

# SSMJ South Sudan MEDICAL JOURNAL

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*Streptococcus pneumoniae* infection

Onchocerciasis control in South Sudan

Understanding the haemogram

**SPECIAL SUPPLEMENT:  
CONDUCTING HEALTH SERVICES RESEARCH**

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*Cover photo - South Sudan Independence Celebrations July 9th, 2011  
(Credit: Erin Polich)*

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# The surmountable challenge of setting up postgraduate medical education

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The strongest force to build capacity in the health sector in the new Republic of South Sudan (ROSS) is Education and Training. This requires immediate investment to implement postgraduate medical education, expand and strengthen Juba College of Nursing and Midwifery and improve medical assistants/clinical officers training schools. These institutions compliment each other and must never be viewed in isolation as has been the case since 1972.

As Adam Smith wrote in 1776, "*A man educated at the expense of much labour and time may be compared to one of those expensive machines... The work which he learns to perform over and above the usual wages of common labour will replace the whole expense of his education*" (1). We ignore education and training at our peril.

Implementation of the postgraduate medical education programme proposed by the St Mary's Hospital, (Isle of Wight, UK)- Juba Teaching Hospital Link is the best opportunity to equip future South Sudanese physicians, obstetricians, gynaecologist, paediatricians, public health specialists and surgeons with skills to enable them to work across the traditional hospital-community divide. These specialists need new perspectives and skills for evidence-based practice, effective use of information technology, quality measurement and improvement, cost awareness, care coordination, leadership of interdisciplinary teams and shared decision making with clinical officers, nurses and midwives, pharmacists and therapists(2).

Forty four (56.4%) of the 78 South Sudanese doctors with postgraduate training live outside the country or are retired whilst only 34 (43.6%) work in South Sudan. These are concentrated in the towns and cities and are not evenly distributed across the specialties (3). Careful planning is crucial in order to deploy trained doctors to all ten States so that they can start to reduce the high maternal and child mortality rates; tackle preventable illnesses, such as diarrhoea and measles, as well as re-emerging neglected tropical diseases, and control the spread of HIV/AIDS, tuberculosis and childhood pneumonia. There are between 200 and 300 South Sudanese doctors with basic medical degrees whose training can be delivered within the proposed ROSS postgraduate programme. Training in developed countries is expensive, may not be relevant to current needs and cannot be coupled to service delivery.

The postgraduate training should be integrated into clinical practice and made mandatory for all medical graduates employed by the Ministry of Health. Those passing local postgraduate examinations should be awarded an appropriate qualification to entitle them to apply for consultant posts. A fraction of these successful candidates can be selected for further training to become trainers on the postgraduate programme. The ball is now firmly in ROSS's court to take the training programme forward.

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

Ayat C. Jervase<sup>a</sup>

## 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%<sup>1</sup>, 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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Contribution: planning, implementation and report writing

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.

## MAIN ARTICLES

### 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
<b>Total</b>	<b>6175</b>	<b>100.0</b>

- 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	Kajojeji 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

## MAIN ARTICLES

### 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,

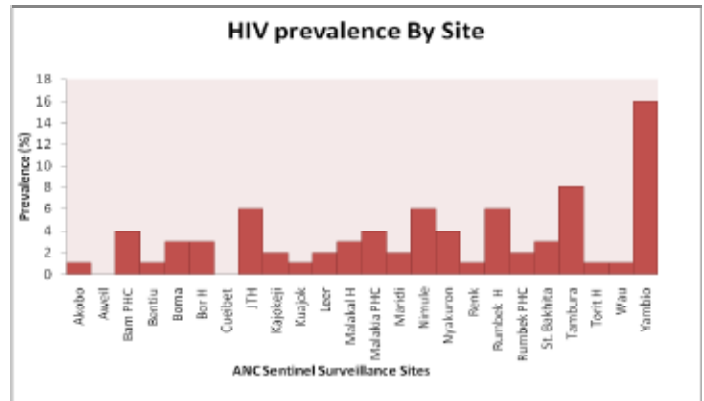


Figure 1. HIV prevalence by site

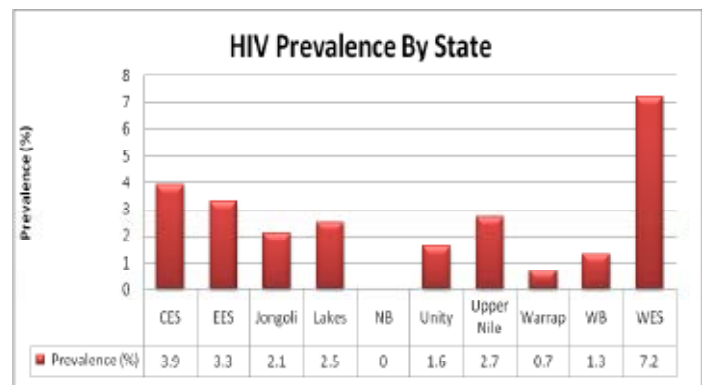


Figure 2. HIV prevalence by State

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
<b>Total</b>	<b>5913</b>	<b>176</b>	<b>3.0</b>



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
<b>Total</b>	<b>149</b>	<b>27</b>	<b>176</b>

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		
<b>HIV</b>	<b>Total</b>	<b>Positive</b>	<b>Negative</b>	<b>%(15-24 years)</b>	<b>% Total</b>
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		
<b>Syphilis</b>	<b>Total</b>	<b>Positive</b>	<b>Negative</b>	<b>%(15-24 years)</b>	<b>% Total</b>
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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**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%
<b>Total</b>	<b>4,710</b>	<b>174 (3.7%)</b>	<b>3.2-4.3%</b>	<b>5,913</b>	<b>176 (3.0%)</b>	<b>2.6 - 3.4</b>

# Carriage rates, circulating serotypes and antibiotic resistance among *Streptococcus pneumoniae* in healthy infants in Yei, South Sudan

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## Summary

The carriage of *Streptococcus pneumoniae*, serotypes, antimicrobial susceptibility patterns and disease development are poorly understood in Yei. Availability of affordable antibiotics over the counter, lack of laboratory infrastructure and high rates of penicillin resistance have the potential to aggravate rates of childhood mortality associated with *Streptococcus pneumoniae*. There is an urgent need to strengthen microbiological and public health services.

## Introduction

The burden of lower respiratory tract infections is significantly greater in the developing world compared with developed countries (1). *Streptococcus pneumoniae* is responsible for 70-80% of severe pneumonia cases in the African continent (2). It is frequently associated with otitis media, bacteraemia and meningitis. The incidence of pneumococcal infections is greater in high-risk groups especially infants. Environmental factors such as crowding and air pollution also contribute to the risk (3). In tropical regions, invasive pneumococcal diseases (IPD) occur frequently during the cold, dry months (4). However, in temperate climates, IPD are most often observed during the winter months (5). The mucosal epithelium of the nasopharynx is the primary site of pneumococcal colonization with an average duration of colonization between 2.5 and 4.5 months (6).

Capsular serotypes causing nasopharyngeal colonization and infections, as well as the development of antibiotic resistance, vary according to age, geographic location, and socioeconomic status (7, 8). However, there is an apparent link between penicillin resistance and high

level antibiotic consumption (9). There is a substantial overlap between the serotypes that are carried and those that are recovered from IPD (6, 10). Some pneumococcal serotypes colonizing the nasopharynx have little tendency to cause IPD (11).

Pneumococcal carriage rates and patterns of antibiotic-resistance are important in determining response to antibiotics or vaccines, especially when these may be effective against only a subset of strains or serotypes. This report describes isolation, carriage rates and antibiotic-resistance in pneumococci among healthy infants in Yei, South Sudan. The report also highlights essential issues for improving diagnostics, public health services and other infrastructures.

## Methodology

### Population, location and samples

Nasopharyngeal swabs were taken from 38 healthy infants aged between 2 weeks and 12 months, during a single vaccination session at Martha Clinic. A verbal explanation of the purpose of the study was given to and consent obtained from the parents of the children prior to sampling. Those who agreed to participate were questioned regarding the age of the child, recent antibiotic therapy and any hospitalization in the past two weeks. A flexible per-nasal twisted wire with rayon tip (Sterilin®: Newport, NP11 3EF, UK) was used to take the swabs and transported in Sterilin Transport Swabs with Charcoal/Aimes Media. The lack of incubators, -80°C freezers and regular electricity made storage and transport of samples suboptimal.

### Culture, bacteriological identification, antibiotic sensitivities and capsular serotyping

Forty-eight hours after taking the swabs, they were cultured on Colombia blood agar plates plus Optochin disks. Plates were incubated for 24-48 hours at 37°C with

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**Table 1. Results of antibiotic sensitivities and circulating serotype**

Infant No.	Age in months	Serotype	Penicillin* (MIC)	Cotrimoxazole	Erythromycin	Tetracycline	Cefachlor	Chloramphenicol	Linezolid
1	9	- **	R (0.5)	R	S	S	S	S	S
4	9	23F	R (0.25)	R	S	S	S	S	S
8	9	-	R (1)	R	S	R	S	S	S
11	2	15A/ 15F	R (0.25)	R	S	S	S	S	S
12	1	6A/ 6B	R (0.5)	R	S	S	S	S	S
20	9	23F	R (0.5)	R	S	S	S	S	S
21	1	7C/ 7B	R (0.5)	R	S	S	S	S	S
23	2	-	R (0.12)	R	S	S	S	S	S
27	1.5	23A	R (0.25)	R	S	S	S	S	S
30	2.5	6A/ 6B	R (0.5)	R	S	R	S	S	S
31	12	19A	R (0.25)	R	S	R	S	S	S
34	3	6A/ 6B	R (0.5)	R	S	R	S	S	S
36	5	6A/ 6B	R (0.25)	R	S	S	S	S	S
37	2	19F	R (0.5)	R	S	S	S	S	S
Colonization Rate	39 %	100 % Resistance Rate	100 % Resistance Rate	0 % Resistance Rate	25 % Resistance Rate	0 % Resistance Rate	0 % Resistance Rate	0 % Resistance Rate	0 % Resistance Rate

\*All isolates expressed low level penicillin resistance; the values represent minimum inhibitory concentration (MIC) for each isolate

\*\* - Isolates not been serotyped by our PCR. R = Resistant, S = sensitive

5% CO<sub>2</sub> in the microbiology department at the Royal Hampshire County Hospital, Winchester, UK. Growth of pneumococci was identified from colony morphology and optochin sensitivity. Sensitivity to oxacillin (1µg), chloramphenicol (10µg), erythromycin (5µg), cefaclor (30µg), linezolid (10µg), cotrimoxazole (25µg) and tetracycline (30µg) (MAST, Liverpool, UK) was tested using the BSAC method (12) on ISO with 5% horse blood (E&O, Scotland, UK). Penicillin MICs of the oxacillin resistant serotypes were tested by using penicillin E-test (Oxoid, Basingstoke, UK) on the same media according to the British Society of Antimicrobial Chemotherapy method (12). Pneumococcal isolates were transported to Sir Henry Wellcome Laboratories, University of Southampton School of Medicine, Southampton, UK and stored on cryobeads (Microbank, Pro-Lab Diagnostics, Wirral, UK) at -80°C.

In order to prepare genomic DNA for capsular polymerase chain reaction (PCR) one bead was removed from the storage vial and streaked onto a Columbia blood agar plate plus optochin disc. Single colonies

were suspended in 200l lysis buffer (10mM Tris, 100mM EDTA, 0.5% (weight/volume) SDS) and incubated at 37°C for 1 hour. Genomic DNA (gDNA) was prepared from this lysate using the QiaAmp DNA kit (Qiagen, UK). Pneumococcal capsular typing was performed on genomic DNA isolated from sub-cultured isolates by multiplex-PCR following the method described by the Centers for Disease Control (13, 14).

## Results

Every parent who was approached to participate in the study agreed to do so. None of the infants had been vaccinated with pneumococcal vaccines. No parent reported the use of antibiotics for their child and no child had been hospitalized in the 14 days prior to sampling. Fourteen (39%) of the 38 infants carried *S. pneumoniae* in the nasopharyngeal swabs.

Circulating serotypes and antibiotic sensitivities are shown in (Table 1). Our method was not able to serotype three isolates (infants 1, 8 and 23) as these isolates tested positive for the internal control for a universal

## MAIN ARTICLES

pneumococcal capsular gene (*cpsA*) suggesting that a capsular locus is present in these strains. Based on these findings, 50% of the serotypes we identified in this group are covered by the seven valent pneumococcal vaccines which contains serotypes [4, 6B (potentially cross cover 6A), 9V, 14, 18G, 19F, 23F]. The ten and thirteen valent vaccine types would not provide additional coverage.

### Discussion

Epidemics of pneumococcal disease have been reported in many communities before the discovery of antimicrobial agents and in other situations where people lived in crowded conditions(6). With better living conditions and the accessibility to antimicrobial agents, outbreaks of this disease have been infrequent. Carriage rates of 71.9% and 85% have been reported in infants from Zambia and Botswana respectively (15).

In this study we discovered 39% nasopharyngeal carriage among infants in Yei. Obtaining samples was not problematic. Lack of laboratory facilities (working incubators, culture media and regular electricity) meant that the conditions in which samples were kept and transported were not ideal. Availability of a better equipped laboratory would probably have increased recovery rates. Commonly isolated serotypes in this study included 6A/B, 19A, 19F and 23F. These serotypes are identified globally as common causes of IPD among children. None of the infants in our study was colonized with serotype 14 which is the most commonly identified serotype worldwide in children under aged five years (16). Children in Yei receive their medical care through the facilities of Yei Civil Hospital, Martha clinic and other local clinics. Local shops and pharmacies sell antibiotics without prior prescription. There is no antibiotic advice or protocol for use in these clinics and the hospital for otitis media, bronchitis, pharyngitis and lower respiratory infections. All the isolates proved to be resistant to cotrimoxazole and intermediately resistant to penicillin. Various factors may have contributed to this finding including over prescription, availability of affordable antibiotics without prescription, frequent use and multiple exposures to the same antibiotics, empirical therapy from prescribers and non compliance by patients leading to selection of more resistant strains.

Even though the sample size was small, our study highlights the increasing problem of antimicrobial resistance particularly among *S. pneumoniae*. This in turn complicates therapy of such infections. Penicillin seems to be no longer useful for the treatment of complicated infections due to this organism in this area. Although other agents like erythromycin, tetracycline, chloramphenicol and third generation cephalosporins can be used, clinicians and prescribers must know that the patterns of resistance continue to change and therefore constant epidemiological surveillance is needed for judicious antibiotic prescribing.



Figure 1. Microbiology laboratory at Yei Civil Hospital

### Conclusion

The extents of pneumococcal carriage and disease, serotypes, and antimicrobial susceptibility patterns have been poorly described in South Sudan. The lack of quality diagnostic services with high rates of antimicrobial resistance may have the potential to seriously exacerbate childhood mortality associated with *S. pneumoniae*. A comprehensive, extensive-scale surveillance of both clinical and community isolates is necessary to identify serotypes and the extent of drug-resistant strains of *S. pneumoniae* in South Sudan, to allow management and prevention strategies to be established before options become limited. Therefore the priorities recommended to the government of South Sudan are:

- Urgent measures to strengthen microbiology laboratory and public health services (see Figure 1).
- Exploration of ways of addressing the lack of basic infrastructure.
- Continued monitoring of antimicrobial resistance.
- Continued professional education of all within the healthcare system including private pharmacies.

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Sudan Research Ethics Committee.

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# Onchocerciasis control in South Sudan

Mounir Christo Lado Lugga<sup>a</sup> and Fasil Chane<sup>b</sup>

*This paper gives an overview of the Community Directed Treatment with Ivermectin (CTDI) projects in 2009. Data from the 2010 report will be published when it is available. Box 1 at the end of this article gives treatment guidelines.*

## Background

Onchocerciasis is an insect-borne disease caused by the parasite *Onchocerca volvulus* and transmitted by blackflies of the species *Simulium damnosum*. It is often called 'river blindness' because the blackfly lives in fertile riverside areas, that frequently remain uninhabited for fear of infection. *Onchocerca volvulus* is almost exclusively a parasite of humans. Adult worms live in nodules in the body where the female worms produce large numbers of first-stage larvae known as microfilariae. These migrate from the nodules to the sub-epidermal layer of the skin where they are ingested by blackflies. The microfilariae develop in the body of the blackfly and are transmitted to humans when the fly bites them (1).

Microfilariae cause eye lesions in humans. They are found in all the internal tissues of the eye, except the lens, where they cause inflammation, bleeding, and other complications that ultimately lead to blindness (1). The patient initially complains of itching, but blindness results from chorioretinitis and optic neuritis.

Between 1995 and 2002, Rapid Epidemiological Assessment (REA) was conducted in South Sudan by various Non-Government Organizations (NGOs) supporting Onchocerciasis Control in areas where they provided health services. However, in 2003, the African Program for Onchocerciasis Control (APOC) in collaboration with the Southern Sudan Onchocerciasis Task Force carried out Rapid Epidemiological Mapping of Onchocerciasis (REMO) in the country, partly to validate available historical epidemiological data (2). Results confirmed that onchocerciasis was a disease of public health importance in the country (3).

## Current activities

Activities to control onchocerciasis were started in the mid-1990s and Community Directed Treatment with Ivermectin (CTDI) projects were developed at the inception of the autonomous Government of Southern Sudan in 2005. There are currently five CTDI projects. Onchocerciasis is endemic in all the states except Unity State. The main endemic foci are located in Western Equatoria, Northern Bahr el Ghazal and Western Bahr el Ghazal (3). In some villages more than 80% of individuals

have palpable nodules and more than 12% are blind (4).

## Training

In 2009, a total of 9,268 Community Directed Distributors (CDDs), 1,094 Health Workers and 1,253 Community Leaders were trained on onchocerciasis activities (5).

## Planned coverage

Over the five CTDI project areas:

- Total population targeted = 5,605,726
- Ultimate Treatment Goal (UTG) = 4,708,810 people
- Annual Treatment Objective (ATO) = 3,019,766 people.

Figure 1 shows the planned coverage by CTDI project.

## Actual coverage

A total of 5,701 villages have been treated out of 6,503 endemic villages giving a geographical coverage of 87.7% see Figure 2. The total population that has been treated is 3,012,058 giving a therapeutic coverage of 53.7% - see Figure 3 (5).

## Discussion

Much progress has been made in fighting onchocerciasis in the five project areas through annual distribution of ivermectin. This relieves the severe skin itching caused by the disease. Ivermectin kills the larvae but not the adult worms of *Onchocerca volvulus* so annual or biannual treatments are required to prevent resurgence. However, studies in Mali and Senegal showed that after 15 to 17 years of six-monthly or annual treatments, only a few infections remained in the human population (6).

The Ministry of Health, South Sudan has now embarked on an Integrated Neglected Tropical Disease Control strategy for sustainable and effective interventions to combat the human suffering caused by Neglected Tropical Diseases (NTDs) (7). One method, applicable to

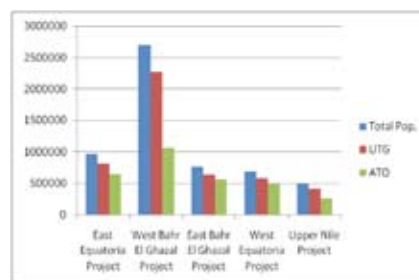


Figure 1. Total population, Ultimate Treatment Goals (UTG) and Annual Treatment Objectives (ATO) in the CTDI projects.

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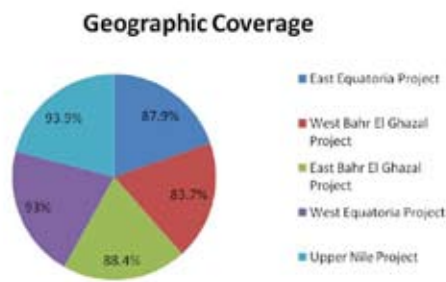


Figure 2. Geographical coverage in the CDTI projects.

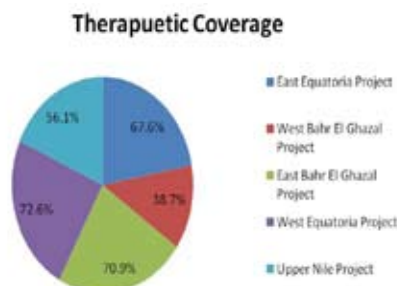


Figure 3. Therapeutic coverage in CDTI projects.

strengthen the link between communities and health facilities. This unprecedented opportunity to build evidence-based systems for NTD control or elimination needs to be maximised now while rebuilding of the health sector is ongoing (9).

#### References:

the control or elimination of seven NTDs – lymphatic filariasis, onchocerciasis, schistosomiasis, soil-transmitted helminths (i.e. ascariasis, trichuriasis and hookworm disease) and trachoma – is Mass Drug Administration (MDA) of Preventive Chemotherapy (PCT) through an integrated approach (8).

#### MDA Packages

The MDA Packages will contain any of five drugs - ivermectin, praziquantel, albendazole (or mebendazole), azithromycin, tetracycline - depending on the co-endemicity of diseases and whether the intervention threshold is exceeded. For areas where helminth diseases - onchocerciasis, lymphatic filariasis, schistosomiasis and soil-transmitted helminths – are co-endemic, administration of a MDA package will be relatively straightforward, because all of the required drugs have been cleared for co-administration. However praziquantel should only be administered alongside other anthelmintics after at least one separate round of MDA, to avoid adverse events in individuals with high worm loads. Where trachoma is endemic, a minimum of one week has to elapse between administration of antihelminth and azithromycin, because there is insufficient information to guarantee the safe co-administration of these drugs. Areas endemic for lymphatic filariasis and highly endemic for *L. loa*, but not onchocerciasis, will be excluded from MDA packages as the risk of adverse events is thought to outweigh the advantages of treatment (7).

In implementation units where the intervention threshold for a particular disease or combination of diseases has been exceeded, presumptive treatment will be delivered. This means that no diagnostic tool will be used and that a large number of infected and uninfected people will be treated. In areas where only helminth diseases are being treated this is feasible because anthelmintics have an excellent safety record, adverse reactions are minimal and transient, and severe adverse effects are extremely infrequent (7, 8).

Though this presents great challenges, it also offers great potential to increase treatment coverage for co-endemic NTDs, integrate more complex case-management into facility-based health care delivery and

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#### Box 1. Recommended treatment guidelines using Ivermectin

Body weight (kg)	Body length (cm)	IVM Dose	Route
15-25	90-119	1 tablet (3mg)	Oral once
26-44	120-139	2 tablets (6mg)	Oral once
45-64	140-159	3 tablets (9mg)	Oral once
65 and above	160 and above	4 tablets (12mg)	Oral once

# The Full blood count and blood film (Haemogram)

David Tibbutt<sup>a</sup>

Wherever we are in the world there never seems to be enough money for healthcare provision. So the key is to make what resources we have go as far as possible. Any laboratory test that we request should always be preceded by the questions “*Why are we making the request, what are the possible results and what decisions might those results lead us to make?*” Then we should ask “*Have we gained all possible information from that test?*”

A simple examination of the blood (with an Erythrocyte Sedimentation Rate / ESR) is probably the best example of this approach. It may appear very limited but a great deal of information can be obtained about systemic disease. Most hospitals and health centres have the facilities for these tests.

The commoner blood count and blood film abnormalities can be considered under the headings of chronic disorders, infections and diseases of the various systems. (Primary haematological diseases are excluded from the present discussion).

## Chronic disorders

Chronic disorders are often associated with a mild normochromic (or slightly hypochromic) anaemia with a haemoglobin level of around 90 - 100 g/l (9 - 10 g/100ml). Other investigations may help to define the anaemia as one arising from a chronic disorder but such tests are not likely to be readily available in South Sudan: e.g. serum iron (reduced), transferrin (reduced) and ferritin (normal or raised). There is no response to haematinics (e.g. iron, folic acid).

Such chronic disorders include:

- Infections (viral, bacterial, parasitic)
- Kidney diseases
- Malignant diseases
- Collagen diseases (e.g. rheumatoid arthritis)

The situation may be complicated by additional causes of anaemia such as:

- Haemolysis in malaria and sickle cell disease,
- Iron deficiency in hookworm infestation or as a result of gastrointestinal bleeding caused by non-steroidal anti-inflammatory drugs used for rheumatoid arthritis,

- Folate deficiency in dietary deficiency or tropical sprue.

## Infections

Common viral infections (e.g. adenoviruses, rubella, infectious mononucleosis (Epstein Barr virus) and varicella zoster) often cause a fall in white blood cell numbers (leucopenia) and, less frequently, platelet numbers (thrombocytopenia). Serious consequences are rare but occasionally thrombocytopenia will cause bleeding, which can be particularly marked in the viral haemorrhagic fevers e.g. Ebola, Marburg, Lassa.

Infection with the human immunodeficiency virus (HIV) causes a wide variety of abnormalities, especially lymphopenia, neutropenia and thrombocytopenia. Anaemia is common. Bone marrow suppression can occur due to anti-retroviral drugs such as zidovudine.

Bacterial infections are typically associated with a neutrophil leucocytosis and raised ESR. Prolonged infection can result in an "anaemia of chronic disorder".

Septicaemia can lead to fragmented red cells on the blood film and thrombocytopenia as a result of disseminated intravascular coagulation (DIC).

Infection with Mycobacterium tuberculosis may produce a variety of haematological features:

- Miliary tuberculosis (TB) is often associated with a moderate normochromic or slightly hypochromic anaemia. Rarer occurrences include pancytopenia (low red cell, white cell and platelet levels), “leukaemoid reactions” (high white cell levels with variable numbers of immature white cells on the blood film) and leucoerythroblastic anaemia (where the blood film contains small numbers of immature white cells and immature red cells) due to myelofibrosis.
- Abdominal TB, with malabsorption, can lead to a megaloblastic anaemia, with macrocytes in the blood.

• The anti-TB drug isoniazid may cause a sideroblastic anaemia<sup>1</sup>. The blood film shows a wide variety of red cell sizes, ranging from hypochromic microcytes to normochromic macrocytes, often with small numbers of stippled red cells.

<sup>a</sup> [david@tibbutt.co.uk](mailto:david@tibbutt.co.uk)

<sup>1</sup> In sideroblastic anaemia there is an accumulation of iron in the marrow erythroblasts: this appears, with special stains, as granules around the nucleus. The cells are called sideroblasts.

Parasitic infections are especially common in the Tropics:

- Hookworm infestations can cause severe iron deficiency and a hypochromic microcytic anaemia.
- Helminthic infestation can produce eosinophilia.
- Malaria is one of the commonest causes of anaemia. Neutropenia often develops as the infection progresses, and a monocytosis occasionally occurs. Thrombocytopenia is especially common in the acute stages.
- The tropical splenomegaly syndrome produces hypersplenism and hence anaemia, neutropenia and thrombocytopenia.

## Diseases of the various systems

### Gastrointestinal disease

The commonest problem is chronic blood loss leading to iron deficiency anaemia (hypochromic microcytic red cells). The underlying cause in the Tropics is likely to be hookworm infestation but peptic ulcer and gastrointestinal malignancy are also possibilities.

A malabsorption syndrome may present with a macrocytic anaemia (megaloblastic bone marrow) arising from folate and / or vitamin B12 deficiency. The cause in the tropics may be difficult to define although tropical sprue is always likely in a traveller from overseas. Malabsorption which is always worth considering in patients who have had previous gastrointestinal surgery, and which could have produced:

- Blind intestinal loops or anastomoses between loops
- Strictures
- Fistulae
- Extensive gut resection

These structural problems lead to an overgrowth of bacteria and thence to vitamin B12 deficiency ('blind loop syndrome'). A course of a broad spectrum antibiotic may be beneficial.

### Liver disease

Chronic liver disease can produce a mild to moderate macrocytic anaemia. This may also be associated with target red cells on the blood film and a moderate reticulocytosis. Cirrhosis associated with portal hypertension can lead to hypersplenism and pancytopenia.

A mild macrocytosis without anaemia is common in patients who drink alcohol to excess. Chronic alcoholics often have a macrocytic anaemia which may be due to a variety of causes, including:

- Dietary folate deficiency
- Gastrointestinal blood loss
- Liver dysfunction
- Direct toxic effects of alcohol on the bone marrow, which can also cause neutropenia (predisposing to infection) and thrombocytopenia (increasing the risk of bleeding).

### Renal disease

Chronic renal failure is usually accompanied by a normochromic anaemia. There is a shortened red cell life span and red cell production is reduced. In the later stages the blood film may show 'burr' cells (irregularly contracted red cells with spiny projections on the surface).

In malignant hypertension and some other causes of progressive renal failure associated with intravascular deposition of fibrin, a microangiopathic haemolytic anaemia occurs, with fragmented red cells on the blood film.

Anaemia is less commonly seen in chronic renal failure from polycystic kidneys because these kidneys produce excess erythropoietin. White cell and platelet counts are usually normal but uraemia causes platelet dysfunction and an increased bleeding tendency. Sometimes thrombocytopenia occurs, usually related to the underlying cause of the renal failure.

### Respiratory disease

- Asthma, in common with other forms of atopy, can be associated with eosinophilia. Other respiratory pathology producing a raised eosinophil count includes aspergillus and ascariasis infection. Allergy to drugs used in the treatment of pulmonary infection, e.g. penicillin and sulphonamides, can also be responsible.
- Pertussis infection causes a lymphocyte leucocytosis.
- Bacterial pneumonia/acute bronchitis causes a neutrophil leucocytosis.
- Mycoplasma infection can cause a haemolytic anaemia (typically when the patient is recovering from the infection) due to the presence of a red cell antibody ('cold agglutinin'). This produces red cell clumping on the blood film.
- Chronic obstructive pulmonary disease and other causes of chronic hypoxia lead to secondary polycythaemia.

### Endocrine disease

- Diabetic ketoacidosis often leads to a neutrophil leucocytosis even in the absence of infection. Renal failure arising from diabetes will bring the haematological problems described above.

## MAIN ARTICLES

- Hypothyroidism may be associated with a mild macrocytosis and irregularly contracted red cells ('gingerbread men') on the blood film.

### Malignant disease

Almost any haematological abnormality may be produced by a malignant disease. So an unexplained abnormal blood count or film, especially if associated with a raised ESR, should point to the possibility of a malignancy. Here are some common associations:

### The Erythrocyte Sedimentation Rate (ESR)

The ESR is a measure of the rate at which red cells fall to the bottom of an upright column of anticoagulated blood. It depends on many factors including the relative specific gravities of the red cells and the plasma. The latter is related to the level of fibrinogen, alpha 2 and gamma globulins. Therefore it is not surprising that a wide variety of conditions will affect the ESR. The generally accepted upper limits of normal (in mm in one hour at 17 - 23 degrees C) are shown in Table 2.

A raised ESR is not diagnostic of anything. It is a supportive indicator of "something wrong". It should arouse our suspicions to seek further. In addition the progress of certain diseases (e.g. rheumatoid arthritis) may be followed with serial ESR measurements.

So the message is that the "haemogram" should be carefully prepared and reported. IT CAN GIVE US MUCH USEFUL INFORMATION and significantly assist the diagnostic process when related to a carefully taken history and physical examination.

*Thanks to Dr Alistair Savyers for help in preparing this article.*

**Table 1: Association of abnormal blood count or film with malignancy**

"Haemogram" abnormality	Malignancy association
Anaemia of a chronic disorder	All
Hypochromic microcytic red cells	Gastrointestinal, cervix, uterus, kidney
Leucoerythroblastic picture*	Bronchus, breast, prostate, stomach, kidney.
Polycythaemia	Kidney, liver, uterus.
Neutrophil leucocytosis	All
Leukaemoid reaction	As for leucoerythroblastic picture.
Eosinophilia	Hodgkin lymphoma
Lymphopenia	Lymphoma
Monocytosis	All
Thrombocytosis	All
Thrombocytopenia (chronic DIC)	Stomach and mucin-secreting tumours (colon, ovary).

*[\* reflects bone marrow infiltration: anaemia, fragmented red cells, immature red cells and white blood cell precursors on the blood film]*

**Box 2: Upper limits of normal ESR for males and females**

Age ranges (years)	Men	Women
17 - 50	10	19
50 - 60	12	19
60 - 70	14	20
>70	30	35

# Guidance for undertaking research in the Republic of South Sudan.

**Richard Lino Lako and Samson Baba**

The overall responsibility for health research in South Sudan falls under the Division of Research, Monitoring and Evaluation and has been the remit of the Directorate of Planning and Coordination in the Ministry of Health, Republic of South Sudan. The existing structure of the research department includes the research data hub, the ethical committee and the research secretariats.

The Republic of South Sudan (ROSS) established a Research Ethics Committee (REC) in June 2006. Its purpose is to ensure that research in South Sudan is conducted according to internationally accepted norms in order to protect healthy volunteers and patients from exploitation and harm by researchers and commercial organizations.

Compliance with these guidelines helps to ensure that the dignity, rights, safety, and well-being of research participants are promoted and that the results of the investigations are credible. Over the years it has been noted that pharmaceutical companies and research organizations based in the developed countries have carried out research in less developed countries, such as ROSS, without regard to patient autonomy. On rare occasions the practice of research has even involved the deliberate and appalling violation of human beings.

All international guidelines require the ethical and scientific review of biomedical research alongside informed consent, and the appropriate protection of those unable to consent, as essential measures to protect the individual person and the communities who participate in research.

For example, it is no longer possible in the United Kingdom to publish a paper on original research in any reputable medical journal without prior Research Ethical approval. ROSS will be no different in this regard.

The South Sudan Research Ethics Committee (SSREC) will publish full guidance on undertaking original research in ROSS on the South Sudan Medical Journal website ([www.southsudanmedicaljournal.com](http://www.southsudanmedicaljournal.com)). This will enable prospective researchers from any part of the world to read it and download application forms for Research Ethics approval well ahead of their arrival in the South Sudan. Applications for Research Ethics approval must be accompanied by the following documentation:

- Completed application form signed by the lead researchers.
- Covering letter from the researcher or researcher institution.
- Attach Copy of REC approval if this proposal was reviewed by another institution.
- Curriculum vitae of all those involved in the research.
- Soft copy and seven hard copies of the research proposal.

*For more information consult Dr Richard Lako [richardlaku@yahoo.com](mailto:richardlaku@yahoo.com) or Dr Samson Baba ([samson\\_baba@yahoo.co.uk](mailto:samson_baba@yahoo.co.uk))*

## Appeal for cancer services in South Sudan

Dear Readers,

I am writing from the newly born country of South Sudan. I am a physician who has recently relocated here after 22 years in the UK. One huge problem that this new country faces is lack of facilities for the treatment of all types of cancers. In my short stay here (i.e. less than six months) I, with the help of the only histopathologist, have diagnosed more than fifteen blood and lymph node related cancers. Most of these were in young people. The majority of these are from the poor sector of the society and are unable to travel outside the country were these facilities may be available. Recently a 30-year old woman with pancytopenia as a result of AML was sent home to die from the only teaching hospital in Juba, the capital of this new country! As far as I know there are no plans for such a facility at hand. Please - this is a cry for help for your fellow Africans who have ever been suffering.

Kind regards,

Dr Ronald Woro

[ronaldworo@yahoo.co.uk](mailto:ronaldworo@yahoo.co.uk)

PS: I have started a rudimentary "Cancer Registry" and would appreciate help in developing it.

## Interview

### South Sudanese doctor receives PEPFAR award

*The United States AIDS Program known as the 'President's Emergency Plan for AIDS Relief' (PEPFAR) has awarded the 2011 Lahya Shiimi Award to Dr Basilica Modi. This is the first time a South Sudanese has received this prestigious award "in recognition of the outstanding team work, leadership, dedication and critical contributions to ensuring the sustainability of the HIV/AIDS response in South Sudan"*

Dr Edward Eremugo Luka interviewed Dr Basilica Modi for SSMJ

#### **Dr Modi, what is the Lahya Shiimi Award?**

The Lahya Shiimi Award for Exceptional Contribution to PEPFAR was established in 2007 in honour of Ms. Lahya Dnapandula Shiimi, Senior Technical Advisor for HIV/AIDS at USAID/Namibia, who passed away in April 2006. Lahya Shiimi was respected, admired, and loved by everyone who worked with her. She was one of Namibia's most accomplished and respected HIV/AIDS experts. At USAID, Shiimi helped lead a massive and historic expansion in U.S. assistance to Namibia's HIV/AIDS prevention, control and treatment programme under PEPFAR.

#### **What is the significance of the award for South Sudan?**

The award is presented in recognition of the exceptional contribution to PEPFAR. My receiving this global award highlights to the entire PEPFAR community the critical work being done in South Sudan in the area of HIV/AIDS.

#### **What is PEPFAR?**

PEPFAR is the U.S. Government initiative to help prevent new HIV/AIDS infections and to save the lives of those suffering from HIV/AIDS around the world. The PEPFAR/South Sudan strategy is to operate among 'Most at Risk Populations' in the counties bordering high prevalence countries and along the transport corridors in South Sudan as well as to help to strengthen the Ministry of Health's capacity to address HIV/AIDS.

#### **Which programmes are supported by PEPFAR in South Sudan?**

There are many covering: Prevention, Adult Care and Support, Strategic Information, Training and Laboratory Strengthening.

#### **What is your role in these PEPFAR Programmes?**

I am the USAID portfolio manager for PEPFAR/South Sudan. In this capacity I play the key management role, taking the lead in representing USAID/South Sudan on the PEPFAR South Sudan United States Government (USG) team. I help to design, manage, implement, evaluate and report on the USG strategy and country operational plan. I also coordinate HIV related activities with other stakeholders. In addition I represent the USG on the Country Coordinating Mechanism for Global Fund (CCM) and other committees and work groups, and I work



*Basilica Modi with Charles Lerman, Clifford Lubitz and Susan Fine on her right, and Ambassador Barrie Walkley on her left.*

*(Credit: Taban Emmanuel).*

with the other USG agencies that are implementing PEPFAR in South Sudan. I coordinate closely with RoSS counterparts to ensure that the PEPFAR/South Sudan program is aligned to the National HIV/AIDS strategic framework.

#### **How will the award support and improve your work?**

This award has motivated me so much, I know I am on the right track and I need to continue to support the fight against HIV in RoSS by playing my role effectively.

#### **Briefly highlight your educational and work background?**

I am a graduate of Juba University Medical School and I acquired a master's degree in Public Health from Braun School of Public Health in Jerusalem, Israel. I did my internship and hardship in different hospitals in North Sudan and worked with Internally Displaced Persons in the outskirts of Omdurman and Khartoum.

I relocated to South Sudan in 2001 and worked on an HIV/AIDS and Reproductive Health pilot project supported by USAID and implemented by International Rescue Cross (IRC) in Rumbek. I joined USAID in 2004 and am still working with them.

#### **Have you any special message to our readers?**

The people and government of South Sudan as well as the donors supporting development in this country need to pay special attention to the fight against HIV/AIDS, We need to avoid the serious impact of HIV epidemics that have occurred in other developing countries, which includes losing limited human resources and causing a heavy economic burden. South Sudan has a chance to avoid escalation of the epidemic if all citizens get involved and we implement the right interventions now.

## Interview

## “MGH - Harvard is committed to long term partnership with the government and people of South Sudan”

*Dr Thomas Burke is Chief of the Division of Global Health and Human Rights at the Massachusetts General Hospital (MGH), a Professor of Surgery at Harvard Medical School, a faculty of the Committee on African Studies at Harvard University, and a physician at MGH and Children's Hospital Boston. Since 2008, at the request of Government of Southern Sudan (GOSS) and the World Bank, Dr. Burke has been working with the Ministry of Health (MOH) in the areas of maternal and child health and capacity building.*

Dr Eluzai Abe Hakim, UK-based Editor of SSMJ, interviewed him.



*Figure 1. Dr Burke and Dr Wani Mena (CEO Juba Teaching Hospital and South Sudan-based Editor of SSMJ) assessing the hospital for clinical training in May 2011*

### What was the purpose of your first visit in 2008 and what did you accomplish?

Our main purpose was to find out how we might help South Sudan improve maternal and child health. We met leaders in the health sector and with them identified interventions to support critical issues in maternal and child health. This led to us funding and supplying all three

teaching hospitals (Juba, Malakal and Wau) with oxygen concentrators and pulse oximeters. We also provided Juba and Malakal with ultrasound and ultrasound training.

### What were your main activities in 2009?

In 2009, while we continued to work with the Ministry of Health to design an innovative community based approach to maternal, newborn and child health, we focused our implementation efforts on the 3 teaching hospitals. We:

- trained, and the GOSS MOH certified, 146 health care providers and their trainers in newborn resuscitation and supplied teaching tools such as mannequins.
- created and deployed an evidence-based newborn resuscitation card in Arabic and English
- provided health worker in-service training
- helped to develop clinical pathways in acute respirator and acute diarrheal illness.

### Did you accomplish anything else in 2009?

Yes, after Dr Eluzai Hakim had introduced me/us to Professor Abate, the Vice Chancellor, and working primarily through Dr. Bona (the Dean) and Dr. Kimo (VC office), we began supporting the Juba University College of Medicine by sending instructors in preclinical sciences and supplying educational resources.

### Can you expand on how you gave this support?

In 2010 we provided the University of Juba Medical School with:

- over 1,500 hours of teaching using instructors from Harvard Medical School, Johns Hopkins Medical School, Albany Medical College, Tufts Medical School, and the University of Nairobi Medical School – all working under our MGH/Harvard umbrella.
- 350 medical textbooks and other training materials including projectors, copiers, computers, teaching



Figure 2. Dr Burke and other members of the MGH/Harvard team with some of the medical students in 2011.

microscopes, and stethoscopes.

Then, under the guidance of the Dean, we helped to update the curriculum.

#### **Is this teaching continuing in 2011?**

It is. With support from the office of the Vice President and great collaboration across the spectrum, we have taught preclinical sciences during March, April, and up until May 10th. Although the medical school is now temporarily closed we will soon begin a primary care teaching service.

#### **Have you continued to support the development of maternal and child health services?**

Yes, in 2010, a grant from the MOH helped to implement the Maternal, Newborn and Child Survival (MNCS) Program. In 2010 we developed a best evidence training program, training materials, and began training trainers in Eastern Equatoria. This year (2011) we have:

- trained and outfitted 74 Master Trainers in MNCS and by the end of June we will have trained and supplied 700 front line health workers in MNCS in 7 States
- created a 2-year plan to roll out MNCS to a total of 2,500 front line health workers.

#### **Dr Burke—you and your colleagues have accomplished**

#### **a great deal in a short time. How are these activities supported and funded?**

As well as the GOSS, our most important supporters are the Massachusetts General Hospital, the Ujenzi Charitable Trust, ([see www.ujenzi.org](http://www.ujenzi.org)), the US Medical Schools involved, and other private donors, corporations, and charitable foundations.

#### **Lastly, how would you like to see the Medical Schools in South Sudan develop? What outside support do they need? Can what you helped to establish in Juba be generalized to the other medical schools in the South Sudan?**

These indeed are critical questions; ones that we have tried to answer by completing a formal and rigorous assessment of the medical education training capacity in all of South Sudan. As directed by Dr. Abdi, the in-country WHO Director, we undertook a formal assessment of medical education infrastructure, educators, and students in February of 2011. The recommendations that emerged from that assessment are that given the severe lack of infrastructure and the severe shortage of instructors, establishing and supporting one quality medical school ought to be the initial priority of the country. We do believe that our innovative partnership and approach could certainly be expanded once Independence has been obtained.



# Summary of a KAP survey in Aweil East County - Highlands in 2010

*Extract from 'KAP Survey Report: Aweil East County-Highlands, Northern Bahr el Ghazal state, November 2010'. By Jane Gune, Project Manager (Tearfund DMT South Sudan). Funded by the Canadian International Development Agency.*

The project area in the highlands of Aweil East County has a population of ~124,000 and is a major returnee entry point as the disputed oil rich area of Abyei is to the north. The survey in November 2010 aimed to:

- assess the knowledge and practices related to healthy living among the targeted population
- determine the impact of the Tearfund programme by comparing these results to those from the baseline survey of November 2009.
- 120 households (30 clusters of 4 households) were randomly selected. The person interviewed was usually the head of the household.

## Results

- 87.5% of the 120 respondents were from the host community and 12.5% were returnees (i.e. had returned within the last two years).
- 23.3% were male and 76.7% were female.
- 15.0% were aged 10 – 18 years, 81.7% were aged 19 – 50 years and 3.3% were aged above 50 years.

Table 1 shows that compared to the previous year, a higher proportion of people benefited from Tearfund services especially in the areas of water, health promotion, latrines and food security.



Figure 1. A Tearfund health education session.

**Table 1. Proportion of the population benefiting from Tearfund services.**

	2009	2010
	Percentage	
Water Provision	19.2	31.7
Clinics /PHCU	66.3	64.2
EPI	64.4	58.3
Health Promotion	11.5	19.2
Latrines	8.7	15.8
Food security	1.0	39.2
Employment	1.0	1.6
Others – Bed nets	1.0	1.6

## Water, sanitation and hygiene (WASH)

49.2% of the target population had access to borehole water compared with 42.3% in 2009 and there was an increase in the litres of water utilised/person/day from 13.0 to 14.7 (although this did not reach the SPHERE recommendations of at least 15 litres or the WHO benchmark of 20 litres). In addition:

- 7.5% of the population had access to a latrine; 0.8% buried their stools and 91.7% disposed of stools in the bush.
- 87.3 % of the latrines were in use and 71.4% were clean.
- 17% of the community had latrines under construction.
- 39.5% of the households gave evidence of using soap in 2010 compared to 37.5% in 2009.

## Health

- Morbidity was estimated at 0.31 persons/household/week. This means that 1 person was sick in every 23 households or 1 in every 137 persons per day.
- The crude mortality rate was estimated at 0.15/10,000 persons/day and the under-five mortality rate was 0.25/10,000/day.
- Among young children 77.3% were vaccinated against measles, 73.4% had a BCG scar and 72.8% had completed their tri-vaccine dose against DPT.
- 75.8% of the population received health messages in 2010 compared to 74.0% in 2009 – see Figure 1.
- Knowledge of HIV and AIDS had increased from 41.3% in 2009 to 56.3% in 2010.

**CASE STUDY - SUBACUTE STRIATUM INFARCT****Clinical History**

Hospital admission after sudden onset of headache, dense contralateral hemiplegia and hemisensory deficit.

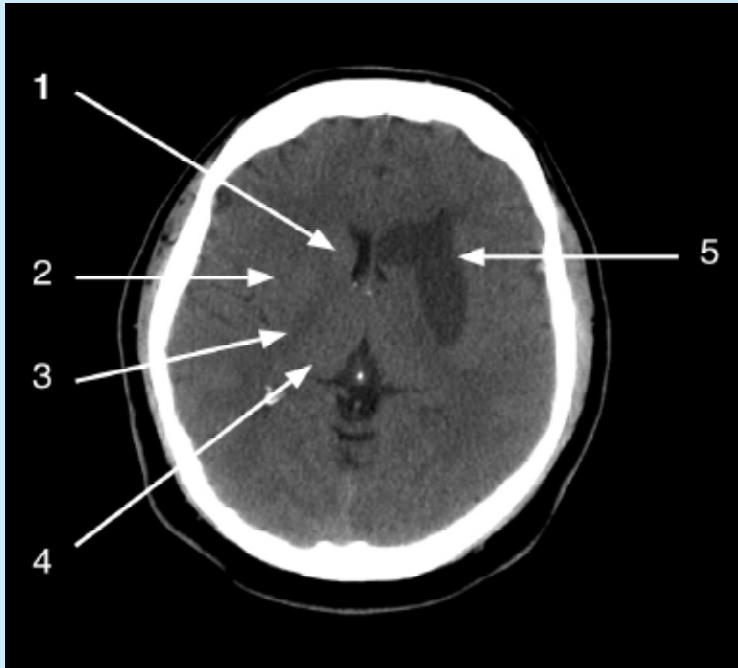


Figure 1. CT scan without iv-contrast obtained at admission about 8 hour post onset of symptoms.

1. Head of caudate nucleus
2. Lentiform nucleus (putamen and globus pallidus)
3. Internal capsule (posterior limb)
4. Thalamus
5. Subacute striatum infarct (involving caudate nucleus, anterior limb of internal capsule and putamen)

**Radiological Report**

There is evidence of a hypodense CT appearance of the left sided caudate nucleus, anterior limb of internal capsule and putamen resulting in a slight compression of the frontal horn of left lateral ventricle. These CT findings are in keeping with a subacute ischaemia of the perforating branches of left sided middle cerebral artery or a subacute striatum infarct. There is no evidence of an internal hydrocephalus, midline shift or of signs of significantly raised intracranial pressure. No underlying space occupying lesions or obvious malformations are demonstrated. No haemorrhagic infarct transformation is seen.

Contributed by Dr med. Stephan Voigt, Consultant Radiologist, St. Mary's Hospital, Isle of Wight, UK. [stephan.voigt@iom.nhs.uk](mailto:stephan.voigt@iom.nhs.uk)

**Food Security**

38.3% received food security support from Tearfund in 2010 compared to 1.9% in 2009. When asked what type of food security intervention would be beneficial:

- 60% of respondents suggested seeds distribution
- 31.7% suggested tools distribution
- 15.8% requested ox-ploughs
- 16.7% opted for training on improved farming methods
- 14.0% did not know of any solutions to improve food security.

**Literacy and Gender**

Only 5.8% of the respondents had attained formal education to the level of primary. The majority, 94.2%, did not attend any formal education and therefore were illiterate. The percentage of illiteracy among women was 98.9% compared to 76% among men. In the 5-20 year age group, 32.1% of boys and 58.6% of girls were not attending school.

**Conclusions**

There was an increase in service delivery to the beneficiaries across different sectors in the programme. The results showed improvement in WASH activities with an increase in the quantity of water used for domestic purposes. Latrine construction and usage was encouraging when compared with previous results. Observation showed that there was a remarkable increase in food security support this year compared to previous years. Health services were delivered successfully with no disease epidemic recorded during the year. Both crude mortality rates and under-fives mortality rates were below the Sphere thresholds for Sub-Saharan Africa and are well controlled. There is a serious education deficit among the population with 94.2% classed as illiterate. More than half of the female children were not attending school, and school dropout rates among girls was alarmingly high as they progressed to the upper classes. There was concern about the huge expected influx of returnees in the area. The influx may reverse the progress made if needs for the services surpass the available resources. More resources will be required to meet the increased demand.

To obtain the full report email

[dmt-southsudan-ha@tearfund.org](mailto:dmt-southsudan-ha@tearfund.org).

## THE ROYAL COLLEGE WRITTEN EXAMS: HOW TO PASS AND HOW TO USE THE E-LEARNING PORTAL

### The only way to pass the written exams:

The purpose of the e-learning portal is to assist trainees with their written exams. This portal will allow trainees to gain exclusive access to online companies such as onexamination.com and medical-masterclass.com, which have online question banks containing thousands of mock questions. It is impossible to pass the written exams by reading text books only: the Royal Colleges ask certain questions that textbooks often fail to answer. The only way to pass is to answer at least 2,000 practice questions. When you get a question wrong, do not go to the next question. Look in a book, go online, and find out why you got the question wrong and why the right answer is the right answer. This is the only way to pass

### How to access the learning portal:

Once you have made the decision to take the Royal College exams, please contact Dr Edward Luka +249912925346 at the South Sudan Doctors Association (SoSDA) or email [sosda.sudan@yahoo.com](mailto:sosda.sudan@yahoo.com). Then follow the following steps:

1) A deposit of BP £80 or USD \$131 or SSP 390 will be required. This should be paid into the following account:

South Sudan Medical Journal, Equity Bank

Account numbers : (SSP) 2001211149150 (USD) 2001211149151

2) Once this is done, show Dr Luka or provide SSMJ with copy of the deposit as proof. Then email the SSMJ on [david@southsudanmedicaljournal.com](mailto:david@southsudanmedicaljournal.com).

3) The South Sudan Medical Journal (SSMJ) will then give you a password to use for onexamination.com. This will last for six months and gives access to the following mock exam questions:

- MRCGP
- MRCP Part 1 and 2 written
- MRCS Part 1 and 2
- MRCPCH Part 1 A and B
- MRCPCH Part 2
- MRCOG Part 1 and 2
- FRCA Primary
- FRCR Part 1

Please note: 1 password = one exam. Furthermore, you will also be given the password to medical-masterclass.com which houses further questions for the MRCP part 1 and part 2 written. This password will last for one year.

4) Log on to [www.southsudanmedicaljournal.com](http://www.southsudanmedicaljournal.com) and click on the e-learning portal and then choose the hyperlink that you wish to go to. In the case of onexamination.com:

a) click on Find my exam' box, and click 'Go'.

b) select the 6 month subscription length from the drop down list and click the 'Buy Now' button

c) Give your email address and password to register. At the checkout page, fill in your name and address details. Towards the top of this page, there is a box labelled: 'voucher code'. Enter your code and click the 'Submit Code' button. If the code is valid, the total price will change to £0.00.

d) Tick the 'I accept' box, then click the yellow 'Place order now' button.

5) Once you have been accepted to the Royal College exam, if you show proof of this to SSMJ/SoSDA, you will be refunded 50% of the fee you gave us as a goodwill gesture (£40 or \$65 or SSP 195).

We hope that you find this service useful. Good luck for the exams.

# Conducting health services research

Ann Dewey, Amy Drahota, Carole Fogg, Sue Halson-Brown, Sally Kilburn, Heather Mackenzie, Chris Markham, Rebecca Stores and Annabel Tremlett

*The purpose of this beginner's guide is to start you off on the research journey by outlining the sequence of steps along the research process and providing guidance, including signposting other useful resources, that can help support each stage of the process.*

## What is Health Services Research?

Health services research is the scientific investigation of the use, costs, delivery and effects of health care treatments or services for individuals and populations (Lohr and Steinwachs 2002). It is not about collecting information for information's sake or transforming facts from one place to another. Health services research involves systematically seeking knowledge which will lead to improvements in the delivery of health care (Crombie and Davies 1996). This type of research will require team members from a wide range of backgrounds for example healthcare professionals, University researchers, charities or commercial organisations, social researchers, epidemiologists, economists and statisticians as well as non-professionals such as those who may potentially use the service or treatment.

Good health services research is not accidental. It requires careful planning as well as careful implementation. Before starting a research project, it is therefore important to prepare a research proposal in which the aims and research questions, background, plans and reasoning for the research are clearly laid out. Good planning will help you to anticipate and avoid numerous obstacles and pitfalls, save time in the long run, and produce a superior finished product. Remember effective planning for health services research involves seeking views and expertise from a wide range of professionals and non-professional groups.

## 1. Getting Started – thinking of an idea

Taking that first step is always the hardest and always starts with a question, "What do I want to research? Where do I get ideas from?". Ideas can come from anywhere within your practice. Here are some sources of research ideas you might consider:

- Service user comments. What do your service users think about the service? Do they think they are receiving what you think you are delivering? Is your service accessible to all? Can you undertake a reflective cycle to identify key issues for your service users?
- Personal interest
  - From your practice. If you have an interesting finding, do other people find the same?
  - From literature you have read. Is there a question

left unanswered?

- Audit of your own work or the work of others – but remember if you are considering an audit you must have a benchmark or gold standard to compare your findings with.
- Topics of local or national interest such as screening programmes. Are you offering a service which is part of a local or national programme? What are your findings? Who attends screening programmes ...who does not attend? Is there anything that you are doing that is different from others offering the same thing?
- Service development. Are you meeting the needs of your population? What is essential, what is desirable and what is something to aspire to? Could your research move you or your organisation from providing a basic service to providing an exemplary service?
- Role extension. Are you happy in your role? Are you capable of more? Could your research provide evidence that you can work at a higher level?
- Evidence Based Practice (EBP). Can your research provide the evidence to change practice within your field? Can you see a pattern of evidence emerging from your own practice that may not currently be evidenced in the literature?
- Practice specialty. Are you working in a specialty? Can you share that practice with others?

All you need to get started is: time, an understanding of how far you want to take your research, some local resources and possibly, though not essentially, some funding. Taking that first step to research can have a profound effect on your practice.

So ... let's get started!

**The full article is available on the  
SSMJ website:**

**[www.southsudanmedicaljournal.com](http://www.southsudanmedicaljournal.com)**

## News and Resources

In this issue these are listed under:

- South Sudan in the Lancet
- HIV and other infections
- Non-Communicable Diseases
- Maternal, neonatal and child health
- Surgery
- Health services and Job Aids

### South Sudan in The Lancet

There have been three recent articles on South Sudan in this journal. These are:

- Infectious diseases burden in South Sudan by Talha Burki in *The Lancet Infectious Diseases*, Volume 11, Issue 4, Pages 266 - 267, April 2011
- South Sudan faces grim health and humanitarian situation by Wairagala Wakabi in *The Lancet*, Volume 377, Issue 9784, Pages 2167 - 2168, 25 June 2011
- Lul Riek: helping to improve public health in South Sudan by Wairagala Wakabi in *The Lancet*, Volume 377, Issue 9784, Page 2171, 25 June 2011

Note that free registration for *The Lancet* at <http://www.thelancet.com/user/register> allows you to view many full articles free of charge, set up email alerts of tables of contents and subscribe to free email newsletters from *The Lancet* in your specialty.

### HIV and other infections

#### HIV treatment as prevention

An international study shows that antiretroviral treatment can prevent the sexual transmission of HIV among heterosexual couples in whom one partner is HIV-infected and the other is not. The study showed a 96% reduction in risk of HIV transmission.

Reference: Editorial *The Lancet*, Volume 377, Issue 9779, Page 1719, 21 May 2011.

6-month versus 36-month isoniazid preventive treatment for tuberculosis in adults with HIV infection in Botswana: a randomised, double-blind, placebo-controlled trial

In a tuberculosis-endemic setting, 36 months' isoniazid prophylaxis was more effective for prevention of tuberculosis than was 6-month prophylaxis in individuals with HIV infection, and chiefly benefited those who were tuberculin skin test positive.

Reference: *The Lancet*, Volume 377, Issue 9777, Pages 1588 - 1598, 7 May 2011

### Non-Communicable Diseases

### Online textbook of Cardiology

Cardiopedia.net (<http://www.cardiopedia.net/>) is a free online textbook of Cardiology. Any medical professional can contribute to the website and changes are supervised by physicians and cardiologists. The Cardiopedia Project is a worldwide collaborative project to develop a comprehensive, best researched resource for cardiology community and to evolve a new model for sharing and advancing cardiology knowledge. By registering you can contribute to this collaborative cardiology encyclopedia. Cardiopedia aims to become a repository of up-to-date unbiased cardiology related information, contributed and maintained by medical professionals around the world, and freely available to everyone.

[From Procor <http://www.procor.org>]

### Cardiology news

CardiologyNews.org is a one stop website for cardiology news worldwide. It is a single web page which wraps up the latest headlines from the trusted cardiology news sources worldwide. It gives you a quick glance on what's happening in the cardiology world. [CardiologyNews.org](http://www.cardiologynews.org) is the starting point for doctors to navigate the world of Cardiology. Visit <http://www.cardiologynews.org/>

[From procor 28]June2011 <http://www.procor.org>]

### Maternal, neonatal and child health

#### Pocket Book of Obstetric, Neonatal and Paediatric Emergencies including Major Trauma

This is a pocket book that Maternal and Childhealth Advocacy International (MCAI) and The Advanced Life Support Group (ALSG) provide to all midwives, nurses and doctors trained in the emergency healthcare of pregnant mothers, babies and children. It can be downloaded [6.9 Mb-286 pages] from <http://www.mcai.org.uk/resources/manualsbooks.aspx>. Also available from the same site is Pictorial Manual for village health workers [4.28 MB 15 pages]

[http://www.mcai.org.uk/assets/content/documents/vhw\\_manual.pdf](http://www.mcai.org.uk/assets/content/documents/vhw_manual.pdf). For other MCAI resources see <http://www.mcai.org.uk/resources.aspx>

[From CHILD2015]

### Healthy timing and spacing of pregnancy

This K4 Health eToolkit provides resources for advocacy, training, or health systems strengthening. The goal of the toolkit is to provide wide-ranging information so that any woman in any community, region, or country can safely delay, space, or limit her pregnancies. To download this toolkit, go to <http://www.k4health.org/toolkits/HTSP>

## NEWS AND RESOURCES

and click the horizontal tabs.

K4Health eToolkits are electronic libraries of resources on a particular health topic that are selected by technical experts and designed for health program managers, service providers, and policy makers. Toolkits are available under the following topics: Environmental Health, Family Planning Methods, Family Planning/ Reproductive Health Programs and Services, HIV/AIDS, Maternal and Child Health, Nutrition. Go to <http://www.k4health.org/toolkits> for full details

### More skilled midwives needed to save women's and newborns' lives

The first State of the World's Midwifery report (from UNFPA) confirms the critical role midwives play in improving maternal and newborn health and survival. It highlights the shortage of skilled midwives in many low-income countries, stressing the need to train and deploy more midwives especially remote and rural areas.

The report surveyed 58 countries, which together represent just under 60% of all births worldwide, but 91% of all maternal deaths. The report estimates that countries require a minimum of six skilled birth attendants per 1000 births if they are to achieve the aim of 95% coverage. Sudan was one of the nine countries needing to scale up midwifery by a factor of between 6 and 15.

To see the report and video go to <http://www.unfpa.org/sowmy/report/home.html>

### Two materials from the Infant & Young Child Nutrition (IYCN) Project in Zambia

Video: Connecting with the community: Kabwe's story documents IYCN's experiences with strengthening linkages between nutritional support activities in Zambian communities and health facilities. See <http://www.iycn.org/zambia#kabwe>.

Our approach: Improving nutrition counseling across the continuum of care in Zambia summarizes a demonstration project implemented in two of Zambia's health facilities, which showed that efforts to improve nutrition assessment, counselling, and support across the continuum of care achieve greater success when activities at the community and facility levels are linked.

See [http://www.iycn.org/files/iycn\\_case\\_study\\_zambia-v6-lo-res.pdf](http://www.iycn.org/files/iycn_case_study_zambia-v6-lo-res.pdf).

### Hydroxycarbamide in very young children with sickle-cell anaemia: a multicentre, randomised, controlled trial (BABY HUG)

The safety and efficacy data from this trial showed that hydroxycarbamide can now be considered for all very young children with sickle-cell anaemia. See a summary of the article at <http://www.thelancet.com/journals/lancet/>

[article/PIIS0140-6736\(11\)60355-3/abstract](http://www.thelancet.com/article/PIIS0140-6736(11)60355-3/abstract).

Reference: Wang WC et al. The Lancet, Volume 377, Issue 9778, Pages 1663 - 1672, 14 May 2011

## Surgery

### Surgery in Africa Monthly Reviews

These reviews are available free at [www.ptolemy.ca/members](http://www.ptolemy.ca/members)

Examples of recent ones in 2011 are:

- March: Treatment of Neglected Clubfoot
- May: Musculoskeletal tuberculosis in children
- June: Blood Transfusion in Surgery--update 2011

Also at this site are archives of reviews since 2005 and a resource library. [from HIFA2015 2 June, 2011]

## Health services and Job Aids

### USAID Health Care Improvement (HCI) Project

The USAID Health Care Improvement (HCI) Project (<http://www.hciproject.org>) assists national and local programs to scale up evidence-based interventions and improve outcomes in child health, maternal and newborn care, HIV/AIDS, tuberculosis, malaria, and reproductive health. The project also helps countries expand coverage of essential services; make services better meet the needs of underserved populations, especially women; improve efficiency and reduce the costs of poor quality; and improve health worker capacity, motivation, and retention.

Under this project is a Website about Community Health Workers - CHW Central ([www.chwcentral.org](http://www.chwcentral.org)) which is an interactive platform that facilitates information-sharing and dialogue about how to support CHWs who work in communities around the world providing health education and care. The website provides links to topics and tools relevant to CHWs. [HIFA2015 June 16, 2011]

### Adolescent Job Aid. A Handy Desk Reference Tool for Primary Level Health Workers

This job aid is for any health worker who provides services to children, adolescents and adults. It aims to help them to respond to their adolescent patients more effectively and with greater sensitivity and covers: Part 1: The clinical interaction between the adolescent and the health worker; Part 2: algorithms, communication tips and frequently asked questions related to developmental conditions, pregnancy-related conditions and genital conditions including STI and HIV. Part 3: Information for adolescents and their parents or other accompanying adults on health and development issues. Download from [http://www.who.int/child\\_adolescent\\_health/documents/9789241599962/en/](http://www.who.int/child_adolescent_health/documents/9789241599962/en/)

## A note on the 'Real Medicine Foundation'



The Real Medicine Foundation ([www.realmedicinefoundation.org](http://www.realmedicinefoundation.org)) was founded in May 2005 inspired by lessons learned after working for months in the Asian Tsunami relief efforts. Real Medicine Foundation (RMF) provides humanitarian support to people living in disaster and poverty stricken areas, and continues to help communities long after the world's spotlight has faded. We believe that 'real' medicine is focused on the person as a whole by providing medical/physical, emotional, economic and social support.

Starting in early 2009, RMF focused on looking into ways to improve the health of the citizens of the world's newest forming country South Sudan. Inspired by the brave stories coming out of this war torn country, and well aware of the terrible state of its health care infrastructure, we wanted to find a way to contribute to the overwhelming need for all levels of basic healthcare. It was quickly realized, that RMF's blueprint of setting up efficient primary health clinics using local staff was not going to be an option as there was virtually no available local staff to hire and no infrastructure into which to plug. With so many years of civil war and strife, the health care systems of South Sudan had atrophied almost to the point of not existing at all.

It was after initial research that RMF was lucky enough to join forces with the St Mary's Juba Hospitals Link team, partners at the UNFPA and the Ministry of Health to plan a new college to educate local midwives and nurses. With generous funding support from the World Children's Fund ([www.worldchildrensfund.net](http://www.worldchildrensfund.net)) over the past two years, RMF continues to play a role in the continued success of the Juba College of Nursing and Midwifery. Together with staff in the new Republic of South Sudan, UNFPA and the many other project partners involved, we are very proud to see the first generation of student midwives and nurses becoming trained and ready to serve their new country!

(supplied by Jonathan White, COO, RMF, [jonathan.white@realmedicinefoundation.org](mailto:jonathan.white@realmedicinefoundation.org))

### Watch out for developments to our website

In order to make our website more useful and exciting to health professionals working in South Sudan we are adding a LINKS folder, which gives an overview of many of the different organisations working or supporting health services in the country. If your organisation would like to link with us please email David Attwood ([david@southsudanmedicaljournal.com](mailto:david@southsudanmedicaljournal.com)) who will send more details.

By working together we can help our new country provide the health services it deserves.

### New on the website

#### Quality of Treatment in PHC

We thank Medair for permission to publish their presentation, given at the July South Sudan Health Forum, outlining how they carried out an audit and improved the quality of treatment in PHC, particularly for malaria, diarrhea and pneumonia. See under 'Latest News'.

SSMJ would like to thank the authors of articles and everyone else who helped to prepare this issue of the journal.

## WHO CHARTS FOR EVERYONE CARING FOR CHILDREN IN HOSPITAL

**Charts 7 and 8. How to give IV fluids to children without and with severe malnutrition** from 'Pocket Book of Hospital Care for Children - Guidelines for the Management of Common Illnesses with Limited Resources' WHO 2005. See the whole book at <http://www.ichrc.org/>. Charts 1 – 6 were reproduced in previous issues of this journal.

You can use these charts in different ways. For example, you can print them and display them in relevant wards or clinics (laminated if possible), or use them as a 'memory aid' in your pocket, as handouts or as training aids.

We thank the WHO for permission to reproduce these charts, and Dr O'Hare who gave us the idea of making the charts more widely available.

### CHART 7. How to give IV fluids rapidly for shock in a child without severe malnutrition

- ▶ If the child is severely malnourished the fluid volume and rate are different, so check that the child is not severely malnourished  
Shock in child without severe malnutrition—Chart 7  
Shock in child with severe malnutrition—Chart 8 (and section 1.3, page 18)
- ▶ Insert an intravenous line (and draw blood for emergency laboratory investigations).
- ▶ Attach Ringer's lactate or normal saline—make sure the infusion is running well.
- ▶ Infuse 20 ml/kg as rapidly as possible.

Age/weight	Volume of Ringer's lactate or normal saline solution (20 ml/kg)
2 months (<4 kg)	75 ml
2–4 months (4–6 kg)	100 ml
4–12 months (6–10 kg)	150 ml
1–3 years (10–14 kg)	250 ml
3–5 years (14–19 kg)	350 ml

#### Reassess child after appropriate volume has run in

- Reassess after first infusion: If no improvement, repeat 20 ml/kg as rapidly as possible.
- Reassess after second infusion: If no improvement, repeat 20 ml/kg as rapidly as possible.
- Reassess after third infusion: If no improvement, give blood 20 ml/kg over 30 minutes (if shock is not caused by profuse diarrhoea, in this case repeat Ringer's lactate or normal saline).
- Reassess after fourth infusion: If no improvement, see disease-specific treatment guidelines. You should have established a provisional diagnosis by now.

After improvement at any stage (pulse slows, faster capillary refill), go to Chart 11, page 16.

### CHART 8. How to give IV fluids for shock in a child with severe malnutrition

Give this treatment only if the child has signs of shock *and is lethargic or has lost consciousness*:

- ▶ Insert an IV line (and draw blood for emergency laboratory investigations)
- ▶ Weigh the child (or estimate the weight) to calculate the volume of fluid to be given
- ▶ Give IV fluid 15 ml/kg over 1 hour. Use one of the following solutions (in order of preference), according to availability:
  - Ringer's lactate with 5% glucose (dextrose); or
  - half-normal saline with 5% glucose (dextrose); or
  - half-strength Darrow's solution with 5% glucose (dextrose); or, if these are unavailable,
  - Ringer's lactate.

Weight	Volume IV fluid Give over 1 hour (15 ml/kg)	Weight	Volume IV fluid Give over 1 hour (15 ml/kg)
4 kg	60 ml	12 kg	180 ml
6 kg	90 ml	14 kg	210 ml
8 kg	120 ml	16 kg	240 ml
10 kg	150 ml	18 kg	270 ml

- ▶ Measure the pulse and breathing rate at the start and every 5–10 minutes.

*If there are signs of improvement (pulse and respiratory rates fall):*

- give repeat IV 15 ml/kg over 1 hour; then
- switch to oral or nasogastric rehydration with ReSoMal (see page 179), 10 ml/kg/h up to 10 hours;
- initiate refeeding with starter F-75 (see page 184).

*If the child fails to improve after the first 15ml/kg IV, assume the child has septic shock:*

- give maintenance IV fluid (4 ml/kg/h) while waiting for blood;
- when blood is available, transfuse fresh whole blood at 10 ml/kg slowly over 3 hours (use packed cells if in cardiac failure); then
- initiate refeeding with starter F-75 (see page 184);
- start antibiotic treatment (see page 182).

*If the child deteriorates during the IV rehydration (breathing increases by 5 breaths/min or pulse by 15 beats/min), stop the infusion because IV fluid can worsen the child's condition.*

Every effort has been made to ensure that the information and the drug names and doses quoted in this Journal are correct. However readers are advised to check information and doses before making prescriptions. Unless otherwise stated the doses quoted are for adults.