

HIV prevalence in South Sudan: data from the ANC sentinel surveillance 2009

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Summary

Data on the prevalence of HIV and syphilis was collected from 24 ante-natal care clinic (ANC) sentinel sites in all 10 states of South Sudan during the three months September to December 2009. The overall sample size was 6175 pregnant women; however, only 5913 samples were tested for HIV of which 176 (3%) were positive.

Interestingly, the age groups 15-24 years accounted for almost half (49.5%) of the overall sample size of this ANC 2009 Survey distributed between the age group 15-19 years with 18.6% of the overall sample and the age group 20-24 years accounting for 30.9% of the total sample size.

The prevalence of HIV was 2.3% (n=25) in the 15-19 year age group and 3.3% (n=59) in the 20-24 year age group. The prevalence of syphilis was 7.6% (n=74) in the 15-19 year age group and 9.6% (n=183) in the 20-24 year age group.

The HIV prevalence among the young women aged 15-24 years was 2.9% compared to the overall HIV prevalence among all age groups of 3%. Similarly the syphilis prevalence among 15-24 year old women was 28.4% compared to the overall survey syphilis prevalence of 9.9%.

In conclusion, the post conflict ANC surveillance showed an HIV prevalence of 3% and the experience had shed some light, proved and disregarded a wide range of assumptions with regards to HIV distribution in the country. Despite all challenges, the routine ANC surveillance system, in the context of South Sudan, is very promising in provision of timely relevant information and can be used to monitor the trend over time.

Introduction

Although the prevalence of HIV was estimated from 2007 data at only 3.1%¹, the Ministry of Health decided to set up a surveillance system to periodically monitor the prevalence and trends of HIV/AIDS.

Data from South Sudan and other studies show that periodic estimates for HIV prevalence for pregnant women represent a suitable monitor to HIV trends overtime. However it often overestimates the general population prevalence. For this reason other studies should be conducted, triangulated and corroborated with it. The MOH GOSS has implemented the Second Sudan Household Health Survey (SHHS II); it is expected that the results will produce representative population based estimates for HIV in South Sudan with which data from ANC surveillance surveys will be corroborated.

With the signing of the Comprehensive Peace Agreement (CPA) in January 2005, 22 years of civil war in South Sudan officially ended. Since then the focus of

health planning has shifted from relief to development. Even so the war, which has greatly affected South Sudan, left all segments of the population still facing formidable social problems including health related challenges such as HIV/AIDS.

The return of refugees from surrounding countries with higher HIV prevalence has increased the risk of HIV infection in South Sudan. High risk behaviours resulting from poverty and certain cultural practices of different communities including returnees and people from neighbouring countries, and high incidences of STIs aggravated by poor access to and/or low coverage of health services further contribute to the spread of the HIV. However, knowledge of prevention methods and where to get help is a critical first step towards addressing some of these key drivers.

Other effects of peace are increased trade and commercial activities across borders (especially increased traffic of trucks and other vehicles along the trans-African Highway), reconstruction and rehabilitation activities,

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1 Based on calculations done by the South Sudan AIDS Commission in 2007. Derived from the 2007 ANC Surveillance conducted by US-CDC.

Extract from 'South Sudan Antenatal Care Clinics Sentinel Surveillance Report 2nd Round September - December 2009' HIV/AIDS/STI Directorate, Ministry of Health, Republic of South Sudan

Note: The full report is available on the SSMJ website.

Table 1. Ante-Natal Care (ANC) Sites for HIV Sentinel Surveillance 2009.

State	Urban	Rural
Central Equatoria	Juba Teaching Hospital (JTH) Nyakuron PHCC	Kajo Keji Hospital St.Bakita - Yei
Unity	Bentiu State Hospital	Leer-MSF Holland
Western Bahr El Ghazal	Wau Teaching Hospital	None
Western Equatoria	Yambio Civil Hospital	Tambura PHCC- IMC Maridi
Upper Nile	Malakia PHCC Bam PHCC Malakal Teaching Hospital	Renk Civil Hospital
Lakes	Rumbek State Hospital Rumbek PHCC	Cueibet PHCC
Eastern Equatoria	Torit Civil Hospital	Nimule Hospital -Merlin
Jonglei	Bor Civil Hospital	Boma Hospital-Merlin Akobo PHCCs -IMC
Northern Bahr El Ghazal	Awiel Hospital	None
Warrap	Kwajok Hospital	None
Total	14	10

Table 2. Distribution of respondents by State

State	Number	Percent
Central Equatoria	1119	18.1
Eastern Equatoria	552	8.9
Jonglie	630	10.2
Lakes	899	14.6
Northern Bahr El Ghazal	300	4.9
Unity	441	7.1
Upper Nile	807	13.1
Warrap	300	4.9
Western Bahr El Ghazal	299	4.8
Western Equatoria	828	13.4
Total	6175	100

relative peace and affluence coupled with cultural religious and tribal traditions also may contribute to the risk of HIV in the post war era.

HIV situation in South Sudan

Previous ANC sentinel surveillance results covering 10 sites in 6 states of South Sudan indicated that 3.8% of the 3,638 tested were found to be reactive by EIA (ELISA) with a range in prevalence of 0% - 12%. (1) Surveys conducted in Yei (2002) and Rumbek (2003) also showed huge regional differences. (2) While Rumbek had 0.4% sero-prevalence, Yei recorded 2.7%. In 2000, a sleeping sickness survey in Tambura, Ezo and Yambio counties tested 500 people for HIV and found that:

- 1.6% tested positive in Tambura and 2% in Ezo.
- Villages near the road had a higher prevalence (3.2%) compared with those further from it (1.1%). Yambio had the highest rate (7.2%), which ranged from 3% in peri-urban areas to 8.7 percent in Yambio town.

The Sudan Household Survey Report 2006 (3) indicated that the level of knowledge of how to prevent HIV transmission was staggeringly low among women aged 15-49 years in most States (i.e. 36% in Lakes, 8.9% in Jonglei and 9.7% in Warrap). However it was 64% in

Central Equatoria.

MSF-Switzerland (4) reported in 2006 that the prevalence among blood donors ranged from 11% in Kajo Keji to 0% in the fairly remote areas of Bahr el Ghazal. Yei is reported to have prevalence rates among some formally displaced adults of 4.4%. Although limited in coverage, the ANC surveillance and the Yei/Rumbek surveys are considered to have provided key findings that informed the HIV situation in Southern Sudan before the ANC surveillance in 2009. They indicated that:

- HIV rates vary widely between different States.
- Rates may be higher where there has been greater population mobility and contact with other countries.
- Rates appear to be higher in towns than in rural areas.
- Rates in women are markedly higher than those in men.

Compared to Rumbek, more participants in Yei had been displaced internally or as refugees but a history of displacement were not significantly associated with HIV status.

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Objectives

The overall objective of establishing ANC sentinel surveillance sites is to provide data for estimating HIV prevalence and so monitor the epidemic in different regions and overtime.

The specific objectives are to:

1. Monitor the trends of HIV (and syphilis infection) among pregnant women attending ANC sentinel sites
2. Provide estimates of the burden and distribution of HIV infection in the general population at least in areas where the surveillance is conducted, by extrapolating data from prevalence in pregnant women attending ANC clinics.
3. Support dissemination of sentinel surveillance information in order to advocate and plan more effective HIV prevention and control services.
4. Establish a review process for ANC surveillance data, triangulated with data from other sources that will achieve informed consensus about population prevalence.

Methodology

Selection of sample

Sentinel surveillance was conducted among pregnant women aged 15-49 attending ANC. Pregnant women were selected as a proxy for the general population and because they represent the sexually active population. Women recruitment in the survey depended on whether they were on their first ANC visit to the sentinel clinic for that pregnancy or the visit when blood testing was first done. They also had to be residents of the site's catchment area and to have attended the clinic during the sentinel surveillance period.

Each eligible woman was enrolled until the required sample size was attained or the sampling period ended. The sample size was pre-determined for each site as:

- Urban - 300 pregnant women/site in 14 sites.
- Rural - 250 pregnant women/site in 10 sites.

Selection of sentinel sites

It was impractical to have a site in all 79 counties. Potential sites were assessed based on: numbers attending in the previous three months, level of laboratory services and personnel, and ability to store and ship specimens. This resulted in the selection of 24 sites with at least one from each State - see Table 1.

Recruitment and training

Fifty eight laboratory technicians, nurses/midwives, and field supervisors were trained for 4 days. Nurses and midwives were trained how to:

Table 3. Distribution of respondents by age

Age years	Number	Percent
15 - 19	1151	18.6
20 - 24	1905	30.9
25 - 29	1662	26.9
30 - 34	895	14.5
35 - 39	481	7.8
40 - 44	45	0.7
45 - 49	34	0.6
Missing data	2	0.0
Total	6175	100.0

- identify eligible clients
- fill in laboratory request forms, and
- refer clients to the laboratory for routine haemoglobin and syphilis tests.

Field laboratory technicians were trained how to:

- collect blood samples
- prepare, package and store dried blood Spot (DBS) and
- transport them to the JTH laboratory.

Training emphasized ways to minimize risks in handling biological specimens and gave an overview of HIV/AIDS. Three laboratory technologists from JTH were trained for two weeks on DBS ELISA testing in Nairobi.

Sample collection

3-5ml of blood was taken from the arm by venepuncture using the vacutainer system, put into a purple EDTA anticoagulated tubes and mixed well. Prior to testing any identifiers on the samples were removed and replaced with pre-printed 8-digit surveillance code label. Demographic information was transferred from the laboratory request form to the surveillance form. Each day, a drop from the left over blood was placed on the three circles of the S & S 903 filter paper. The DBS filter papers were dried overnight, packaged according to the Standard Operating Procedures and shipped to JTH laboratory every two to three weeks.

Site supervision

Ten supervisors from MOH Directorate of HIV/AIDS/STIs and South Sudan AIDS Commission (SSAC) visited each site at least once a month to:

- perform quality checks on demographic data collection and field laboratory procedures
- deliver supplies and
- take the data collection forms and DBS samples to the JTH laboratory.

Sample processing

The JTH coordinated all the laboratory logistics including securing and storage of supplies for the field laboratory activities, receiving, archiving and processing samples, testing, coordinating with the CDC quality assurance laboratory and dispatch of results to MOH Directorate of HIV/AIDS/STIs.

At JTH, laboratory staff checked the integrity of the samples and that they were accompanied by the surveillance forms. 95.77% of the DBS submitted were of adequate quality for testing. These were logged on a spread sheet and stored at -20°C.

All the eligible samples were initially tested for HIV using Vironostika uniform II plus O ELISA kit. Quality control was done at JTH following the standard operating procedures and using known DBS controls. Results of HIV were crosschecked to ensure accuracy. All the reactive samples and 5% of randomly selected non-reactive samples were retested for quality assurance at the CDC laboratory in Kenya using the Murex HIV antibody kit. Specimens with discrepant results between the two laboratories were retested again at the CDC laboratory using the same algorithm. Specimens that were still discrepant after retesting were resolved by PCR at CDC QA lab.

Data analysis

Demographic data were entered in a spread sheet in the HIV Directorate and sample information was entered in JTH laboratory. All sheets were locked and computers were pass-worded protected. Data were analyzed using SPSS version 17.0. The standard formula for statistical methods (5) (6) was used to calculate the confidence interval for the observed prevalence for each site based on the sample size collected. It provides information on the relationship between surveillance sample sizes and statistical confidence intervals, for different HIV prevalence rates.

Results

Characteristics of the respondents

A total of 6175 pregnant women were recruited (see Table 2). Table 3 shows that 50% of respondents were aged 15- 24 years. 93.5% were married (60% in monogamous marriages and 33% in polygamous ones).

Prevalence of HIV

The HIV test was carried out on samples of only

5913 of the 6175 women recruited. 176 (3%) of these 5913 women were positive for HIV. However prevalence varied widely among the sites and States ranging from 7.2% in Western Equatoria to 0% in Northern Bahr El Ghazal. – see Figures 1 and 2.

HIV Results by age, site and state

The distribution of HIV results by ANC site is shown in Table 4. Meanwhile, Table 5 shows the sample size and the HIV prevalence in the different states. Table 6 show the age distribution of the HIV-positive women.

Syphilis Results among HIV positive clients

Of the 176 HIV positive pregnant women, 27 were found to be reactive for syphilis accounting for a prevalence of 15.3% among HIV Positive clients. (Table 7)

HIV and syphilis among young women aged 15-24

Table 4. HIV results by ANC site

S/N	Site Name	Results		
		Total Tested	Positive (%)	Negative
1	Akobo PHCC	169	1 (0.6%)	168
2	Aweil Civil Hospital	299	0 (0.0%)	299
3	Bam PHCC	169	6 (3.6%)	163
4	Bentiu State Hospital	296	4 (1.4%)	292
5	Boma PHCC	159	4 (2.5%)	155
6	Bor Civil Hospital	300	8 (2.7%)	292
7	Cueibet PHCC	300	1 (0.3%)	299
8	Juba Teaching Hospital	299	18 (6.0%)	281
9	Kajokeji Civil Hospital	264	6 (2.3%)	258
10	Kuajok PHCC	289	2 (0.7%)	287
11	Leer PHCC	135	3 (2.2%)	132
12	Malakal Teaching Hospital	265	8 (3.0%)	257
13	Malakia PHCC	140	5 (3.6%)	135
14	Maridi PHCC	250	6 (2.4%)	244
15	Nimule PHCC	249	14 (5.6%)	235
16	Nyakuron PHCC	300	12 (4.0%)	288
17	Renk Civil Hospital	216	2 (0.9%)	214
18	Rumbek State Hospital	283	16 (5.7%)	267
19	Rumbek PHCC	300	5 (1.7%)	295
20	St. Bakhita PHCC	255	8 (3.1%)	247
21	Tambura PHCC	250	19 (7.6%)	231
22	Torit Civil Hospital	298	4 (1.3%)	294
23	Wau Teaching Hospital	299	4 (1.3%)	295
24	Yambio Hospital	129	20 (15.5%)	109
	Total	5913	176 (3.0%)	5737

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years

The distribution of HIV and syphilis among HIV positive young women were as shown in Table 6.

As above, the prevalence of HIV was:

- 2.3% (n=25) in the 15-19 year age group and
- 3.3% (n=59) in the 20-24 year age group.

The prevalence of syphilis was:

- 7.6% (n=74) in the 15-19 year age group and
- 9.6% (n=183) in the 20-24 year age group.

Discussion

The overall objective of establishing ANC sentinel surveillance system in South Sudan is to provide data for monitoring the epidemic in different regions of South Sudan overtime in addition to estimating HIV prevalence. Although South Sudan has conducted only two rounds of ANC Surveillance, an attempt has been made to compare and track the prevalence in the different sites taking into account the increasing number of sites in the subsequent round see Table 9.

Although the ANC surveillance provides results by sites, an aggregate by South Sudanese states was produced to inform and educate the different levels of local government in each state i.e. State, Counties & Payams. HIV results ranged from as high as 7.2% in Western Equatoria state to as low as no sero-positivity (0%) in Northern Bahr El Ghazal state. The sample sizes varied from one state to another according to the number of sites contributed to the survey.

Interestingly, the age group 15-24 years accounted for almost half (49.5%) of the overall sample size of this ANC 2009 survey. Within the overall sample 18.6% were in the age group 15-19 year age group and 30.9% in the 20-24 year age group.

The HIV prevalence among the young women aged 15-24 years was 2.9% compared to the overall HIV prevalence among all age groups of 3% - see Figure 3. Similarly the syphilis prevalence among 15-24 year old women was 28.4% compared to the overall survey syphilis prevalence of 9.9% - see Table 8.

In conclusion, the post conflict ANC surveillance experience in South Sudan had shed some light, proved and disregarded a wide range of assumptions with regards to HIV distribution in the country. Despite all challenges, the routine ANC surveillance system, in the context of South Sudan, is very promising in provision of timely relevant information and can be used to monitor the trend over time.

Limitations of the study

- ANC surveillance only accounts for women,

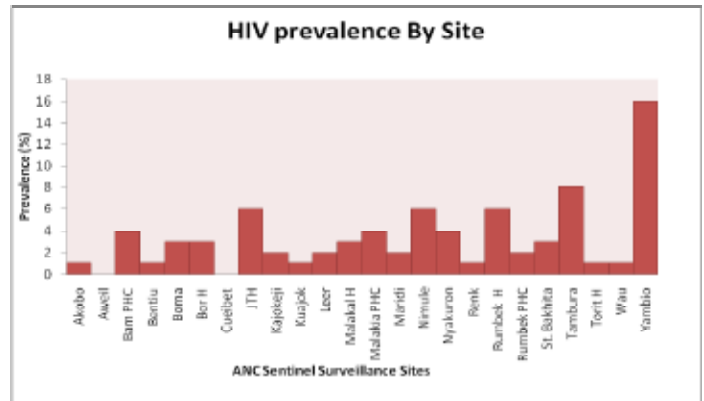


Figure 1. HIV prevalence by site

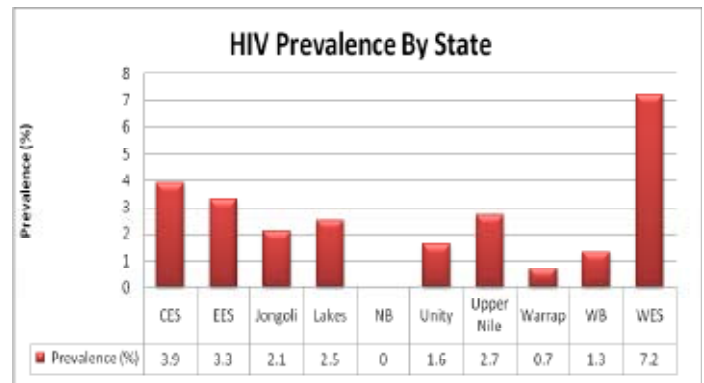


Figure 2. HIV prevalence by State

Table 6. Distribution of HIV results by age group

Age years	Total tested	HIV Positive	
		Number	%
15 – 19	1091	25	2.3
20 – 24	1811	59	3.3
25 – 29	1605	51	3.2
30 – 34	858	29	3.4
35 – 39	468	11	2.4
40 – 44	44	1	2.3
45 – 49	34	0	0.0
Missing data	2	0	0.0
Total	5913	176	3.0

and specifically women who attend the ANC, so there is a bias towards those who have access to service.

- Some States have only one ANC site while others go up to 4 sites making a difference in the sample size per state; as a result further weighting can be calculated to precise the prevalence by state.
- Although the study provided valuable biological indicators for HIV and syphilis, no behavioural information was generated and linked to the biological aspect in this study.

Recommendations

For Programmes

1. Strengthen Social Mobilization Campaigns in the communities to enhance uptake of ANC services especially during the sentinel surveillance periods.
2. Increase the reach of HIV prevention, treatment and care in areas where the prevalence is merely high.

For Surveillance

1. New sites may be considered as follows: if data from population surveys and/or PMCT indicate that existing sites do not adequately or appropriately represent segments of the population, population reassignments may also be made based on new information from complementary sources.
2. Identify additional sites in the same geographical area (e.g. Yambio, Akobo etc...) where the desired sample size was not attained. And combine multiple sites to form one composite site for that geographical location. (Use all available data including VCT, PMTCT, ART to identify potential locations).
3. Increase surveillance sites to at least in one in each county in states where HIV prevalence has been highly detected like Western Equatoria State.
4. Involve NGO in planning and identification of new sites and implementation of the surveys. (One NGO running an ANC site was not initially cooperative in allowing the survey process in that specific location. This resulted in a delayed start and low sample attainment).
5. Ensure the availability of STI drugs, and other supplies in all Sentinel Surveillance sites during the sentinel surveillance period
6. Ensure that all logistic are in place in subsequent rounds to avoid another major rejection of samples (262 samples were rejected due to improper packaging (26), missing (25), contamination (4) and improper sample preparation (3). Due to rain Yambio and Maridi were inaccessible in the

Table 7. Distribution of syphilis results among HIV positive clients by site.

Site Name	Syphilis Test		Total
	Non Reactive	Reactive	
Akobo	1	0	1
Bam PHC	6	0	6
Bentiu	3	1	4
Boma	4	0	4
Bor H	6	2	8
Cueibet	0	1	1
JTH	17	1	18
Kajokeji	5	1	6
Kuajok	2	0	2
Leer	3	0	3
Malakal H	6	2	8
Malakia PHC	4	1	5
Maridi	6	0	6
Nimule	13	1	14
Nyakuron	11	1	12
Renk	1	1	2
Rumbek H	10	6	16
Rumbek PHC	2	3	5
St. Bakhita	8	0	8
Tambura	16	3	19
Torit H	4	0	4
Wau	4	0	4
Yambio	17	3	20
Total	149	27	176

Table 8. Prevalence of HIV and syphilis among young women

Age Group	Total	Percentage Distribution	Cummulative Distribution		
15 - 19	1151	18.6	18.64		
20 - 24	1905	30.9	49.49		
HIV	Total	Positive	Negative	%(15-24 years)	% Total
15-24	2902	84 (2.9%)	2818	2.9	3.0
15 - 19	1091	25 (2.3%)	1066		
20 - 24	1811	59 (3.3%)	1752		
Syphilis	Total	Positive	Negative	%(15-24 years)	% Total
15-24	3056	257	2799 (8.4%)	8.4	9.9
15 – 19	1151	74 (6.4%)	1077		
20 – 24	1905	183 (9.6%)	1722		

first month of data collection so 199 samples had exceeded the allowed storage time at room temperature when they reached JTH) This will save a lot of energy, time, and resource and eventually increase precision of the results.

For Research

1. Compare the upcoming SHHS II results to the ANC surveillance results to obtain a more accurate national estimate.
2. More behavioral and biological research is recommended in areas like Northern Bahr El Ghazal where the prevalence was (0%) in order to better understand the HIV situation and to further complement the current results.

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Acknowledgement

Dr. Lul P. Riek Director General for HIV Directorate Ministry of Health for the strong leadership, guidance & commitment expressed. Mr. Gregory Wani, the laboratory focal person and his team in Juba Teaching Hospital. Ms. Elizabeth Novello Nylock, HIV/AIDS/STIS Surveillance officer for the extensive coordination and logistical support. The ten States' Ministries of Health and states HIV/AIDS/STIs Directors/Coordinators for providing direct support and supervision of data collection from the facilities. I would also like to acknowledge the quality of samples collected during the ANC surveillance survey 2009, and this goes to the laboratory staff in the 24 health facilities undertaken this survey round. For data entry Mr Eban Taban, Senior HIV/AIDS/ STIs Monitoring and Evaluation Specialist, Ms Idak Makur VCT Counselor and Ms. Golda Caesar, Surveillance officer. Many thanks go to Mr. Adwok Chol Awur of the South Sudan Centre for Census & Statistics Evaluation (SSCSSE) whom I consulted extensively during analysis. Dr. Emmanuel Lino, Deputy Director for HIV Clinical Management & Care, Mr. James Ayeiny, HIV/AIDS/STIS Surveillance officer. NGOs running the health facilities during this ANC surveillance survey 2009. Great Acknowledgment goes to Dr. Fazole Khan and Mr. Edwin Ochieng of CDC for the specialized technical, logistical support and quality assurance of the survey. We register our acknowledgement to the Global Fund for making this survey a reality in the history South Sudan.

Table 9. Comparison of HIV numbers and prevalence in the 2007 and 2009 surveys

Site Name (U - Urban/R Rural)	Number Tested	Number & (%) HIV Positive 2007	95% Confidence Interval	Number tested 2009	Number & (%) HIV Positive 2009	95% Confidence Interval
Awiel Civic Hospital (U)	---	---	---	299	0 (0.0%)	---
Cuiebet PHCC (R)	107	1 (0.9%)	0.02 - 5.1%	300	1 (0.3%)	0 - 0.98%
Akobo PHCC (R)	110	1 (0.9%)	0.02 - 5%	169	1 (0.6%)	0 - 0.7%
Kuajok PHCC (U)	---	---	---	289	2 (0.7%)	0 - 1.6%
Renk Civic Hospital (R)	---	---	---	216	2 (0.9%)	0 - 2.2%
Torit Civic Hospital (U)	---	---	---	298	4 (1.3%)	.03 - 2.7%
Wau Teaching Hospital(U)	---	---	---	299	4 (1.3%)	.04 - 2.6%
Bentiu State Hospital (U)	---	---	---	296	4 (1.4%)	.04 - 2.7%
Rumbek PHCC (U)	---	---	---	300	5 (1.7%)	0.2 - 3.1%
Leer - PHCC (R)	874	7 (0.8%)	0.3 - 1.6%	135	3 (2.2%)	0 - 4.7%
Kajo Keji Civil Hospital (R)	1045	17 (1.6%)	1.0 - 2.6%	264	6 (2.3%)	0.5 - 4.1%
Maridi PHCC (R)	244	14 (5.7%)	3.2 - 9.4%	250	6 (2.4%)	0.5 - 4.3%
Boma PHCC (R)	429	31 (7.2%)	5.0 - 10.1%	159	4 (2.5%)	.08 - 5.0%
Bor Civil Hospital (U)	---	---	---	300	8 (2.7%)	0.9 - 4.5%
Malakal Hospital(U)	---	---	---	265	8 (3.0%)	1.0 - 5.1%
St. Bakhitia PHCC (R)	792	21(2.7%)	1.6 - 4.0%	255	8 (3.1%)	1.0 - 5.3%
Malakia PHCC (U)	---	---	---	140	5 (3.6%)	0.5 - 6.6%
Bam PHCC (U)	---	---	---	169	6 (3.6%)	0.8 - 6.3%
Nyakuron PHCC (U)	---	---	---	300	12 (4.0%)	1.8 - 6.2%
Nimule PHCC (R)	492	11 (2.2%)	1.1 - 4.0%	249	14 (5.6%)	2.8 - 8.5%
Rumbek State Hospital (U)	---	---	---	283	16 (5.7%)	1.0 - 8.3%
Juba Teaching Hospital (U)	---	---	---	299	18 (6.0%)	3.3 - 8.7%
Pochalla PHCC	18	2 (11.1%)	*	---	---	---
Tambura PHCC (R)	599	69 (11.5%)	9.1 - 14.4%	250	19 (7.6%)	4.3 - 10.9%
Yambio Hospital (U)				129	20 (15.5%)	9.3 - 21.8%
Total	4,710	174 (3.7%)	3.2-4.3%	5,913	176 (3.0%)	2.6 - 3.4