



Sero-Prevalence of Syphilis among Patients with Mental Illness: Comparison with Blood Donors

Sero Prévalence de la Syphilis Parmi des Patients Présentant Une Maladie Mentale: Comparaison à des Donneurs de Sang

B. A. Issa^{*†}, A. Fadeyi[‡], I. A. Durotoye[§], A. D. Yussuf[†], A. K. Salami[¶], O. A. Shittu[§], P. O. Ajiboye[†], H. O. Olawumi[§],
O. A. Adegunloye[†], C. Mwabuisi[‡], D. Sulyman[†],

ABSTRACT

BACKGROUND: Mentally ill individuals (MII) are at risk of acquiring syphilis and other sexually transmitted infections. This study aimed at determining sero-prevalence of syphilis among MII and compare them with voluntary blood donors (VBD) at University of Ilorin Teaching Hospital (UITH), Nigeria.

METHODS: A cross-sectional study done between June, 2010 and June 2011, and involving 350 each of VBDs and MII in and out-patients of UITH. Serological test was done using venereal disease research laboratory (VDRL) and the *Treponema Pallidum* Haemagglutination (TPHA) kit.

RESULTS: Of the 700 subjects, 324 (92.6%) MII, and 349 (99.7%) VBDs were ≤ 55 years; 71 (21.4%) MII were Civil Servants compared with 96 (27.4%) VBDs. Significantly more VBDs had higher education than MII (185 or 52.9%, and 140 or 40% respectively). Christians constituted the majority (176 or 50.3%) among MII, and Muslims (210 or 60%) among VBDs. Significantly more married VBDs (204/206 or 99.0%) live with spouses; more VBDs consumed alcohol (37 or 10.6%), smoked (19 or 5.4%), and engaged in extramarital sex (105 or 30.0%). Significantly more MII had blood transfusion (40 or 11.4); engaged in sex trade (12 or 3.4%); and more syphilis prevalence (5.4%). In addition, more syphilitic MII smoked (18 or 94.7%); and all syphilitic MII had psychotic disorders.

CONCLUSION: The prevalence of syphilis in MII is significantly higher than among VBDs. Routine screening of MII is advocated to stem this problem. *WAJM* 2013; 32(2):210–215.

Keywords: Seroprevalence, syphilis, mental illness, blood donors, Nigeria.

RÉSUMÉ

CONTEXTE: Les personnes présentant une maladie mentale sont à risque de contracter la syphilis et d'autres infections sexuellement transmissibles. Cette étude visait à déterminer la séroprévalence de la syphilis chez des personnes malades mentales et de la comparer à celle de donneurs volontaires de sang à l'Hôpital Universitaire d'Ilorin, Nigeria.

MÉTHODES: Une étude descriptive a été menée entre juin 2010 et juin 2011 incluant 350 donneurs de sang et 350 malades mentaux à l'Hôpital Universitaire d'Ilorin. Un test sérologique a été réalisé utilisant le venereal disease research laboratory (VDRL) et le kit *Treponema Pallidum* Haemagglutination (TPHA).

RÉSULTATS: Parmi les 700 personnes, 324 (92,6%) malades mentaux et 349 (99,7%) donneurs de sang avaient un âge ≤ 55 ans; 71 (21,4%) malades mentaux étaient des fonctionnaires comparés à 96 (27,4%) donneurs de sang. Les donneurs de sang avaient un niveau d'éducation significativement plus élevé que celui des malades mentaux (185 ou 52,9% et 140 ou 40% respectivement). Les chrétiens étaient majoritaires (176 ou 50,3%) parmi les malades mentaux et les musulmans étaient majoritaires (210 ou 60%) parmi les donneurs de sang. Il y avait significativement plus de donneurs de sang mariés vivant avec leur conjoint (204/206 ou 99,0%), consommant de l'alcool (37 ou 10,6%), fumeurs (19 ou 5,4%) et entretenant des rapports sexuels extra conjugaux (105 ou 30,0%). Il y avait significativement plus de malades mentaux ayant eu une transfusion (40 ou 11,4); engagés dans le commerce sexuel (12 ou 3,4%) et une plus grande prévalence de syphilis (5,4%). On notait aussi plus de malades mentaux syphilitiques fumeurs (18 ou 94,7%) et tous les syphilitiques malades mentaux avaient des troubles psychotiques.

CONCLUSION: La prévalence de la syphilis chez les malades mentaux était plus élevée que chez les donneurs de sang. Ceci plaide en faveur d'un dépistage de routine afin d'endiguer ce problème. *WAJM* 2013; 32(2): 210–215.

Mots clés: Séro prévalence, syphilis, maladie mentale, donneurs de sang, Nigeria.

Departments of [†]Behavioural Sciences, University of Ilorin. [‡]Medical Microbiology and Parasitology, University of Ilorin. [§]Haematology, University of Ilorin. [¶]Department of Medicine, University of Ilorin.

*Correspondence: Dr. Baba A. Issa, Department of Behavioural Sciences, University of Ilorin, PMB 1515, Ilorin, 240001, Nigeria.

Email: issababa2002@yahoo.com Phone: +234-8033559293

Abbreviations: MII, Mentally Ill Individuals; TPHA, *Treponema Pallidum* Haemagglutination; UITH, University of Ilorin Teaching Hospital; VBD, Voluntary Blood Donors; VDRS, Venereal Disease Research Laboratory

INTRODUCTION

Syphilis is a systemic disease caused by *Treponema pallidum* which can be spread by sexual contact, blood transfusion and via vertical transmission.¹ In Sub-Saharan Africa, syphilis remains a serious public health problem and contributes to approximately 20% of perinatal deaths.² Rates are proportionally higher among intravenous drug users, HIV patients, and homosexuals.³ In the United States, the rate of syphilis as of 2007 was 6 times higher in men than women but about equal in 1997.⁴ In Africa, the prevalence of active syphilis infections were 12.8%, and 3.8% in Tanzania, and Kenya, respectively.^{5,6} The relationship between syphilis and mental disorders is important and historical. The link between general paralysis of the insane and end-stage syphilis was initially described by Wassermann in 1906, and confirmed by Noguchi in 1912.⁷ This discovery was a watershed that led to search for treatment for a psychotic disorder amongst patients in 'lunatic asylum' who were hitherto 'condemned' as hopeless and untreatable. The 'malaria treatment' of syphilis by Wagner-Jauregg started in 1917⁷ and the discovery of penicillin later in 1940s brought great relief to patients with neurosyphilis,⁷ and drastic reduction in mortality and morbidity from this *Treponema* disease. Syphilis is an important medical problem worldwide, not only because of the neurotropic potential of syphilis but also because neurosyphilis can be a reversible cause of mental and behavioural disorders and cognitive decline such as dementia. Syphilis has frequently been under-diagnosed in psychiatric patients perhaps because the disease may remain asymptomatic for a long period.⁸

Persons with serious mental illness may be at higher risk of infection with sexually transmitted diseases than the general population as studies indicate they often engage in behaviours that predispose them to sexually transmitted infections (e.g., multiple sexual partners, sexual intercourse with unfamiliar partners, homosexual anal intercourse, and refusal to use condoms).^{8,9}

Given the historical association of neurosyphilis with psychiatric symptoms and the increase in primary and

secondary syphilis reported in the 1980s and early 1990s,¹⁰ screening psychiatric patients for syphilis has persisted as the standard of care in most developed countries particularly in high risk populations and locations.¹¹ Thus, the incidence and prevalence of syphilis has fallen steeply due to improved access to health care, effective control programmes and efficacious treatment.^{10,12} However, it is somewhat different in developing countries, including Nigeria, despite literature evidences of syphilis resurgence due to HIV.^{12,13} The call for routine screening of psychiatric patients for the presence of syphilis¹² has not been adopted optimally in most developing countries and may, perhaps, have been responsible for the persistent relatively high prevalence of syphilis in such countries.

The aim of this study was to determine the sero-prevalence of Syphilis among patients with mental illness at the University of Ilorin Teaching Hospital, Nigeria and to compare this with healthy voluntary blood donors (VBD) in the same hospital.

The reasons for our choice of syphilis included the fact that despite the known risks for sexually transmitted infections among patients with mental illness, there is dearth of study regarding the seroprevalence of syphilis among this population in Nigeria; and secondly, there are inexpensive, minimally invasive, serological tests for syphilis.

This study is expected to add to the data bank on the available sero-prevalence studies on syphilis in patients with mental illness. If significant relationship is established, screening for this infection might then be considered as a routine test in the mentally-ill in Nigeria. The extent to which this group of patients serve as reservoir of infection will be determined and will aid knowledge and evidence-based practice. The findings might also be useful in planning for a better health care for patients with mental and behavioural disorders alone or comorbid with other sexually transmitted infections which may include routine screening for syphilis. Detecting sero-positivity before clinical manifestation would go a long way at reducing the morbidity of syphilis among patients with mental illness.

METHODOLOGY

The study was a hospital based, cross-sectional study of patients with mental illness attending the University of Ilorin Teaching Hospital (UIH), Nigeria. Three hundred and fifty consented patients attending the psychiatric clinics and in-patient psychiatric facility of the hospital were recruited into the study while 350 voluntary blood donors within the same hospital were used for comparison. The study was carried out between June, 2010 and June 2011.

To be included in the study, the VBDs must not have been diagnosed with mental illness. Sample size determination was done using the Fisher's formula and a prevalence of 1.87% for syphilis¹⁴. This figure was the reported national prevalence for syphilis and was chosen in the absence of a syphilis prevalence figure among patients with mental illness. The mentally ill individual (MII) were consecutive attendees of the out-patients and all in-patients admitted in the twenty bed psychiatric facility until the sample size was achieved. Those MII that reported treatment for sexually transmitted infection prior to developing mental illnesses were excluded.

UIH is located in Ilorin the capital of administrative area called Kwara State, North-Central and one of the 36 states in Nigeria. The hospital enjoyed patronage from Kwara, Oyo, Osun, Kogi and from other parts of Nigeria, thus, all major ethnic and religious groups were represented. It is the only referral centre for mental and behavioural disorders in Kwara state which has an estimated population of about 3 million.

The patients and donors were informed of the nature and reasons for the study by the researchers and consents were obtained from them or their wards. Thereafter, 5ml of venous blood was taken from each subject. The blood sample was used for the screening for syphilis using the DiaSpot Rapid Diagnostic Test kit (DS 401–Syphilis test strips; lot: SYP2070028) according to the manufacturer' (Sam Tech Diagnostics) instructions. According to the kit manual DiaSpot Syphilis ultra rapid test strip/ Device is a lateral flow immunoassay for the detection of human antibodies to

Treponema pallidum in serum, plasma and whole blood with a high degree of specificity and sensitivity. The kit utilizes a unique combination of syphilis antigen coated particles and anti-human IgG and IgM to detect *Treponema pallidum* qualitatively and selectively in serum or plasma.

The socio-demographic details (e.g., age, sex, occupation, and other risk behaviours/ procedure, etc) were obtained using a structured questionnaire designed for the study. The questionnaire is self-administered and only those who were unable to read and write were assisted by the researchers in completing the questionnaire.

Standard ethical procedure was complied with in accordance with Helsinki declaration.¹⁵ University of Ilorin Teaching Hospital Ethical Review Committee which is one of the members of the National Health Research Ethics Council approved the study protocol as part of larger study to determine the sero-prevalence of HIV, Hepatitis and Syphilis among the mentally ill patients via a letter referenced UITH/CAT182/12/726. Written Informed consent of the participants was equally obtained. Patients that did not consent to the study were excluded.

Statistical Analysis

Statistical Package for Social Sciences, SPSS (Windows version 13.0; SPSS Inc, Chicago, IL, US)¹⁶ software was used for statistical analysis. Results were calculated as frequencies, means, standard deviations (SD), cross-tabulation, and chi-square. Fisher's exact test, odd ratio at 95% confidence interval calculation was done where necessary, with p-value set at 0.05.

RESULTS

Seven hundred subjects participated in the study comprising 350 each of persons with mental illnesses and blood donors. Most (324 or 92.6% MII, and 349 or 99.7% VBD) were of the age range ≤ 55 years, civil servants (71 or 21.4% for MII, and 96 or 27.4% VBD) and most (140 or 40% MII, and 185 or 52.9% VBDs) had up to a tertiary level of education. Significantly more of the VBD had higher educational status than the MII, which had more respondents in the "primary" category than the VBD group. More of the MII were also found in the lower

"unemployed" and "petty traders" occupational group (Table 1).

One hundred and seventy six MII (50.3%) were Christians compared with 174 of VBDs while 174 MII were Muslims compared with 210 of VBDs.

Out of the 144 MII who were married, 105 (72.9%) were living with their spouses compared with 204 (99.0%) of 206 married VBDs. Reasons for not living together included "mental illness" (15 MII, 38.5%); "job location" (18, 46.2% MII; "misunderstanding" (6 MII, 15.4%); and 2, 100.0% of the VBD).

When other lifestyle and risky behaviour practices (i.e., alcohol and

cigarette consumption, sexual practices, extramarital engagement, sex trade and self injection practices) were compared, significantly more respondents in the VBD had consumed alcohol than the MII (37 or 10.6% Vs. 11 or 3.1, respectively), smoked than the MII (19 or 5.4% Vs. 8 or 2.3%, respectively), and had engaged in extramarital sex than the MII (105 or 30.0% Vs. 59 or 16.9%, respectively). However, more of the MII has had blood transfusion in the past than the VBDs (40 or 11.4 Vs. 13 or 3.7% respectively), and had also engaged in sex trade than the VBDs (12 or 3.4% Vs. 1 or 0.3% respectively) (Table 2).

Table 1: Socio-demographic Distribution of MII and VBD

Variables	II (N=350) n (%)	VBDs (N=350) n (%)		OR (95% CI)
Gender			X ² =190.08 P-value=0.000	0.034(0.021–0.05)
Male	179(51.1)	339(96.9)		
Female	171(48.9)	11(3.1)		
Age				
16–35	193(55.2)	252(72.0)		
36–55	131(37.4)	97(27.7)	X ² =11.47 P=0.0096	0.57(0.41–0.79)
56–75	25(7.1)	1(0.3)		
>75	1(0.3)	0(0)		
Mean Age	36.5 $\pm$ 12.3	31.4 $\pm$ 8.3	F=41.35 p-value=0.000	
Marital Status				
Divorced	18 (5.1)	–	X ² =42.32 p-value=0.000	1.34(0.63–2.95)
Married	144 (41.1)	206 (58.9)		
Single	170 (48.6)	143 (40.9)		
Widowed	18 (5.1)	1 (0.3)		
Family Type				
Monogamy	123 (71.9)	185 (89.8)	X ² =18.791 p-value=0.000	0.29(0.17–0.51)
Polygamy	48 (28.1)	21 (10.2)		
Occupation				
Professionals	–	4(1.1)		
Civil Servant	75 (21.4)	96 (27.4)		
Businessman/ woman	10 (2.9)	30 (8.6)	X ² =50.54 P=0.95	0.59(0.26–1.3)
Skilled Artisan	56 (16)	88 (25.1)		
Pensioner	8 (2.3)	–		
Petty Traders	56 (16)	16 (4.6)		
Unemployed/ housewife	145 (41.4)	116(33.1)		
Level of Education				
Illiterates	32 (9.1)	18 (5.1)		
Others	4 (1.1)	8 (2.3)	X ² =46.275 p-value=0.000	3.5(2.08–5.9)
Primary	65 (18.6)	21(6)		
Secondary	109 (31.1)	122 (34.9)		
Tertiary	140 (40)	185 (52.9)		

Others = included in this group are home taught Arabic & Islamic education and other teachings in local languages that could not be classified.

Table 2: Lifestyles/Risk Behaviours of Respondents

Variables	MII (N=350) n (%)	VBDs (N=350) n (%)	Chi Square Statistics	OR (95% CI)
Alcohol Consumption				
Yes	11(3.1)	37(10.6)	$X^2=13.979$ p-value=0.000*	0.27(0.14–0.55)
No	339 (96.9)	313 (89.4)		
Cigarette Smoking				
Yes	8 (2.3)	19 (5.4)	$X^2=3.852$ p-value=0.05*	0.41(0.17–1.0)
No	342 (97.7)	331 (94.6)		
Anal Sex				
Yes	6 (1.7)	3 (0.9)	$X^2=0.45$ p-value=0.502	2.0(0.26–15.64)
No	344 (98.3)	347 (99.1)		
Blood Transfusion				
Yes	40 (11.4)	13 (3.7)	$X^2=13.8$ p-value=0.000	3.34(1.77–6.33)
No	310 (88.6)	337 (96.3)		
Extramarital Sex				
Yes	59 (16.9)	105 (30.0)	$X^2=16.126$ p-value=0.000	0.47(0.33–0.68)
No	291 (83.1)	245 (70.0)		
Sex Trade				
Yes	12 (3.4)	1(0.3)	$X^2=7.838$ p-value= 0.005	12(2.12–72.26)
No	338 (96.6)	349 (99.7)		
Oral Sex				
Yes	11(3.1)	6 (1.7)	$X^2=0.965$ p-value=0.326	1.86(0.54–6.43)
No	339 (96.9)	344 (98.3)		
Self Injection				
Yes	–	1 (0.3)	$X^2=1$ p-value=1.000	Indeterminate
No	350 (100)	349 (99.7)		

Table 3: Syphilis Screen

	MII (N=350) n (%)	VBD (N=350) n (%)	X^2	p-value	OR(95% CI)
Syphilis Screening					
Positive	19 (5.4)	4 (1.1)	8.811	0.003	4.96 (1.7–14.3)
Negative	331 (94.6)	346 (98.9)			

The prevalence of syphilis among patients with mental illness (MII) in this study was 5.4% compared to a sero-prevalence of 1.1% among the VBDs. Significantly more of syphilitic MII had smoked compared with syphilitic VBDs (18 or 94.7% Vs. Zero respectively) (Table 4).

All syphilitic patients were diagnosed to have psychotic disorders comprising schizophrenia (13 or 68.4%), and psychotic episode, unspecified (6 or 31.6%).

DISCUSSION

The reasons for finding patients with mental illnesses in the lower socio-

economic class and lower education status have been previously explained in terms of the 'downward drift' and 'social maintenance' hypothesis.^{17,18} Thus, one of the ways of liberating the mentally sick out of the social doldrums is education; education could bring about better job prospects for the mentally sick with possible upward drift to higher social classes. However, this was not the case in this study where majority of the MII had higher education but were still predominant in the lower occupational groups of petty trading and unemployed groups. Bad national economy and general high unemployment rate in Nigeria might be contributory but further

studies might be needed to provide further reasons for this.

Perhaps, because being religious is not known to confer any immunity against mental disorder, and coupled with the near equal distribution of adherents of both religions (Christianity and Islam) in Nigeria, the observed religious equi-distribution of respondents in this study may not be too surprising. One of the adverse social consequences of mental disorders is social distancing with the resultant spousal rejection/distancing.¹⁹ This could explain the fewer 'MII' living with their spouses compared with 'VBDs'. Different job locations were the reasons given by 'VBDs' for their not living with their spouses while 'MII' gave reasons of 'mental illness' and 'misunderstanding'.

Sero-prevalence of 1.1% among blood donors (VBDs) in this study is lower than the 13.5%²⁰ and 7.5%²¹ in Ghanaian studies but similar to 1.3% in Ethiopian study²² and 1.2% previously reported in Nigeria.¹³ The variance in the Ghana studies requires further explanations which may be out of the scope of this paper because the methodologies of all the quoted studies are similar. Generally, higher national prevalence could only be a wise guess in the absence of a National prevalence statistical figure. The finding that significantly more of the blood donors had consumed alcohol than the MII, smoked than the MII and had engaged in extramarital sex than the MII needs careful interpretation. The MII are clinic attendees, some of whom have been on follow up for months or years and are under observation and continual counselling by the clinicians, social workers and relations. Therefore, engaging in risky behaviours like those listed above might be limited compared to VBDs due to repeated health and sex education that some of these visits entail. Similarly, the finding that more of the MII had received blood transfusion in the past than the VBDs might be because donors are healthy individuals who voluntarily went to give his or her blood. The fact that the MII in this study had engaged in sex trade than the VBDs may not be surprising because some mentally sick persons could easily be lured into

Table 4: Socio-demographic and Risk Characteristics of Sub-cohort with Syphilis

Variables	MII (N=350) n (%)	VBD (N=350) n (%)	p-value	Fisher's Exact (One-Tail)	OR(95% CI)
Gender					
Male	11 (57.9)	4 (100)	X ² =1.06		
Female	8 (42.1)	–	p-value=0.303	0.1542	
Marital Status					
Single	6 (31.6)	2 (50)	X ² =0.93		0.6
Married	10 (52.6)	2 (50)	p-value=0.818		(0.0–4872)
Divorced	2 (10.2)	–			
Widowed	1 (5.3)	–			
Mean Age	39.68 ± 10.634	32.0 ± 12.806	0.215		
Education					
Illiterate	4 (21.1)	–	X ² =1.72		0.6
Primary	4 (21.1)	–	p-value=0.634		(0–7835)
Secondary	4 (21.1)	2 (50)			
Tertiary	7 (36.8)	2 (50)			
Smoking					
Yes	18 (94.7)	–	X ² =12.31		0.0006
No	1 (5.3)	4 (100)	p-value=0.000		
Alcohol					
Yes	2 (10.5)	–	X ² =0.01		0.676
No	17 (89.5)	4 (100)	p-value=0.767		
Blood Transfusion					
Yes	4 (21.1)	–	X ² =0.08		0.436
No	15 (78.9)	4 (100)	p-value=0.776		
Self Injection					
Yes	–	–			
No	19 (100)	4 (100)			
Number of Sexual Partners					
0	8 (42.1)	1 (25)	X ² =0.33		
1	7 (36.8)	3 (75)	p-value=0.847		
2	3 (15.8)	–			
4	1 (5.3)	–			
Extramarital Sex					
Yes	6 (31.6)	1 (25)	X ² =0.11		0.648
No	13 (68.4)	3 (75)	p-value=0.736		
Same Gender Sex					
Yes	–	–	NA		
No	19 (100)	4 (100)			
Oral Sex					
Yes	–	–	NA		
No	19 (100)	4 (100)			
Anal Sex					
Yes	–	–	NA		
No	19 (100)	4 (100)			
Sex Trade					
Yes	–	–	NA		
No	19 (100)	4 (100)			

NA= Not applicable

sex for a token or primarily promiscuous.

The observed prevalence of syphilis (i.e., 5.4%) among MII was about 5 times higher than VBDs. The National HIV/STD sentinel study, 1999¹⁴ put the rate of syphilis in Nigeria at 1.87%, a figure that is about 3 times lower than the finding in this study. This national figure seems to have fallen further as evidenced by a recent national study²³ that indicated a very low level of Syphilis. In that report no syphilis was detected among male homosexuals. The syphilis level was put at ≤1% among police; non-brothel based female sex workers and the armed forces. Our finding of 5.4% is therefore high among patients with mental illnesses and even higher than prevalence of 0.80% among mentally ill in Brazil.²⁴ In this study, significantly, more of the syphilitic MII had smoked compared with syphilitic VBDs. Prevalence of smoking among the mentally ill population is beyond the scope of this study but it is generally known that smoking is a risk factor for cardiovascular diseases and could occur as comorbid problem in the mentally ill individuals.

In conclusion, the prevalence of syphilis among patients with mental illness is high compared with the VBDs. We therefore call for routine screening of mentally ill patients for syphilis. We believe this will go a long way at early detection of syphilis and institution of appropriate treatment. If this is done the prevalence of syphilis among patients with mental illness might be reduced.

Limitation

The study was not designed to test the causal effect of syphilis in mental illness but rather to report casual occurrence of syphilis in individuals with mental illness and to compare the prevalence with voluntary blood donors. A prospective study design where cases and controls were appropriately matched to exclude confounders would have been more appropriate. We accept this as a major limitation and can be improved upon in subsequent studies.

The strength of this study is that it is the only one that has determined the prevalence of syphilis among patients with mental illness in Nigeria. The implication of this is that the study would

be a baseline for other studies to build on.

REFERENCES

- Murray P, Rosenthal K, Kobayashi G, Pfaller M: Medical Microbiology. Mosby company, St. Louis, 4th edition 2002: 379–380.
- Woods CR. “Congenital syphilis-persisting pestilence”. *Pediatr. Infect. Dis. J* 2009 **28**: 536–7 PMID: 19483520.
- Wikipedia.org. Syphilis. <http://en.wikipedia.org/wiki/Syphilis>. Accessed 23rd December, 2011.
- Centres for Disease Control and Prevention. Trends in Reportable Sexually Transmitted Diseases in the United States, 2007. <http://www.cdc.gov/std/stats07/trends.htm> Accessed 2nd January 2012.
- Todd J, Munguti K, Grosskurth H, Mngara J, Chagalucha J, Mayaud P, *et al*. Risk factors for active syphilis and TPHA sero conversion in rural African population. *Sex Transm infect* 2001, **77**:37–45. doi:10.1136/sti.77.1.37.
- Temmerman M, Fonck K, Bashir F, Inion I, Ndinya-Achola JO, Bwayo J, *et al*. Declining syphilis prevalence in pregnant women in Nairobi since 1995: another success story in STDs. *Int J STD AIDS* 1999, **10**: 405–408. PMID: 10414884
- Bynum W. Experimenting with fire: giving malaria. *The Lancet* 2010; **376**: 6 doi:10.1016/S0140-6736(10)62019-3.
- Carey MP, Carey KB, Maisto SA, Gordon CM, Vanable PA. Prevalence and correlates of sexual activity and HIV-related risk behaviour among psychiatric outpatients. *Journal of Consulting and Clinical Psychology*. 2001; **69**:500–505.PMCID: PMC2424203.
- Coverdale JH, Turbott SH. Risk Behaviors for Sexually Transmitted Infections Among Men With Mental Disorders. *Psychiatric Services*. 2000; **51**(2): 234–238 PMID:10655009
- Centres for Disease Control and Prevention: Primary and Secondary Syphilis: United States, 1981–1990. *MMWR* 1991; **40**: 314–315, 321–323 <http://www.cdc.gov/mmwr/preview/mmwrhtml/00001988.htm>
- Woo BK, Jeevarakshagan S, Sevilla C, and Obrocea GV. Psychiatric and Neuro-Ophthalmological Manifestations of Syphilis. *Psychosomatics*. 2007; **48**: 451 PMID:17878509.
- Sobhan T, Rowe HM, Ryan WG, Munoz C. Unusual case report: three cases of psychiatric manifestations of neurosyphilis. *Psychiatr Serv* 2004; **55**: 830–832 PMID:15232027.
- Olokoba AB, Olokoba LB, Salawu FK, Danburam A, Desalu OO, Badung LH, *et al*. Syphilis in Voluntary Blood Donors in North-Eastern, Nigeria *European Journal of Scientific Research* 2009; **31**(3):335–340 http://www.eurojournals.com/ejsr_31_3_03.pdf
- National AIDS and STD Control Programme. The 2001 National HIV/Syphilis Sentinel Survey among Pregnant Women Attending Antenatal Clinics in Nigeria National AIDS/STDs Control Programme, The Federal Ministry of Health; Department of Public Health, December, 2001 Technical report. Available at http://naca.gov.ng/index2.php?option=com_docman&task=doc_view&gid=3&Itemid=268 Accessed 24th March, 2012.
- World Medical Association. Declaration of Helsinki. 2008 revision available from: <http://www.wma.net/e/ethicsunit/helsinki.htm> Accessed 3rd August, 2012
- Statistical Package for Social Sciences. SPSS (Windows version 13.0) SPSS Inc, Chicago, IL, US), 2004.
- Fox FW. Social Class, Mental Illness, and Social Mobility: The Social Selection-Drift Hypothesis for Serious Mental Illness. *Journal of Health and Social Behaviour* 1990; **31**:344–353. <http://www.jstor.org/stable/2136818>.
- Murali V, Oyeboode F. Poverty, social inequality and mental health. *Advances in Psychiatric Treatment*. 2004; **10**: 216–224. doi:10.1192/apt.10.3.216.
- Baumann AE. Stigmatisation, social distance and exclusion because of mental illness: the individual with mental illness as a ‘stranger’. *Int Rev Psychiatry*. 2007; **19**(2):131–135. PMID:17464791.
- Ampofo W, Nii-Trebi N, Ansah J, Abe Kenji, Naito H, Aidoo S, *et al*. Prevalence of Blood-Borne Infectious Diseases in Blood Donors in Ghana. *Journal of Clinical Microbiology*. 2002; **3523**–**3525**. doi: 10.1128/JCM.40.9.3523-3525.2002
- Adjei AA, Kudzi W, Armah H, Adiku T. Prevalence of antibodies to syphilis among blood donors in Accra, Ghana. *Jpn. J. Infect. Dis*. 2003; **56**: 165–167. PMID:14583641.
- Tessema B, Yismaw G, Kassu A, Amsalu A, Mulu A, Emmrich F, *et al*. Seroprevalence of HIV, HBV, HCV and syphilis infections among blood donors at Gondar University Teaching Hospital, Northwest Ethiopia: declining trends over a period of five years. *BMC Infectious Diseases* 2010; **10**:111 doi:10.1186/1471-2334-10-111
- United Nations General Assembly Special Session (UNGASS), Country Progress Report, Nigeria (Reporting Period: January 2008–December 2009). Available at http://www.unaids.org/en/dataanalysis/monitoringcountryprogress/2010progressreportssubmittedbycountries/nigeria_2010_country_progress_report_en.pdf Accessed 12th January, 2012.
- Guimaraes MD, Campos LN, Melo AP, Carmo RA, Machado CJ, Acurcio Fde A; PESSOAS Project Network Group. Prevalence of HIV, syphilis, hepatitis B and C among adults with mental illness: a multicenter study in Brazil. *Rev Bras Psiquiatr*. 2009; **31**: 43–7. PMID:19506775.