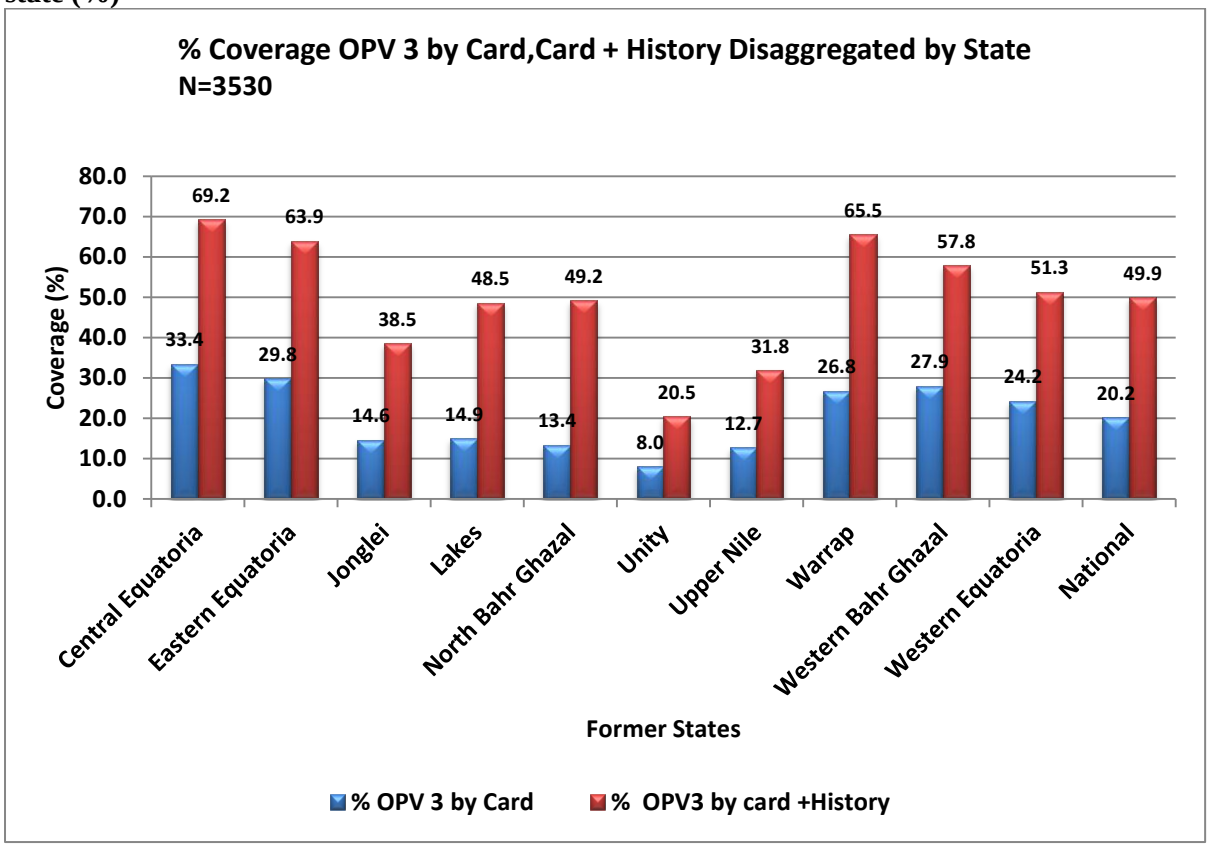
Figure 8. Percentage Coverage of Oral Polio Vaccine 2nd dose by card, card + History



Source: South Sudan EPI coverage Survey 2017

The figure above shows OPV 2 coverage by card was at 21.1% 95% CI(20.3,23.1) and by card + History at 50.3%.Former hub of Central Equatoria had higher coverage by card+ History at 68.9% as compared to Former Unity hub at 20.5

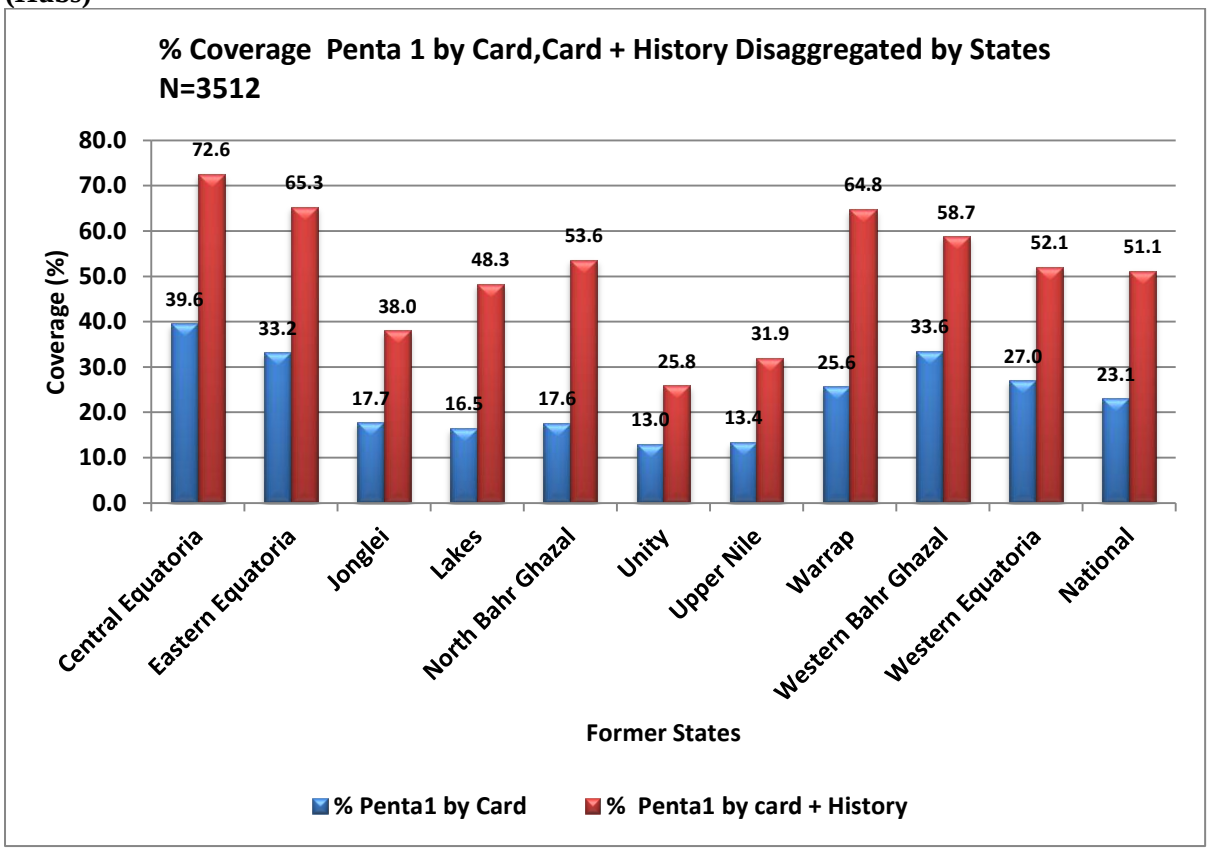
Figure 9. Coverage with Oral Polio Vaccine 3rd dose by card, card + history disaggregated by state (%)



Source: South Sudan EPI coverage Survey 2017

The figure above presents OPV 3 coverages disaggregated by Former States (Hubs).OPV coverage by card was 20.2% 95% CI (19.5,22.2) and by card + history was 49.9%.The figure further shows higher coverages by card + history in the Former Central Equatoria state hub at 69.2% as compared to the lowest coverage of 20.5 % observed in the former Unity State hub.

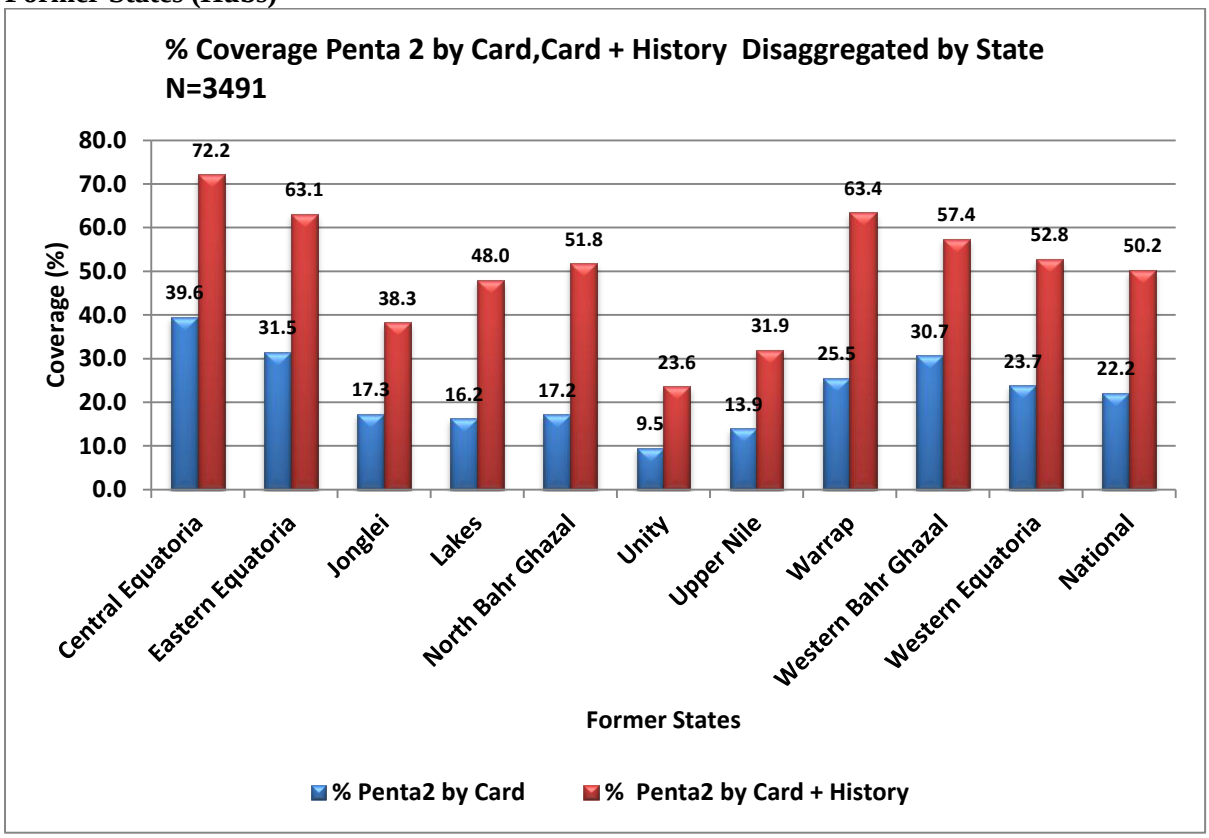
Figure 10. Pentavalent 1 coverage by card, card + history disaggregated by Former States (Hubs)



Source: South Sudan EPI coverage Survey 2017

The figure above shows that Pentavalent 1st dose coverage by card was 23.1% 95% CI (21.7,24.5) and by history was 51.1%.It further shows higher Penta 1 coverage by cad + history at 72.6% in the former Central Equatoria state Hub as compared to 25.8% in the former Unity state hub.

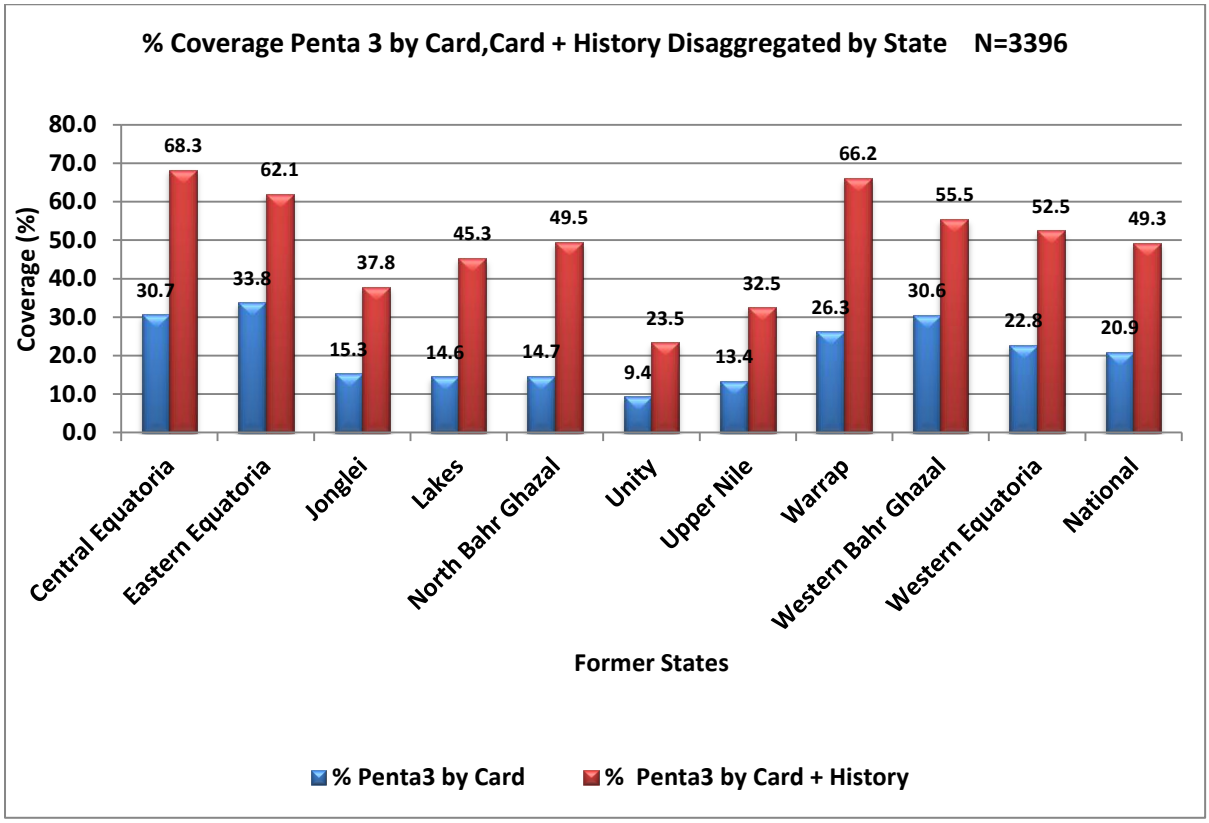
Figure 11. Percentage pentavalent 2nd dose coverage by Card, Card + History disaggregated by Former States (Hubs)



Source: South Sudan EPI coverage Survey 2017

The figure above shows that Pentavalent 2nd dose percentage coverage among children aged 12-23 months was 22.2% 95% CI (20.6,23.3) while by Card +History was 50.2%.The Figure further shows higher coverages by card+ history in the former Central Equatoria state hub was 72.2% and the lowest was observed in the Former States (Hubs) of Unity at 23.6%.

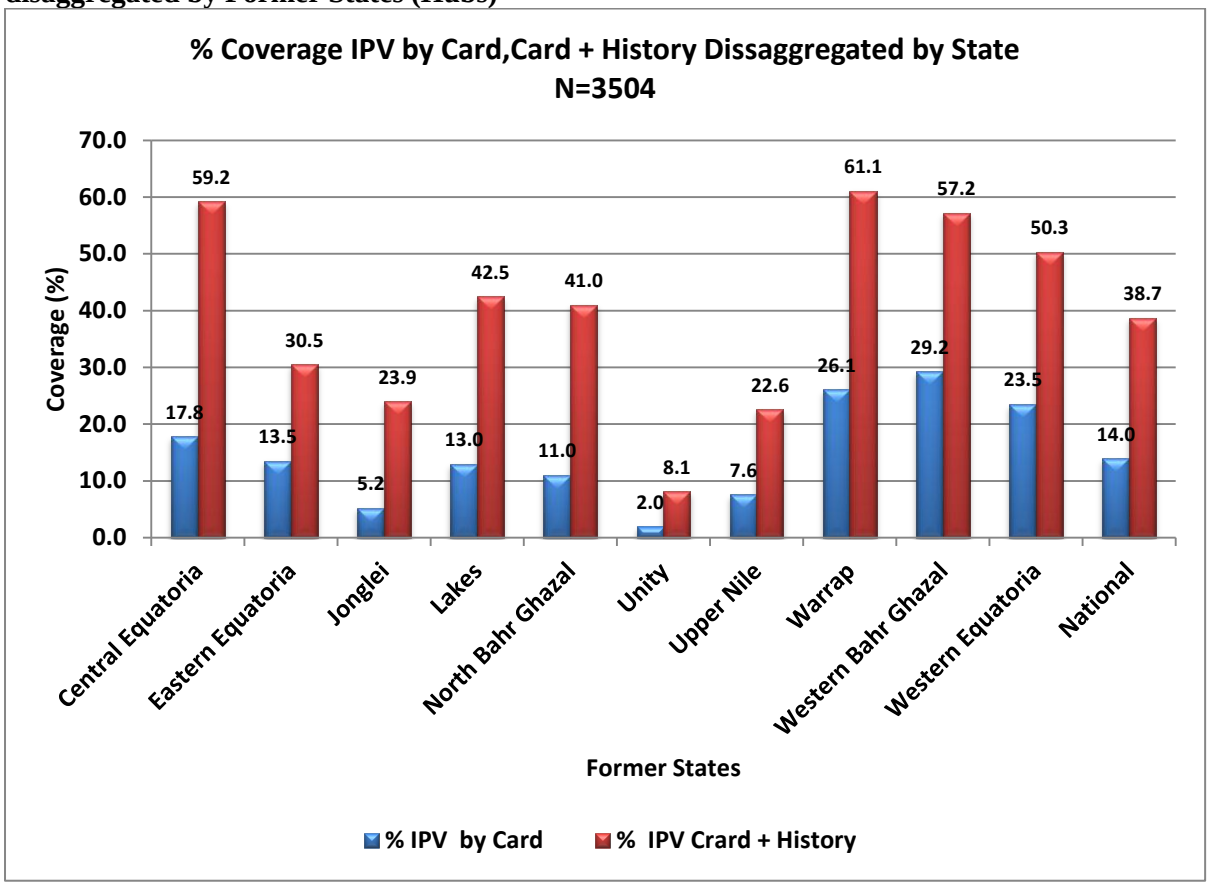
Figure 12: Pentavalent 3rd dose coverage by Card, Card +History disaggregated by Former States (Hubs)



Source: South Sudan EPI coverage Survey 2017

The figure above presents 3rd dose of pentavalent vaccinations among children aged 12-23 months. Percentage coverage for Penta 3 by card was 20.9% 95% CI (19.4, 22.2) while by Card + history was (49.3%). The figure further shows that higher coverage by card +history was observed in the former Central Equatoria State Hub - 68.3% while the lowest was observed in the Former State hub of Unity at 23.5%.

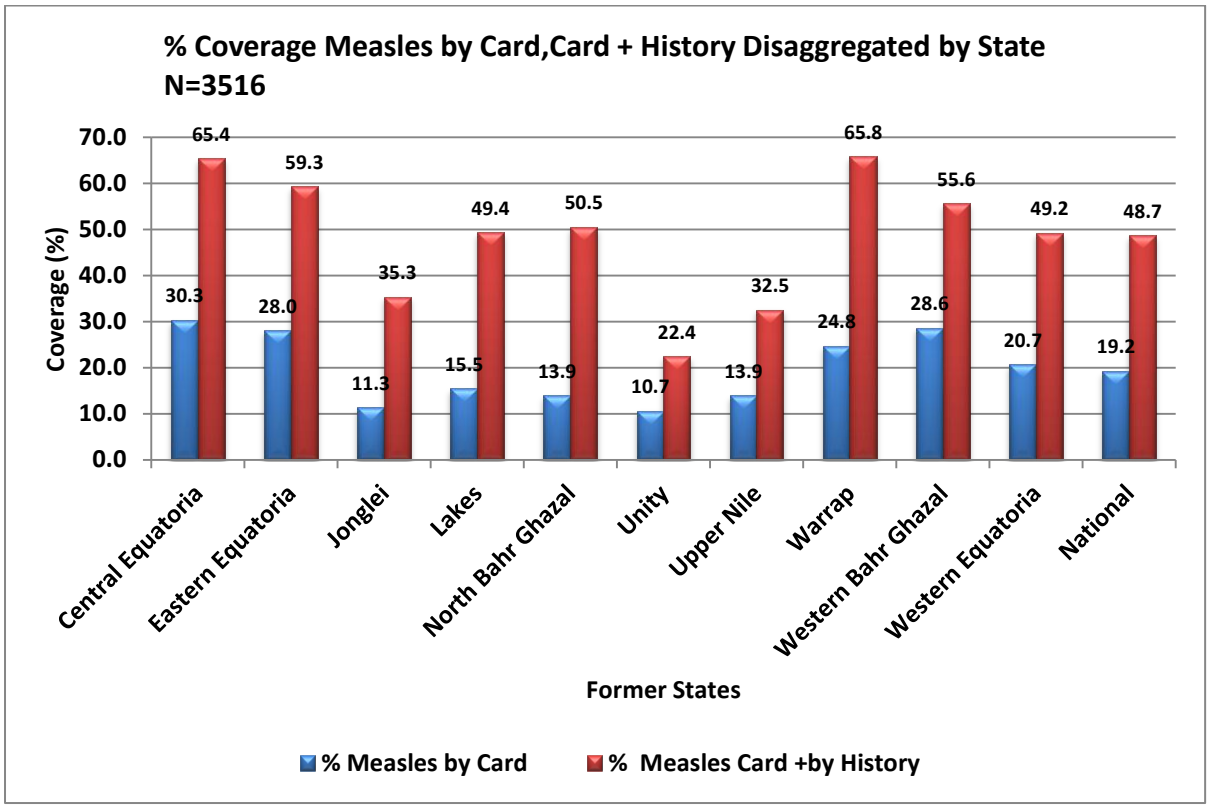
Figure 13. Percentage coverage for inactivated polio Vaccine by Card, Card + History disaggregated by Former States (Hubs)



Source: South Sudan EPI coverage Survey 2017

The Figure above shows Inactivated Polio Vaccine (IPV) percentage coverage by card was 14.0% 95% CI (13.4, 21.0) and card +History was 38.7%. Further disaggregation by Former States (Hubs) indicates that the highest coverage by card + history was observed in the former Central Equatoria state hub at 59.2 % and the lowest coverage observed in the former Unity state hub at 8.1%.

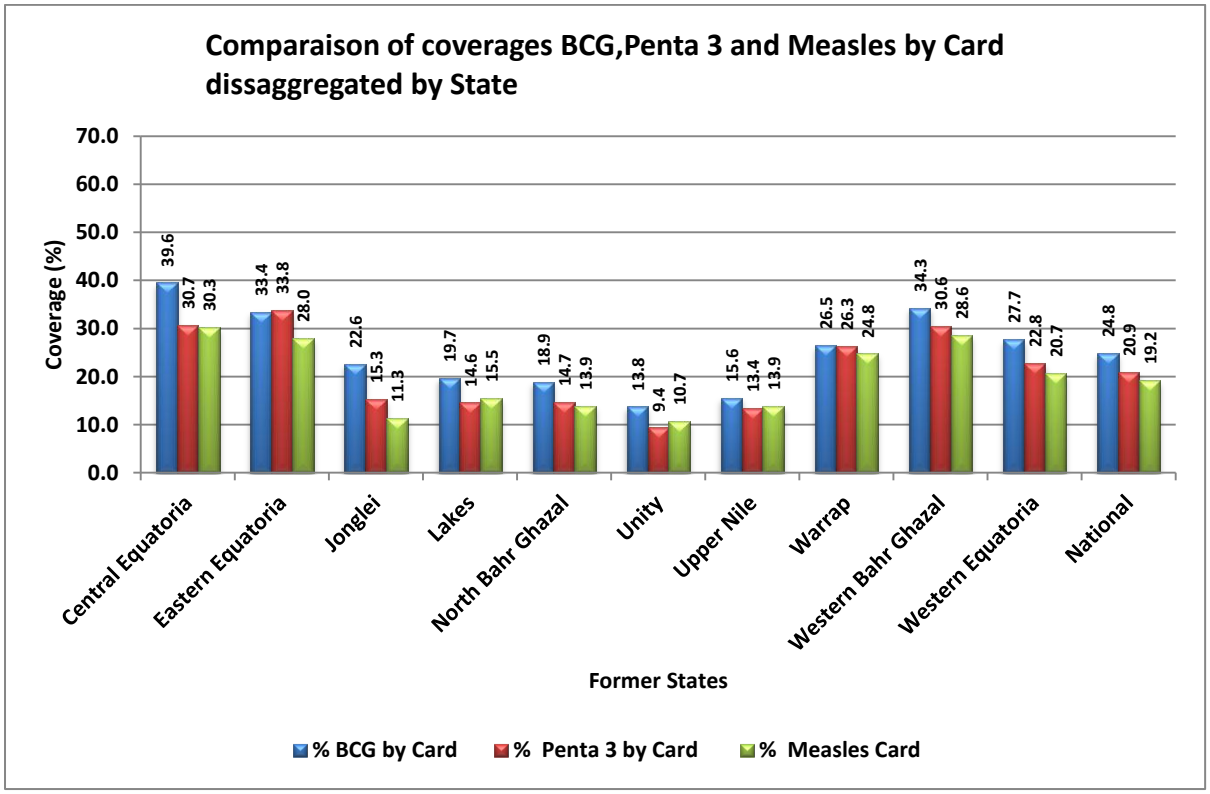
Figure 14. Percentage coverage for Measles by Card, Card + History disaggregated by Former States (Hubs)



Source: South Sudan EPI coverage Survey 2017

The figure above shows measles percentage coverage by card was 19.2% 95% CI (13.4, 21.0) and card +History was 48.7%. Further disaggregation by Former States (Hubs) indicates that the highest coverage by card + history was observed in the former Warrap state hub at 65.8 % and the lowest coverage observed in the former Unity state hub at 22.4%.

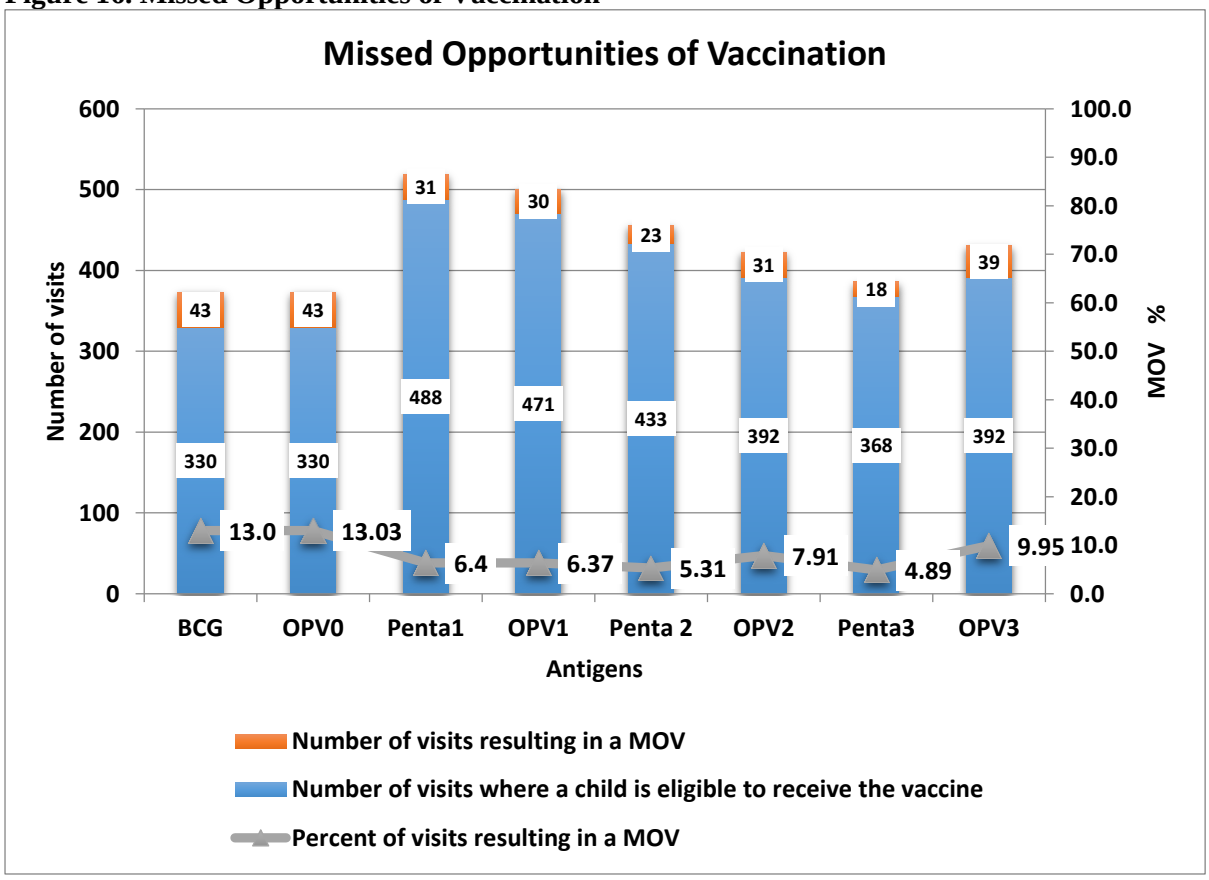
Figure 15. Comparison BCG, Penta 3 and Measles percentage coverages by card disaggregated by Former States (Hubs)



Source: South Sudan EPI coverage Survey 2017

The figure above compares percentage coverages of BCG,Penta 3 and Measles among children aged 12-23 months across the 10 Former States (Hubs) in South Sudan. Former State (Hub) of Central Equatoria, Eastern Equatoria,Warrap,Western Bahr el Ghazal and Western Equatoria had higher measles coverages ranging from 20.7%-30.3% as compared to Coverages for ranging from11.3%-15.5% for the rest of the former state hubs.BCG coverage was higher in the former Central Equatoria (39.6%) and Western Bahar el Ghazal 34.3% whereas the lowest coverage was observed in the former unity state hub at 13.8%.Former States (Hubs) of Jonglei, Upper Nile and Unity reported the lowest coverages across the three antigens.

Figure 16. Missed Opportunities of Vaccination



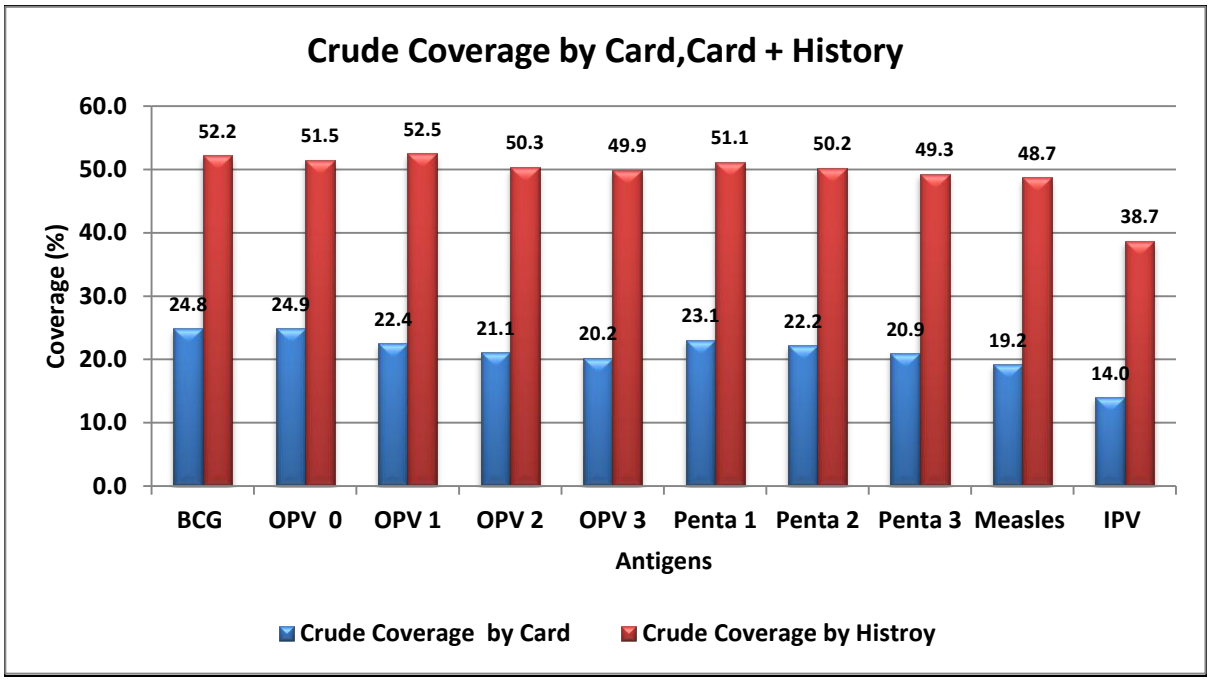
Source: South Sudan EPI coverage Survey 2017

MOV for BCG and OPV 0 was 13%, Penta 1 and OPV 1 was 6.4%, Penta 2 was 5.3% and OPV 2 was 7.9%.The missed opportunity for Penta 3 and OPV 3 were 4.8% and 9.9% respectively. The causes of the missed opportunities are likely to be as a result of stock out of vaccines as well as postponement of vaccinations.

Crude Coverage

Crude coverage in this survey includes all doses (whether valid or not) for each respective vaccine by document (home-based record and/or register) plus history, by the time of the survey.

Figure 17. Percentage crude coverage by Card, Card + History disaggregated by all antigens



Source: South Sudan EPI coverage Survey 2017

Overall, the percentage crude coverage (card and history combined) is ranging between 48.7% to 52.5% for all the Antigens in the National Immunization program. Further analysis show that Penta 1 recorded the highest percentage crude coverage of 23.1% while Inactivated Polio Vaccine (IPV) recorded the lowest percentage crude coverage of 14.0%.

Validity and Timeliness of vaccinations administered to children aged 12-23 months

Validity in this context means valid doses that were administered to children aged 12-23 months. Valid doses therefore were doses administered when a child had reached the minimum age for the vaccine, and was administered with the proper spacing between doses according to the national schedule. For a vaccine dose to be considered valid, the child must have attained the minimum age to be eligible for the dose (single-dose vaccines and first-dose in sequence) as per WHO vaccination coverage cluster survey reference manual-2018.

This section outlines the valid doses that were administered and the proportion coverages for the selected antigens as indicated by the table below.

Table 10. Table showing validity and timeliness of vaccinations during the survey

Invalid doses of Vaccines Table					
dose	**Recommended age**	**Invalid dose (very early)**	**Timely dose**	**Delayed dose**	**Late (not included in coverage for age)**
BCG	Birth	-	0-30 days of age	31-364 days of age	> 365 days of age (not recommended)
Polio 1/Penta 1	6week	< 42 days of age	42-90 days of age	91-364 days of age	> 1 year of age (365 days)
Polio 2/Penta 2	10weeks	< 28 days since previous dose	70-150 days of age or 28-58 days since previous dose	> 211 days of age, or > 59 days after previous dose	> 1 year of age (365 days)
Polio 3/Penta 3	14weeks	< 28 days since previous dose	98-210 days of age or 28-58 days since previous dose	91-104 days of age	> 1 year of age (365 days)

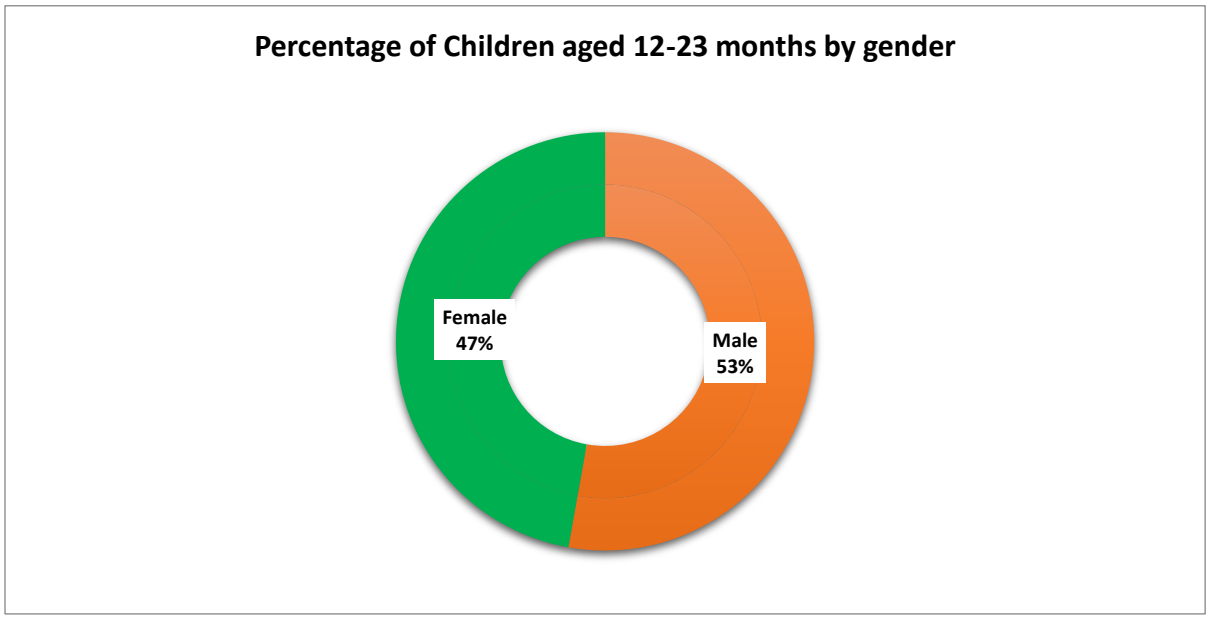
Table 11. Valid coverage by card among children aged 12-23 months

CHILDHOOD IMMUNIZATION BY CARD		**Wilson 95% Conf Limits**	
Valid Coverage(Card) before 1st birthday	**Coverage %**	**Lower limit**	**Upper limit**
BCG by Card	20.6	18.05	23.48
OPV 0 by Card	18.7	16.17	21.39
OPV 1 by Card	11.6	9.52	13.8
OPV 2 by Card	10.4	8.45	12.54
OPV 3 by Card	10.1	8.24	12.29
Penta 1 by Card	13.6	10.92	15.44
Penta 2 by Card	11.2	9.2	13.43
Penta 3 by Card	11.0	8.98	13.17
Measles by Card	11.6	9.52	13.8

Source: South Sudan EPI coverage Survey 2017

The Table above shows that the valid coverages for BCG, Penta 1 by evidence of vaccination card range between 13.6% to 20.6%.Measles valid coverage was estimated at 11.6%.The least valid coverage was observed with Penta 3 coverage at 11.0%.

Figure 18. Percentage of children aged 12-23 months surveyed by gender



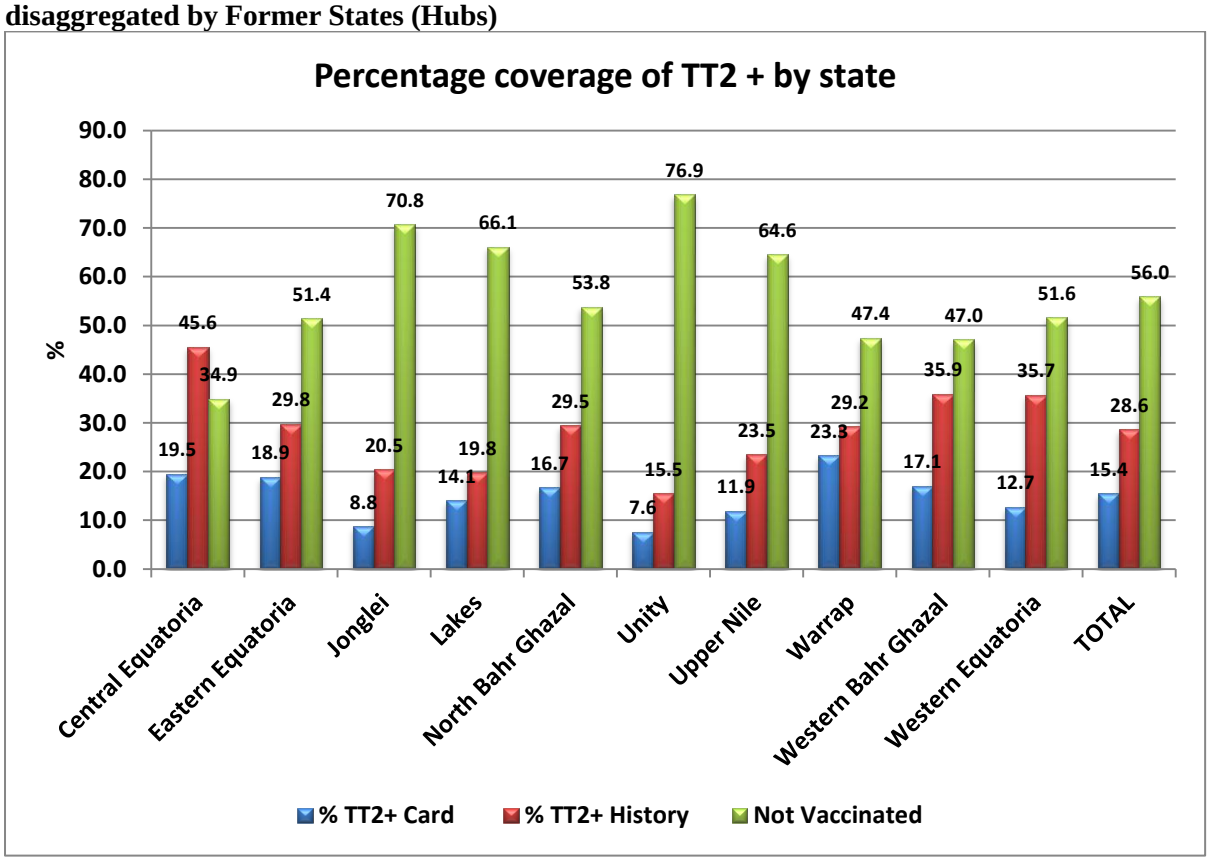
Source: South Sudan EPI coverage Survey 2017

The figure above shows that 53% of Children aged 12-23 months were surveyed as this compares with 47% of females within the sample population.

4.0 TETANUS VACCINATION COVERAGES AMONG MOTHERS OF CHILDREN AGED 0-11 MONTHS

Survey Objective 2: Tetanus Vaccination Coverages among mothers of children aged 0-11 months

Figure 19. Percentage of women who have received two or more doses of tetanus vaccine, disaggregated by Former States (Hubs)



Source: South Sudan EPI coverage Survey 2017

The figure above shows that the TT2 + (card) highest coverage was observed in the Former State hub of Warrap at 23.3% while the lowest was observed in the former Unity state hub at 7.6%. Nationally, 15.4 % of women had received two or more doses of tetanus vaccine. Women who were not protected were observed at 56% nationally.

Survey Objective 3: The proportion of children protected at birth from tetanus

Protection at Birth from Tetanus Toxoid Vaccinations

Table 12. Child protected at birth (Card only)

RI.92. Child protected at birth (Card only)	Frequency	Percent
No	926	74.02
Yes	325	25.98
Total	1251	100.00

Source: South Sudan EPI coverage Survey 2017

The proportion of children protected at birth from tetanus as evidenced with availability of an immunization card for mothers of children aged 0-11 months was only 26% with 74% of them without the immunization cards to provide evidence for vaccination services.

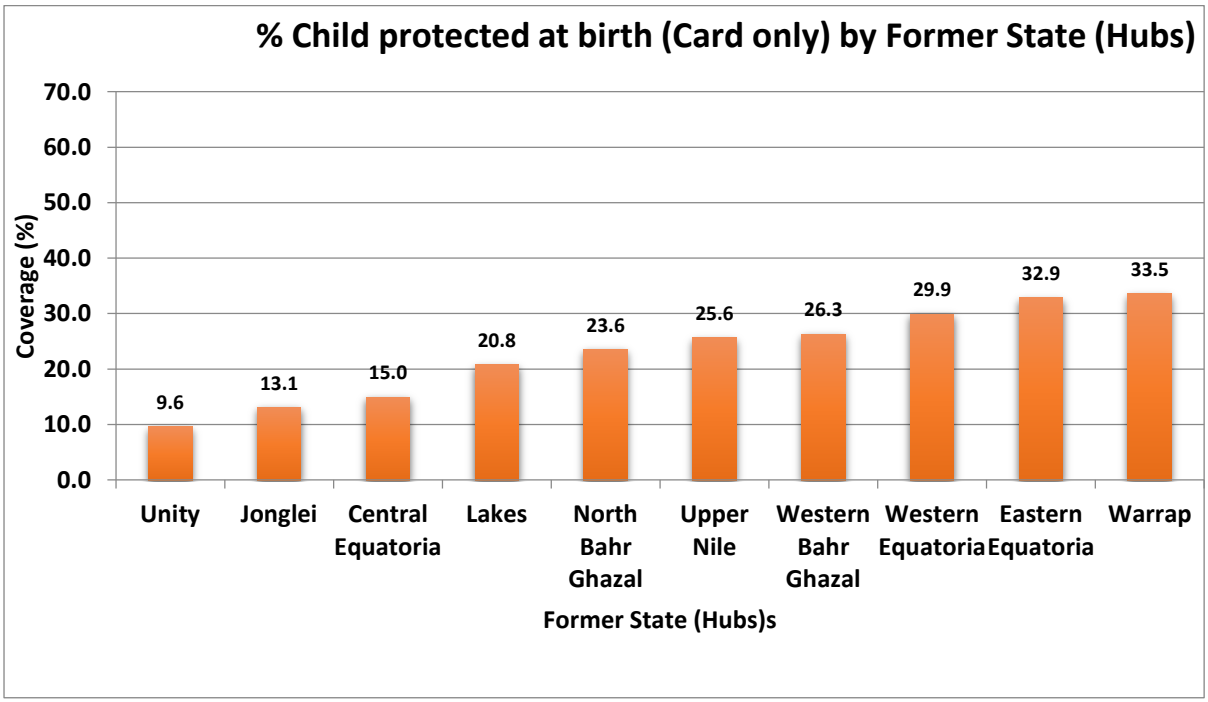
Table 13. Child protected at birth (History only)

RI.93. Child protected at birth (History only)	Frequency	Percent	Lower limit	Upper limit
No	583	45.91	43.18	48.65
Yes	687	54.09	51.35	56.82
Total	1270	100		

Source: South Sudan EPI coverage Survey 2017

The proportion of children protected at birth from tetanus from history given by mothers was that 54% alluded to having received TT vaccination with 46% indicating not having received.

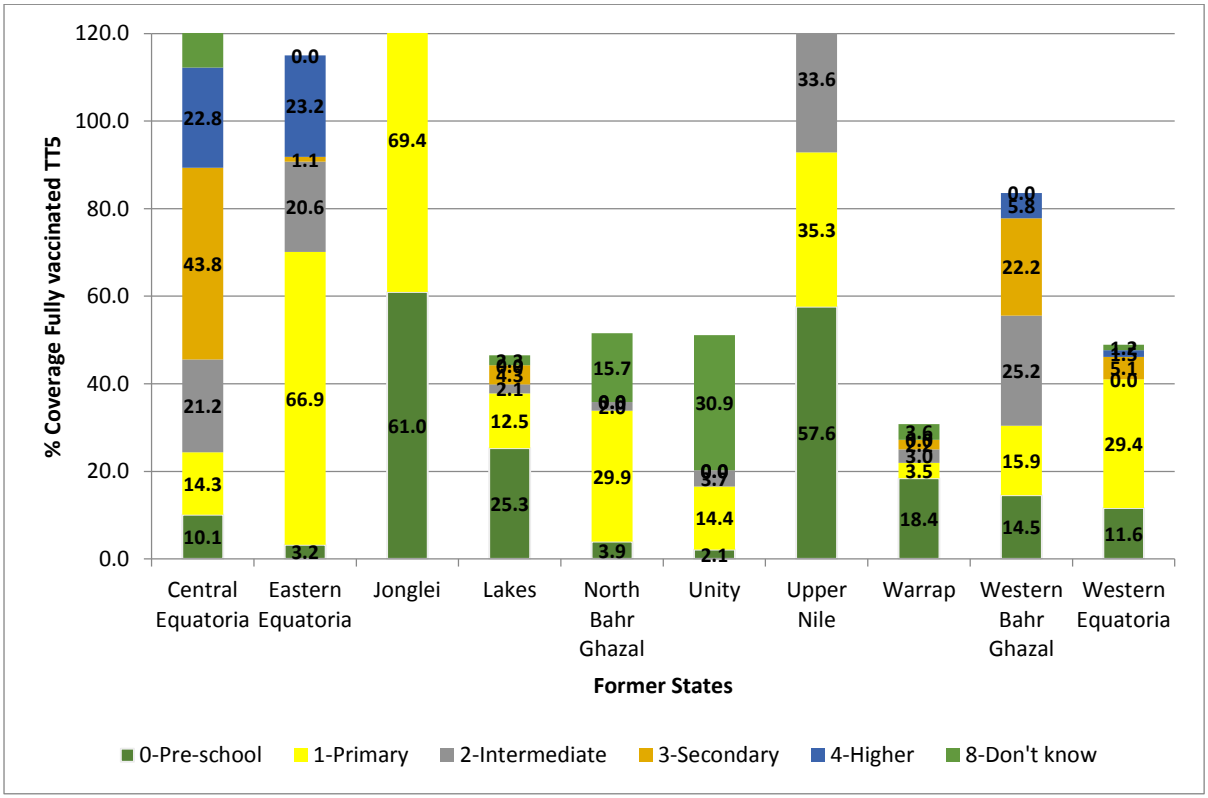
Figure 20. Child protected at birth (Card only) by Former States (Hubs)



Source: South Sudan EPI coverage Survey 2017

The highest coverage of children protected at birth from Tetanus as evidence by availability of card was observed in Warrap (33.5%) followed by Eastern Equatoria (32.9%) and Western Bahr El Ghazal(26.3%).The least was in the former unity state(9.6%)

Figure 21. Proportion of Mother's (of children 0-11 m) education status, fully immunized with card and History by Former States (Hubs) n=914



Source: South Sudan EPI coverage Survey 2017

A large proportion of mothers of children 0-11 months that were fully immunized with pre-school education were located in Jonglei states (61.0%) while those with higher-level education located in Central Equatoria (22.8%).

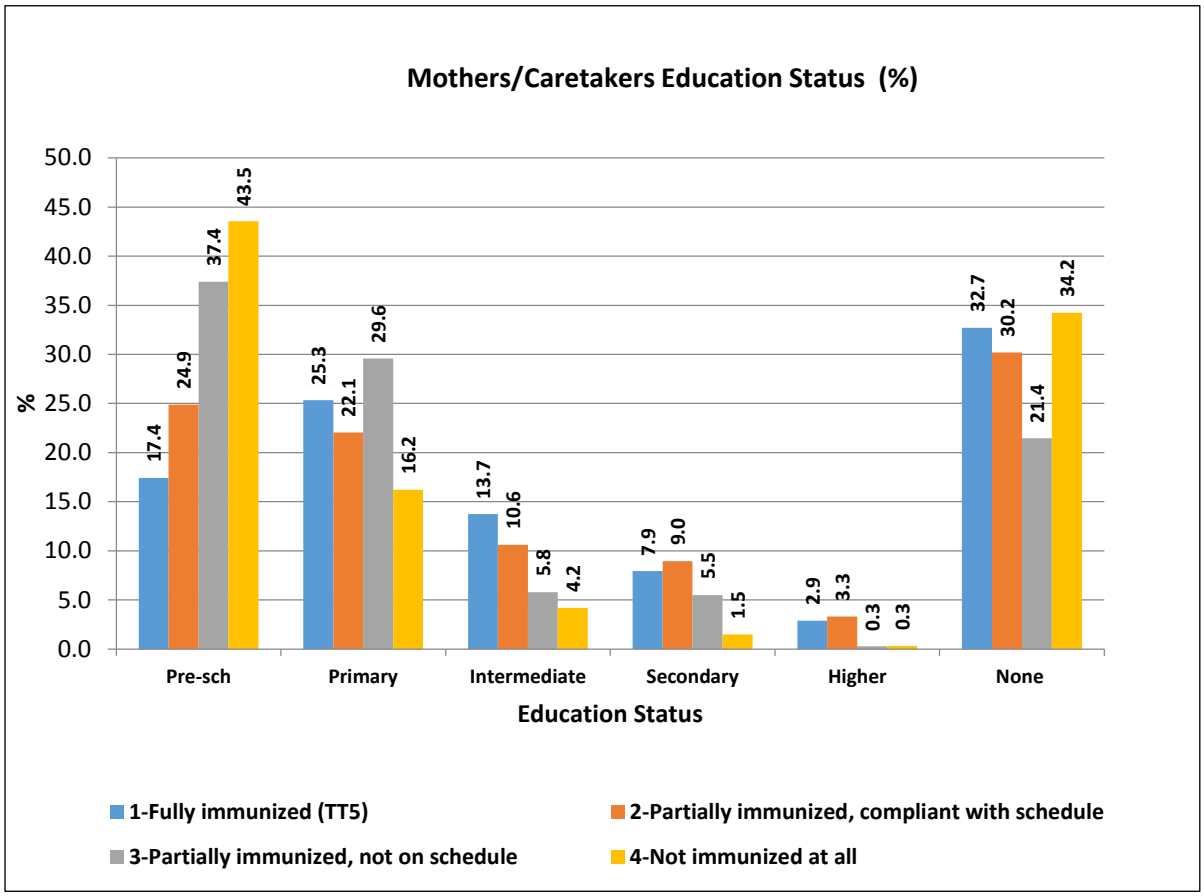
Table 14. Mother living status by State

RI.5. Whether Mother Alive						
HH1.FORMER STATE (HUBS)	**No**	**Yes**	**Total**	**% No**	**% Yes**	**% Total**
Central Equatoria	1	176	177	0.6	99.4	100.0
Eastern Equatoria	3	153	156	1.9	98.1	100.0
Jonglei	10	211	221	4.5	95.5	100.0
Lakes	4	179	183	2.2	97.8	100.0
Northern Bahr El Ghazal	1	228	229	0.4	99.6	100.0
Unity	2	125	127	1.6	98.4	100.0
Upper Nile	1	145	146	0.7	99.3	100.0
Warrap	1	296	297	0.3	99.7	100.0
Western Bahr El Ghazal	1	83	84	1.2	98.8	100.0
Western Equatoria	5	118	123	4.1	95.9	100.0
TOTAL	29	1714	1743	**1.7**	**98.3**	**100.0**

Source: South Sudan EPI coverage Survey 2017

Majority of children with deceased parents were in Western equatorial (4%) with the least in Warrap (0.3%).

Figure 22. Tetanus Toxoid Vaccination and Mothers/Caretakers Education Status (%)



Source: South Sudan EPI coverage Survey 2017

The Figure above indicates that nationally the highest fully immunized (TT5) mothers (33%) were mostly mothers without any formal education compared with those with a higher education status recording (3%). The highest percentage (44%) of non-vaccinated women were mainly from the pre-school status followed by women without formal education (34%) and those with primary school level of Education (16.2%). Low percentages were recorded in intermediate (4%), Secondary (2%) and Higher (0.3%) levels of education.

Table 15. Vitamin A dose to breastfeeding women before most recent source by card or history

	RI.37. Vitamin A-dose before most recent Source							
HH1.FORMER STATES (HUBS)	**1-C**	**2-H**	**3-Not Administered**	**Total**	**% VITA Card**	**% VITA History**	**% VITA Not administered**	**Total**
Central Equatoria	5	117	52	174	2.9	67.2	29.9	100.0
Eastern Equatoria	9	88	57	154	5.8	57.1	37.0	100.0
Jonglei	5	165	122	292	1.7	56.5	41.8	100.0
Lakes	5	157	92	254	2.0	61.8	36.2	100.0
Northern Bahr El Ghazal	9	101	134	244	3.7	41.4	54.9	100.0
Unity	8	186	18	212	3.8	87.7	8.5	100.0
Upper Nile	26	121	15	162	16.0	74.7	9.3	100.0
Warrap	17	290	46	353	4.8	82.2	13.0	100.0
Western Bahr El Ghazal	16	117	17	150	10.7	78.0	11.3	100.0
Western Equatoria	4	117	7	128	3.1	91.4	5.5	100.0
TOTAL	104	1459	560	2123	4.9	68.7	26.4	100.0

Source: South Sudan EPI coverage Survey 2017

The table above shows the highest Vitamin A supplementation coverage by card was in Upper Nile (16%) while the lowest coverage was reported in Jonglei at 2%.Northern Bahr Ghazal, Jonglei and Eastern Equatoria have higher percentage of women not administered with Vitamin A at 55%, 42% and 37 % respectively.

Comparison of Coverages for EPI Coverage survey with Administrative data 2016

Table 16. National Immunization coverage for EPI Administrative data 2016 and EPI Coverage survey 2017

Antigen	National Administrative Coverage 2016	EPI Coverage Survey 2017 (data by cards)
BCG	51.6	24.8
OPV 0	34.7	25.1
OPV 1	57.7	22.4
OPV 2	48.2	21.1
OPV 3	43.0	20.2
Penta 1	58.8	23.1
Penta 2	49.1	22.2
Penta 3	45.0	20.9
Measles	51.9	19.2
IPV	33.9	14.0
Fully Immunized		18.9

Source: South Sudan EPI Data 2016 &EPI coverage Survey 2017

Table 17. Percentage vaccination coverage by EPI administrative data 2016 disaggregated by state

Percentage vaccination coverages by Administrative EPI Data 2016 disaggregated by state											
	BCG %	OPV 0 %	OPV 1 %	OPV 2 %	OPV 3 %	Penta-1 %	Penta-2%	Penta-3 %	IPV	MEASLES %	TT2+ %
CEQ	61.7	50.6	75.2	66.4	60.4	75.1	67.0	62.2	57.6	65.6	38.3
EEQ	50.5	45.1	54.5	48.2	43.6	56.4	49.9	46.8	32.1	46.6	25.9
JON	19.4	7.9	21.1	14.6	14.6	20.9	14.2	12.0	5.3	16.9	10.6
LAK	84.5	45.7	86.0	70.6	63.1	87.3	72.2	64.0	44.0	67.6	92.9
NBG	55.7	41.7	64.4	55.7	44.7	65.5	56.0	45.1	42.5	45.5	52.3
UNI	34.1	16.1	36.2	28.2	24.2	38.7	29.6	26.1	9.6	34.4	14.5
UPN	29.2	14.2	29.5	24.4	19.0	30.8	25.3	19.5	8.0	25.7	13.7
WAR	90.7	69.1	106.7	87.8	80.4	108.7	89.8	91.4	83.5	122.2	79.4
WBG	58.3	36.0	65.0	54.4	45.6	65.6	54.3	47.3	29.7	52.8	33.1
WEQ	51.7	25.7	56.3	47.8	45.5	58.6	48.7	47.3	25.0	49.7	31.8
NATIONAL	**51.6**	**34.7**	**57.7**	**48.2**	**43.0**	**58.8**	**49.1**	**45.0**	**33.9**	**51.9**	**37.7**

Source: South Sudan Admin Coverage 2016

Nationally, Penta 3 coverage, which is normally used to estimate the immunization coverage, recorded 45% by EPI administrative data -2016. The highest percentage coverage was Penta 1 at 59% while the lowest recorded coverage was IPV with 34%.

Table 18. Comparison of Admin 2016 Percentage Vaccination coverages & EPI Coverage Survey 2017 disaggregated by Former State (Hubs)

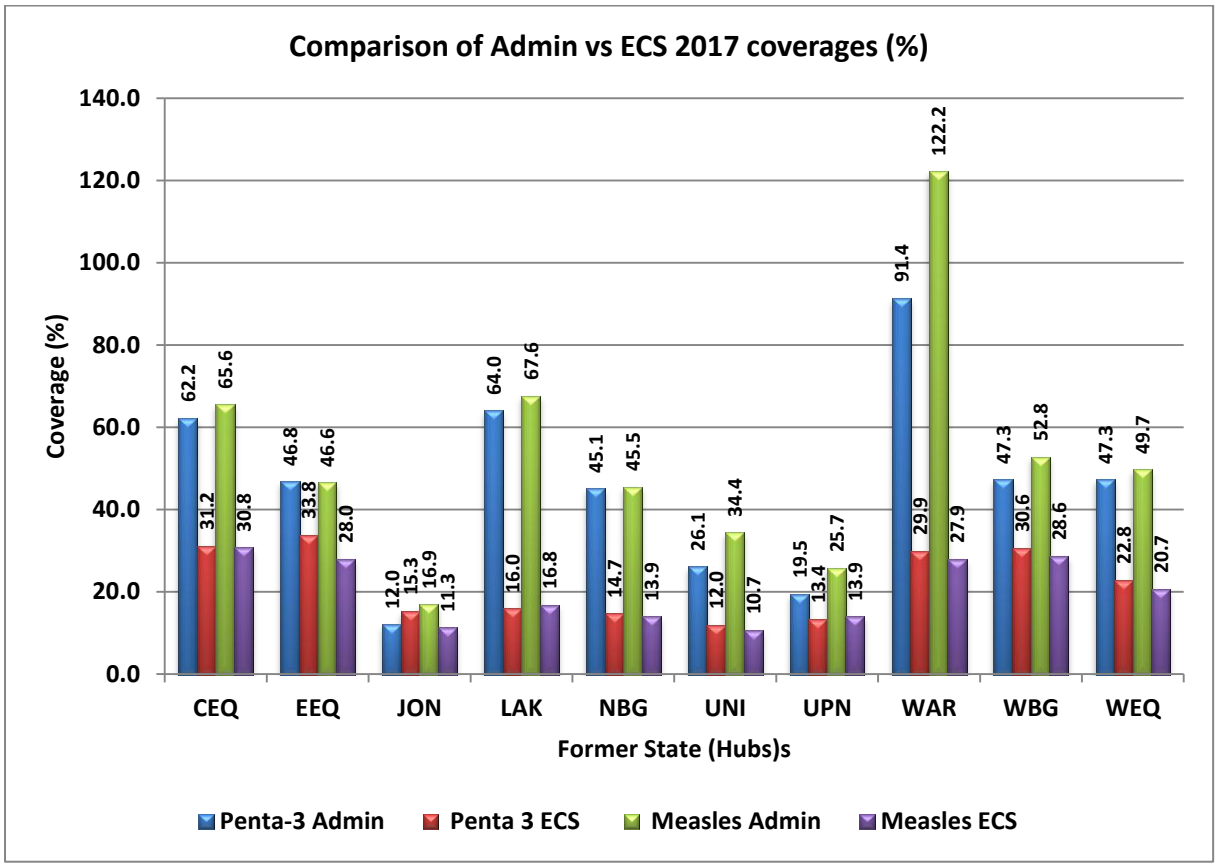
Admin Percentage vaccination coverages & EPI Coverage Survey 2017 by Former State (Hubs)s

Former State (Hubs)	BCG		OPV 0		OPV 1		OPV2		OPV 3		Penta1		Penta 2		Penta 3		IPV		Measles		TT 2+	
	Admin 2016	EPI CS 2017	Admin 2016	EPI CS 2017	Admin 2016	EPI CS 2017	Admin 2016	EPI CS 2017	Admin 2016	EPI CS 2017	Admin 2016	EPI CS 2017	Admin 2016	EPI CS 2017	Admin 2016	EPI CS 2017	Admin 2016	EPI CS 2017	Admin 2016	EPI CS 2017	Admin 2016	EPI CS 2017
CEQ	61.7	39.6	50.6	39.8	75.2	33.7	66.4	34.6	60.4	33.4	75.1	39.6	67	39.6	62.2	30.7	57.6	17.8	65.6	30.3	38.3	19.5
EEQ	50.5	33.4	45.1	34.2	54.5	34.5	48.2	31.1	43.6	29.8	56.4	33.2	49.9	31.5	46.8	33.8	32.1	13.5	46.6	28	25.9	18.9
JON	19.4	22.6	7.9	22.7	21.1	17.7	14.6	15.5	14.6	14.6	20.9	17.7	14.2	17.3	12	15.3	5.3	5.2	16.9	11.3	10.6	8.8
LAK	84.5	19.7	45.7	19.8	86	16.6	70.6	15.6	63.1	14.9	87.3	16.5	72.2	16.2	64	14.6	44	13	67.6	15.5	92.9	14.1
NBG	55.7	18.9	41.7	19.6	64.4	17.6	55.7	15	44.7	13.4	65.5	17.6	56	17.2	45.1	14.7	42.5	11	45.5	13.9	52.3	16.7
UNI	34.1	13.8	16.1	13.8	36.2	10.5	28.2	8.4	24.2	8	38.7	13	29.6	9.5	26.1	9.4	9.6	2	34.4	10.7	14.5	7.6
UPN	29.2	15.6	14.2	15.5	29.5	12.8	24.4	12.2	19	12.7	30.8	13.4	25.3	13.9	19.5	13.4	8	7.6	25.7	13.9	13.7	11.9
WAR	90.7	26.5	69.1	27.3	106.7	26.1	87.8	27.2	80.4	26.8	108.7	25.6	89.8	25.5	91.4	26.3	83.5	26.1	122.2	24.8	79.4	23.3
WBG	58.3	34.3	36	34.3	65	33.7	54.4	30.7	45.6	27.9	65.6	33.6	54.3	30.7	47.3	30.6	29.7	29.2	52.8	28.6	33.1	17.1
WEQ	51.7	27.7	25.7	27.7	56.3	25.4	47.8	24.7	45.5	24.2	58.6	27	48.7	23.7	47.3	22.8	25	23.5	49.7	20.7	31.8	12.7
NATIONAL	51.6	24.8	34.7	25.1	57.7	22.4	48.2	21.1	43	20.2	58.8	23.1	49.1	22.2	45	20.9	33.9	14	51.9	19.2	37.7	15.4

Source: South Sudan EPI coverage Survey 2017 & Admin data 2016

The table above shows the EPI survey vaccination coverages across all the antigens administered to children aged 12-23 months and mothers of children aged 0-11 months in the Former States (Hubs) of South Sudan based on the households that were surveyed in 2017 as evidenced by card against admin coverage 2016. Penta 3 being an indicator for national coverage estimation is at 20.9% 95% CI (19.4,22.2) whereas Mothers who received the 2nd dose of Tetanus Toxoid 2 + recorded is estimated at of 15.4% while the Newly introduced Inactivated Polio Vaccine (IPV) recorded the lowest coverage 14.0% 95% CI (13.4,15.7) as noted in EPI Coverage survey 2017.

Figure 23. Comparison between Administrative Coverage 2016 and EPI Coverage survey 2017 disaggregated by Former States (Hubs)



***Source: South Sudan Admin Coverage 2016 & EPI Survey* 2017**

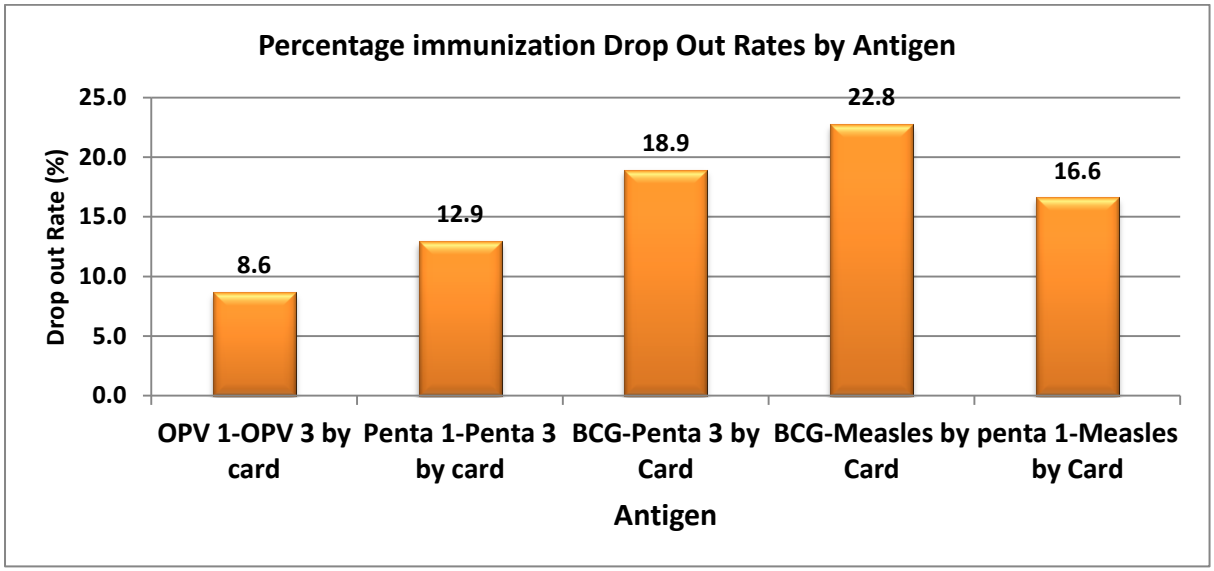
Generally, the Former States (Hubs) of South Sudan have higher administrative coverages as compared to EPI Survey 2017 Coverages across all the antigens represented by Penta 3 and Measles. Former Warrap state has the highest admin coverage of 122% for measles as compared to Unity with the lowest percentage coverage of 10.7% for measles.

5.0 QUALITY OF SERVICE PROVISION & AVAILABILITY OF IMMUNIZATION SUPPLY

Access and dropout rates

Survey Objective 4: The quality and access to immunization services and the factors affecting service provision; including the main reasons for immunization failure and the card availability rate for both mothers and children

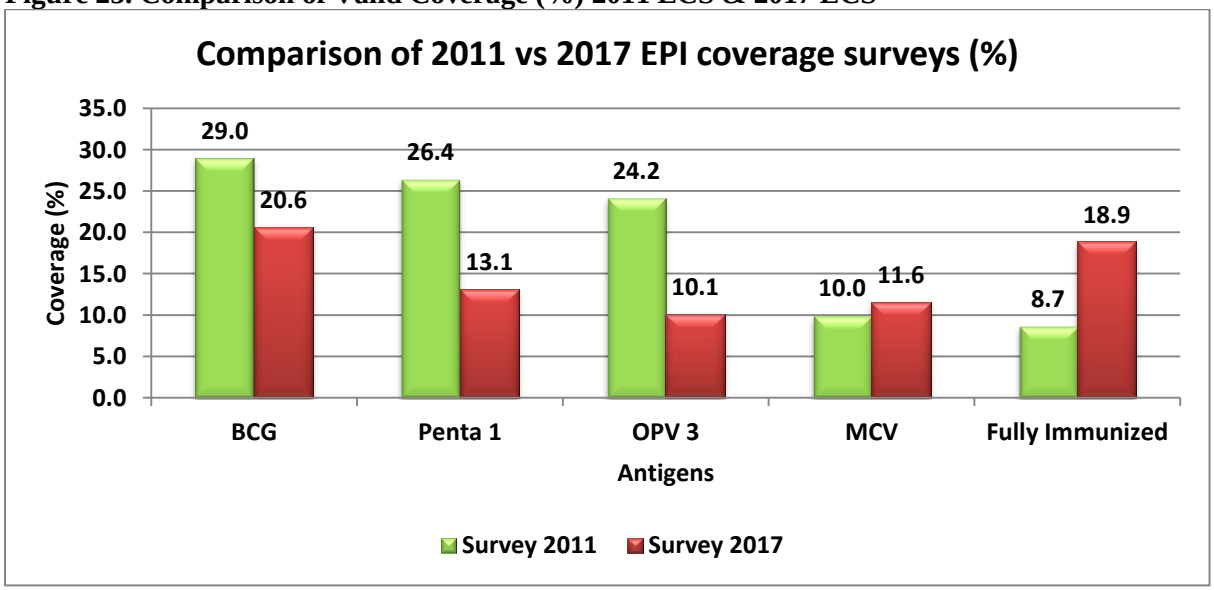
Figure 24. Estimated % dropout rate among children aged 12-23months



Source: South Sudan EPI coverage Survey 2017

The figure above shows the highest dropout was observed with BCG –Measles at 22.8% ,followed by BCG-Penta 3 at 18.9%,Penta 1 – Measles 16.6% and Penta 1-Penta 3 at 12.9%.OPV1-OPV 3 was 8.6%.

Figure 25. Comparison of Valid Coverage (%) 2011 ECS & 2017 ECS



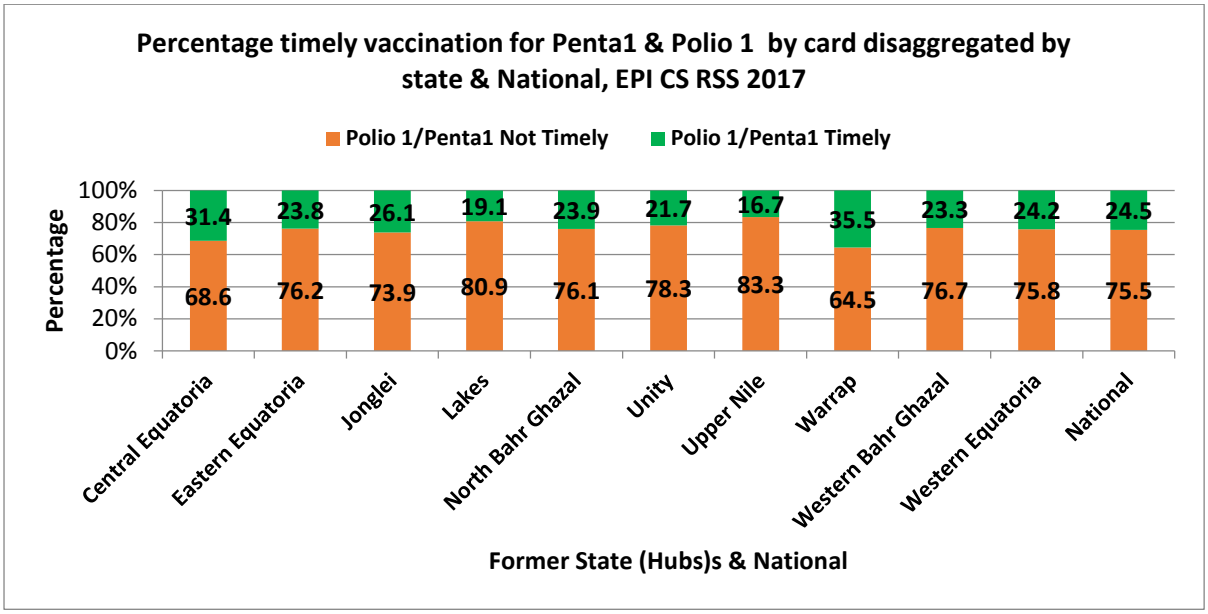
Source: South Sudan EPI coverage Survey 2017

The figure above shows a drop in the valid coverages of 2017 survey as compared to 2011 survey. There is a slight increase with measles valid coverage from 10.0% (ECS 2011) to 11.6% (ECS 2017). Fully immunized significantly increased from 8.7% (ECS 2011) to 18.9% (ECS 2017).

Timeliness of Vaccinations during the EPI Coverage Survey

The timing of administration of a vaccine is important in determining immune response and hence the efficacy of the vaccine in protecting from disease. It is therefore vital that vaccines are given when appropriate according to the schedule.
The figure below shows the percentage timeliness of vaccination of selected antigens disaggregated by former states (hubs);

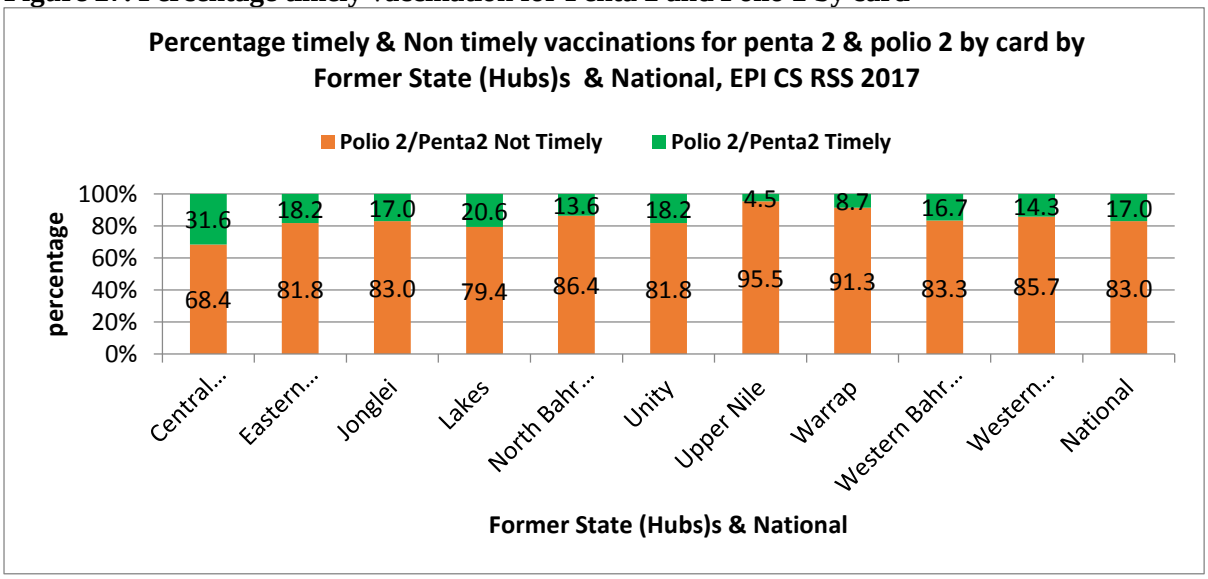
Figure 26. Percentage timely vaccination for Penta 1 and Polio 1 by card



Source: South Sudan EPI coverage Survey 2017

The figure above shows that the highest timely vaccination for Polio 1/Penta 1 was recorded in Central Equatoria at 31% whereas the least timely vaccination was recorded in Upper Nile at 17%.

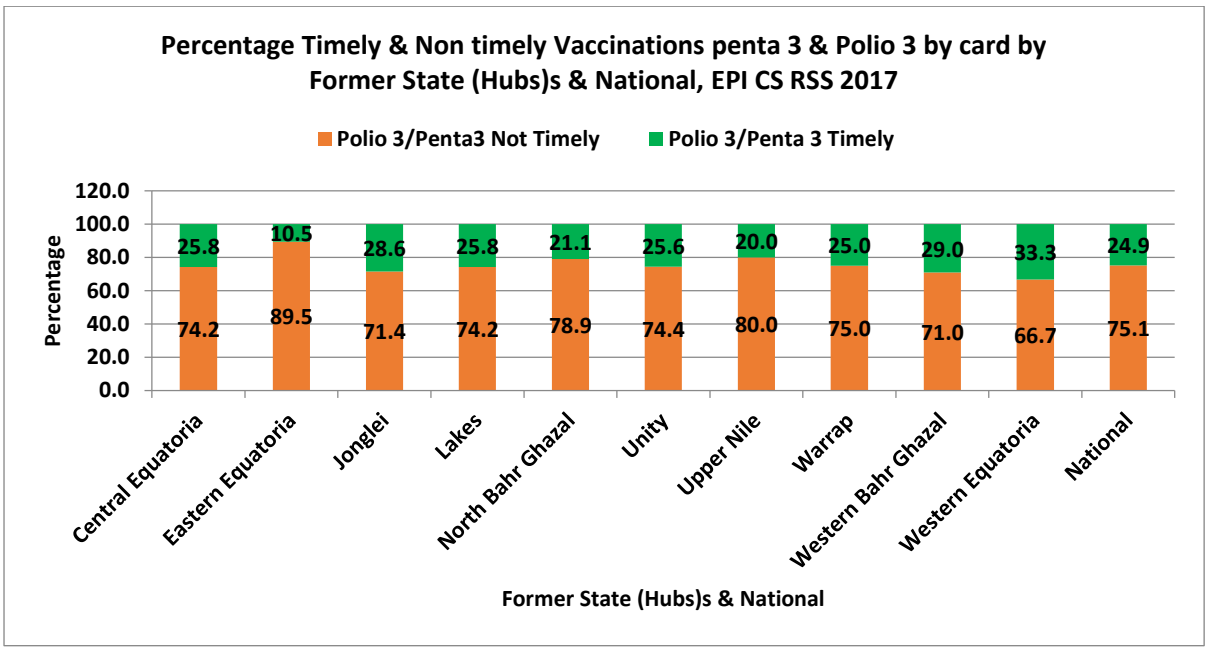
Figure 27. Percentage timely vaccination for Penta 2 and Polio 2 by card



Source: South Sudan EPI coverage Survey 2017

The Highest Percentage timely penta 2 coverage was recorded in Central Equatoria (32%) whereas the lowest was recorded in Upper Nile (5%).

Figure 28. Percentage timely vaccination for Penta 3 and Polio 3 by card



Source: South Sudan EPI coverage Survey 2017

Highest Percentage timely Penta 3 coverage was recorded in Western Equatoria (33%) whereas the lowest was recorded in Eastern Equatoria (11%).

Simultaneous Vaccination coverages for children aged 12-23 months

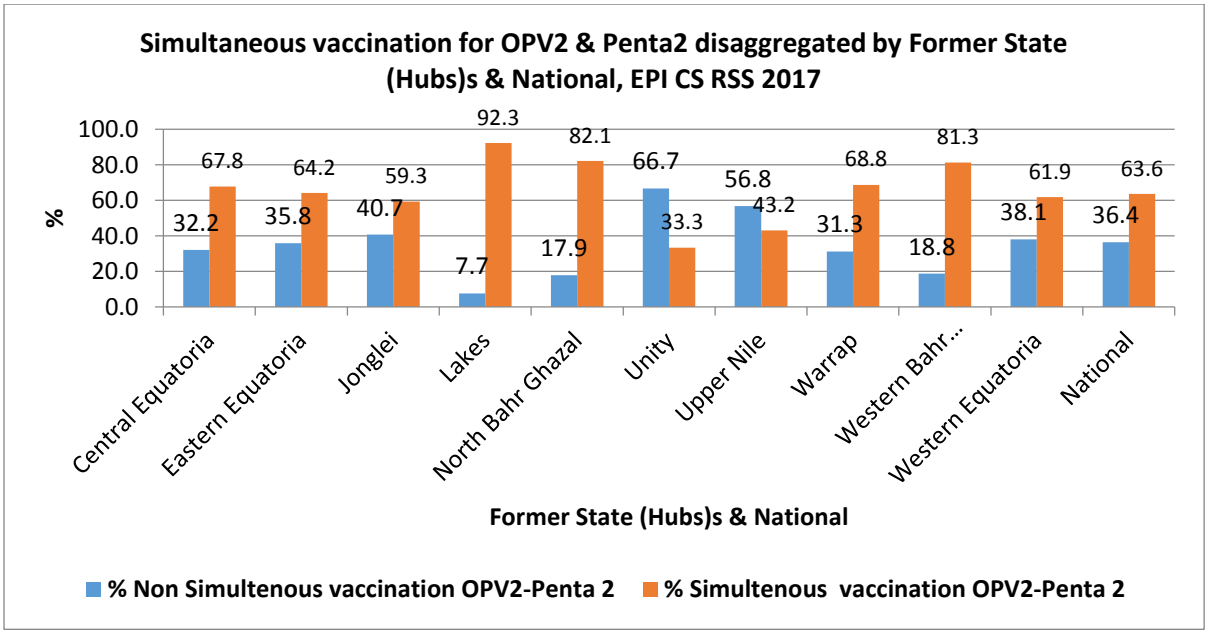
Table 19. Percentage of vaccines administered simultaneously on the same day, disaggregated by State; OPV1-Penta 1

Count of Simultaneous Vaccination OPV1-Penta 1					
Former States (Hubs)	**No**	**Yes**	**Grand Total**	**% Non-Simultaneous vaccination**	**% Simultaneous vaccination**
Central Equatoria	35	55	90	38.9	61.1
Eastern Equatoria	22	35	57	38.6	61.4
Jonglei	42	52	94	44.7	55.3
Lakes	3	13	16	18.8	81.3
Northern Bahr El Ghazal	8	23	31	25.8	74.2
Unity	13	4	17	76.5	23.5
Upper Nile	26	16	42	61.9	38.1
Warrap	7	14	21	33.3	66.7
Western Bahr El Ghazal	3	14	17	17.6	82.4
Western Equatoria	4	21	25	16.0	84.0
Grand Total	**163**	**247**	**410**	39.8	60.2

Source: South Sudan EPI coverage Survey 2017

The national coverage for simultaneous vaccination for OPV1-Pentavalent1 was 60% with Western equator having the highest coverage (84%) with the least in former Unity state with only 23.5% for simultaneous vaccination.

Figure 29. Simultaneous vaccination for OPV 2 and Penta 2



Source: South Sudan EPI coverage Survey 2017

The national coverage for simultaneous vaccination for OPV2-Pentavalent 2 was 64% while the percentage for in the non-simultaneous was 37%.
At state level, the highest simultaneous coverage was recorded in the former Lakes state at 92% while the lowest was recorded in the former Unity State at 33%. The non-simultaneous vaccination for OPV2-Penta 2 was recorded in the former Unity at 67% whereas the lowest was seen in Lakes at 8%.

Table 20. Simultaneous vaccination OPV1-Penta1 disaggregated by Urban & Rural

Count of Simultaneous Vaccination OPV1-Penta 1 Urban and Rural Clusters EPI Survey 2017											
	1-Urban		1-Urban Total	2-Rural		2-Rural Total	Grand Total	Urban Cluster		Rural Cluster	
Former States (Hubs)	No	Yes		No	Yes			% Non-Simultaneous vaccination	% Simultaneous vaccination	% Non-Simultaneous vaccination	% Simultaneous vaccination
Central Equatoria	17	32	49	17	20	37	**86**	19.8	37.2	19.8	23.3
Eastern Equatoria	9	14	23	13	13	26	**49**	18.4	28.6	26.5	26.5
Jonglei	4	8	12	32	37	69	**81**	4.9	9.9	39.5	45.7
Lakes	1	1	2		9	9	**11**	9.1	9.1	0.0	81.8
Northern Bahr El Ghazal		2	2	5	20	25	**27**	0.0	7.4	18.5	74.1
Unity	3	3	6	4	1	5	**11**	27.3	27.3	36.4	9.1
Upper Nile	4	8	12	18	8	26	**38**	10.5	21.1	47.4	21.1
Warrap		1	1	5	10	15	**16**	0.0	6.3	31.3	62.5
Western Bahr El Ghazal	2	11	13		2	2	**15**	13.3	73.3	0.0	13.3
Western Equatoria	2	12	14	2	3	5	**19**	10.5	63.2	10.5	15.8
Grand Total	**42**	**92**	**134**	**96**	**123**	**219**	**353**	**11.9**	**26.1**	**27.2**	**34.8**

Source: South Sudan EPI coverage Survey 2017

The national coverage for simultaneous vaccination for OPV3-Pentavalent3 in the urban cluster was 26% as compared to rural cluster 34.8% with Western Bahr El Ghazal having the highest coverage for Urban cluster coverage (73%) with the least in former Upper Nile state with only 6% for simultaneous vaccination for in the urban cluster. The highest coverage for simultaneous vaccination for OPV1. Pentavalent1 was observed in Lakes (82%) with the lowest in Unity (9%).

Simultaneous Vaccination OPV2-Penta 2 Urban and Rural Clusters EPI Survey 2017

Table 21. Simultaneous Vaccination OPV2-Penta 2 disaggregated by Urban and Rural

Count of Simultaneous Vaccination OPV2 -Penta 2 Urban and Rural Clusters EPI Survey 2017											
	1-Urban		1-Urban Total	2-Rural		2-Rural Total	Grand Total	Urban Cluster		Rural Cluster	
Former State (Hubs)	No	Yes		No	Yes			% Non-Simultaneous vaccination	% Simultaneous vaccination	% Non-Simultaneous vaccination	% Simultaneous vaccination
Central Equatoria	14	35	49	14	24	38	87	16.1	40.2	16.1	27.6
Eastern Equatoria	7	17	24	12	17	29	53	13.2	32.1	22.6	32.1
Jonglei	1	11	12	32	37	69	81	1.2	13.6	39.5	45.7
Lakes	1	1	2		11	11	13	7.7	7.7	0.0	84.6
Northern Bahr El Ghazal	1	1	2	4	22	26	28	3.6	3.6	14.3	78.6
Unity	3	4	7	5		5	12	25.0	33.3	41.7	0.0
Upper Nile	5	7	12	20	12	32	44	11.4	15.9	45.5	27.3
Warrap		1	1	5	10	15	16	0.0	6.3	31.3	62.5
Western Bahr El Ghazal	2	12	14	1	1	2	16	12.5	75.0	6.3	6.3
Western Equatoria	4	12	16	4	1	5	21	19.0	57.1	19.0	4.8
Grand Total	38	101	139	97	135	232	371	**10.2**	**27.2**	**26.1**	**36.4**

Source: South Sudan EPI coverage Survey 2017

The table above shows that OPV2-Penta 2 were administered simultaneously in the rural and urban set ups. The percentage simultaneous coverage in the rural setup was 36% while the urban setup recorded 27%.The non-simultaneous vaccination coverage in the rural was higher than the urban set up at 26% and 10% respectively.

Table 22. Simultaneous Vaccination OPV3-Penta 3 disaggregated by Urban and Rural

Simultaneous Vaccination OPV3-Penta 3 Urban and Rural Clusters EPI Survey 2017											
	1-Urban		1-Urban Total	2-Rural		2-Rural Total	Grand Total	Urban Cluster		Rural Cluster	
Former State (Hubs)	No	Yes		No	Yes			% Non-Simultaneous vaccination	% Simultaneous vaccination	% Non-Simultaneous vaccination	% Simultaneous vaccination
Central Equatoria	13	34	47	11	21	32	79	16.5	43.0	13.9	26.6
Eastern Equatoria	5	15	20	9	16	25	45	11.1	33.3	20.0	35.6
Jonglei	3	8	11	23	27	50	61	4.9	13.1	37.7	44.3
Lakes	0.0	2	2		9	9	11	0.0	18.2	0.0	81.8
Northern Bahr El Ghazal	0.0	2	2	3	18	21	23	0.0	8.7	13.0	78.3
Unity	5	1	6	4		4	10	50.0	10.0	40.0	0.0
Upper Nile	4	8	12	19	9	28	40	10.0	20.0	47.5	22.5
Warrap	1		1	4	6	10	11	9.1	0.0	36.4	54.5
Western Bahr El Ghazal	1	11	12		1	1	13	7.7	84.6	0.0	7.7
Western Equatoria	3	9	12	3	2	5	17	17.6	52.9	17.6	11.8
Grand Total	35	90	125	76	109	185	310	**11.3**	**29.0**	**24.5**	**35.2**

Source: South Sudan EPI coverage Survey 2017

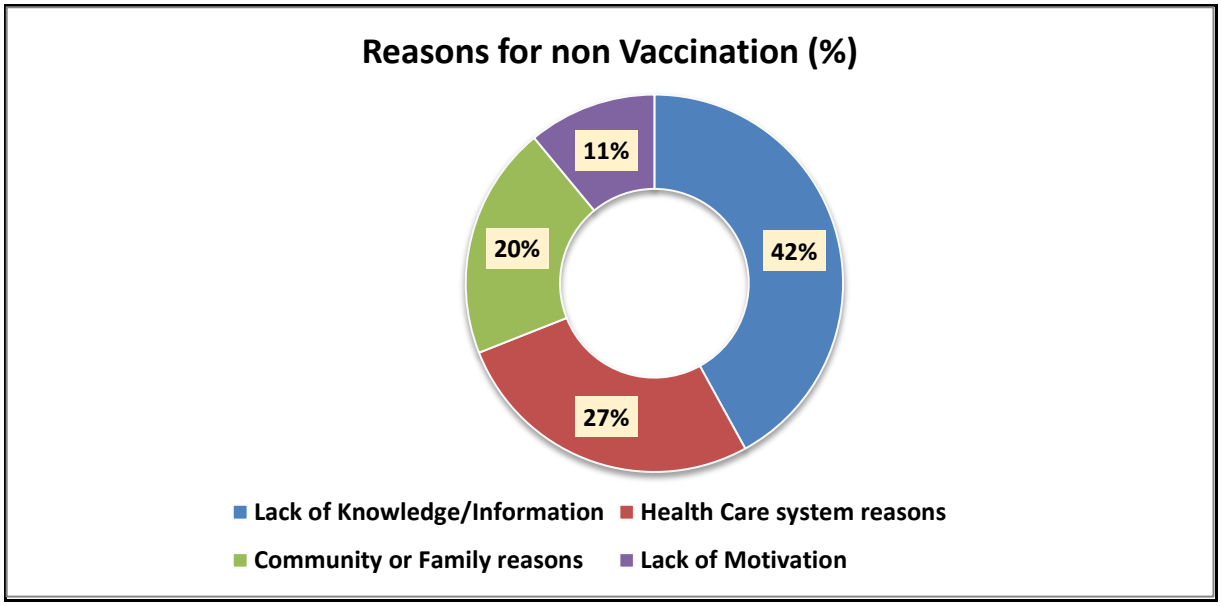
Reasons indicated by caregivers for Non Vaccination of children aged 12-23 months and mothers of children aged 0-11 months

During the EPI Coverage survey of 2017 a number of reasons were indicated as the main obstacles of immunization services across all the Former States (Hubs) in South Sudan. These reasons were categorized into 4 main groups as indicated below

1. Health care System Reasons for Non vaccination
2. Community or Family Reasons for Non vaccination
3. Motivation Reasons for Non vaccination
4. Lack of Information Reasons for Non vaccination

The figure below summarizes the main reasons given by Mothers /Caregivers for Non-Vaccination of the Children

Figure 30. Reasons for non-vaccinations

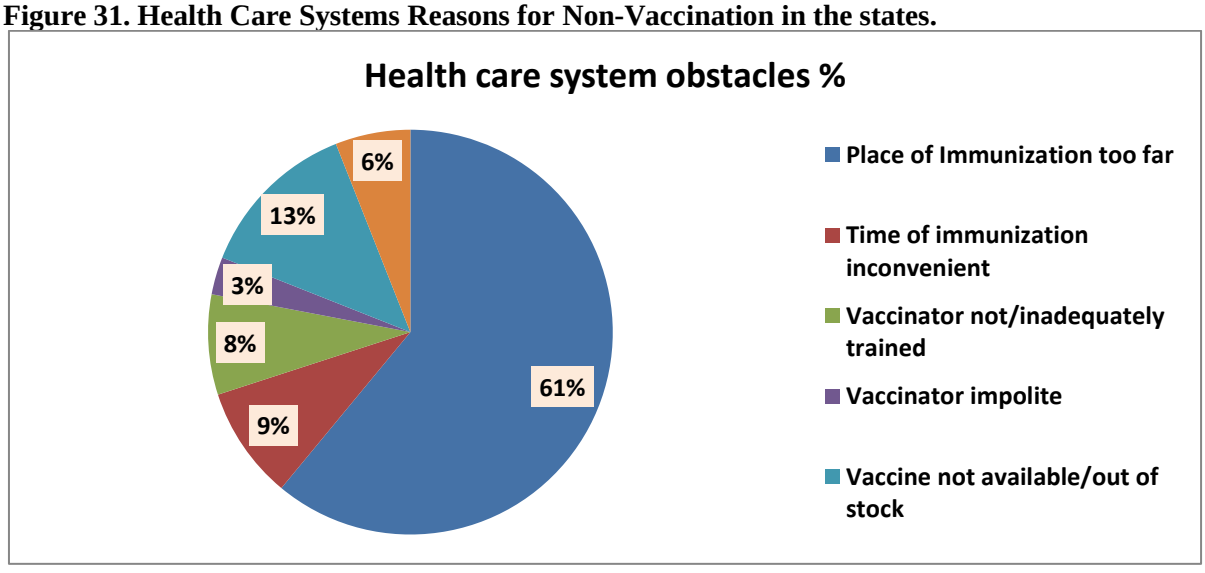


Source: South Sudan EPI coverage Survey 2017

Among the reasons for non-vaccination in the figure above, over 42% of mothers did not have knowledge or information on the benefits of vaccinations for their children. An estimated 27% of the women indicated the reasons for non vaccination of their children was purely within the health care system. Community reasons (20%) were responsible for the mothers not taking their children for vaccinations.11% of the mothers lacked motivation to have their children vaccinated.

(i) Health Care Systems Reasons for Non Vaccination

Figure 31. Health Care Systems Reasons for Non-Vaccination in the states.



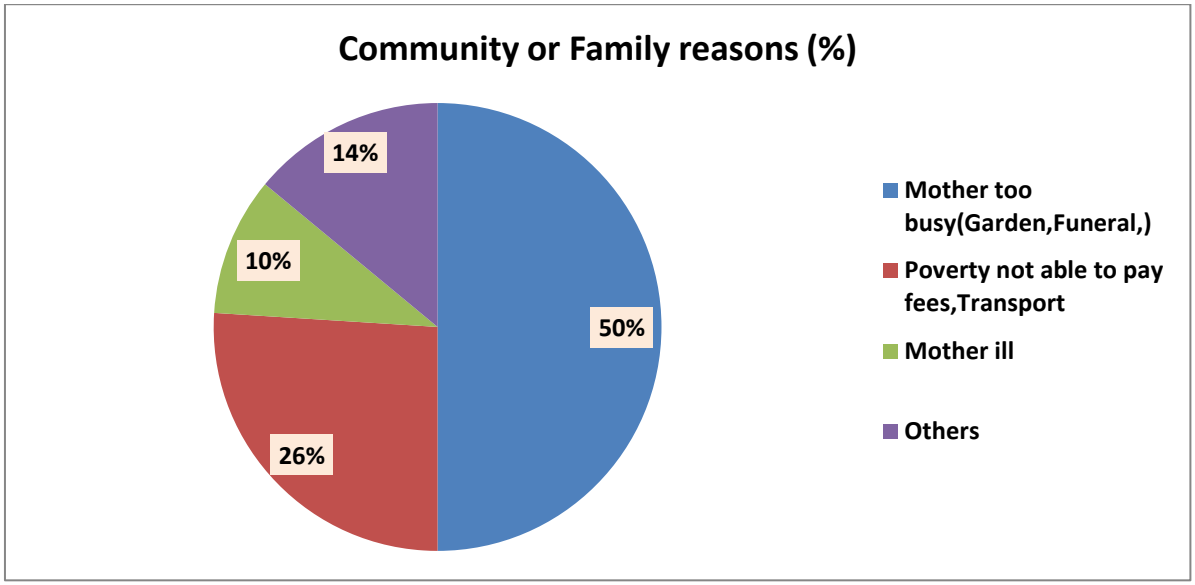
Source: South Sudan EPI coverage Survey 2017

The main reasons for non-vaccination attributed to obstacles of the health care system was cited as the place of immunization being to too far (61%) followed by Vaccines not being available or out of

stock(4.8%).Other reasons included time for vaccination not convenient (9%),Vaccinator not adequately trained (8%),child ill (6%) and Vaccinator impolite (3%).

(ii) Community /Family Reasons for non-vaccination

Figure 32. Community or Family reasons for Non-Vaccination in the states.

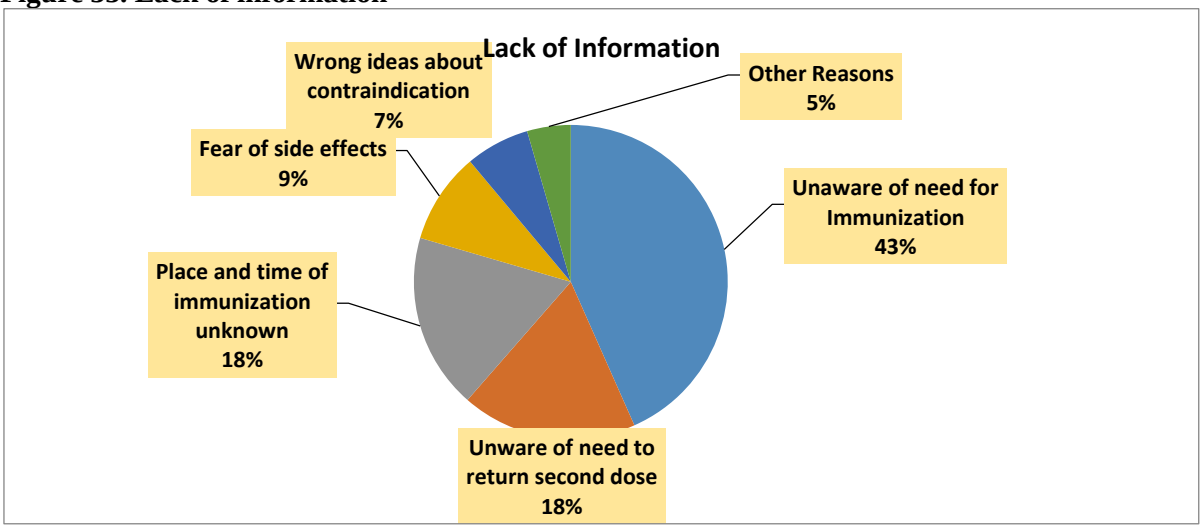


Source: South Sudan EPI coverage Survey 2017

The main reasons for non-vaccination attributed to obstacles in the family/community attributed to the mother or caregiver being too busy (in garden, at work, at funeral) (50%) followed by poverty not able to afford fees, transport (26%) ,mother being ill (10%),others 14%

(iii) Lack of Information Reasons for non-vaccination

Figure 33. Lack of information



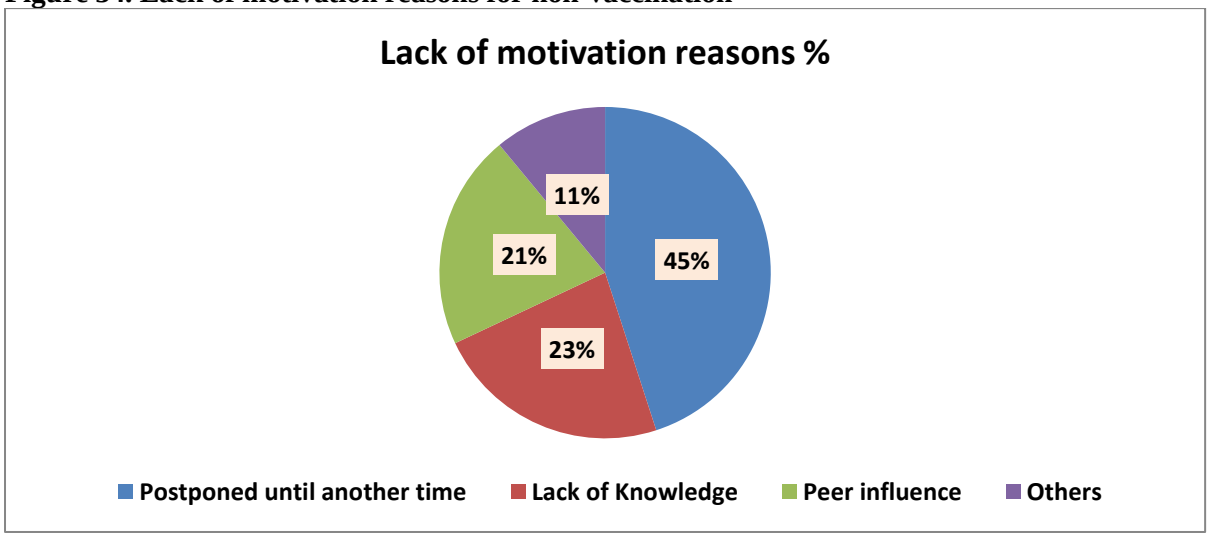
Source: South Sudan EPI coverage Survey 2017

The main reasons given for non-vaccinated children under lack of information were due to most care givers not being unaware of the benefits of immunization for their children (43%) followed by those unaware of need to return for 2 or 3 dose (18 %) while those who did not know the place and time of

immunization (18%) and fear of side effects (9%).The rest of the care givers had misconceptions /wrong ideas about the perceived contraindications or adverse reactions of the vaccines.

(iv) Lack of Motivation reasons for non-vaccination

Figure 34. Lack of motivation reasons for non-vaccination



Source: South Sudan EPI coverage Survey 2017

The main reasons for non-vaccination attributed to lack of information was cited as the vaccination being Postponed until another time (45%),Lack of knowledge on the benefit of immunization (23%) and peer influence from friends and religious sects (21%).The rest of the reasons classified as '***others***' was at 11 %.

Survey Objective 5: Quality of Service provision and availability of Immunization supplies & Commodities at service delivery points

Table 23. Level of Health Facilities assessed

RI.113. Level of Health Facility Assessed	Frequency	Percent
1-PHCU	61	45.86
2-PHCC	51	38.35
3-Hospital (Specify level)	18	13.53
4-Other (Specify Category)	3	2.26
Total	**133**	**100.00**

Source: South Sudan EPI coverage Survey 2017

The table above shows that a large proportion of health facilities assessed were PHCC(46%) with the least being of those classified under others (unspecified category) at 2% mainly comprising of clinics. These facilities were mainly Hospitals, PHCUs, PHCCs and others (clinics) that were located within the Enumeration areas.

Table 24. Mean Distance (by road) from Cluster Centre to the Health Facility (KM)

Descriptive Statistics for Each Value of Crosstab Variable					
	Obs	**Total**	**Mean**	**Variance**	**Std Dev**
Central Equatoria	23	146.8	6.4	104.8	10.2
Eastern Equatoria	20	54.0	2.7	6.4	2.5
Jonglei	22	226.5	10.3	112.4	10.6
Lakes	19	122.0	6.4	32.0	5.7
Northern Bahr El Ghazal	5	5.0	1.0	0.4	0.6
Unity	2	2.0	1.0	0.0	0.0
Upper Nile	8	46.0	5.8	25.1	5.0
Warrap	14	42.9	3.1	7.1	2.7
Western Bahr El Ghazal	10	17.0	1.7	2.0	1.4
Western Equatoria	10	13.0	1.3	3.4	1.8

Source: South Sudan EPI coverage Survey 2017

Health facilities providing vaccination services were at far away distances. The longest distances were observed in the former Jonglei hub at 10.3 Kilometres,6.4 kilometers for the former Central Equatoria and Lakes hubs

Table 25. Availability of vaccines and other vaccine supplies

HH.46. State (Former)	Vaccines adequate for 1 month	Vaccines inadequate for 1 month	antigens out of stock specify	Total	Adequate Stock (%)	Inadequate stocks (%)	Stock outs(%)
Central Equatoria	14	4	5	23	60.9	17.4	21.7
Eastern Equatoria	12	2	6	20	60.0	10.0	30.0
Jonglei	3	4	15	22	13.6	18.2	68.2
Lakes	7	8	4	19	36.8	42.1	21.1
Northern Bahr El Ghazal	4	1	0	5	80.0	20.0	0.0
Unity	0	0	1	1	0.0	0.0	100.0
Upper Nile	0	2	6	8	0.0	25.0	75.0
Warrap	3	9	2	14	21.4	64.3	14.3
Western Bahr El Ghazal	7	1	2	10	70.0	10.0	20.0
Western Equatoria	0	1	9	10	0.0	10.0	90.0
TOTAL	66	30	37	133	49.6	22.6	27.8
%	**49.6**	**22.6**	**27.8**	**100**	49.6	22.6	27.8

Source: South Sudan EPI coverage Survey 2017

The table above shows that nearly 50 percent of the health facilities assessed had adequate stocks of antigens to last for a month. Stock outs were experienced in 27.8% health facilities. Former Western Equatoria state had the highest stock out of antigens at 90%.

Table 26. Availability of syringes /needles for immunization

	RI.119. Syringes/needles for immunization						
HH.46. State (Former)	0-Out of stock	1-All syringes in stock adequate for 1 month	2-All syringes in stock, all/some inadequate	Total	0-Out of stock	1-All syringes in stock adequate for 1 month	2-All syringes) in stock, all/some inadequate
Central Equatoria	4	11	8	23	17.4	47.8	34.8
Eastern Equatoria	5	9	6	20	25.0	45.0	30.0
Jonglei	10	8	4	22	45.5	36.4	18.2
Lakes	2	7	9	18	11.1	38.9	50.0
Northern Bahr El Ghazal	0	0	5	5	0.0	0.0	100.0
Unity	1	0	1	2	50.0	0.0	50.0
Upper Nile	0	4	4	8	0.0	50.0	50.0
Warrap	1	4	8	13	7.7	30.8	61.5
Western Bahr El Ghazal	1	5	4	10	10.0	50.0	40.0
Western Equatoria	3	5	2	10	30.0	50.0	20.0
TOTAL	27	53	51	131	20.6	40.5	38.9

Source: South Sudan EPI coverage Survey 2017

Table above shows availability of syringes and needles for immunization. Nearly 20% of the health facilities had stock outs and 40.5% had adequate stocks while 38.9 did not have adequate stocks of needles/syringes for immunization services.

Availability of Cold Chain and functional status in health facilities that were assessed

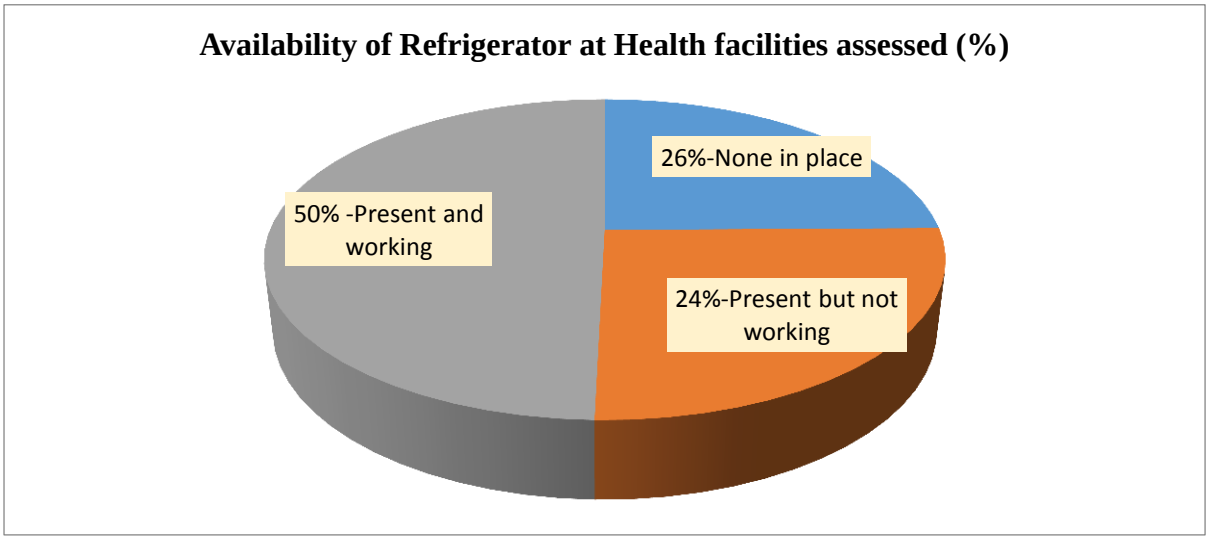
Table 27. Status of Cold Chain

RI.116. Vaccine Refrigerator	Frequency	Percent (%)
0-None in place	32	24.8
1-Present but not working	33	25.6
2-Present and working	64	49.6
Total	129	100

Source: South Sudan EPI coverage Survey 2017

Overall, there were functional vaccine refrigerators available in 50% of all the facilities that were assessed. 26% of the facilities reported to have vaccine refrigerators that are not functional having broken down. There were no refrigerators in 24 % of the total facilities assessed.

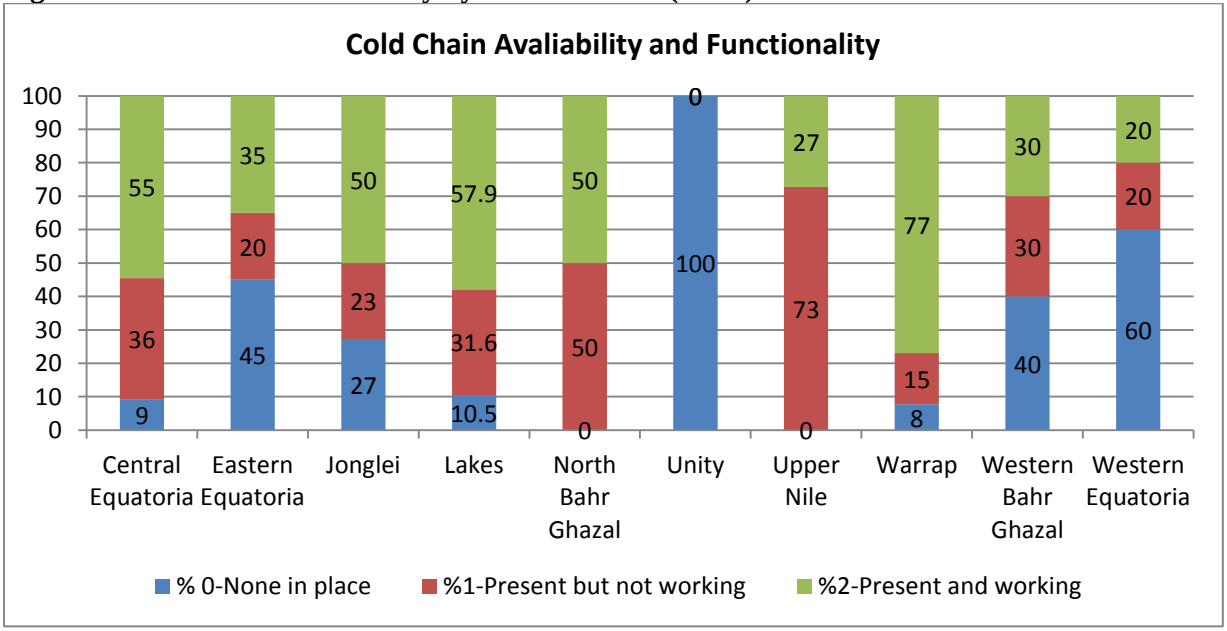
Figure 35. Availability of Refrigerator at health facilities assessed by heath facilities assessed



Source: South Sudan EPI coverage Survey 2017

In all the health facilities assessed, 50% of them had functional refrigerators as an essential commodity for provision of immunization services. Nearly a quarter of the health facilities have no functional refrigerator in place (24%) with 26% of health facilities having the refrigerators but not working.

Figure 36. Cold Chain Availability by Former States (Hubs)



Source: South Sudan EPI coverage Survey 2017

The figure above shows that the former Warrap State hub had the highest percentage of facilities with functional refrigerators (77%) while fewer facilities in the former Upper Nile state hub had functional refrigerators at 27%. In Unity, the two health facilities that were assessed did not have refrigerators in place.

Table 28. Hot Spot of Counties with Low coverage

The survey was conducted in households found within the sampled enumeration areas. The tables below illustrate the percentages of vaccinated and the unvaccinated children in the counties and further shows the hotspots for these unvaccinated children aged 12-23 months within the 10 Former States (Hubs).

Former CEQ		
Former County	**% Vaccinated**	**% Not Vaccinated**
Terekeka	22	78
Juba	55.3	44.7

Former EEQ		
Former County	**% Vaccinated**	**% Not Vaccinated**
Lafon	0	100
Kapoeta North	6.3	93.8
Kapoeta East	15.6	84.4
Budi	18.8	81.3
Kapoeta South	33.3	66.7
Magwi	34.9	65.1
Ikotos	36.4	63.6
Torit	40	60

Former LAKES		
Former County	**% Vaccinated**	**% Not Vaccinated**
Rumbek North	0	100
Wulu	0	100
Yirol East	0	100
Rumbek Centre	2.2	97.8
Cueibet	6.4	93.6
Awerial	15.8	84.2
Rumbek East	17.4	82.6
Yirol West	38.3	61.7

	% Vaccinated	**% Not Vaccinated**
National	18.2	81.8

Former JON		
Former County	**% Vaccinated**	**% Not Vaccinated**
Ayod	0	100
Canal/Pigi	0	100
Nyirol	0	100
Old Fangak	0	100
Pibor	0	100
Pochalla	0	100
Akobo	3.3	96.7
Bor South	12	88
Twic	20.6	79.4
Duk	26.7	73.3

Former WBG		
Former County	**% Vaccinated**	**% Not Vaccinated**
Jur River	3.4	96.6
Raga	20	80
Wau	29.3	70.7

Former WAR		
Former County	**% Vaccinated**	**% Not Vaccinated**
Twic East	0	100
Tonj East	7.7	92.3
Tonj South	17.6	82.4
Tonj North	18.9	81.1
Gogrial East	22.2	77.8
Gogrial West	22.6	77.4

Former UPN		
Former County	**% Vaccinated**	**% Not Vaccinated**
Melut	0	100
Ulang	0	100
Urol	0	100
Renk	10.1	89.9
Maban	23	77

Former NBG		
Former County	**% Vaccinated**	**% Not Vaccinated**
Aweil South	6.7	93.3
Aweil Centre	8.8	91.2
Aweil East	11	89
Aweil West	20.6	79.4
Aweil North	28.8	71.2

Former WEQ		
Former County	**% Vaccinated**	**% Not Vaccinated**
Nzara	3.7	96.3
Ezo	4.5	95.5
Tombura	5.9	94.1
Meridi	32.1	67.9
Yambio	48.6	51.4

Former UNI		
Former County	**% Not Vaccinated**	**% Vaccinated**
Guit	80.4	19.6
Rubkona	80.3	19.7
Paynijar	95	5

Source: South Sudan EPI coverage Survey 2017

The counties of Ayod, Canal Pigi,Lafon,Melut,Nyirol,Old Fangak, Pibor, Pochalla, Rumbek North and Twic East were identified with many enumeration areas with low coverage.

6.0 ANTENATAL CARE AND NEWBORN CARE AFTER DELIVERY INCLUDING PREVENTION STRATEGIES OF MALARIA

Antenatal Care Visits to the Health Facilities by the pregnant women

Table 29. Antenatal care during the last pregnancy

RI.65. Pregnant women attended antenatal care during the last pregnancy.						
HH.24. State (Former):	**No**	**Yes**	**Total**	**%No**	**%Yes**	**Total**
Central Equatoria	18	172	190	9.5	90.5	100.0
Eastern Equatoria	66	87	153	43.1	56.9	100.0
Jonglei	79	52	131	60.3	39.7	100.0
Lakes	45	71	116	38.8	61.2	100.0
Northern Bahr El Ghazal	21	104	125	16.8	83.2	100.0
Unity	59	35	94	62.8	37.2	100.0
Upper Nile	9	113	122	7.4	92.6	100.0
Warrap	48	121	169	28.4	71.6	100.0
Western Bahr El Ghazal	12	61	73	16.4	83.6	100.0
Western Equatoria	30	103	133	22.6	77.4	100.0
National	387	919	1306	29.6	70.4	100.0

Source: South Sudan EPI coverage Survey 2017

A large percentage of pregnant women attended antenatal care during the last pregnancy was observed in Upper Nile 93% followed by Central Equatoria with coverage of 91% and Western Bahr El Ghazal 84% with the least observed in unity (37%).

Table 30. Descriptive Statistics for Number of ANC visits for Number of ANC Visits disaggregated by Former State (Hubs)

Descriptive Statistics for Each Value of Crosstab Variable					
Former State (Hubs)	**Obs**	**Total**	**Mean**	**Variance**	**Std Dev**
Central Equatoria	175.0	710.0	4.057	3.0312	1.74
Eastern Equatoria	89.0	275.0	3.089	2.1964	1.48
Jonglei	52.0	134.0	2.576	1.9744	1.40
Lakes	75.0	224.0	2.986	2.0944	1.44
Northern Bahr El Ghazal	111.0	358.0	3.225	1.2488	1.11
Unity	44.0	156.0	3.545	4.8584	2.20
Upper Nile	113.0	486.0	4.300	2.6051	1.61
Warrap	121.0	339.0	2.801	1.4937	1.22
Western Bahr El Ghazal	60.0	257.0	4.283	3.6641	1.91
Western Equatoria	103.0000	299.0000	2.9029	1.6768	1.2949

Source: South Sudan EPI coverage Survey 2017

The highest mean of ANC clinic visits among mothers was recorded in Western Bahr El Ghazal with a mean of 4.2 visits followed by Central Equatoria with 4 visits the least of the mean visits was recorded in Jonglei with 2.5 ANC visits.

Table 31. Descriptive Statistics for Number of ANC visits for Number of ANC Visits disaggregated by Former State (Hubs)

Former State (Hubs)	Minimum	25%	Median	75%	Maximum	Mode
Central Equatoria	1.0	3.0	4.0	5.00	8.0	3.0
Eastern Equatoria	1.0	2.0	3.0	4.00	8.0	3.0
Jonglei	1.0	1.5	2.0	3.00	6.0	2.0
Lakes	1.0	2.0	3.0	4.00	6.0	2.0
Northern Bahr El Ghazal	1.0	2.0	3.0	4.00	6.0	4.0
Unity	0.0	2.0	3.5	5.00	8.0	5.0
Upper Nile	1.0	3.0	5.0	5.00	8.0	5.0
Warrap	1.0	2.0	3.0	4.00	7.0	3.0
Western Bahr El Ghazal	1.0	3.0	4.0	6.00	8.0	3.0
Western Equatoria	1.0	2.0	3.00	4.00	8.0	3.0

Source: South Sudan EPI coverage Survey 2017

The minimum of ANC visits was 1 visit with a maximum of 8 visits recorded in 6 out of the 8 states. The most common number of ANC visits was 3 visits.

Strategic approaches for prevention and Control of Malaria

The key strategies for malaria prevention were covered in this survey: use of mosquito nets by children and mothers, and Intermittent Preventive Treatment (IPT) of malaria in pregnancy. Table below presents the findings on use of mosquito nets.

Table 32. Mother slept under a mosquito net on the survey night

	RI.106. Mother slept under a mosquito net on the survey night					
HH.35. State (Former)	**No**	**Yes**	**Total**	**% No**	**% Yes**	**Total**
Central Equatoria	4	83	87	4.60	95.4	100
Eastern Equatoria	4	17	21	19.05	80.9	100
Jonglei	9	20	29	31.03	68.9	100
Lakes	1	38	39	2.56	97.4	100
Northern Bahr El Ghazal	3	51	54	5.56	94.4	100
Unity	2	97	99	2.02	97.9	100
Upper Nile	1	85	86	1.16	98.8	100
Warrap	0	23	23	0.00	100.0	100
Western Bahr El Ghazal	0	43	43	0.00	100.0	100
Western Equatoria	3	33	36	8.33	91.6	100
TOTAL	27	490	517	5.22	94.7	100

Source: South Sudan EPI coverage Survey 2017

The proportion of mother who slept under a mosquito net on the survey night was above 90% coverage (94.7%) with the highest in Warrap and Western Bahr El Ghazal with 100% coverage. The lowest coverage was recorded in the Former State (Hub) of Jonglei (68.9%).

Table 33. Children who slept under a mosquito net on the survey night

	RI.107. Did the child sleep under a mosquito net on survey night.					
HH.35. State (Former)	**No**	**Yes**	**Total**	**% No**	**% Yes**	**Total**
Central Equatoria	5	82	87	5.75	94.25	100.0
Eastern Equatoria	4	17	21	19.0	81.0	100.0
Jonglei	10	19	29	34.5	65.5	100.0
Lakes	1	38	39	2.6	97.4	100.0
Northern Bahr El Ghazal	2	52	54	3.7	96.3	100.0
Unity	1	98	99	1.0	99.0	100.0
Upper Nile	9	77	86	10.5	89.5	100.0
Warrap	0	23	23	0.0	100.0	100.0
Western Bahr El Ghazal	0	42	42	0.0	100.0	100.0
Western Equatoria	3	33	36	8.3	91.7	100.0
TOTAL	35	481	516	6.8	93.2	100.0

Source: South Sudan EPI coverage Survey 2017

The proportion of children who slept under a mosquito net on the survey night was above 90% coverage (93.2%) with the highest in Warrap and Western Bahr El Ghazal with 100% coverage. The lowest coverage was recorded in the Former State (Hub) of Jonglei (65.5%). 7 out of the 10 Former State (Hubs) recorded coverage of above 90% on this indicator.

Table 34. Pregnant Mothers received two doses of Antimalarial Prophylaxis (SP) to prevent Malaria

Pregnant Mothers received two doses of SP to prevent Malaria						
HH.24. State (Former):	**No**	**Yes**	**Total**	**%No**	**%Yes**	**Total**
Central Equatoria	44	142	186	23.7	76.3	100.0
Eastern Equatoria	73	77	150	48.7	51.3	100.0
Jonglei	63	46	109	57.8	42.2	100.0
Lakes	37	68	105	35.2	64.8	100.0
Northern Bahr El Ghazal	56	69	125	44.8	55.2	100.0
Unity	50	36	86	58.1	41.9	100.0
Upper Nile	19	103	122	15.6	84.4	100.0
Warrap	61	106	167	36.5	63.5	100.0
Western Bahr El Ghazal	13	58	71	18.3	81.7	100.0
Western Equatoria	22	94	116	19.0	81.0	100.0
National	438	799	1237	35.4	64.6	100.0

Source: South Sudan EPI coverage Survey 2017

Nationally, 64.6% of mothers received Intermittent Preventive Treatment (IPT) of malaria during pregnancy. The highest coverage was recorded in Upper Nile (84.4%) with the least coverage in Unity with 41.9%.

Practices after Delivery & New-born Care

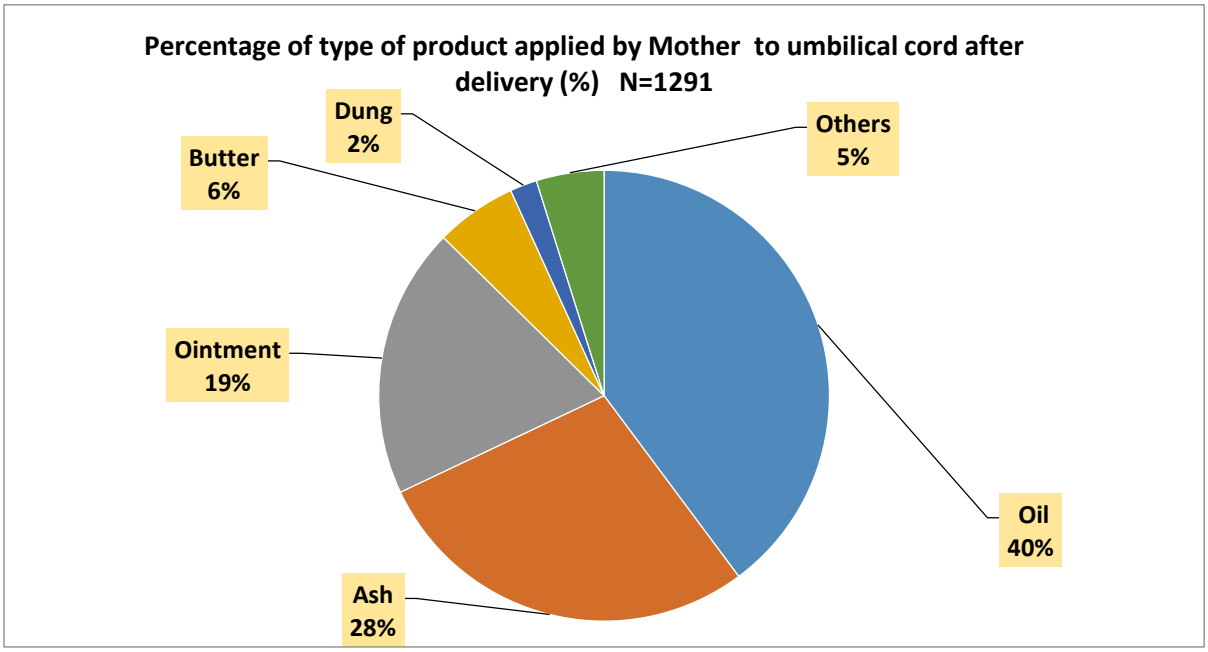
Table 35. Products applied on the umbilical cord of the baby after delivery.

% After delivery of baby, anything applied on umbilical cord of the baby						
HH.24. State (Former):	**No**	**Yes**	**Total**	**%No**	**%Yes**	**Total**
Central Equatoria	58	132	190	30.5	69.5	100.0
Eastern Equatoria	63	84	147	42.9	57.1	100.0
Jonglei	72	57	129	55.8	44.2	100.0
Lakes	37	75	112	33.0	67.0	100.0
Northern Bahr El Ghazal	82	43	125	65.6	34.4	100.0
Unity	13	79	92	14.1	85.9	100.0
Upper Nile	10	112	122	8.2	91.8	100.0
Warrap	154	14	168	91.7	8.3	100.0
Western Bahr El Ghazal	66	7	73	90.4	9.6	100.0
Western Equatoria	69	64	133	51.9	48.1	100.0
TOTAL	624	667	1291	48.3	51.7	100.0

Source: South Sudan EPI coverage Survey 2017

Majority of the Former States (Hubs) indicated the prevalence of the practice of applying various products to the umbilical cord of the baby immediately after birth with upper Nile recording the highest 92% with the least in the former state (Hub)of Warrap (8.3%).

Figure 37. Percentage of type of products applied to the umbilical cord of the baby immediately after delivery.



Source: South Sudan EPI coverage Survey 2017

The figure above shows that percentage of mothers who had applied some products to the umbilical cord of the baby immediately after the birth was Oil at 40%.Ash (28%),ointment(19%), butter(6%), Others (5%) and cow dung(2%) were among the other products that were also applied.

7.0 DISCUSSION OF RESULTS

This section focuses on the discussions of the findings comparing various sources of data that include administrative EPI data, survey conducted in 2011 and immunization estimates. The findings measure performance of National EPI program based on the set national targets.

National immunization coverage

Looking at the immunization services of children aged 12-23 months, the analysis indicated that the national immunization coverage of Penta3 evidenced by card was at 21.7% 95% CI (19.4, 22.2) while fully immunized children aged 12-23 months was 18.9%.

The coverage by Card + history or recall reported by mothers/caregivers was 49.3%.The immunization coverage by card is lower than the EPI Coverage Survey 2011/2012 that reported 24% (Penta 3 coverage) and Administrative data -2016 that shows coverage of 45%.

There was a remarkable improvement in the coverage for fully immunized (18.9%) reported in 2017 survey compared to only 8.7% reported in 2011 survey.

Some of the reasons for low coverages in the 7 stable states include ;

- Periodic population movements to inter clan fights related to cattle rustling.
- Population movements in search of pasture.
- Challenges in accessing some of the health facilities or service delivery points due to transportation challenges and seasonal floods.
- Human resource and EPI operations heavily depend on agencies (NGOs) whose services are pegged on contracts and external funding.
- Poor vaccine quantification and forecasting leading to inadequate supplies in all health facilities hence persistent stock outs experienced.

The noted improvement on immunization coverage in general of antigens may be attributed to program funding support through GAVI/WHO for the roll out of PIRI and outreaches as well as support from other agencies .Quite a number of trainings have been conducted through the support of UNICEF, WHO, MOH and other partners.

Coverage compared to other sources

BCG at birth coverage was estimated at 24.4% 95%CI (21.5, 26.2) in this survey. This means that among the children sampled for the survey, twenty four percent of the sample population accessed immunization services. This compares with 29% access coverage that was reported by Epi Coverage Survey 2011 and EPI Administrative routine coverage of 52 %.

Oral Polio Vaccine zero Dose: National coverage is 25.1%. **Oral Polio Vaccine 3rd dose:** National coverage is 25.1% 95% CI (25.9.5, 26.2) this compares with **Epi Coverage Survey of 2011** at 24% and **administrative coverage for routine immunization at** 43%.

Pentavalent 1st dose: National coverage is 23.1% 95% CI (21.7,24.5).This shows a slight drop from the EPI Coverage survey (**ECS)** conducted in **2011** 26% and **administrative coverage of** 59%.**Penta 3rd dose:** National coverage is 20.9% 95% CI (19.4,22.2) This compares with the 2011 EPI Coverage survey with 24% and **administrative coverage of** 45%.

Inactivated Polio Vaccine: National coverage was estimated at 14.0 % at 95% CI (13.4,21.0) and **Measles**: National coverage is 19.2% 95% CI (18.4,21.0) compared to a coverage of 10% (**EPI Coverage Survey 2011)** and EPI administrative coverage of 52%.

At the national level, 51.0 percent of eligible children age between 12 to 23 months did not receive any vaccination.

Some of the reasons for low coverages observed

These coverages show a drop from the coverages in 2011 EPI coverage survey because of the conflicts that was experienced in 2014 where populations moved to other locations. Fresh conflicts were again experienced in 2016 that affected most parts of the country. The Republic of South Sudan continues to be challenged by civil conflict in several states. Population displacements both internally and across international borders continues to be problematic with more than an estimated one million

South Sudanese projected to be refugees in neighboring countries (UNHCR). Not surprisingly given the current situation, concerns continue with regards to quality of recording and monitoring, timeliness and completeness of data. Reported administrative coverage data reflect reporting from 80 percent of total expected district reporting. WHO and UNICEF encourage continued efforts to improve recording and monitoring while also increasing coverage. (***South Sudan, WHO and UNICEF estimates of immunization coverage: 2016 revision)***

Some of the reasons for low coverage in the former state hubs of Northern Bahar el Ghazal are

- Influx of high numbers of IDPs from conflict affected states with integration into the community.
- Population movement to neighboring counties for cultivation
- Seasonal floods hindering service delivery point access.
- Cultural beliefs, practices and myths on vaccinations.
- Low card retention practices with inability to remember the appointment dates due to low education levels.

It is also important to note that there was also famine that may have let to many mothers not bringing the children to health facilities for vaccinations due to lack of food and other basic necessities.

Some of the suggestions for improvement of immunization coverages

- Areas with very low coverages are particularly from the conflict affected states, they need to be assessed and strong strategies put in place to raise the coverages This includes evaluating Supplementary Immunization activities through a post campaign survey to highlight areas the routine programme is weak, through inclusion of questions on whether children have received a dose of relevant vaccine (s) in the routine programme. Strengthen proper programmatic planning through integration of the outreaches services with other health programs.
- Revitalize and or initiate the VHCs/Boma health Initiative in all health facilities.
- Recruitment of personnel with good capacity to be trained and their retention as EPI workers to ensure quality efficient immunization services.
- Training of vaccination teams with emphasis on vaccine management and forecasting to ensure potent and adequate supplies.
- Due to challenges of high transportation costs provision of affordable transportation means for vaccination teams to be used for stocking and outreach services.
- Strengthen VPD surveillance and use the findings as an opportunity for vaccination.

Vaccination card retention practices

Vaccination card availability was low at 24.2% compared to Card availability for EPI Coverage survey of 2011 which reported 62%. The low card availability is likely due to displacement of the populations during the conflicts in 2014 and 2016 where most of the populations were displaced, houses destroyed, large number of people moved to neighboring countries for their safety. During these conflicts, the Home based records were either burnt or misplaced or destroyed. According to **WHO Vaccination coverage reference manual 2018**, many countries are conducting regular data quality assessments that compare information in registers with the information provided in reports to higher levels of the health system. Coverage surveys can provide an opportunity to assess the quality of primary data recording in registers and on vaccination cards. One of the findings was that some of the vaccination cards did not have proper dates, some had ineligible writings and others were not standard tools provided by the Ministry of Health.

Protection of pregnant women against TT as Evidenced with Card Availability

Low Coverage for Tetanus Toxoid 2nd dose plus (TT2+) for mothers with children aged 0-11 months by card was 15.4 % evidenced by card availability and by history was 28.6%.

Proportion of children protection at birth by card was 25.9% and by history was 54.1%.

An estimated 56% of the mothers including pregnant women of children aged 0-11 months were not vaccinated with Tetanus Toxoid Vaccine.

Nearly 11% of the Mothers were fully immunized with Tetanus Toxoid Vaccine (TT5) evidenced by availability TT Cards .This is also very low though has significantly improved compared to EPI Coverage survey of 2011 which indicated 2%.

Antenatal Care visits:

The highest mean visits among mothers was recorded in Western Bahr El Ghazal (4.2), followed by Central Equatoria(4) and the least was from Jonglei (2.5).The minimum of ANC visits was 1 visit with a maximum of 8 visits recorded in 6 out of the 8 states.

Prevention and control of Malaria

Survey findings showed that proportion of children who slept under a mosquito net on the survey night was 93.2 %, which was above the national target of 90% coverage.95% of the mothers assessed slept under treated mosquito nets (LLITNs) above target of 90% .

Intermittent Preventive Treatment (IPT) use by pregnant women for prevention of malaria was recorded at 65%.

Practices after delivery & new-born Care

Majority of the Former States (Hubs) indicated the existence of the practice of applying various products to the umbilical cord of the baby immediately after birth. Nationally, 52% were reported to have applied the products while 48% had not applied the products with the former Upper Nile state recorded the highest 92% while the least percentage was recorded in the former Warrap state at 8.3%. During the survey, it was found out that 10% of mothers applied some products to the umbilical cord immediately after the birth of the baby with the leading products being applied are Ash (49%) followed by oil 17.7% and ointment (8.6%) while 2% of the mothers applied dung on the umbilical cord of the baby.

Estimation of dropout rates for this coverage survey

Low access to immunization was observed at national level as well as state levels. Overall, about 23% of the children aged 12- 23months in South Sudan had access to immunization services: estimated coverage of BCG, OPV1 and Penta1 were 24.8%, 22.4% and 23.1% respectively.

High dropout rates were reported with BCG to Measles (22.8%),BCG to Penta 3 (18.9%),Penta 1 to Measles (16.6%) and Pentavalent 1 to pentavalent 3 dropout rate: 12.9%.These dropouts are high which a pointer to low access and poor utilization of immunization services .

High BCG to Measles dropout rate: 22.8% are an indicator for Poor utilization of immunization services.

Pentavalent 1 to Measles dropout rate: 16.6% Poor utilization of immunization services

These drop out rates are high signifying low access and utilization of immunization services which need to be investigated to find out the direct causes. They may have been caused by movement of people to different locations, lack of information on the benefits of vaccinations and long distances covered to reach health facilities providing vaccination services. Completion of immunizations is also low as can be evidenced by a high dropout rate of Penta1-Measles (14.6%). A point to note is that there is a significant improvement in the dropout rate of EPI Coverage survey 2011 of BCG at birth to Measles 25% to 13.4%% observed in EPI Coverage survey 2017.

Missed opportunities for Vaccination during the survey

MOV for BCG and OPV 0 was 13%, Penta 1 and OPV 1 was 6%, Penta 2 was 5% and OPV was 28%. The missed opportunity for Penta 3 and OPV 3 were 5% and 10% respectively. The highest missed opportunity for measles was 51% where nearly half of the children due to receive the dose did

not complete the measles vaccination. The causes of the missed opportunities are likely to be as a result of stock out of vaccines as well as postponement of vaccinations.

Reasons for non-vaccination

Among the main reasons for non-vaccination, more than a half (61%) of mothers did not take their children for vaccinations due to long distances covered to reach these facilities. Distances to reach some of the facilities were estimated to be 10 kilometers. Others reasons included mothers being unaware of the benefits of these vaccinations, frequent stock outs of vaccine supplies in most of the facilities, mothers too busy on their gardens or funerals, Vaccination sessions postponed to another day, poverty hence unable to pay hospital fees and cater for transport expenses.

Quality and access to immunization services in Health Facilities

Challenges of access to EPI services; Distance to facility: Most of the facilities were found to be far away from cluster centers ranging from 5 to 10 kms**.** The highest mean Distance (by road) from Cluster Centre to the Health Facility (KM) was observed in the former Jonglei state hub (10km) followed by Former State (Hub)of lakes (6.4km) and Former State (Hub) of Central Equatoria with the least observed in the former state hubs of Northern Bahr El Ghazal and Unity State (1km). The mean distance covered to the nearest facility was 5.1km. The maximum distance covered was observed in Jonglei (8km) with the least in former Eastern and Western Equatoria state hubs with less than a kilometer.

Availability of Immunization supplies & Commodities at service delivery points

Health Facilities assessed: Health facilities that were assessed in the EPI coverage survey 2017 were mainly Hospitals, PHCUs, PHCCs and others (clinics) that were located within the Enumeration areas. A large proportion of health facilities assessed were PHCC(46%) with the least being of those classified under others (unspecified category)(2.3%) mainly comprising of clinics**.**

Availability of refrigerator at health facilities assessed: Nearly a quarter of the health facilities did not have vaccine refrigerators (24%). 25% of health facilities had broken down fridges (non-functional) while the rest had fridges that were functional (49%)

Staff training on cold chain and vaccine management disaggregated by 10 Former States (Hubs)

Training on cold chain for health worker was **very low** across all the states. State level training on cold chain was also low with Upper Nile having a mean of 2.5%.There was no cold chain training conducted in the former Western Bahar el Ghazal state. There were only 5 health workers reported to have been trained in the former upper Nile state.

Some of the issues related to non-functional cold chain include

- Stolen solar panels
- Vandalized EPI refrigerators and generators.
- Delay in maintenance and repair of broken down EPI equipment.
- Lack of trained cold chain personnel at health facility levels.

Simultaneous Vaccination for various vaccine doses

The first, second and third doses of the pentavalent and OPV vaccines were administered simultaneously in 60.0%,63.6% and 64.5% of children during this survey .These coverages are low and a point to be taken into account when administering simultaneous vaccinations now that Pentavalent and Inactivated Polio vaccines are the latest to be introduced into the country.

Urban cluster OPV3-Pentavalnent 3 Simultaneity was observed at 26% as compared to rural cluster where 34.8% was reported.

Literacy levels verses immunization coverage in the former state hubs.

Generally, a high number of women interviewed were of low literacy levels. Literacy levels did not negatively affect immunization since a high percentage of women with low literacy levels completed their TT vaccinations.

8.0 CHALLENGES ENCOUNTERED WHILE CONDUCTING THE NATIONAL VACCINATION COVERAGE SURVEY 2017

Some of the constraints encountered during the implementation of the survey were as follows;

- ✓ Security challenges-This was a major challenge in some of the states where accessing some of the selected Enumeration areas or selected clusters was not possible.
  - Insecurity was a major challenge in the 3 conflict affected states of Jonglei,Unity,Upper Nile in addition to Lakes, Eastern Equatoria, Western Equatoria, Central Equatoria (Terekeka) and Western Bahar El Ghazal (Jur River). In Leer, survey teams had to be airlifted back to Juba due fights that had erupted the previous night before the survey and new team trained and to continue with the survey thereafter.
  - Evacuation of some of the survey officers –expensive to charter flights to get the survey officers out of volatile areas of high insecurity /attacks.
  - Some of the teams could not work in some areas due to personal insecurity which delayed survey being implemented in good time.
  - Some of the populations had been displaced following escalating conflicts in some of the Enumeration areas. These populations had moved to neighbouring border countries (Kenya, Uganda, Ethiopia, Congo) leaving behind empty houses no persons living there.
  - Internal conflicts within the counties due to cattle rustling etc. making some of the counties inaccessible hence data collection process prolonged and difficult.
  - Flight cancellation to most of the areas served by UNHAS flights due to reported insecurity affected implementation of the survey in good time. This delayed implementation especially in the conflict affected states in areas that had one or two flights per week.
  - Insecurity affected the state level trainings for some of the counties in former state hub Jonglei (Pibor, Old Fangak, Khorflus, Ayod, Wuror, Nyirol and Akobo). The trainings were conducted in Juba where the teams were airlifted to Juba and back after the training. This had budget implications as well. Moreover it lengthened the period of implementation due to flight cancellations every now and then.
- ✓ The second key challenge was poor or inexistent mobile network connectivity which led to late synchronisation of completed data real time.
  - There was communication breakdown due to weak telephone network signals and coverage and this affected relay of the reports promptly to the State level and onward transmission to the National level for further data management.
- ✓ Inflation and fluctuating (High) currency exchange rates was another challenge that seriously affected the survey implementation. The inflation was so high that the costs of fuel also shot up
- ✓ The survey was faced with challenges of transport due to high costs of fuel that were experienced during the implementation period. Some of the teams had to travel by air where the roads were rendered impassable. All these had budgetary implication.
- ✓ There were challenges in shipping logistical funds to the team for field implementation because most of the banking institutions had closed down their branch offices in most of the states.
- ✓ There were inaccessible roads due to poor road network infrastructure due to rainy season and flash floods especially from the state capitals to the clusters and to the households. The challenge was caused by difficult terrain, riverine enumeration areas which had to be accessed by boat also limited the speed with which teams could work.
- ✓ Availability of evidence of vaccination (home-based record) and poor conservation practices by mothers or other secondary care givers of HBR affected the survey. Some of HBR were torn, burnt or destroyed which affected collection of the key response variables for the survey such as Vaccination date, date of birth, name of antigen).
  - ✓ Poorly documented HBR (Home based records) was also a major challenge as there were lots of missing information on the vaccination cards, scanty information or no dates of birth or date of vaccination at all where a child or pregnant women received the vaccine.
  - ✓ The survey was conducted towards the end the year due to logistical challenges and flight cancellations. This was when most of the government departments were also implementing

their activities hence competing activities (Activities implemented alongside the survey were National Immunization campaigns -NIDs, KAP Assessment , Malaria Indicator Survey etc.)

- ✓ There was delayed transmission of survey completed reports to the state level and onward transmission to the Central level due to broken down channels of communication which caused a major delay in data entry, management and report writing.
- ✓ Competing activities being implemented at the same time the Survey was being conducted hence most of the State officers were involved in more than one activity-Compromising the quality of training and supervision.

8.1 Limitations and Potential Bias of this coverage survey

I. The sampling frame that was used for this coverage survey was sourced from the Population Census 2008 because no other population census has been conducted in South Sudan.

II. Population migration from conflict affected areas to other areas perceived to be safe was an area that is seen to introduce biasness and affect the overall results to this survey

III. Low availability of Vaccination cards was a potential bias due to the fact that it was the only way of providing evidence for children who have been vaccinated. Most of the mothers/care givers had lost their belongings including home based vaccination cards as they ran for safety during the skirmishes and yet their children had been vaccinated

IV. Facility based records (FBR) not used to validate Home based Records and Photos not taken to validate the proper dates for the valid coverages. This will pre dispose the survey to potential bias

V. Insecurity in most of the areas the biggest limitation in this study as survey teams would not move to all the clusters and households freely to collect data.

9.0 CONCLUSIONS

The results from the EPI Coverage survey conducted 2017 clearly demonstrate that immunization services are provided in health facilities.

- Coverage among children aged 12–23 months is low.
  - Low coverage of the complete basic immunizations as per the National vaccination schedule in South Sudan.
  - National coverage (Penta 3 Coverage was 20.9%)
  - Low vaccination coverage for Inactivated Polio vaccine -14.0% nationally.
  - Only 18.9% (of the 3300 surveyed) children aged 12-23 months had completed their vaccinations before their first birthday.
- Access to immunization is very low
  - BCG and Penta 1 vaccination coverages are 22.4% and 23.2% respectively
- Dropout rates were high: Poor access and low utilization of immunization services
  - The BCG to Measles drop out was 22.8%, Pentavalent 1 to Measles was 16.6% and pentavalent 1 to pentavalent 3 dropout rate was 12.9%.
- The population largely approve of immunization services
  - The reasons mothers gave for not immunizing their children showed they lacked a clear understanding of the benefits of vaccinations for their children.
  - There were no refusals that were observed throughout the survey period
- A low proportion of mothers /caregivers of children aged 12-23 months had immunization cards (only 24.2% were in possession of immunization cards.
  - However, a wide range of different versions of immunization cards was observed.
  - Poor documentation of vaccination dates, tick marks and return dates by health workers observed
  - Poor storage of these cards by mothers and other primary caregivers was also observed
- Proportion of mothers completing their tetanus vaccinations is low (11%)
  - Nearly a quarter of the mothers/care givers were immunized against TT2
  - Low coverage for tetanus toxoid 2nd dose plus (TT2+) for mothers with children aged 0-11 months (15.4 %)
  - Protection at birth was low at 25.9%.
  - High proportion of women not protected (56.0%) unvaccinated against Tetanus.
- Availability of vaccines and vaccine supplies are inadequate
  - Only 50% of facilities assessed had adequate stocks to last a month
  - 25% had inadequate stocks of vaccines and 27.8% had stock outs
  - 18.6 had no vaccine carriers
- Cold chain availability in health facilities is low
  - Nearly half of the facilities assessed had functional refrigerators.
  - 25.6 % of health facilities have non-functional refrigerators
  - 24.8% had no refrigerators
- Malaria control and prevention coverage is low
  - Nationally, 64.6% of mothers received Intermittent Preventive Treatment (IPT) of malaria during pregnancy.
  - Three quarters of surveyed mothers had slept under a mosquito net during the most recent pregnancy; and 93 percent of surveyed children 0-23 months old had slept under a mosquito net on the survey night.
- Most of the facilities were found to be far away from cluster centres ranging from 5 to 10 kilometres which is one of the main reasons for high dropout rates observed and high proportions of non-vaccinated among the sampled populations.
  - More than a half (61%) of responses from mothers indicated that they did not take their children for vaccinations due to long distances to reach these facilities
- Poor health practices and health seeking behaviour after delivery
  - Nationally, 52% of women were reported to have applied traditional products to their new born after delivery

10.0 RECOMMENDATIONS

These are the recommendations that were based on the findings of the vaccination coverage survey-2017

- Need for National Ministry of Health together with state MOH to strengthen routine immunization in all the states with particular attention to conflict affected areas/counties even in the perceived stable areas.
- Provide regular supportive supervision and follow-up of children with incomplete immunization schedules.
- Consider special assessments in areas with low coverage.
    - Study missed opportunities, barriers, causes for non-vaccination and dropouts.
    - Identify knowledge, attitudes and practices (KAP) of workers and service users.

- Health Managers, partners and all key players to Seek mechanisms to step up immunization services in the Hot spots and areas of low coverages
    - Ensure the programme is sustainable by formulating policies and frameworks for sustained funding for immunization services.
- National Ministry of health to conduct an Immunization commodity assessment to establish the stocks and functional status of the commodities including refrigerators and vaccine supplies
- State Ministries of Health together with partners to restore the broken down cold chain equipment/carry out repairs for non functional cold chain in the affected health facilities
- Health implementing agencies to set up outreach vaccination posts at entry points due to population migrations
- Socio mobilization teams/Communication department to use social media and promote health, including immunization services , to ensure continued high demand of Immunization services from the population.
- Key actors in health to conduct Knowledge attitude and Practises assessment on uptake of immunization services so as to create awareness of the benefits of immunization for children under 1 year of age.
    - Demystify perceptions about immunizations
    - Mobilize mothers to take their children to health facilities for vaccinations
- Ensure adequate supply of immunization commodities and constant check on the quality of care by service providers
    - Supply immunization commodities and vaccines to all the PHCC, PHCUs and Hospitals to avoid frequent stock outs of these commodities in the health facilities.
- MOH to institute measures to reduce the high dropout rates experienced with most of the antigens and innovate ways of defaulter tracing
- Ministry of Health to ensure more Immunization centres are opened to increase accessibility of the services due to long distances covered by mothers in search of immunizations as well as train EPI personnel.
- Communication team to develop strong advocacy towards IPV vaccinations due to low coverage reported for the newly introduced vaccine.
- Health care workers to emphasize to the mothers/other primary care givers on the importance of the HBR –Home based Records, cards/documents to increase card availability.
- Communication department together with health implementing partners to strengthen awareness on TT immunization among women attending ANC clinics.
- NMOH to strengthen continuous mentorship and capacity building on routine immunization and microplanning, REC approach to be enhanced.
- MOH with support from partners should review the documentation mechanism of the EPI Vaccines administration at the health facility, at households, at community so as to be better equipped for next EPI coverage survey which will be looking for evidence of vaccination of children all over as per the WHO 2018 manual on EPI cluster survey.

- MOH and Implementation partners to continue adopting the core principles of MOV strategy to assist in reduction in MOV and improve on vaccination coverage.
- Consider data quality and documentation for routine immunization services at the health facilities due to missing key variables on vaccinations cards or scanty information extracted from the HBR.
- Need for an Electronic monitoring system to monitor immunization services, service delivery, vaccine supplies and cold chain with possible alert signals.

11.0 ANNEXES

11.1 Annex A

Unweighted Analysis of the EPI Coverage survey results

This section provides results for the unweighted data, which describes the characteristics of the respondents but not generalized to the whole population. The results of the EPI Coverage Survey were analyzed and as presented in the tables below.

Table 36. BCG Birth Dose unweighted Analysis

	RI.9. BCG Source							
HH1.FORMER STATE (HUBS)	**1-C**	**2-H**	**3-NA**	**Total**	**% BCG Card**	**% BCG History**	**% BCG N/A**	**Total**
Central Equatoria	85	74	15	174	49	43	8.6	100.0
Eastern Equatoria	70	55	31	156	44.9	35.3	19.9	100.0
Jonglei	76	155	65	296	25.7	52.4	22.0	100.0
Lakes	38	154	72	264	14.4	58.3	27.3	100.0
Northern Bahr El Ghazal	55	185	73	313	17.6	59.1	23.3	100.0
Unity	36	120	57	213	16.9	56.3	26.8	100.0
Upper Nile	30	93	38	161	18.6	57.8	23.6	100.0
Warrap	51	245	58	354	14.4	69.2	16.4	100.0
Western Bahr El Ghazal	45	94	11	150	30.0	62.7	7.3	100.0
Western Equatoria	32	83	13	128	25.0	64.8	10.2	100.0
TOTAL	518	1258	433	2209	23.4	56.9	19.6	100.0

Source: South Sudan EPI coverage Survey 2017

Table 37. Pentavalent 3rd Dose unweighted Analysis

	RI.19. Penta3 Source							
HH1.FORMER STATE (HUBS)	**1-C**	**2-H**	**3-NA**	**Total**	**% Penta 3 Card**	**% Penta 3 History**	**% Penta 3 N/A**	**Total**
Central Equatoria	64	80	24	168	38.1	47.6	14.3	100.0
Eastern Equatoria	44	71	39	154	28.6	46.1	25.3	100.0
Jonglei	57	153	81	291	19.6	52.6	27.8	100.0
Lakes	28	135	83	246	11.4	54.9	33.7	100.0
Northern Bahr El Ghazal	37	159	79	275	13.5	57.8	28.7	100.0
Unity	33	114	63	210	15.7	54.3	30.0	100.0
Upper Nile	28	95	39	162	17.3	58.6	24.1	100.0
Warrap	57	216	62	335	17.0	64.5	18.5	100.0
Western Bahr El Ghazal	37	86	27	150	24.7	57.3	18.0	100.0
Western Equatoria	28	88	12	128	21.9	68.8	9.4	100.0
TOTAL	413	1197	509	2119	**19.5**	**56.5**	**24.0**	**100.0**

Source: South Sudan EPI coverage Survey 2017

Table 38. Measles Containing Vaccine unweighted Analysis

	RI.33. Measles Source							
HH1.FORMER STATE (HUBS)	**1-C**	**2-H**	**3-NA**	**Total**	**% Measles Card**	**% Measles History**	**% Measles N/A**	**Total**
Central Equatoria	66	74	34	174	37.9	42.5	19.5	100.0
Eastern Equatoria	39	78	42	159	24.5	49.1	26.4	100.0
Jonglei	43	162	94	299	14.4	54.2	31.4	100.0
Lakes	30	149	81	260	11.5	57.3	31.2	100.0
Northern Bahr El Ghazal	38	176	86	300	12.7	58.7	28.7	100.0
Unity	26	124	63	213	12.2	58.2	29.6	100.0
Upper Nile	30	93	39	162	18.5	57.4	24.1	100.0
Warrap	53	250	58	361	14.7	69.3	16.1	100.0
Western Bahr El Ghazal	35	89	26	150	23.3	59.3	17.3	100.0
Western Equatoria	27	82	19	128	21.1	64.1	14.8	100.0
TOTAL	387	1277	542	2206	**17.5**	**57.9**	**24.6**	**100.0**

Source: South Sudan EPI coverage Survey 2017

Table 39. Oral Polio Vaccine 3rd Dose unweighted analysis

	RI.29. OPV3 Source							
HH1.FORMER STATE (HUBS)	**1-C**	**2-H**	**3-NA**	**Total**	**% OPV 3 Card**	**% OPV 3 History**	**% OPV 3 N/A**	**Total**
Central Equatoria	71	80	23	174	40.8	46.0	13.2	100.0
Eastern Equatoria	42	80	37	159	26.4	50.3	23.3	100.0
Jonglei	53	162	85	300	17.7	54.0	28.3	100.0
Lakes	30	147	84	261	11.5	56.3	32.2	100.0
Northern Bahr El Ghazal	39	188	85	312	12.5	60.3	27.2	100.0
Unity	27	123	63	213	12.7	57.7	29.6	100.0
Upper Nile	28	96	38	162	17.3	59.3	23.5	100.0
Warrap	63	239	59	361	17.5	66.2	16.3	100.0
Western Bahr El Ghazal	34	92	24	150	22.7	61.3	16.0	100.0
Western Equatoria	28	85	15	128	21.9	66.4	11.7	100.0
TOTAL	415	1292	513	2220	18.7	58.2	23.1	100.0

Source: South Sudan EPI coverage Survey 2017

Table 40. Fully immunized before 1 Year Old by Card only unweighted Analysis

	RI.41. Fully immunized before 1 year old (Card only)				
HH1.FORMER STATE (HUBS)	**No**	**Yes**	**Total**	**% Yes Card**	**% With No Card**
Central Equatoria	96	77	173	44.5	55.5
Eastern Equatoria	116	42	158	26.6	73.4
Jonglei	279	21	300	7.0	93.0
Lakes	225	32	257	12.5	87.5
Northern Bahr El Ghazal	265	48	313	15.3	84.7
Unity	177	36	213	16.9	83.1
Upper Nile	141	21	162	13.0	87.0
Warrap	301	61	362	16.9	83.1
Western Bahr El Ghazal	123	27	150	18.0	82.0
Western Equatoria	99	29	128	22.7	77.3
TOTAL	1822	394	2216	17.8	82.2

Source: South Sudan EPI coverage Survey 2017

Table 41. Fully Immunized 1 Year Old by Card only unweighted Analysis

	RI.42. Fully immunized after 1 year old (Card only)				
HH1.FORMER STATE (HUBS)	**No**	**Yes**	**Total**	**% Yes Card**	**% With No Card**
Central Equatoria	171	1	172	0.6	99.4
Eastern Equatoria	126	21	147	14.3	85.7
Jonglei	298	2	300	0.7	99.3
Lakes	236	14	250	5.6	94.4
Northern Bahr El Ghazal	308	5	313	1.6	98.4
Unity	178	35	213	16.4	83.6
Upper Nile	145	17	162	10.5	89.5
Warrap	341	21	362	5.8	94.2
Western Bahr El Ghazal	140	10	150	6.7	93.3
Western Equatoria	120	8	128	6.3	93.8
TOTAL	2063	134	2197	**6.1**	**93.9**

Source: South Sudan EPI coverage Survey 2017

Table 42. Vaccination Card availability by Former State (Hubs), EPI Survey 2017(unweighted)

HH1.FORMER STATE (HUBS)	No	Yes	Total	% Without Card	% With Card
Central Equatoria	94	80	174	54.0	46.0
Eastern Equatoria	110	49	159	69.2	30.8
Jonglei	218	82	300	72.7	27.3
Lakes	220	44	264	83.3	16.7
Northern Bahr El Ghazal	257	56	313	82.1	17.9
Unity	170	43	213	79.8	20.2
Upper Nile	121	41	162	74.7	25.3
Warrap	292	70	362	80.7	19.3
Western Bahr El Ghazal	108	42	150	72.0	28.0
Western Equatoria	94	34	128	73.4	26.6
TOTAL	1684	541	2225	**75.7**	**24.3**

Source: South Sudan EPI coverage Survey 2017

Table 43. Estimation of Immunization coverage of BCG at Birth (unweighted)

`	RI.9. BCG Source							
HH1.FORMER STATE (HUBS)	**1-C**	**2-H**	**3-NA**	**Total**	**% BCG Card**	**% BCG History**	**% BCG N/A**	**Total**
Central Equatoria	85	74	15	174	49	43	8.6	100.0
Eastern Equatoria	70	55	31	156	44.9	35.3	19.9	100.0
Jonglei	76	155	65	296	25.7	52.4	22.0	100.0
Lakes	38	154	72	264	14.4	58.3	27.3	100.0
Northern Bahr El Ghazal	55	185	73	313	17.6	59.1	23.3	100.0
Unity	36	120	57	213	16.9	56.3	26.8	100.0
Upper Nile	30	93	38	161	18.6	57.8	23.6	100.0
Warrap	51	245	58	354	14.4	69.2	16.4	100.0
Western Bahr El Ghazal	45	94	11	150	30.0	62.7	7.3	100.0
Western Equatoria	32	83	13	128	25.0	64.8	10.2	100.0
TOTAL	518	1258	433	2209	23.4	56.9	19.6	100.0

Source: South Sudan EPI coverage Survey 2017

Table 44. Coverage by Antigen disaggregated by state –Survey 2011 (Card Only)

Coverages per Antigen per state 2011 survey (Card Only)											
	National	**CES**	**EES**	**JON**	**LAKES**	**NBG**	**UNI**	**UPN**	**WRP**	**WBG**	**WES**
BCG	29.0	50.1	43.3	28.6	12.1	31.3	26.4	17.9	5.7	25.5	36.8
Penta 1	26.4	42.8	35.6	27.1	12.5	29.1	20.7	18.3	4.8	28.0	39.5
Penta 3	23.8	39.6	24.0	28.6	3.4	20.0	24.2	17.0	5.7	22.6	27.9
OPV 3	24.2	39.6	24.9	29.0	4.9	24.3	23.8	17.9	5.7	21.8	29.2
MCV	10.0	34.2	21.9	15.2	5.8	17.8	13.2	11.9	6.6	16.3	20.6
Fully Immunized	8.7	10.8	10.3	10.0	1.3	8.2	5.7	4.6	0.9	5.0	13.7
BCG-MCV Drop out	65.5	31.7	49.4	46.9	52.1	43.1	50.0	33.5	15.8	36.1	44.0
Penta1-Penta 3	9.8	7.5	32.6	5.5	75.2	31.3	16.9	3.9	18.6	19.3	29.4

Source: South Sudan EPI coverage Survey 2017

The table above shows the coverages of the survey 2011 by card only. Nationally, Penta 3 coverage was recorded at 23.8%.The highest coverage was BCG (29.0%) whereas the lowest MCV at 10.0%.

Table 45. Coverage by Antigen by state for survey 2011 Card + History

Coverages per Antigen per state 2011 survey(Card + History)											
	National	**CES**	**EES**	**JON**	**LAKES**	**NBG**	**UNI**	**UPN**	**WRP**	**WBG**	**WES**
BCG	76.2	86.9	64.4	73.8	61.2	76.1	58.1	61	72.5	77.8	74.2
Penta 1	80.1	87.8	63.9	76.7	55.8	78.3	66.1	67.9	70	82.4	78.5
Penta 3	45	53.6	31.3	62.8	15.8	44.3	44.1	47.7	39.3	57.7	52.8
OPV 3	48.1	32.9	30.5	63.8	15.4	45.7	58.1	51.8	39.3	66.9	55.8
MCV	45.9	43.7	30	58.1	32.1	44.3	48.2	48.2	41	52.3	54.1
Fully Immunized	34.2	23.4	21	50.5	11.6	30.4	35.3	35.3	30.1	40.6	40.8
BCG-MCV Drop out	39.6	49.7	53.4	21.3	47.5	41.8	6.7	21	43.4	32.8	27.1
Penta1-Penta 3	43.8	40	51	18.1	71.5	43.4	33.3	29.7	44.4	30	32

Source: South Sudan EPI coverage Survey 2017

The table above shows the coverages by antigen (Card +History).Nationally Penta1 had the highest coverage (80.1%) whereas the lowest coverage was Penta 3 at 45%.

Table 46. Estimated % Coverage of at Tetanus Toxoid 2nd Dose for Mothers

	RI.81. TT2 Source							
HH.24. State (Former):	**1-C**	**2-H**	**3-Not Vaccinated**	**Total**	**% TT Card**	**% TT History**	**% TT NOT VACCINATED**	**Total**
Central Equatoria	22	119	0	141	15.6	84.4	0	22
Eastern Equatoria	35	50	1	86	40.7	58.1	1.2	35
Jonglei	6	21	3	30	20.0	70.0	10.0	6
Lakes	10	46	0	56	17.9	82.1	0.0	10
Northern Bahr El Ghazal	93	18	0	111	83.8	16.2	0.0	93
Unity	16	75	0	91	17.6	82.4	0.0	16
Upper Nile	45	49	0	94	47.9	52.1	0.0	45
Warrap	30	93	0	123	24.4	75.6	0.0	30
Western Bahr El Ghazal	6	66	0	72	8.3	91.7	0.0	6
Western Equatoria	14	107	2	123	11.4	87.0	1.6	14
TOTAL	277	644	6	927	29.9	69.5	0.6	277

Source: South Sudan EPI coverage Survey 2017

Table 47. Immunization Status of mother by Card

	RI.94. Immunization Status of mother (by card)									
HH.24. State (Former):	1-Fully immunized (TT5)	2-Partially immunized compliant with schedule	3-Partially immunized, not on schedule	4-Not immunized at all	Total	**% 1-Fully immunized (TT5)**	**% 2-Partially immunized compliant with schedule**	**% 3-Partially immunized, not on schedule**	**% 4-Not immunized at all**	**Total**
Central Equatoria	17	27	5	132	181	9.4	14.9	2.8	72.9	100.0
Eastern Equatoria	5	29	14	102	150	3.3	19.3	9.3	68.0	100.0
Jonglei	8	19	7	96	130	6.2	14.6	5.4	73.8	100.0
Lakes	8	11	4	36	59	13.6	18.6	6.8	61.0	100.0
Northern Bahr Ghazal	10	15	9	90	124	8.1	12.1	7.3	72.6	100.0
Unity	10	11	3	63	87	11.5	12.6	3.4	72.4	100.0
Upper Nile	46	15	6	53	120	38.3	12.5	5.0	44.2	100.0
Warrap	3	70	29	66	168	1.8	41.7	17.3	39.3	100.0
Western Bahr El Ghazal	5	4	2	10	21	23.8	19.0	9.5	47.6	100.0
Western Equatoria	7	19	8	7	41	17.1	46.3	19.5	17.1	100.0
TOTAL	119	220	87	655	1081	**11.0**	**20.4**	**8.0**	**60.6**	**100.0**

Source: South Sudan EPI coverage Survey 2017

Table 48. TT5 Immunization Status of mothers of children 0-11 months (by card)

RI.94. Immunization Status of mother (by card)	Frequency	Percent	Lower limit	Upper limit
1-Fully immunized (TT5)	119	11.01	9.28	13.01
2-Partially immunized compliant with schedule	220	20.35	18.06	22.85
3-Partially immunized, not on schedule	87	8.05	6.57	9.82
4-Not immunized at all	655	60.59	57.65	63.46
Total	1081	100		

Source: South Sudan EPI coverage Survey 2017

Table 49. Percentage of vaccines administered simultaneously on the same day, disaggregated by State; OPV2-Penta 2

Count of Simultaneous Vaccination OPV2-Penta 2					
Former State (Hubs)	**No**	**Yes**	**Grand Total**	**% Non-Simultaneous vaccination**	**% Simultaneous vaccination**
Central Equatoria	28	59	87	32.2	67.8
Eastern Equatoria	19	34	53	35.8	64.2
Jonglei	33	48	81	40.7	59.3
Lakes	1	12	13	7.7	92.3
Northern Bahr El Ghazal	5	23	28	17.9	82.1
Unity	8	4	12	66.7	33.3
Upper Nile	25	19	44	56.8	43.2
Warrap	5	11	16	31.3	68.8
Western Bahr El Ghazal	3	13	16	18.8	81.3
Western Equatoria	8	13	21	38.1	61.9
Grand Total	135	236	371	36.4	63.6

Source: South Sudan EPI coverage Survey 2017

The national coverage for simultaneous vaccination for OPV2-Pentavalent2 was 63.6% with Norther Bahr Ghazal having the highest coverage (82%) with the least in former Unity state with only 33% for simultaneous vaccination

Table 50. Percentage of vaccines administered simultaneously on the same day, disaggregated by State; OPV3-Penta 3

Count of Simultaneous Vaccination OPV3-Penta 3					
Former State (Hubs)	**No**	**Yes**	**Grand Total**	**% Non-Simultaneous vaccination**	**% Simultaneous vaccination**
Central Equatoria	25	56	81	30.9	69.1
Eastern Equatoria	16	31	47	34.0	66.0
Jonglei	28	39	67	41.8	58.2
Lakes	0	12	12	0.0	100.0
Northern Bahr El Ghazal	4	20	24	16.7	83.3
Unity	9	3	12	75.0	25.0
Upper Nile	24	19	43	55.8	44.2
Warrap	5	9	14	35.7	64.3
Western Bahr El Ghazal	1	13	14	7.1	92.9
Western Equatoria	6	12	18	33.3	66.7
Grand Total	118	214	332	35.5	64.5

Source: South Sudan EPI coverage Survey 2017

The national coverage for simultaneous vaccination for OPV3-Pentavalent3 was 64.5% with Lakes having the highest coverage (100%) with the least in former Unity state with only 25% for simultaneous vaccination.

Table 51. Missed Opportunity for Vaccination per Selected Antigens

Vaccine/dose	Number of visits where a child is eligible to receive the vaccine	Number of visits resulting in a MOV	Percent of visits resulting in a MOV
BCG	330	43	13.0
OPV0	330	43	13.03
OPV1	471	30	6.37
OPV2	392	31	7.91
OPV3	392	39	9.95
Penta1	488	31	6.4
Penta 2	433	23	5.31
Penta3	368	18	4.89

Source: South Sudan EPI coverage Survey 2017

NB: This is based on the data analyzed, where the dates for vaccination were clearly captured. Due to the damage or perforation in the cards not all the data with the indication on the availability of cards was included in the analysis. All dates that were missing or with incorrigible dates were not included in the analysis. Measles was used as measure to assess the missed opportunities for vaccination antigens which were expected to have been received (BCG, OPV0,OPV1,OPV2,OPV3,Penta1,Penta2,Penta3).

Table 52. Hot Spot of Counties with Low coverage (Colour Coded)

	RI.41. Fully immunized before 1 year old (Card only)				
Former County	**RI.41. No**	**RI.41. Yes**	**Total**	**% Not Vaccinated**	**% Vaccinated**
Ayod	4	0	4	**100.0**	**0.0**
Canal/Pigi	7	0	7	**100.0**	**0.0**
Lafon	4	0	4	**100.0**	**0.0**
Melut	32	0	32	**100.0**	**0.0**
Nyirol	18	0	18	**100.0**	**0.0**
Old Fangak	39	0	39	**100.0**	**0.0**
Pibor	24	0	24	**100.0**	**0.0**
Pochalla	16	0	16	**100.0**	**0.0**
Rumbek North	15	0	15	**100.0**	**0.0**
Twic East	15	0	15	**100.0**	**0.0**
Ulang	1	0	1	**100.0**	**0.0**
Urol	36	0	36	**100.0**	**0.0**
Wulu	14	0	14	**100.0**	**0.0**
Yirol East	16	0	16	**100.0**	**0.0**
Rumbek Centre	44	1	45	**97.8**	**2.2**
Akobo	29	1	30	**96.7**	**3.3**
Jur River	57	2	59	**96.6**	**3.4**
Nzara	26	1	27	**96.3**	**3.7**
Ezo	21	1	22	**95.5**	**4.5**
Panyijar	19	1	20	**95.0**	**5.0**
Tombura	16	1	17	**94.1**	**5.9**
Kapoeta North	15	1	16	**93.8**	**6.3**
Cueibet	44	3	47	**93.6**	**6.4**
Aweil South	28	2	30	**93.3**	**6.7**
Tonj East	72	6	78	**92.3**	**7.7**
Aweil Centre	31	3	34	**91.2**	**8.8**
Renk	62	7	69	**89.9**	**10.1**
Aweil East	121	15	136	**89.0**	**11.0**
Bor South	66	9	75	**88.0**	**12.0**
Kapoeta East	27	5	32	**84.4**	**15.6**
Awerial	16	3	19	**84.2**	**15.8**
Rumbek East	38	8	46	**82.6**	**17.4**
Tonj South	42	9	51	**82.4**	**17.6**
TOTAL	1812	404	2216	**81.8**	**18.2**
Budi	13	3	16	**81.3**	**18.8**
Tonj North	77	18	95	**81.1**	**18.9**
Guit	37	9	46	**80.4**	**19.6**
Rubkona	118	29	147	**80.3**	**19.7**

Raga	12	3	15	**80.0**	**20.0**
Twic	27	7	34	**79.4**	**20.6**
Aweil West	50	13	63	**79.4**	**20.6**
Terekeka	39	11	50	**78.0**	**22.0**
Gogrial East	7	2	9	**77.8**	**22.2**
Gogrial West	72	21	93	**77.4**	**22.6**
Maban	47	14	61	**77.0**	**23.0**
Duk	22	8	30	**73.3**	**26.7**
Aweil North	37	15	52	**71.2**	**28.8**
Wau	53	22	75	**70.7**	**29.3**
Meridi	19	9	28	**67.9**	**32.1**
Kapoeta South	10	5	15	**66.7**	**33.3**
Magwi	28	15	43	**65.1**	**34.9**
Ikotos	7	4	11	**63.6**	**36.4**
Yirol West	37	23	60	**61.7**	**38.3**
Torit	12	8	20	**60.0**	**40.0**
Yambio	18	17	35	**51.4**	**48.6**
Juba	55	68	123	**44.7**	**55.3**

Source: South Sudan EPI coverage Survey 2017

In the table above, the counties (color coded orange) of Ayod, Canal/Pigi, Lafon, Melut, Nyirol, Old Fangak, Pibor, Pochalla, Rumbek North and Twic East, Ulang, Urol, Wulu, Yirol East were identified as areas with alarmingly low vaccination coverage (100% not vaccinated).

Similarly, the counties color coded yellow had low vaccination coverage with unvaccinated coverage ranging as high as 98% in Rumbek Centre to 71% in Wau.

The counties color-coded green had low vaccination coverage with unvaccinated coverage ranging between 68% in Maridi to 45% in Juba.

Appendix A: Sample Design

Sample design for South Sudan EPI Coverage Survey, 2017

1. **Overall purpose of the Survey**

   The overall purpose of the coverage Survey is to validate the quality and the coverage of the EPI programme across 10 Former State (Hubs) of South Sudan.

   The specific objectives of the Survey are to establish the immunization coverage for all antigens among children aged 12- 23 months and Tetanus Toxoid immunization coverage among mothers of children aged 0-11 months.

2. **Target population group**

   The target population group will include

   - Children aged 12- 23 months
   - TT Immunization coverage among mothers of children aged 0- 11 months.

3. **Stratification**

   The EPI Coverage Survey was being conducted in the ten Former State (Hubs) of South Sudan. Therefore there were 5 strata. Within each State the EAs were ordered geographically by County, Payam and Boma in order to provide further implicit stratification and ensure that the Survey data were geographically representative. Therefore for the Statistical purposes due to logistic, time and Budget constraints the number of strata considered were 5 and the Sampled Households allocated by using proportional allocation across the ten States of South Sudan. The details of the strata were as followed:-

   Stratum1: Upper Nile State and Unity State
   Stratum 2: Eastern Equatoria State and Jonglei State
   Stratum 3: Central Equatoria State and Western Equatoria State
   Stratum 4: Lakes State and Western Bahr El Ghazel State
   Stratum 5: Warrap State and Northern Bahr El Ghazel State

4. **Sample Size Calculation**

   For detailed calculation of sample size was presented in the below table B1 and Table C below

Table B1

		Expected Coverage					
		50-70%	**75%**	**80%**	**85 %**	**90%**	**95%**
Precision for 95% CI	±3%	1,097	892	788	663	518	354
	±4%	622	517	461	394	315	227
	±5%	401	340	306	265	216	162
	±6%	280	242	220	192	160	132
	±7%	207	182	167	147	125	110
	±8%	159	143	131	117	101	93
	±9%	126	115	106	96	83	81
	±10%	103	95	88	80	70	70

Table C. Example design effects (DEFF) for coverage surveys						
	Average Respondent per Cluster (m)					Description
ICC	1	5	7	10	15	20
0	1	1	1	1	1	1	Uniform coverage
0.042	1	1.17	1.25	1.38	1.58	1.79	ICC = 1/24 very little variation in coverage
0.167	1	1.67	2	2.5	3.33	4.17	ICC = 1/6 conservative choice for SIA surveys
0.333	1	2.33	3	4	5.67	7.33	ICC = 1/3 conservative choice for RI surveys
1	1	5	7	10	15	20	Some clusters 100% covered; all others 0%

DEFF= 1+ICC (m-1)
DEFF=5.67
ICC= 0.333
Therefore m= $\frac{DEFF-1}{0.333}$ +1 = $\frac{5.67-1}{0.333}$ +1= 15

Detailed Information from Table B1 and Table C above:-
(A) Number of strata= 5
(B) Effective Sample Size (ESS) =102
(B1) Expected coverage = 0.4. This is the expected coverage of the indicator level of interest.
(B2) Desired precision= 10%= 0.1
(B3) Alpha The Probability that a stratum a true coverage within the confidence interval is falsely estimated to have coverage outside of the confidence interval=5%=0.05
(C) Design effect (DEFF) the design effect (DEFF) is a multiplier that inflates = 5.67
(C1) Target number of respondents per cluster (m) = 15
(C2) Intracluster Correlation Coefficient (ICC) =0.333
(D) Average number of households to visit to find 1 eligible respondent=5
(E) Non response inflation factor= 1.111
(E1) Response rate= 0.9

Sample size calculation

A*B*C= N= 2892 Total completed interviews needed.
N*D*E= 16067 Total number of Households to visit (total household sample size)
B*C*D*E= 3213 Number of households to visit in each stratum (household sample size per Stratum)
B*C/m= 39 Number clusters per stratum
D*E*m = 84 Number of households per cluster
Clusters per stratum*A= 200 Total number of clusters. In this case we can take A=5 strata then use proportion allocation across the 10 States of South Sudan.

5. Sampling Strategy

Two stage cluster Sampling Strategy was adopted for EPI Coverage Survey, 2017. In the first stage unit of selection the Enumeration Areas (EAs) were selected by using Systematic Probability Proportional to the size of Households (PPS) and in the second stage unit the

Households were selected by using Systematic Sampling after listing all the Households in the selected cluster by the supervisor and the enumerator before conducted the interview. Therefore as a result of over Sampling in total **3000** Households**, 200** clusters and **15** Households per cluster were sampled across the ten Former States (Hubs) of South Sudan. The limitation for Survey was that some of the areas were inaccessible due to insecurity, rain, floods and poor infrastructures such as roads etc. Therefore as a result of this 21 Enumeration Areas (EAs) were replaced.

6. Sample allocation of Households and EAs by States for EPI Coverage Survey, 2017

SC	State	Sample Households	Sample EAs/clusters	Households per EA
71	Upper Nile	270	18	15
72	Jonglei	375	25	15
73	Unity	210	14	15
81	Warrap	450	30	15
82	Northern Bahr El Ghazel	360	24	15
83	Western Bahr El Ghazel	150	10	15
84	Lakes	270	18	15
91	Western Equatoria	255	17	15
92	Central Equatoria	360	24	15
93	Eastern Equatoria	300	20	15
	Total	**3000**	**200**	

7. Sampling Weights for South Sudan EPI Coverage Survey, 2017

The major component of the weight is the reciprocal of the sampling fraction employed in selecting the number of sample households in that sampling stratum (h) and PSU (i)

Whi= $\frac{1}{fhi}$

The term fhi, the sampling fraction for the i-th sample PSU in the h-th stratum is the product of probabilities of selection at every stage in each sampling stratum:

fhi= P1hi*P2hi

Based on the sample design these probabilities were calculated as follows:

P1hi= = $\frac{nh*Mhi}{Mh}$

nh= number of sample PSUs selected in stratum h ,Mhi= number of households in 2008 Census frame for the i-th sample PSU in stratum h

Mh= total number of households in the 2008 Census frame for stratum h (Cumulative measure of size)

P2hi= $\frac{15}{M'hi}$

15= number of sampled Households from each sampled cluster

M'hi= number of households listed in the i-th sample PSU in stratum h

A final component in the calculation of sample weights takes into account the level of non-response for the household and individual interviews. The adjustment for household non response in each stratum is equal to $\frac{1}{RRh}$

Where, RRh is the response rate for the sample households in stratum h, defined as the proportion of the number of interviewed households in stratum h out of the number of selected households found to be occupied during the field work in stratum h.

Appendix B: List of survey personnel involved in the survey

SURVEY TEAM MEMBERS

1. Survey Steering & Coordination Committee

	Name	Position	Organization
1.	Dr. Samson Baba	Advisor to the Minister	MOH-GoSS
2.	Dr. Atem Nathan	Director General -PHC	MOH-GoSS
3.	Dr. Richard Lako	Director General (PP&B)	MOH-GoSS
4.	Dr Antony Laku	National Director -EPI	MOH-GoSS
5.	Mr.Taban Musa	Deputy Director-EPI	MOH-GoSS
6.	Mr. Sisto Angelo	EPI -M&E	MOH-GoSS
7.	Mr. Charles Mona Kristino	Director	SSNBS, GIS, Remote Sensing & Cartography
8.	Mr. Adwok Chol	Director	Census and Survey
9.	Mr. Julius Sebit	Deputy Director	SSNBS
10.	Ms. Penelope Campbell	Chief of Health	UNICEF
11.	Dr. Evans Mokaya	EPI Technical Officer	CDC/AFENET/MOH
12.	Dr Lydie Maoungou Minguiel	Immunization Manager	UNICEF
13.	Dr. Jean Luc Kagayo	Immunization Specialist	UNICEF
14.	Dr. Samuel Patti	Immunization Specialist	UNICEF
15.	Mr. Lobson Kajawuya	EPI Officer	UNICEF
16.	Mr. Baboucarr Boye	Immunization officer	UNICEF
17.	Mr. Mutuma Abeshu	Cold Chain Consultant	UNICEF
18.	Dr. Rachel Seruyange	Routine Immunization Officer	WHO
19.	Dr Sylvester Maleghemi	EPI/Polio Technical Officer	WHO
20.	Mr. Kofi Boateng	EPI/RI Technical Officer	WHO
21.	Ms Rosebella Odera	STOP Consultant	CDC/AFENET/WHO
22.	Mr. Hassan Noor Ibrahim	Lead Consultant	Techman Global
23.	Mr. Boniface Ambani Isindu	M&E Independent Consultant	Techman Global
24.	Mr. Titus Kolongei	M&E Independent Consultant	Techman Global

National Steering Committee

The National Technical Steering committee's main function was the overall coordination of the implementation of the survey. The Committee under the Leadership of Ministry of Health-Directorate of Planning, Policy, Budgeting and Research constituted sub committees guided day to day implementation of the survey.

This committee was an Inter-agency committee that drew its members from the government departments, development partners, all implementing agencies, NGOs and others key players on Expanded Programme on Immunization.

Functions of the National Technical Steering Committee were

I. They provided overall leadership and technical guidance to the Lead Consultants throughout implementation of the survey.
    a. This included determining the Terms of Reference,
    b. Resource mobilization (funds and other resources required for implementation)

c. Quality assurance (including securing the appropriate ethical clearance as per National policy) and monitoring of the field trainings, data collection and transmission of the survey reports to the Central level
d. Worked with the Lead Coordinator/Consultant, identified, selected and trained the National survey Teams, state teams and survey interviewers required for the survey.

Technical Support & Guidance

UNICEF and WHO South Sudan Country office as well as Regional Office offered technical support and Guidance through Mamadou S. Diallo UNICEF (USA, New York) and Dr Carolina Danovaro WHO (Geneva). WHO Scholar program, colleagues and alumni who supported in providing guidance.

Survey Team for the Pretesting of Questionnaires		
Gumbo South: Enumeration Area 1		
Name	**Position**	**Role**
Mike Francis	Statistician	Household Listing & Selection
Jane Manase	M&E Officer-MOH	Lead Supervisor
Rosebella Odera	WHO STOP Consultant	Lead Supervisor
Boniface Isindu	Private Consultant	Coordination and Data Specialist
Titus Kolongei	Private Consultant	Coordination and Data Specialist
Julius Sebit	Deputy Director	Household Listing & Selection
Grace Marcello	County Officer	Interviewer
Sunday Batista	County Officer	Interviewer
Gumbo South: Enumeration Area 2		
Name		**Role**
Victor Mikasa	M&E Officer-MOH-DHIS	Lead Supervisor
Sisto Angelo	EPI M&E Officer	Lead Supervisor
Hassan Ibrahim	Lead Consultant	Coordination
Leah Muja	M&E Officer -MOH -DHIS	Interviewer
Flora Achola	County Officer	Interviewer
George Awzienio	Routine Immunization Officer	Lead Supervisor
Gordon Wani	Statistician	Household Listing & Selection
Fredrick Oduho	Statistician	Household Listing & Selection

2. Survey Team for the field work				
HH1	**HH8**	**Name Of Data Collector**	**Name Of National Supervisor**	**Name Of State Supervisor**
Central Equatoria	920107001110	Santino Modi	Lea Muja	Lily Kitali
Central Equatoria	920211003101	David Sebit Yatta	Lea Muja	Loku Simon
Central Equatoria	920206004108	David Sebit Yatta	Cicilia Konga	Loku Simon
Central Equatoria	920206004108	David Sebit Yatta	Cicilia Konga	Loku Simon
Central Equatoria	920206004108	Peter Woro Morgan	Cicilia Konga	Loku Simon
Central Equatoria	920212004203	David Sebit Yatta	Lea Muja	Loku Simon
Central Equatoria	920213001201	David Sebit Yatta	Lea Muja	Loku Simon
Central Equatoria	920206001117	Peter Woro Morgan	Lea Muja	Loku Simon
Central Equatoria	920206001117	Peter Woro Morgan	Lea Muja	Loku Simon
Central Equatoria	920205011102	Peter Woro Morgan	Cicilia Konga	Loku Simon
Central Equatoria	920205017102	David Sebit Yatta	Cicilia Konga	Loku Simon
Central Equatoria	920205004103	Peter Woro Morgan	Cicilia Konga	Loku Simon
Central Equatoria	920206002111	David Sebit Yalla	Lea Muja	Loku Simon
Central Equatoria	920206004101	Peter Woro Morgan	Cicilia Konga	Loku Simon
Central Equatoria	920212003203	David Sebit Yatta	Lea Muja	Loku Simon
Central Equatoria	920212002201	David Sebit Yatta	Lea Muja	Loku Simon
Central Equatoria	920205018110	David Sebit Yatta	Cicilia Konga	Loku Simon
Central Equatoria	920211012104	David Sebit Yatta	Lea Muja	Loku Simon
Central Equatoria	920109001202	Michael Juma	Lea Muja	Lily Kitali
Central Equatoria	920104005202	Santino Modi	Lea Muja	Lily Kitali
Central Equatoria	920104002204	Michael Juma	Lea Muja	Lily Kitali
Central Equatoria	920103002204	Michael Juma	Lea Muja	Lily Kitali
Central Equatoria	920102004201	Michael Juma	Lea Muja	Lily Kitali
Central Equatoria	920211001101	Peter Woro Morgan	Lea Muja	Loku Simon
Central Equatoria	920211008103	David Sebit Yatta	Lea Muja	Loku Simon
Central Equatoria	920213005204	Peter Woro Morgan	Lea Muja	Loku Simon
Central Equatoria	920211005104	David Sebit Yatta	Lea Muja	Loku Simon
Central Equatoria	920206002111	David Sebit Yatta	Lea Muja	Loku Simon
Eastern Equatoria	930602006204	Lomiriye Billa Apus	Casio Oliwa	Loinet Alphonse
Eastern Equatoria	930804002101	Ohoro Leo Jacob	Angelina Idyongo	Oler Charles

Eastern Equatoria	930105001201	Ohoro Leo Jacob	Angelina Idyongo	Oler Charles
Eastern Equatoria	930802004201	Ohoro Leo Jacob	Angelina Idyongo	Oler Charles
Eastern Equatoria	930806002203	Ohoro Leo Jacob	Angelina Idyongo	Oler Charles
Eastern Equatoria	930705002201	Ohoro Leo Jacob	Angelina Idyongo	Oler Charles
Eastern Equatoria	930103004202	Onyun Nicodemus	Angelina Idyongo	Oler Charles
Eastern Equatoria	930804004201	Onyun Nicodemus	Angelina Idyongo	Oler Charles
Eastern Equatoria	930205002203	Ohoro Leo Jacob	Angelina Idyongo	Oler Charles
Eastern Equatoria	930702003201	Onyun Nicodemus	Angelina Idyongo	Oler Charles
Eastern Equatoria	930107001103	Onyun Nicodemus	Angelina Idyongo	Oler Charles
Eastern Equatoria	930602006204	Lomeriye Billa Apus	Casio Oliwa	Loinet Alphonse
Eastern Equatoria	930403003203	Lomeriye Billa Apus	Casio Oliwa	Loinet Alphonse
Eastern Equatoria	930607001203	Lomeriye Billa Apus	Casio Oliwa	Loinet Alphonse
Eastern Equatoria	930406002203	Lomeriye Billa Apus	Casio Oliwa	Loinet Alphonse
Eastern Equatoria	930405004201	Lomeriye Billa Apus	Casio Oliwa	Loinet Alphonse
Eastern Equatoria	930501006101	Lomeriye Billa Apus	Casio Oliwa	Loinet Alphonse
Eastern Equatoria	930504005103	Lomeriye Billa Apus	Casio Oliwa	Loinet Alphonse
Eastern Equatoria	930301003205	Lomeriye Billa Apus	Casio Oliwa	Loinet Alphonse
Eastern Equatoria	930303001201	Lomeriye Billa Apus	Casio Oliwa	Loinet Alphonse
Eastern Equatoria	930404002202	Lomeriye Billa Apus	Casio Oliwa	Loinet Alphonse
Jonglei	720306003201	Both Molpieny	Justin Loro	Thomas Tot
Jonglei	720504005204	Samuel Chuol Luk	Justin Loro	Dr Teny Manang
Jonglei	720706001202	Mai Gathip Riam	Justin Loro	Abraham Simon
Jonglei	721102003210	Gabriel Majok Kuany	Francis Andruga	Simon Garang
Jonglei	720506001201	Riek Mayul	Justin Loro	Dr. Teny Manang
Jonglei	720604005204	Amos Chol	Justin Loro	Waya Anthony
Jonglei	720402004201	Gabriel Majok Kuany	Francis Andruga	Simon Garang
Jonglei	720502006203	John Gai Jok	Justin Loro	Thomas Tut

Jonglei	721106004208	Jacob Ajak	Francis Andruga	Simon Garang
Jonglei	720703001104	Nyak Lual	Justin Loro	Lam Philip
Jonglei	721101001204	Jacob Ajak Job	Francis Andruga	Simon Garang
Jonglei	721003004203	Jacob Ajak Job	Francis Andruga	Simon Garang
Jonglei	721105003202	Gabriel Majok	Francis Andruga	Simon Garang
Jonglei	721103003206	Gabriel Majok	Francis Andruga	Simon Garang
Jonglei	720406003202	Jacob Ajak	Francis Andruga	Simon Garang
Jonglei	720102003202	Panywan Chan	Francis Andruga	Kiri Joseph
Jonglei	720101003205	Gatdin Deng	Grace Marcello	Tut Thor
Jonglei	720101003201	Kuol Jal	Grace Marcello	Tut Thor
Jonglei	720603002201	Tot Jok Jek	Grace Marcello	Tut Thor
Jonglei	720201002204	Chal Malual	Justin Loro	John Koang
Jonglei	720604005204	Amos Chot	Justin Loro	Waya
Jonglei	720306003201	Both Molpeny	Justin Loro	Thomas Tot
Jonglei	720903004201	Johnson Beko	Jok Peter	Kuon Samuel
Jonglei	720801004201	Lubang Stephen	Jok Peter	Kuon Samuel
Jonglei	720805006201	Lubang Stephen	Jok Peter	Kuon Samuel
Jonglei	720908003203	David Loki	Jok Peter	Kuon Samuel
Jonglei	720904010205	Jidu Kurok	Jok Peter	Kuon Samuel
Jonglei	720502006203	Charles Chuol	Justin Loro	Thomas Tut Bii
Jonglei	720706001202	Garang Keak	Justin Loro	Abraham Simon
Jonglei	721102003210	Gabriel Majok Kuany	Francis Andruga	Simon Garang
Jonglei	720402004201	Gabriel Majok Kuany	Francis Andruga	Simon Garang
Jonglei	720502006203	John Gai Jok	Justin Loro	Thomas Tot
Jonglei	720703001104	Gatkek Puok	Justin Loro	Lam Philip
Jonglei	721003004203	Jacob Ajak Job	Francis Andruga	Simon Garang
Jonglei	720406003202	Jacob Ajak	Francis Andruga	Simon Garang
Jonglei	720101003205	Gatdin Deng	Francis Andruga	Simon Garang
Lakes	840302001107	James Manyang	Esther Keji	Simon Makon
Lakes	840105002204	Peter Mayor Kenyienga	Esther Keji	Simon Makon
Lakes	840104001212	Peter Mayor Kenyienga	Esther Keji	Simon Makon
Lakes	840807001204	Peter Aberich Riak	Justin Loro	Dr Marial
Lakes	840605002204	Dam Majok	Justin Loro	Dr Marial
Lakes	840605002204	Dam Majok	Justin Loro	Dr Marial
Lakes	840605002204	Dam Majok, Phillip Angony	Justin Loro	Dr Marial
Lakes	840701002206	Gabriel Mayun	Justin Loro	Dr Marial

Lakes	840601001201	Dam Majok	Justin Loro	Dr Marial
Lakes	840704001211	James Adut Majok	Justin Loro	Dr Marial
Lakes	840602002206	Philip Angony, Dam Majak Thon	Justin Loro	Dr Marial
Lakes	840802002203	James Mabor Maker, Peter Aberich Riak	Justin Loro	Dr Marial
Lakes	840304001104	Albino Matur Maker, Deng Henry Malual	Esther Keji	Simon Makon
Lakes	840401002222	James Manyang	Esther Keji	Simon Makon
Lakes	840505002209	Andrew Chol	Esther Keji	Simon Makon
Lakes	840501001203	James Manyang	Esther Keji	Simon Makon
Lakes	840102003203	Thot Jacob Bol	Esther Keji	Simon Makon
Lakes	840304002210	Albino Matur Maker	Esther Keji	Simon Makon
Lakes	840204001101	Zacharia Malual	Esther Keji	Simon Makon
Lakes	840503002201	Andrew Chol	Esther Keji	Simon Makon
Lakes	840105002204	Peter Mayor Kenyienga	Esther Keji	Simon Makon
Lakes	840104001212	Peter Mayor	Esther Keji	Simon Makon
Lakes	840204001101	Zacharia Malual	Esther Keji	Simon Makon
Northern Bahr El Ghazal	820304002207	Abraham Kuan Athin	Rosebella Odera & Jackline Mensona	Adeb
Northern Bahr El Ghazal	820404002201	Joseph Bol Kur	Rosebella Odera & Jackline Mensona	Kuol Manyang
Northern Bahr El Ghazal	820201001203	Marko Mou Mel	Rosebella Odera & Jackline Mensona	Adeb
Northern Bahr El Ghazal	820207001206	Marko Mou Mel	Rosebella Odera & Jackline Mensona	Adeb
Northern Bahr El Ghazal	820206005204	Abraham Kuan	Rosebella Odera & Jackline Mensona	Adeb
Northern Bahr El Ghazal	820202003204	Abraham Kuan	Rosebella Odera & Jackline Mensona	Adeb
Northern Bahr El Ghazal	820504002203	Joseph Bol Kur	Rosebella Odera & Jackline Mensona	Kuol Manyang
Northern Bahr El Ghazal	820406001211	Joseph Bol	Rosebella Odera & Jackline	Kuol Manyang

			Mensona	
Northern Bahr El Ghazal	820104004207	Gabriel Garang	Rosebella Odera & Jackline Mensona	Kuol Manyang
Northern Bahr El Ghazal	820402008108	Joseph Kur Bol	Rosebella Odera & Jackline Mensona	Kuol Manyang
Northern Bahr El Ghazal	820102003201	Gabriel Garang	Rosebella Odera & Jackline Mensona	Kuol Manyang
Northern Bahr El Ghazal	820201005210	Abraham Kuan	Rosebella Odera & Jackline Mensona	Adeb
Northern Bahr El Ghazal	820410001208	Gabriel	Rosebella Odera & Jackline Mensona	Kuol Manyang
Northern Bahr El Ghazal	820208001201	Marko Mou	Rosebella Odera & Jackline Mensona	Adeb
Northern Bahr El Ghazal	820103003214	Gabriel Garang	Rosebella Odera & Jackline Mensona	Kuol Manyang
Northern Bahr El Ghazal	820201010203	Marko Mou Mel	Rosebella Odera & Jackline Mensona	Adeb
Northern Bahr El Ghazal	820308001207	Marco Mou Mel	Rosebella Odera & Jackline Mensona	Adeb
Northern Bahr El Ghazal	820308001207	Abraham Kaan	Rosebella Odera & Jackline Mensona	Adeb
Northern Bahr El Ghazal	820205005202	Marko Mou Mel	Rosebella Odera & Jackline Mensona	Adeb
Northern Bahr El Ghazal	820202012202	Abraham Kuan	Rosebella Odera & Jackline Mensona	Adeb
Northern Bahr El Ghazal	820304002207	Marko Mou Mel	Rosebella Odera & Jackline Mensona	Adeb
Northern Bahr El Ghazal	820204002208	Marko Mou Mel	Rosebella Odera & Jackline Mensona	Adeb
Northern Bahr El Ghazal	820204002208	Marko Mou Deng	Rosebella Odera & Jackline Mensona	Adeb
Northern Bahr El Ghazal	820408002209	Gabriel Garang Wual	Rosebella Odera	Kuol Manyang

			& Jackline Mensona	
Northern Bahr El Ghazal	820506002201	Gabriel Garang Wual	Rosebella Odera & Jackline Mensona	Kuol Manyang
Northern Bahr El Ghazal	820506002201	Gabriel Garang Wual	Rosebella Odera & Jackline Mensona	Kuol Manyang
Northern Bahr El Ghazal	820402001104	Gabriel Garang Wual	Rosebella Odera & Jackline Mensona	Kuol Manyang
Northern Bahr El Ghazal	820103007215	Gabriel Garang Wual	Rosebella Odera & Jackline Mensona	Kuol Manyang
Northern Bahr El Ghazal	820205005202	Marko Mou Mel	Rosebella Odera & Jackline Mensona	Adeb
Northern Bahr El Ghazal	820103003214	Gabriel Garang Wual	Rosebella Odera & Jackline Mensona	Kuol Manyang
Northern Bahr El Ghazal	820206005204	Abraham Kuan	Rosebella Odera & Jackline Mensona	Adeb
Northern Bahr El Ghazal	820410001208	Gabriel Garang Wual	Rosebella Odera & Jackline Mensona	Kuol Manyang
Northern Bahr El Ghazal	820308001207	Marko Mou Mel	Rosebella Odera & Jackline Mensona	Adeb
Northern Bahr El Ghazal	820205005202	Mark Mou Mel	Rosebella Odera & Jackline Mensona	Adeb
Northern Bahr El Ghazal	820204002208	Marko Mou Mel	Rosebella Odera & Jackline Mensona	Adel
Northern Bahr El Ghazal	820304002207	Abraham Kuan Athin	Rosebella Odera & Jackline Mensona	Adeb
Unity	730408002201	James Gatluak Gatwich	Orupi Johnson & Dr Apollo Sworo Oliver	Simpson Lok
Unity	730106004201	James Gatlak Gatwich	Orupi Jonson & Dr Apollo Sworo Oliver	Samuel Majang
Unity	730401004101	Gatluoth Mayik Kom	Orupi Johnson & Dr Apollo Sworo Oliver	Samuel Majang
Unity	730307002201	Gatluoth Mayik Kom	Orupi Johnson & Dr Apollo Sworo Oliver	Samuel Majang

Unity	730103002202	James Gatluak Gatwich	Orupi Johnson & Dr Apollo Sworo Oliver	Samuel Majang
Unity	730401004101	James Gatluak Gatwich	Orupi Johnson & Dr Apollo Sworo Oliver	Samuel Majang
Unity	730506001201	James Gatluak Gatwich	Orupi Johnson & Dr Apollo Sworo Oliver	Samuel Majang
Unity	730604004202	Gatkuoth Mayik Kom	Orupi Johnson & Dr Apollo Sworo Oliver	Samuel Majang
Unity	730406010201	Gatluoth Mayik Kom	Orupi Johnson & Dr Apollo Sworo Oliver	Samuel Majang
Unity	730303001203	Gatkuoth Mayik Kom	Orupi Johnson & Dr Apollo Sworo Oliver	Samuel Majang
Unity	730401004101	James Gatluak Gatwich	Orupi Johnson & Dr Apollo Sworo Oliver	Samuel Majang
Unity	730909001201	Tang Yar	Dhil Bath	Stephen Majak
Unity	730903004201	Samuel Keah	Dhil Bath	Stephen Majak
Unity	730903004202	Samuel Keah Riek, John Manyang Gai	Dhil Bath	Stephen Majak
Unity	730408006203	Gatluoth Majik Kom	Orupi Johnson & Dr Apollo Sworo Oliver	Samuel
Unity	730103002202	Gatluoth Mayik Kon	Orupi Johnson & Dr Apollo Sworo Oliver	Samuel
Unity	730504001201	Elijah Makuei	Orupi Johnson & Dr Apollo Sworo Oliver	Simpson
Unity	730401001101	Elijah Makuei	Orupi Johnson & Dr Apollo Sworo Oliver	Simpson
Unity	730408002201	Elijah Makuei	Orupi Johnson & Dr Apollo Sworo Oliver	Simpson Lok
Unity	730604004202	James Gatluak Gatwich	Orupi Johnson & Dr Apollo Sworo Oliver	Samuel Majang
Unity	730103002202	Gatkuoth Mayik	Orupi Johnson & Dr Apollo Sworo Oliver	Samuel
Unity	730407001201	Gatkuoth Mayik	Orupi Johnson & Dr Apollo Sworo Oliver	Samuel
Unity	730106004201	Gatkuoth Mayik Kom	Orupi Johnson & Dr Apollo Sworo Oliver	Samuel Majang
Unity	730307002201	James Gatluak Gatwich	Orupi Johnson & Dr Apollo Sworo Oliver	Samuel Majang

Unity	730406010201	Gatkuoth Mayik Kom	Orupi Johnson & Dr Apollo Sworo Oliver	Samuel Majang
Unity	730106004201	Gatkuoth Mayik Kom	Orupi Johnson & Dr Apollo Sworo Oliver	Samuel Majang
Unity	730406010201	James Gatluak	Orupi Johnson & Dr Apollo Sworo Oliver	Samuel Majang
Unity	730103002202	Gatkuoth Mayik	Orupi Johnson & Dr Apollo Sworo Oliver	Samuel
Unity	730407001201	Gatkuoth Mayik	Orupi Johnson & Dr Apollo Sworo Oliver	Samuel
Upper Nile	710105002103	Chiek Nyok Mayen	Peter Jur Makender	Ajak Aliny
Upper Nile	710505002203	Bulis Gobe	Benjamin Agok	Kamal Khamis
Upper Nile	710504010201	James Nog Teti	Benjamin Agok	Kamal
Upper Nile	710505004202	Anur Mahadi	Benjamin Agok	Kamal
Upper Nile	710502002202	Panyachol Titus Boto	Benjamin Agok	Kamal K
Upper Nile	710104004101	Monnir Deng	Peter Jur Makender	Ajak Aliny
Upper Nile	710402002202	Michael Atem Khot	Peter Jur Makender	Chan Kuol
Upper Nile	710103004102	Michael Atem Khot	Peter Jur Makender	Chan Kuol
Upper Nile	710404004102	Michael Atem Khot	Peter Jur Makender	Chan Kuol
Upper Nile	710403001203	Michael Atem Khot	Peter Jur Makender	Chan Kuol
Upper Nile	710405003201	Michael Atem Khot	Peter Jur Makender	Chan Kuol
Upper Nile	710502003202	Michael Uyaka	Benjamin Agok	Kamal Kwajah
Upper Nile	710105005106	Thomas Dau	Peter Jur Makender	Ajak Aliny
Upper Nile	710104006111	Chick Nyok Mayen	Peter Jur Makender	Ajak Aliny
Upper Nile	710104001203	Chick Ngok	Peter Jur Makender	Ajak Aliny
Upper Nile	710104005101	Thomas	Peter Jur Makender	Ajak Aliny
Upper Nile	710104005101	Thomas	Peter Jur Makender	Ajak Aliny
Upper Nile	710105004201	Monnir Deng	Peter Jur Makender	Ajak Aliny
Upper Nile	710504010201	James Nog Teti	Benjamin Agok	Kamal

Upper Nile	710502002202	Panyachol Titus Boto	Benjamin Agok	Kamal
Upper Nile	710505004202	Anur Mahadi	Benjamin Agok	Kamal
Upper Nile	710501004202	James Winya	Benjamin Agok	Kamal
Upper Nile	710105005106	Thomas Dau	Peter Jur Makender	Ajak Aliny
Upper Nile	710502002202	Panyachol Titus	Benjamin Agok	Kamal
Upper Nile	710505004202	Anur Mahadi	Benjamin Agok	Kamal
Warrap	810503002205	Mareng Santino	Fredrick Oduho	Samuel
Warrap	810307005203	Adong Salvatoria	Peter Kon Thil	Maleng Ayok
Warrap	810501002201	Santino Kon Tong, Mareng Santino Ariath	Fredrick Oduho	Samuel Ajiek
Warrap	810603003205	Santino Kon Tong	Fredrick Oduho	Samuel Ajiek
Warrap	810603003205	Mareng Santino	Fredrick Oduho	Samuel Ajiek
Warrap	810703003210	Santino Kon Tong, Mareng Santino	Fredrick Oduho	Samuel Ajiek
Warrap	810611002203	Mareng Santino	Fredrick Oduho	Samuel Ajiek
Warrap	810611002203	Santino Kon	Fredrick Oduho	Samuel Ajiek
Warrap	810705003208	Santino Kon	Fredrick Oduho	Samuel
Warrap	810705003208	Santino Kon	Fredrick Oduho	Samuel Ajiek
Warrap	810505002205	Santino Kon	Fredrick Oduho	Samuel Ajiek
Warrap	810503002205	Mareng Santino Ariath	Fredrick Oduho	Samuel Ajiek
Warrap	810510001210	Santino Kon Tong	Fredrick Oduho	Samuel Ajiek
Warrap	810606003201	Santino Kon Tong	Fredrick Oduho	Samuel Ajiek
Warrap	810508002210	Mareng Santino	Fredrick Oduho	Samuel Ajiek
Warrap	810306003209	Aloot Emmanuel	Peter Kon Thil	Maleng Ayok
Warrap	810402003206	Aloot Emmanuel	Peter Kon Thil	Maleng Ayok
Warrap	810205004210	Adong Salvatoria	Peter Kon Thil	Maleng Ayok
Warrap	810306001105	Aloot Emmanuel Chol	Peter Kon Thil	Maleng Ayok
Warrap	810203002208	Adong Salvatoria	Peter Kon Thil	Maleng Ayok
Warrap	810309003202	Adong Salvatoria	Peter Kon Thil	Maleng Ayok

Warrap	810507001215	Mareng Santino Ariath	Fredrick Oduho	Samuel Ajiek
Warrap	810704003107	Mareng Santino Ariath	Fredrick Oduho	Samuel Ajiek
Warrap	810502002209	Santino Kon Tong	Fredrick Oduho	Samuel Ajiek
Warrap	810608003207	Mareng Santino Ariath	Fredrick Oduho	Samuel Ajiek
Warrap	810702002208	Mareng Santino Ariath, Santino Kon Tong	Fredrick Oduho	Samuel Ajiek
Warrap	810304001209	Adong Salvatoria, Aloot Emmanuel	Peter Kon Thil	Maleng Ayok
Warrap	810302003210	Aloot Emmanuel	Peter Kon Thil	Maleng Ayok
Warrap	810307005203	Adong Salvatoria	Peter Kon Thil	Maleng Ayok
Warrap	810307005203	Aloot Emmanuel	Peter Kon Thil	Maleng Ayok
Warrap	810307002111	Aloot Emmanuel	Peter Kon Thil	Maleng Ayok
Warrap	810301002211	Adong Salvatoria	Peter Kon Thil	Maleng Ayok
Warrap	810206004219	Aloot Emmanuel	Peter Kon Thil	Maleng Ayok
Warrap	810308004202	Aloot Emmanuel	Peter Kon Thil	Maleng Ayok
Warrap	810203002208	Aloot Emmanuel	Peter Kon Thil	Maleng Ajok
Warrap	810301002211	Aloot Emmanuel	Peter Kon Thil	Maleng Ayok
Warrap	810306001105	Adong Salvatoria	Peter Kon Thil	Maleng Ayok
Warrap	810309003202	Aloot Emmanuel	Peter Kon Thil	Maleng Ayok
Warrap	810206002206	Adong Salvatoria	Peter Kon Thil	Maleng Ayok
Warrap	810205004210	Aloot Emmanuel	Peter Kon Thil	Maleng Ayok
Warrap	810306003209	Adong Salvatoria	Pater Kon Thil	Maleng Ayok
Warrap	810601003208	Mareng Santino	Fredrick Oduho	Samuel Ajiek
Warrap	810503002205	Mareng Santino	Fredrick Oduho	Samuel
Warrap	810603003205	Santino Kon Tong	Fredrick Oduho	Samuel Ajiek
Warrap	810611002203	Mareng Santino	Fredrick Oduho	Samuel Ajiek
Warrap	810307005203	Adong Salvatoria	Peter Kon Thil	Maleng Ayok
Warrap	810307002111	Aloot Emmanuel	Peter Kon Thil	Maleng Ayok
Warrap	810308004202	Adong Salvatoria	Peter Kon Thil	Maleng Ayok
Warrap	810601003208	Santino Kon	Fredrick Oduho	Samuel Ajiek

Western Bahr El Ghazal	830105004201	Saeed Yangi	Grace Marcello	Abdelgadir
Western Bahr El Ghazal	830304011102	Riak Iyok	Flora Achola	Eugino Longar
Western Bahr El Ghazal	830304004103	Riak Iyok Ajuach	Flora Achola	Eugino Longar
Western Bahr El Ghazal	830202004204	Riak Iyok	Flora Achola	Eugino Longar
Western Bahr El Ghazal	830202001202	Riak Iyok	Flora Achola	Eugino Longar
Western Bahr El Ghazal	830105004201	Saeed Yangi Ujang	Grace Marcello	Abdelgadir
Western Bahr El Ghazal	830305010101	Riak Iyok Ajuach	Flora Achola	Eugino Longar
Western Bahr El Ghazal	830205003211	Riak Iyok Ajuach	Flora Achola	Eugino
Western Bahr El Ghazal	830305016103	Riak Tyok Ajuach	Flora Achola	Eugino Longar
Western Bahr El Ghazal	830204001207	Riak Iyok Ajuach	Flora Achola	Eugino Longar
Western Bahr El Ghazal	830305003103	Riak Iyok Ajuach	Flora Achola	Eugino Longar
Western Bahr El Ghazal	830305016103	Riak Iyok	Flora Achola	Eugino Longar
Western Bahr El Ghazal	830204001207	Riak Iyok	Flora Achola	Eugino Longar
Western Bahr El Ghazal	830304004103	Riak Ayok	Flora Achola	Eugino Longar
Western Bahr El Ghazal	830305010101	Riak Iyok Ajuach	Flora Achola	Eugino Longar
Western Bahr El Ghazal	830305003103	Riak Iyok	Flora Achola	Eugino Longar
Western Bahr El Ghazal	830204001207	Riak Iyok	Flora Achola	Eugino Longar
Western Bahr El Ghazal	830105004201	Saeed Yangi	Grace Marcello	Abdelgadir
Western Equatoria	910404003204	Peter Mario, John Gere Maku	Edward Lasio	Evans Ariko
Western Equatoria	910406001201	David Juma Zaki	Edward Lasio	Evans Ariko
Western Equatoria	910402003203	Peter Mario	Edward Lasio	Evans Ariko
Western Equatoria	910704003101	James Mawa	Victor Misaka	Evans Ariko
Western Equatoria	910302004204	Peter Mario	Edward Lasio	Evans Ariko
Western Equatoria	910104007209	John Gere Maku	Edward Lasio	Evans Ariko
Western Equatoria	910305001204	Peter Mario	Edward Lasio	Evans Ariko
Western Equatoria	910302001203	Peter Mario	Edward Lasio	Evans Ariko
Western Equatoria	910103004201	Peter Mario	Edward Lasio	Evans Ariko
Western Equatoria	910705002203	Peter John Basa	Victor Misaka	Evans Ariko
Western Equatoria	910505008203	James Mawa	Victor Misaka	Evans Ariko
Western Equatoria	910505008101	Luka Bambio	Victor Misaka	Evans Ariko
Western Equatoria	910505007106	Peter John Basa	Victor Misaka	Evans Ariko
Western Equatoria	910704002107	Luka Bambio	Victor Misaka	Evans Ariko
Western Equatoria	910602002210	Peter John Basa	Victor Misaka	Evans Ariko
Western Equatoria	910502003202	Luka Bambio	Victor Misaka	Evans Ariko
Western Equatoria	910505003105	Luka Bambio	Victor Misaka	Evans Ariko
Western Equatoria	910505007106	Peter John	Victor Misaka	Evans Ariko
Western Equatoria	910505008101	Luka Bambio	Victor Misaka	Evans Ariko
Western Equatoria	910505003105	Peter John	Victor Misaka	Evans Ariko
Western Equatoria	910704003101	James	Victor Misaka	Evans Ariko
3. **Survey Data Entry & Verification Team**				

Edward Ladu	– Supervisor
Nelson Tong	– Assistant Supervisor
Hannah Richard	– Data entry officer
Repent Lobick	– Data entry officer
Justin Sebit Antony	– Data entry officer
Emmanuel Lokuta	– Data entry officer
Isaac Geoffrey	– Data entry officer
Stephen John	– Data entry officer
Gregory Alex	– Data entry officer
Edjwok Chanjwok	– Data entry officer
Ndiak Apollo Madok	– Data entry officer
David Lado Alex	– Data entry officer

Team Composition

- National supervisor – 1 or 2 depending on number of teams per state
- Interviewers – 2
- NBS (local hub) – 1
- Field Guide – 1
- Driver – 1

NOTE: Lead and assistant coordinators provided technical assistance and coordination across the teams.

Appendix C: EPI Coverage Survey RSS 2017 Questionnaires & Tools

All survey materials (including questionnaires, sketch maps for selected clusters, material related to selection of field staff including terms of reference, field staff training agendas and tools, Standard Operational Procedures (SOPs), letters of introduction from government to local leaders, final ethical review approval correspondence)

Survey Questionnaires
Form 1A

SOUTH SUDAN EPI COVERAGE SURVEY -2017

Form 1A : Infant Immunization – Child Aged 12-23 Months

1.State (Former): _____ 2. State (New) : _____ 3.County (Former) _____
4.County New_____ 5.Payam:_____ 6.Boma _____ 7.Town/Village _____

8. Cluster ID/EA No: _____ 9.Total Households visited:_____10.Team No. _____ 11.Date:_____

No of Visits Fill 1,2 or 3										TOTALS	
HOUSE HOLD NUMBER											
BIRTH DATE RANGE	12. NAME OF CHILD										
02/10/2015-02/10/2016											
Child Number		**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**Card**	**History**
13. Birth Date:	dd/mm/yy										
14. Sex	M/F										
15. Mother alive	Yes/No										
16. Child Health Card seen	Yes/No										
17. BCG	Scar Y/N										
	Date/+/0										
	Source										
18. Penta1	Date/+/0										
	Source										
19.Penta 2	Date/+/0										
	Source										
20. Penta 3	Date/+/0										
	Source										
21. OPV0	Date/+/0										
	Source										
22. OPV1	Date/+/0										
	Source										
23. OPV2	Date/+/0										
	Source										
24. OPV3	Date/+/0										
	Source										
25. IPV	Date/+/0										

	Source										
26. Measles	Date/+/0										
	Source										
27. Vitamin A – most recent dose	Date/+/0										
	Source										
28. Vitamin A – dose before most recent	Date/+/0										
	Source										
29. Weight plotted in CHC (check at last visit)	Yes/No										
30. Immunization status by Card	None =0										
	Partial =1										
	Full = 2										
31. Immunization status by history	None =0										
	Partial =1										
	Full = 2										

32. Fully immunized before 1 year old (card only)	Yes/No										
33. Fully immunized after 1 year old (card only)	Yes/No										

House Hold Tally

Key:	**Source**
Date = date as recorded on immunization card	1 = Government Health Facility (static service)
+ = immunization/Vitamin A reported given (history)	2 = NGO/mission/faith-based Health Facility (static service)
0 = no immunization/Vitamin A given	3 = Private Health Facility (static service)
A = child absent	4 = Outreach service (by any health facility)

Comments:

Name of Data collector: _____ **Signature** _____ **Date** _____

Telephone(s) _____

Name of State Supervisor: _____ **Date**_____ **Name of National Supervisor**_____ **Date**_____

Telephone (s) _____ **Telephone(s)** _____

Form 1B

SOUTH SUDAN EPI COVERAGE SURVEY -2017

Form 1B : Infant Immunization follow up Questions – Child Aged 12-23 Months

1.State (Former): _____ 2. State (New) : _____ 3.County (Former) _____

4.County New_____ 5.Payam:_____ 6.Boma _____ 7.Town/Village _____

8. Cluster ID/EA No: _____ 9.Total Households visited:_____10.Team No. _____ 11.Date:_____

No of Visits (Fill 1,2 or 3 as appropriate)										
Fill as appropriate for all children aged 12-23 months in the households visited .										
Household number										
12. Child Number		1	2	3	4	5	6	7	8	**TOTALS**
13. Sex	M/F									
14. Child Immunization status by card	None =0, Partial=1,Full =2									
15. Child Immunization status by history	None =0, Partial=1,Full =2									
16. Fully immunized before 1 year old (card only)	Yes/No									
17. Fully immunized after 1 year old (card only)	Yes/No									

If answer to Item 14 &15 in NOT 2; ask the reason why the child is not immunized as per MOH immunization schedule-South Sudan (prompt for any other reasons, stop when 3 reasons are given)

Lack of information	Unaware of need for immunization									
	Unaware of need to return for 2nd or 3rd dose									
	Place and/or time of immunization unknown									
	Fear of side effects/reactions									
	Wrong ideas about contraindications									
	Other									
Lack of motivation	Postponed until another time									

	No faith in immunization									
	Encouraged not to go – friends, elders, religious leaders, etc.									
	Other									

Obstacles in system	Place of immunization too far									
	Time of immunization inconvenient									
	Vaccinator absent									
	Vaccinator not/inadequately trained									
	Vaccinator impolite									
	Vaccine not available/out of stock									
	Child ill – brought but not immunized									
	Long waiting time									
	Other									
Obstacles in family	Mother too busy (in garden, at work, at funeral)									
	Child ill – not brought									
	Mother ill									
	Poverty – dirty/old clothes, un-presentable									
	Poverty – not able to afford fees, transport, etc.									
	Family refused – father, grandparent, etc.									

Other reasons (not directly related to the categories given above)	Indicate in appropriate cells									
18.Birth order of child	Number									

19.Child slept under a mosquito net on survey night? ***If answer is No; skip to Item 22***	(Y/N)									
20.If yes, is the net treated with insecticide? (***Observe to see type of net)***	0 = No,1 = Yes, net bought/received treated; ever treated,2 = Do not know (not sure about treatment of net)									
	9 = Other *(specify in appropriate column)*									
21.If No to **item 19**; anyone else in the household slept under a mosquito net on the survey night?	(Y/N)									
22.Mother/caretaker's educational status	0=Pre-School,1= Primary,2= Intermediate ,3 = Secondary, 4= Higher,8 = Don't Know									
23.How long has this household been resident in this Cluster?	**(Write duration of continuous residence in months)**									

Comments:

Name of Interviewer(s):_____ Signature _____Date _____

Telephone (s) _____--

Name of State Supervisor: _____Date: _____ Name of National Supervisor_____ Date _____

Telephone (s) _____ Telephone (s) _____

Form 2A

SOUTH SUDAN EPI COVERAGE SURVEY -2017											
Form 2A :TT Immunization For Mothers – Child Aged 0-11 Months											
1.State (Former): _____ 2. State (New) : _____ 3.County (Former) _____ 4.County New_____ 5.Payam:_____ 6.Boma _____ 7.Town/Village _____ 8. Cluster ID/EA No: _____ 9.Total Households visited:_____10.Team No. _____ 11.Date:_____											
No of Visits (Fill 1,2 or 3 as appropriate)										**TOTALS**	
BIRTH DATE RANGE		MOTHER'S NAME									
02/10/2016 -02/10/2017											
12. Household Number										Card	History
13. Mother's number (in cluster)		1	2	3	4	5	6	7	8		
14. Child's birth date:	dd/mm/yy										
15. Attended Antenatal Care on the last pregnancy? ***(Record from ANC card if available)*** *If No; skip to 18*	Yes/No										
16. If yes, How many times did you go to antenatal care before delivery?	Write total no.of visits										
17. If yes to item 15; Mother got 2 doses of SP to prevent malaria	Yes/No										
18. Delivery of baby	1 = Home alone, 2 = Home, relative 3 = Home, TBA 4 = Health facility										
	9 = Other (specify in the right box)										

19.After delivery of baby,was anything applied on umbilical cord? ***If no, skip to item 21***	Yes/No										
20.If Yes, What was applied?	1.Butter 2.Oil 3.Dung 4.Ash 5.Ointment										
	6.Other Specify										
21.Child's birth order:	Number										
22. Total number of TT doses received before the last pregnancy:	Number										
23. Total number of TT Cards received before last pregnancy:	Number										

24. Total number of TT doses received during the last pregnancy:	Number										
25. Total number of TT Cards received during the last pregnancy:	Number										
26. Mother has TT Card(s)	Yes/No										
27. Total number of TT Cards seen:	Number										
28. TT1	Date/+/0										
	Source										
29. TT2	Date/+/0										
	Source										
30. TT3	Date/+/0										
	Source										
31. TT4	Date/+/0										
	Source										
32. TT5	Date/+/0										
	Source										

33. Mother got Vitamin A (in the last 12 months)	Date/+/0										
	Source										
34. Child 0-11 months has got Vitamin A supplement	Date/+/0										
	Source										
35. Child protected at birth (card only)	Yes/No										
36. Child protected at birth (history only)	Yes/No										

37. Immunization status of mother (by card)	1 = Fully immunized (TT5)										
	2 = Partially immunized, compliant with schedule										
	3 = Partially immunized, not on schedule										
	4 = Not immunized at all										
38. Immunization status of mother (by history)	1 = Fully immunized (TT5)										
	2 = Partially immunized, compliant with schedule										
	3 = Partially immunized, not on schedule										
	4 = Not immunized at all										

Key

Date = date as recorded on TT immunization card

+ = Immunization/Vitamin A reported given (by history)

0 = no TT immunization/Vitamin A given

A = child absent

Source

1 = government health facility (static service)

2 = NGO/mission/faith-based health facility (static service)

3= Private Health Facility (static service)

4 = Outreach service (by any health facility)

5 = Campaigns/SIAs

Comments:

Name of Interviewer(s):_____ Signature _____Date _____

Telephone (s) _____--

Name of State Supervisor: _____Date: _____ Name of National Supervisor_____ Date _____

Telephone (s) _____ Telephone (s) _____

Form 2B

SOUTH SUDAN EPI COVERAGE SURVEY -2017

Form 2B: TT Immunization Follow Up Questions-Mothers of Infants Aged 0-11 Months

1.State (Former): _____ 2. State (New) : _____ 3.County (Former) _____
4.County New_____ 5.Payam:_____ 6.Boma _____ 7.Town/Village _____
8. Cluster /EA No: _____ 9.Total Households visited:_____10.Team No. _____ 11.Date:_____

Extract information Item 12 and 13 for all mothers of infants aged 0-11 months as included in Form 2A .										**Totals**
No of Visits (Fill 1,2 or 3 as appropriate)										
12. Mothers Number (***as in Form 2A***)		1	2	3	4	5	6	7	8	
13. Immunization status (Card or history)	1 = Fully immunized (TT5)									
	2 = Partially immunized, compliant with schedule									
	3 = Partially immunized, not on schedule									
	4 = Not immunized at all									
	If answer is 1; skip to Item 16									
14.***If answer to Item 6 in NOT 1;*** ask the reason why the mother is not immunized as per SS Immunization schedule ***(prompt for any other reasons, stop when 3 reasons are given)***										
Lack of information	Unaware of need for immunization									
	Unaware of need to return for 2nd or 3rd dose									
	Place and/or time of immunization unknown									
	Fear of side effects/reactions									
	Wrong ideas about contraindications									
	Other									
Lack of motivation	Postponed until another time									
	No faith in immunization									
	Encouraged not to go – friends, elders, religious leaders, etc.									
	Other									

Obstacles in system	Place of immunization too far									
	Visit not on vaccination day									
	Vaccinator refused to vaccinate child									
	Health facility closed when I visited									
	Time of immunization inconvenient									
	Vaccinator absent									
	Vaccinator not/inadequately trained									
	Vaccinator impolite									
	Vaccine not available/out of stock									
	Mother was ill at the time of visit to health facility; therefore staff declined to immunize her									
	Long waiting time									
	Other									
Obstacles in family	Mother too busy (in garden, at work, at funeral)									
	Mother was ill at the time scheduled for immunization; therefore did not go to get immunized									
	Poverty – dirty/old clothes, un-presentable									
	Poverty – not able to afford fees, transport, etc.									
	Family refused – husband, in-laws, etc.									
15.Other reasons (not directly related to the categories given above)	***Fill in the appropriate space provided***									
16. Mother slept under a mosquito net during last pregnancy.**If No;Skip to item 18**	Yes/No									
17. If yes, was the net treated with insecticide?	0=No,1=Yes net bought treated/ever treated,2=Do not Know (not sure if net is treated)									
	9=Other specify in appropriate column									
18. Mother slept under a mosquito net on the survey night	Yes/No									
19. Did the child sleep under a mosquito net on survey night?	Yes/No									
20. ***If No item 19;*** did anyone else in this household sleep under a mosquito net on the survey night?	Yes/No									
21. Mother/caretaker's educational status	0 = Pre-School,1 = Primary, 2 = Intermediate, 3 = Secondary,4= Higher,									

	8 = Don't Know									
	9=Others (Specify in appropriate space provided)									
22. How long has this household been resident in this Cluster?	***(Write duration of continuous residence in months)***									

Comments:

Name of Interviewer(s):_____ Signature _____ Date _____

Telephone (s) _____

Name of State Supervisor: _____Date: _____

Telephone (s) _____-

Name of National Supervisor: _____Date: _____
Telephone(s) _____

Form 3A

SOUTH SUDAN EPI COVERAGE SURVEY -2017

Form 3A:Immunization Supplies And Services Assessment (Nearest Health Facility within the cluster)

1. State (Former): _____ 2. State (New) : _____ 3.County (Former) _____
4.County New_____ 5.Payam:_____ 6.Boma _____ 7.Town/Village _____
8. Cluster ID/EA No: _____ 9.Total Households visited:_____10.Team No. _____
11.Date:_____

12. Name of Health Facility: …….. 13. Distance (by road) from Cluster Centre to the Health Facility (Km)……

14. Level of Heath Facility Assessed	**15. Ownership/Management:**	**16. Total Number of staff**
1 =PHCU	1 = Government owned	(those who treat/prescribe
2 = PHCC	2 = NGO/Mission/faith-based	medicine for patients; and/or
3 = Hospital (specify level)	3 = Private for profit	give immunizations)
9 = Other (specify category) ……	9 = Other (specify)……..	……..

	Codes for recording finding	**Write appropriate code in this column**
Immunization services at the health facility		
Equipment and supplies for static immunization services present		
17. Vaccine Refrigerator	0 = None in place 1 = Present but not working 2 = Present and working	
18. Fridge tag in vaccine refrigerators	1= Yes 2= No	
19. Thermometer in vaccine refrigerators	1= Yes 2= No	
20. Syringes/needles for immunization	0 = Out of stock 1 = All syringes (SD 2ml & 5ml; SD 0.05ml & 0.5ml) in stock adequate for 1 month 2 = All syringes (SD 2ml & 5ml; SD 0.05ml & 0.5ml) in stock ,all /some inadequate for 1 month	
21. Vaccine Carriers	0 = None in place	

	1 = Present but not adequate (few, some damaged, inadequate ice packs, etc.) 2 = Present and adequate	
22. Vaccines	1=All Antigens in stock, adequate for 1 month 2=All antigens in stock, all/some inadequate for 1 month 3=Some antigens out of stock (specify)……	
23.Cotton	0= Out of stock 1= In stock adequate for 1 month 2= In stock inadequate for 1 month.	
24. Safety Boxes	0= Out of stock 1= In stock adequate for 1 month 2= In stock inadequate for 1 month.	
25.Weighing Scale (accessible, functional)	1 = Yes 2 = No	
26. Child Health Cards	1 = Yes 2 = No	
Staff training on EPI		
27. Number of staff who have received training on routine immunization (5 days or more at a go) within last 2 years	Record number of staff trained; write zero (0) if no staff has trained	
28.Number of staff who have received training on Cold chain and vaccine management (EVM) (5 days or more at a go) within last 2 years	Record number of staff trained; write zero (0) if no staff has trained	
Immunization services schedule		
29. Number of static immunization sessions conducted at the health facility in the seven days prior to the survey date *(verify from records)*	Record number of sessions; write zero (0) if none	
30. Number of outreach sessions done in the 5 weeks prior to the date of survey *(verify from records)*	Record number of sessions; write zero (0) if none	
31. Number of outreach sessions conducted in the 5 weeks prior to the date of survey to outreach sites within the sampled Cluster *(verify from records)*	Record number of sessions; write zero (0) if none	
EPI-related support and supervision		
32. Date of last visit for cold chain maintenance *(verify from records of visits and/or activities done)*	Record date/month/year of the visit	
33. Date of last visit for technical supervision *(verify from records of visits and/or activities done)*	Record date/month/year of the visit	
Comments :		
Name of State Supervisor:_____ Date: _____ Telephone (s)_____		
Data Checked for completeness: Name of National Supervisor: _____Date: _____ Telephone (s)_____		

Summary Form 1A

Republic of South Sudan Cluster Survey – 2017																															
Summary Form 1A: Infant Immunization																															
State (Former)_____ - State (New) _____																															
Cluster Number:	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**Total**
9) Total HoH visited																															
10) Total in Cluster																															
16) Card - Yes																															
17) BCG																															
Card Only																															
Card + History																															
BCG Scar Present																															
18) Penta 1																															
Card Only																															
Card + History																															
19) Penta 2																															
Card Only																															
Card + History																															
20) Penta 3																															
Card Only																															
Card + History																															
21) OPV0																															
Card Only																															
Card + History																															
22) OPV1																															
Card Only																															
Card + History																															
23) OPV2																															
Card Only																															
Card + History																															
22) OPV3																															
Card Only																															
Card + History																															
25)IPV																															
Card Only																															
Card + History																															

Cluster Number:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Total
26) Measles																															
Card Only																															
Card + History																															
Source: All antigens																															
Gov. Health Fac.																															
NGO/Mission																															
Private																															
OUT																															
SIA																															
27) Vitamin A – most recent dose																															
Card Only																															
Card + History																															
28) Vitamin A – dose before most recent																															
Card Only																															
Card + History																															
Source:																															
Gov HF																															
NGO/Mission																															
Private																															
OUT																															
SIA																															
29) Weight plotted in CHC																															
30) Immun. status																															
None																															
Partially Immunized																															
Fully Immunized																															
31) FIC < 1 yr																															

Name of State Supervisor :(*Check for completeness &Verify data*)

_____

Name of National Supervisor :(Verify data)

_____

Telephone (s) _____ Telephone (s)

_____

Signature: _____ Date:_____ Signature: _____

Date:_____

Summary Form 1B

SOUTH SUDAN EPI COVERAGE SURVEY -2017																																
Summary Form 1B: Infant Immunization																																
State (Former)_____- State (New) _____																																
	Cluster Number:	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**Total**
14.15.16.17 Vaccination Status	1 = FIC < 1 yr																															
	2 = FIC > 1 yr																															
	3 = Partial Immun.																															
	4 = None at all																															
18.Reasons why child NOT fully Immunized																																
Lack of information	Unaware of need for immunization																															
	Unaware of need for 2nd or 3rd dose																															
	Place and/or time unknown																															
	Fear of side effects /reactions																															
	Wrong ideas about contraindications																															
	Other																															
Lack of motivation	Postponed until another time																															
	No faith in immunization																															
	Encouraged not to go																															
	Other																															

Cluster Number:		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Total
Obstacles in system	Place of EPI far																															
	Time of EPI inconvenient																															
	Vaccinator absent																															
	Vaccinator not trained																															
	Vaccinator impolite																															
	Vaccine out of stock																															
	Child ill – brought but not immunized																															
	Long waiting time																															
	Other																															
Obstacles in family	Mother too busy																															
	Child ill – not brought																															
	Mother ill																															
	Poverty-presenting																															
	Poverty – cash cost.																															
	Family refused																															
	Other																															
Other reasons																																
Cluster Number:		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Total

under	1 = Yes																															
	2 = No																															
with	1 = Yes																															
	2 = No																															
21.Anyone else slept under a mosquito net	1 = Yes																															
	2 = No																															
	8 = Not sure																															
	9 = Other																															
Name of State Supervisor :(*Check for completeness &Verify data*) _____- Name of National Supervisor :(*Verify data*)_____																																
Telephone (s) _____ Telephone (s) _____																																
Signature: _____ Date:_____ Signature: _____ Date:_____																																

Summary Form 2A

Republic of South Sudan Cluster Survey – 2017

Summary Form 2A: TT Immunization for Mothers

State (Former) _____ State (New) _____

Cluster No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Total
attended Antenatal																															
16. # attended 4+ times																															
[illegible] of SP to [illegible]																															
Deliveries in health																															
27. # Mothers with TT Card																															
28. TT1 Card																															
TT1 Card + History																															
29. TT2 Card																															
TT2 Card + History																															
30. TT3 Card																															
TT3 Card + History																															

	31. TT4 Card	TT4 Card + History	32. TT5 Card	TT5 Card + History	Imm.status of mother (by card	Fully immunized (TT5)	Partial, compliant	Partial, not on schedule	Not immunized at all	visited (at the top

Name of State Supervisor :(*Check for completeness &Verify data*) _____Name of National Supervisor :(*Verify data*)___

Telephone (s) _____ Telephone (s) _____

Signature: _____ Date:_____ Signature: _____ Date:_____

Summary Form 2B

Republic of South Sudan Cluster Survey- 2017

State (Former) _____ State (New) _____

Summary Form2B: TT immunization Follow up

		Cluster Number:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Total
13. TT imm. Status (card or history)	1 = Fully immunized (TT5)																																
	2 = Partially immunized; compliant																																
	3 = Partially immunized; not compliant																																
	4 = None at all																																
14.Reasons for mother not fully immunized																																	
Lack of information	Unaware of need for immunization																																
	Unaware of need for more doses																																
	Place and/or time unknown																																
	Fear of side effects/reactions																																
	Wrong ideas about contraindications																																
	Other																																

Cluster		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Total	
Lack of motivation	Postponed until another time																																
	No faith in immunization																																
	Encouraged not to go																																
	Other																																
Obstacles in system	Place of EPI far																																
	Time of EPI inconvenient																																
	Vaccinator absent																																
	Vaccinator not trained																																
	Vaccinator impolite																																
	Vaccine out of stock																																
	Mother ill – went but not immunized																																
	Long waiting time																																
	Other																																
Obstacles in family	Mother too busy																																
	Child ill – not brought																																
	Mother ill																																
	Poverty-presenting																																
	Poverty – cash cost.																																
	Family refused																																
	Other																																

Cluster		1	2		3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Total

15.Other																																	
16. Mother	1 = Yes																																
	2 = No																																
18. Mother	1 = Yes																																
	2 = No																																
19. Child	1 = Yes																																
	2= No																																

Name of State Supervisor :(***Check for completeness &Verify data*****)** **___Name of National Supervisor :(** ***Verify data*****)__**

Telephone (s) ___________ **Telephone (s)** ____________

Signature: ________________ **Date:**________________ **Signature:** _________________ **Date:**_________________

Summary Form 3A

Republic of South Sudan Cluster Survey - 2017

State Former)…… State (New)…… County……
Payam……..

Summary Form 3A: Immunization Supplies and Services Assessment at a Nearest Health Facility

Cluster No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Total
17. refrigerator present																															
18. Fridge tag present																															
19. Thermometer present																															
20. Syringes/ needles present																															
21.Adequate vaccine carriers																															
22. Adequate vaccine stock (all)																															
23. Cotton																															
24. Safety Boxes																															
25.Weighing scale present																															
26. Child Health Cards present																															
27. No.of trained staff on RI																															
28. No.of trained staff on Cold Chain																															

29. No.of static sessions-HF																																	
30. No.of outreaches done -5 wks																																	
31. No.of outreaches done																																	

Name of State Supervisor :(*Check for completeness &Verify data*) _____ Name of National Supervisor:(*Verify data*) _____

Telephone (s) _____ **Telephone (s) _____**

Signature: _____ Date:_____ **Signature: _____ Date:_____**

Consent Form

South Sudan EPI Coverage Survey 2017

Consent form for the Survey

Instructions

1. Introduce yourself (mind your language)
2. Briefly introduce your activity
3. Demonstrate how important the activity is to the community and country
4. Do not probe for the name of respondent
5. Information will not be used for any other purpose

Hello. My name is_____. I am working with the Ministry of Health in South Sudan. The Ministry of Health in collaboration with other implementing partners is conducting expanded program on Immunization coverage survey which is about vaccination and health of children all over South Sudan.

The information we are collecting will help the government to plan immunization services in the country. Your household has been selected for this survey.

I would like to ask you some questions about your children aged 0-11 months and 12-23 months. The questions usually take about 15 to 20 minutes.

All of the answers you give will be confidential and will not be shared with anyone other than members of our survey team. Do you have any questions?

Shall I start the interview? (Circle appropriately) Yes ….. No

Thank you very much.

Appendix D: Key Definition of Terms

Cluster a collection of elements (for example, households, communities, villages, etc.) grouped within defined geographical or administrative boundaries.

Cluster survey a survey in which, after the population under study has been subdivided into clusters, only (some) subjects from selected clusters are interviewed or observed.

Confidence Interval A level of confidence set in computing confidence limits. A level of 95% (or 0.95) is conventionally used, but can be set higher or lower. A level of confidence of 95% implies that 19 out of 20 times the results from a survey using these methods will capture the true population value.

Confidence limits The upper and lower limits of the confidence interval in interval estimation. The interval itself is called the confidence interval or confidence range. Confidence limits are so called because they are determined in accordance with a specified level of confidence or probability that these limits will include. Thus, 95% confidence limits are values between which we are 95% confident that the population parameter being estimated will be. Confidence limits are often derived from the standard error (SE).

Design effect a measure of variability due to selection of survey subjects by any method other than simple random sampling. It is defined as the ratio of the variance with other types of sampling, to the variance with simple random sampling. Usually, cluster surveys have a design effect greater than one (the variability is higher than for simple random sampling).

Fully immunized child (FIC) this is a child who has received doses of the basic six antigens: BCG, diphtheria-tetanus-pertussis (DTP: three doses), polio (three doses), and measles vaccines (one dose).

Household/members of household Constitutes a person or group of persons, related or not, who normally live together in the same housing unit or group of housing units and who have common cooking arrangements.

Immunization coverage Proportion of individuals in the target population to be vaccinated with specific
Vaccines in a given time period.

Crude coverage

Crude coverage is defined as immunization given evidenced by card, health facility record or recall from the mother/caretaker. The numerator includes anyone with evidence of vaccination (card, health facility record or recall) and the denominator is everyone else. Crude full Immunization coverage describes the situation whereby children have received all antigens defined for by the expanded Programme on immunization (EPI) without regard to the specified age or time interval between doses as prescribed by the national schedule. A child is considered fully vaccinated if he/she has received BCG vaccine, at least three doses of Polio vaccines, three doses of Pentavalent and one of Measles vaccine.

Valid Coverage

The timing of administration of a vaccine is important in determining immune response and hence the efficacy of the vaccine in protecting from disease. It is therefore vital that vaccines are given when appropriate. To get a measure of how well vaccination programmes are targeting children of the appropriate ages we calculate valid coverage. For a vaccine dose to be considered valid, the child must have attained the minimum age to be eligible for the dose (single-dose vaccines and first-dose in sequence). The WHO vaccination coverage cluster survey reference manual (2015 Draft WHO Vaccination Coverage Cluster Survey: Reference Manual) outlines the following criteria for a vaccine dose to be considered valid:

• There is dated documentary evidence of vaccination (home-based vaccination record and/or health facility register).

• The child reached the minimum age and the previous dose was valid and the minimum acceptable interval had elapsed since the earlier valid dose (later doses in sequence). For the pentavalent vaccine and OPV there ought to be a minimum of 28 days between doses, and at a minimum age of six weeks for the first dose. For measles-containing vaccination, minimum age is 39 weeks.

• Vaccines administered after age 12 months are excluded.

Not Vaccinated

Not vaccinated means that the child had no evidence of receiving ever receiving BCG, OPV1-3, Penta1-3, and Measles.

Clusters with alarmingly low crude coverage

Any cluster with ≤ 10% of children vaccinated is flagged as alarmingly low. It's expressed as % of the eligible population (usually 12-23m old) are estimated to be un-vaccinated, with <*either crude or valid doses*> having received none of the <*doses in the list to be fully vaccinated*> as documented in this survey by <*sources*>."

Missed Opportunity for Vaccination

A missed opportunity for vaccination (MOV) refers to any contact with health services by a child who is eligible for vaccination (e.g. unvaccinated or partially vaccinated and free of contraindications to vaccination), which does not result in the person receiving one or more of the vaccine doses for which he or she is eligible.("WHO | Missed Opportunities for Vaccination (MOV) Strategy," n.d.-b)

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