

Comparison of State Prevention of Mother-To-Child Transmission of HIV and National Biennial ANC HIV Sentinel Surveillance Data: Ten Year Experience from Gombe State, North East Nigeria

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Abstract

There are significant variations in PMTCT programme implementation in the country. Biennial serosentinel survey among pregnant women attending antenatal clinics provides estimates of HIV and for monitoring the epidemic. The objective of this work was to compare HIV prevalence trend using National ANC HSS data and PMTCT programme data in Gombe state over the last 10 years. Methodology: Cross-sectional comparative study. The HIV prevalence among pregnant women in Gombe State obtained from Gombe State PMTCT programme data from 2004-2014 was compared with the National Biennial sentinel survey for HIV in pregnant women attending ANC in the state over the same period. Results: Women tested for HIV during ANC in Gombe state increased from 4689 in 2004 to 74,737 in 2014. 447,732 women were cumulatively tested for HIV with a positivity rate of 2.1% (9543). ANC HIV positivity rates from PMTCT programme data witnessed a decline from 8.2% (385/4689) in 2004 to 0.6% (497/74,737) in 2014. Conversely, the National biennial HIV sero-prevalence sentinel survey reports for Gombe state in 2005, 2006, 2008, 2010, 2012 and 2014 were 4.9%, 4.4%, 4.0%, 4.2%, 4.1% and 3.4% respectively. The state PMTCT data showed a significant decline in HIV positivity rates among women, paralleled by increased testing, whereas

the national sero-prevalence survey averaged 4.2%. Conclusion: While routine yearly Gombe state PMTCT programme data showed a declining HIV trend, biennially conducted seroprevalence in the state was consistent over the period. Implications are unclear to us; accurate estimation of HIV prevalence is a prerequisite for planning.

Keywords

Antenatal, HIV, Prevalence, PMTCT, Sero-Survey

1. Introduction

Trends in HIV prevalence are necessary to monitor the course of the epidemic, measure the effectiveness of control and prevention interventions, and plan further HIV control efforts. Timely and reliable data on HIV prevalence are gathered by HIV surveillance systems through the on-going systematic collection, analysis and reporting of data at different points in the HIV disease process [1] [2].

Since 1991, Nigeria's estimate of the HIV prevalence and burden has been through the conduct of biennial HIV sero-sentinel survey among pregnant women attending clinics throughout the country [3] [4]. In addition, National AIDS and reproductive health surveys (NARHS) provide further understanding of the dynamics of the disease in the country [5]. The National HIV prevalence declined from 4.1% in 2010 to 3.0% in 2014 with state, zonal and urban-rural variations [4] [5].

Antenatal clinics (ANCs) provide an accessible cross-section of healthy, sexually active women in the general population, and data from ANC HIV sero-sentinel survey (HSS) are considered to be generally representative of the underlying community [1] [2]. In many countries, national HIV prevalence estimates are substantially based on annual or biennial ANC HSS [1] [2] [3].

The Joint United Nations Programme on HIV/AIDS (UNAIDS)/World Health Organization (WHO) 2000 [6] and 2013 guidelines on second generation HIV surveillance [2] recommend conducting sero-survey among pregnant women as a core surveillance activity in concentrated and generalized HIV epidemics. Prevention Mother-to-Child Transmission of HIV (PMTCT) programmes in some sub Saharan Africa countries have witnessed substantial expansion in coverage (global report) [7] [8] [9]. As PMTCT programmes expand coverage and capture socio demographics, syphilis and HIV testing data similar to those collected by ANC HSS, many countries are considering the use of routinely collected PMTCT programme data to complement or replace ANC HSS [1] [2].

The World Health Organization (WHO) recommends that five areas be evaluated before a successful transition from ANC HSS to surveillance using routine antenatal HIV testing can be considered. These are: agreement between ANC SS

and routine antenatal HIV test results; magnitude of selection bias in routine antenatal testing compared to ANC SS data; all ANC HSS sites that should provide routine antenatal HIV testing; the quality of routinely collected antenatal data and the state of routine HIV testing quality assurance practices [1].

Nigeria accounts for the 28% of the global burden of mother to child transmission of HIV with about 58,000 of infants delivered with HIV infection in 2014 [10] and there are significant regional and state variations in PMTCT programme implementation in the country [3] [4] [11]. Ebonyi State (Southeast Nigeria) was able to supersede the 80% coverage target while Nassarawa (Northcentral) Gombe (Northeast) and the Federal capital territory-Abuja had over 70% coverage. Seven states were unable to counsel and test up to 20% of pregnant women [11].

Since the inception of the PMTCT programme in Nigeria in 2002, of the 36 states in the country, Gombe State has consistently maintained its position as one of the three leading states in PMTCT coverage nationwide [11]. Also, the dried blood spot DNA-PCR for early infant diagnosis (EID) of HIV was first introduced within the State [11].

Aim

The aim of this report is to compare HIV prevalence trends using National ANC HSS and with that obtained from PMTCT programme data in Gombe state between 2004 and 2014.

2. Methodology

Study Site

Gombe State

Gombe state is one of the 6 states in North east Nigeria and one of the 36 in the country and has an estimated population of 3.0 million (**Figure 1**) [12].

There are 594 health facilities, of these, 21 general hospitals, 1 state owned specialist Hospital, 1 Federal Teaching Hospital, 68 private health facilities, and 517 government owned primary health facilities [13].

Women of child bearing age (15 - 49 years) are estimated as 666,260. The population of children aged 5 years and below is 605,691 (20% of total population). The annual growth rate is 3.2%. The total fertility rate is 7 [13]. Antenatal care provided by skilled Health workers is at 58.2% [14].

Study design

This is a retrospective prevalence-based comparative study of national HIV sero-prevalence sentinel survey among pregnant women attending ANC in Gombe State and PMTCT routine data for the State from 2004-2014.

Gombe State agency for the control of AIDS (GOMSACA) was established in 2002 [15] [16]. The national HIV sero-prevalence sentinel survey was conducted by the Federal Ministry of Health, Nigeria among pregnant women attending ANC in Gombe state and initially involved two then subsequently four sites; with Gombe and Kaltungo as urban and Kwami and Zambuk as rural sites. The

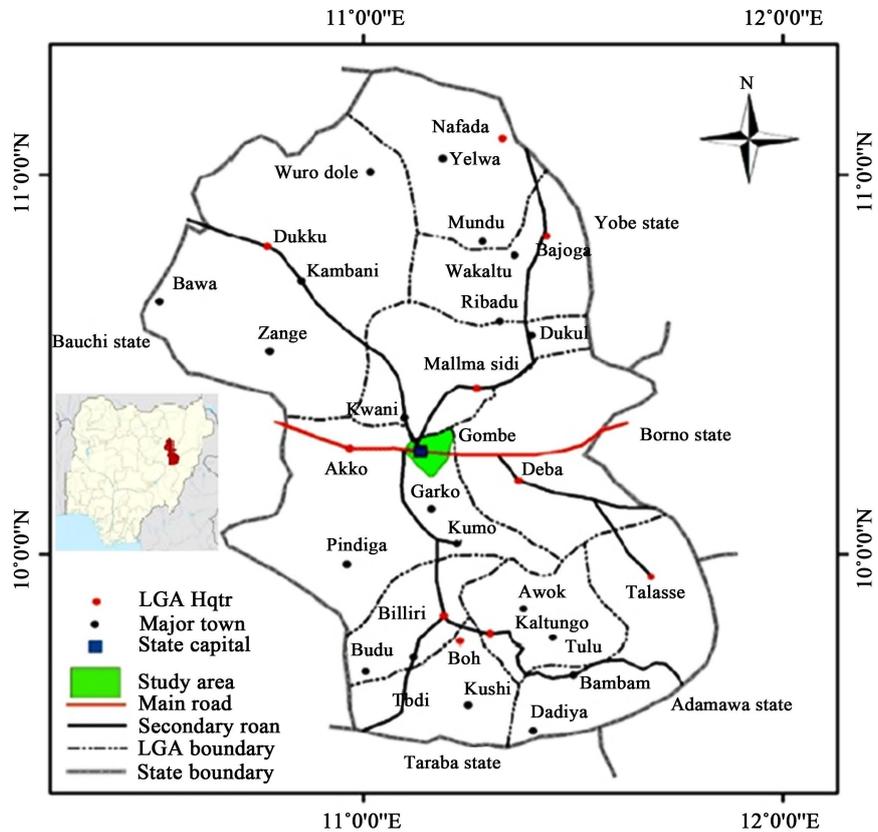


Figure 1. Map of Gombe State showing study area (Source: <http://www.gombestate.gov.ng/>).

HIV sentinel Survey was an unlinked anonymous HIV testing of 900 pregnant women in the 4 sites in Gombe state carried out in 2005, 2006, 2008, 2010, 2012 and 2014 [3] [4]. Women who participated in the sentinel survey were pregnant women of all ages, pregnancy was confirmed by health provider on-site, the women were attending ANC for the first time for that particular pregnancy and they accepted routine ANC test.

PMTCT services in Gombe State started in September 2004 in 9 health facilities and has been scaled up to involve 201 PMTCT sites currently. PMTCT data was collected from each facility records and reviewed the by State agency for the control of AIDS on a yearly basis from 2004 till 2014 [17]. HIV Group information and testing for PMTCT was followed by post-test counselling and opt- out was the strategy in all ANC clinics in the state [18]. Non laboratory staffs have been trained on HIV testing with quality control/assurance processes put in place [19]. HIV testing algorithm is serial testing using recommended HIV test kits with high sensitivity and specificity including Determine R, Unigold and Stat Pak [20].

A multi-disciplinary team formed in 2004 coordinates PMTCT services in Gombe State [17]. Coordinating teams were formed in all health facilities offering PMTCT services and regular coordination meeting, programme review sessions, quarterly monitoring and supportive supervisory meetings are held and

partnerships were created with various non-governmental organisations [21]-[27]. Health care workers at all levels including doctors, nurses/midwives, laboratory staff community extension workers received training and retraining in PMTCT using national training tools [28]-[42].

3. Results

From September 2004 to 2014, 482,730 pregnant women were counselled and tested in 201 sites during ANC in Gombe State. During this period, 447,732 pregnant women were tested for HIV (Table 1). This gave a HIV acceptance testing rate of 92.7% cumulatively. There has been increasing acceptance of HIV testing among pregnant women from 54.7% in 2004 to a peak of 99.3% in 2012 and 97.2% in 2014 (Table 1). Of the 447,732 pregnant women tested for HIV from 2004-2014, 9543 were HIV positive with a cumulative prevalence of 2.1% (Table 1). As many more PMTCT sites were established in Gombe state, women tested for HIV during ANC increased from 4689 in 2004 to 79,488 in 2013. The number of health facilities offering PMTCT services increased from 9 in 2004 to 201 in 2014. There was a steady decline in HIV prevalence in pregnant women from 8.2% in 2004 to 0.6% in 2014 (Table 1).

The number of sites for the National HIV sero-sentinel survey in Gombe state remained 2 rural and 2 urban sites over the last 10 years. Also, the number of pregnant women tested during the HSS remained at 900 (Table 2). Although the prevalence of HIV among pregnant women in 2005 obtained from Gombe State PMTCT data was higher than Sero-sentinel survey (7.5% vs 4.9%); the State PMTCT HIV prevalence rate demonstrated a steady decline till 2014 (Figure 2). From 2005-2012, the National HSS prevalence for Gombe state was consistently up to 4%, with a slight decline to 3.4% in 2014 (Figure 2). HIV prevalence for Gombe state PMTCT programme data and ANC HSS were 0.6% and 3.4% respectively in 2014 (Figure 2).

Table 1. Gombe State PMTCT programme data (2004-2014).

Year	PMTCT sites	Pregnant women counselled	Pregnant women tested for HIV	HIV test acceptance rate (%)	HIV positive pregnant women	Percentage HIV positive (%)
2004	9	8567	4689	54.7	385	8.2
2005	18	9453	6969	73.7	525	7.5
2006	58	14,038	12,619	89.8	613	4.8
2007	66	28,076	25,648	91.3	588	2.2
2008	85	50,956	48,088	94.3	1298	2.7
2009	89	14,038	58,748	91.3	1438	2.4
2010	107	45,068	35,438	78.6	886	2.5
2011	129	56,776	54,678	96.3	1421	2.6
2012	169	46,999	46,630	99.3	968	2.0
2013	224	81,657	79,488	97.3	924	1.1
2014	201	76,815	74,737	97.2	497	0.6
Total		482,730	447,732	92.7	9543	2.1

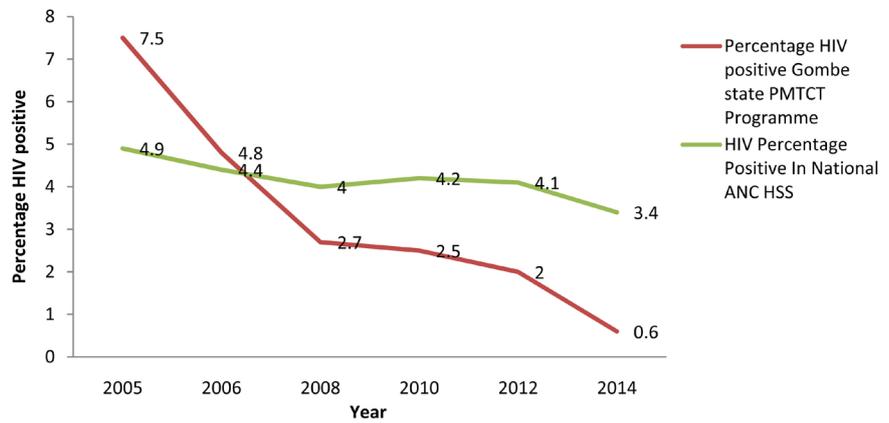


Figure 2. Comparison of HIV prevalence rate in Gombe State PMTCT programme and National Sero-sentinel Survey figures for Gombe State, 2005-2014.

Table 2. National ANC HIV Sero-prevalence sentinel survey for Gombe State.

Year ANC HSS	ANC sites for HSS	Number of Pregnant Women Tested For HSS	HIV Percentage Positive In ANC HSS
2005	4	900	4.9
2006	4	900	4.4
2008	4	900	4.0
2010	4	900	4.2
2012	4	900	4.1
2014	4	900	3.4

4. Discussion

To our knowledge, this study is the first to compare the State HIV PMTCT programme data with ANC HSS data over a 10-year period in Nigeria. Nigeria is currently witnessing a scale up in PMTCT programmes with Gombe state as one of the three states in the country with PMTCT coverage of over 70% as at 2015 [11]. National PMTCT coverage is 30.2% [43].

Comparing ANC sentinel surveillance and PMTCT programme is relatively simple and can provide important information [43]. The utility of HIV prevalence data collected in PMTCT programmes for HIV monitoring and surveillance has been investigated [44]-[49] and is being considered with guidelines developed [1] [2] [50] [51]. ANC HSS raises certain ethical concerns in that it does not obtain informed consent from pregnant women tested for HIV, does not provide them their HIV test results and thus, they are not referred to available HIV care, treatment, and prevention of mother to child transmission (PMTCT) services if HIV test results are positive [1] [50]. Additionally, this ANC HSS model raises challenges in data standardization and designing reliable epidemiological surveillance models for low income countries [1] [47] [50].

High-quality PMTCT programme data could provide a cost-effective alternative to ANC HSS [47] [51]. The population of women captured by both systems

is the same (*i.e.* pregnant women from the communities attending ANC). Epidemiologic information provided by HIV surveillance among pregnant women attending ANC, combined with other sources of surveillance data (e.g. household surveys, key population surveys, HIV case surveillance and surveillance of sexually transmitted infections [STIs]), allows surveillance programmes to address key aspects of the “know your epidemic” approach of second-generation surveillance of HIV [47] [50] [51]. These aspects include understanding changes in the direction of the epidemic, understanding subnational variations in an epidemic and identifying localized geographical areas with higher burdens of HIV [2] [50]. While the WHO recommends that five areas be evaluated before a successful transition from ANC HSS to surveillance using routine antenatal HIV testing can be considered, mature PMTCT programmes at subnational levels can provide reliable data to inform decision making at the national levels [50].

The Gombe state PMTCT program has achieved over 70% [11] coverage; therefore comparing trends in PMTCT programme data and ANC HSS becomes feasible [1] [50]. The number of PMTCT sites in the state has increased rapidly from 2006 with greater representativeness especially as the number of PMTCT sites increased from urban to rural sites and decentralization from secondary health facilities to primary health care centres.

The ANC HSS sites in Gombe state remained largely unchanged in number and pregnant women tested anonymously for HIV. From 2008, HIV prevalence data in our PMTCT programme was consistently lower than that of the ANC HSS. While the Gombe state PMTCT HIV prevalence data showed a steady decline from 7.5% in 2005 to 0.6% in 2014, the ANC HSS programme data remained fairly constant hovering around 4%. In addition, the HIV acceptance testing rate among new ANC attendees increased from 73.7% in 2005 to 97.2% in 2014.

The scaling up of HIV testing by non-laboratory staff is a major factor in uptake and demonstrated increased coverage of over 70%; this was supported by effective quality assurance and quality control processes supervised by laboratory scientists. Mirkuzie *et al.* [52] compared PMTCT and ANC HSS data in Ethiopia over 2 years and concluded that PMTCT data can be used to monitor HIV trends. HIV prevalence rate in the 2 groups studied by the Ethiopian researchers were 6.2% and 4.5% and 6.1% and 5.5% in 2008 and 2009 respectively [52]. Their study was however limited by the short duration (2008-2009) and low coverage. Similarly in a study whose duration was short and PMTCT coverage varied between 6% and 76% Kumar *et al.* [53] reported that routinely collected PMTCT has potential for reliable HIV time trends in India after comparing PMTCT and ANC HSS data from 2005 and 2007. In a Rwandan study [54] involving 27 sites evaluated in 2011 and 2013, routine PMTCT program data were recommended to serve as the basis for antenatal clinic HIV surveillance because of the universal acceptance of HIV testing, relatively low prevalence of HIV among pregnant women, high data quality, and high coverage HIV testing at the

health facility level. Reports from Zimbabwe [55], Kenya [56] and Cameroon [57] have however suggested the need for additional preparation including strengthening quality assurances of HIV rapid testing and data quality practices before transitioning to PMTCT data for HIV surveillance.

5. Conclusion & Recommendations

Gombe state PMTCT programme coverage is high and increasing with high HIV testing acceptance rate. As HIV testing service quality and regular data quality assessment and validation are strengthened in the wake of decentralization, the HIV prevalence data of the Gombe state PMTCT programme has progressively become lower than the National ANC HSS. While the implications for these observations are unclear, accurate estimate of HIV prevalence and burden is critical determinants for planning of impactful interventions.

A sub-regional wide evaluation of PMTCT programme data and ANC HSS in countries with high PMTCT coverage is recommended to guide transitioning from the use of ANC HSS to PMTCT programme data for HIV trend estimation.

Limitations

A larger national or sub-regional study would have been better able to demonstrate the comparison between ANC HSS and PMTCT data across a larger subset of Nigeria's population. However, due to the wide disparity in PMTCT coverage between states and various regions in the country, that was not feasible.

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Author Contributions

IE: Conceived of the study and study design, conducted quantitative data analysis, developed the first manuscript draft, and critically reviewed the final manuscript.

MA: Oversaw the study design and conducted quantitative data analysis.

AS: Oversaw the study design and critically reviewed and conducted quantitative data analysis.

AA & OC: Developed the first manuscript draft, conducted quantitative data analysis and critically reviewed the final manuscript.

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Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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Abbreviations and Acronyms

AIDS	Acquired Immunodeficiency Syndrome
ANC	Antenatal Care
ART	Antiretroviral therapy
ARV	Antiretroviral (drug)
CBOs	Community based Organisation
EID	Early Infant Diagnosis
FCT	Federal Capital Territory
FGHIN	Friends for Global Health Initiative Nigeria
FMOH	Federal Ministry of Health
GOMSACA	Gombe State agency for the control of AIDS
HIV	Human Immunodeficiency Virus
HSS	HIV Sero-sentinel Survey
HTS	HIV Testing Services
ICAP	International Centre for AIDS Prevention
IHVN	Institute of Human Virology of Nigeria
LGA	Local Government Area
M&E	Monitoring and Evaluation
NACA	National Agency for the Control of AIDS
NGOs	Non-Governmental Organisation
PHCs	Primary Health Care Center
PEPFAR	President's Emergency Plan for AIDS Relief
PMTCT	Prevention Mother-to-Child Transmission of HIV
SMOH	State Ministry of Health
UNICEF	United Nations Children's Fund
WHO	World Health Organisation