

## ORIGINAL RESEARCH ARTICLE

# Missed opportunities for HIV counselling and testing service delivery among pregnant women in Nigeria: Evidence from the 2018 National nutrition and health survey

DOI: 10.29063/ajrh2022/v26i11s.4

IO Morhason-Bello<sup>1</sup>, OB Yusuf<sup>1</sup>, JO Akinyemi<sup>1</sup>, KK Salami<sup>1</sup>, AA Aderinto<sup>1</sup>, K Alarape<sup>2</sup>, O Obisesan<sup>1</sup>, A Alada<sup>1</sup>, AS Jegede<sup>1</sup>, O Fawole<sup>1</sup>, I Kana<sup>3</sup>, O Solanke<sup>3</sup>, J Suleiman<sup>3</sup>, D Okara<sup>3</sup>, A Adebisi<sup>3</sup>, AM Abdullahi<sup>3</sup>, OO Ejiade<sup>1</sup>, IF Adewole<sup>1\*</sup>

University of Ibadan, Ibadan<sup>1</sup>; Ministry of Health, Oyo State<sup>2</sup>; Federal Ministry of Health<sup>3</sup>

\*For Correspondence: Email: ifadewole@gmail.com

## Abstract

According to UNAIDS, the 90-90-90 strategy calls for 90% of HIV-infected individuals to be diagnosed by 2020, 90% of whom will be on anti-retroviral therapy (ART) and 90% of whom will achieve sustained virologic suppression. HIV counselling and testing (HCT) is an important entry point for effective prevention of mother-to-child transmission of HIV. However, evidence abounds that HCT is often missed by pregnant women during antenatal care in Nigeria. We used secondary data from the 2018 Nigerian National Nutrition and Health Survey (NNHS) to determine the pattern of missed opportunities within the HCT algorithm and the factors associated with the missed opportunities. Of the 8,329 eligible women, 2,327 (27.9%) missed HCT because of lack of antenatal care; 1,493 (24.9%) missed HIV pre-test counselling; 180 (4.0%) missed HIV testing after participating in pre-test counselling, while 793 (18.2%) missed collection of HIV result and post-test counselling. Generally, most of the women that missed HCT were from the North West (43.3%) and had their antenatal care with traditional birth attendants. The odds of missing ANC were higher in women in the Northern and Southern regions. Concerning pre-test HIV counselling, the odds of missing it were higher among women in the Northwest and Southeast while the odds of missing post-test counselling of HIV test were higher among women in the Northeast and Southeast relative to other regions. Using TBA as a care provider was associated with higher odds of women missing pre-test and post-test counselling of HIV during ANC compared to those that used doctors or midwives or CHEWs. Missed opportunities are common in different stages of HIV counselling and testing pathway in Nigeria, particularly in the Northern regions. Future studies would need to identify the specific reasons for these missed opportunities, enabling the targeting of more specific policy reform and interventions. (*Afr J Reprod Health* 2022; 26[11s]: 44-53).

---

**Keywords:** HIV counselling and testing, missed opportunity, antenatal care, pre and post HIV counselling, Nigeria

---

## Résumé

Selon l'ONUSIDA, la stratégie 90-90-90 appelle à ce que 90 % des personnes infectées par le VIH soient diagnostiquées d'ici 2020, dont 90 % seront sous traitement antirétroviral (TAR) et 90 % atteindront une suppression virologique durable. Le conseil et le dépistage du VIH (HCT) sont un point d'entrée important pour une prévention efficace de la transmission du VIH de la mère à l'enfant. Cependant, les preuves abondent que le HCT est souvent manqué par les femmes enceintes lors des soins prénatals au Nigeria. Nous avons utilisé des données secondaires de l'enquête nationale nigérienne sur la nutrition et la santé (NNHS) de 2018 pour déterminer le schéma des opportunités manquées dans l'algorithme HCT et les facteurs associés aux opportunités manquées. Sur les 8 329 femmes éligibles, 2 327 (27,9 %) ont manqué le HCT en raison du manque de soins prénatals; 1 493 (24,9 %) ont manqué le conseil pré-test du VIH; 180 (4,0%) ont raté le test du VIH après avoir participé au conseil pré-test, tandis que 793 (18,2%) ont raté la collecte des résultats du VIH et le conseil post-test. En général, la plupart des femmes qui n'ont pas reçu de CDS venaient du Nord-Ouest (43,3 %) et ont reçu leurs soins prénatals avec des accoucheuses traditionnelles. La probabilité de manquer des CPN était plus élevée chez les femmes des régions du Nord et du Sud. En ce qui concerne le conseil pré-test sur le VIH, la probabilité de le manquer était plus élevée chez les femmes du Nord-Ouest et du Sud-Est, tandis que la probabilité de manquer le conseil post-test sur le test du VIH était plus élevée chez les femmes du Nord-Est et du Sud-Est par rapport aux autres régions. L'utilisation d'AT en tant que prestataire de soins était associée à une probabilité plus élevée que les femmes manquent le conseil pré-test et post-test du VIH pendant les soins prénatals par rapport à celles qui utilisaient des médecins ou des sages-femmes ou des CHEW. Les occasions manquées sont courantes à différentes étapes du parcours de conseil et de dépistage du VIH au Nigeria, en particulier dans les régions du Nord. Les études futures devraient identifier les raisons spécifiques de ces opportunités manquées, permettant le ciblage de réformes et d'interventions politiques plus spécifiques. (*Afr J Reprod Health* 2022; 26[11s]: 44-53).

---

**Mots-clés:** Conseil et dépistage du VIH, occasion manquée, soins prénatals, conseil pré et post-VIH, Nigeria

---

## Introduction

The Joint United Nations Programme on HIV/AIDS (UNAIDS) and other stakeholders, in 2014, recalibrated the global ambition of eliminating HIV/AIDS by launching the 90-90-90 targets<sup>1</sup>. By 2020, the hope was that 90% of people living with HIV will know their HIV status; 90% of those who know their status will have access to treatment; and 90% of people on treatment will have suppressed viral loads<sup>1</sup>. Following this declaration, there was a global call for renewed commitment in investment and universal access to HIV/AIDS management, especially in low- and middle-income countries with high burden of the disease<sup>1,2</sup>. The strategy is to use innovative approaches to improve access to HIV diagnosis, treatment and adherence to care<sup>3</sup>.

The global evaluation report of the 90-90-90 target in 2017 showed remarkable progress: 75% of people living with HIV knew their status; 79% of the people with HIV infection accessed treatment; and 81% of those on treatment had their HIV viral loads suppressed<sup>2</sup>. These achievements cost about 21.3 billion US Dollars and most of these funds were spent in high-burdened countries. It was also estimated that another 26.2 billion US Dollars investment would be needed to achieve the global target of 90-90-90 by 2020<sup>2</sup>. Women, children and key affected populations (people with high-risk sexual behaviour) have the highest burden of HIV infection worldwide<sup>4</sup>. According to a WHO 2016 report, Nigeria made little progress towards achieving the 90-90-90 target: 34% of the people living with HIV were diagnosed, 30% of the people living with HIV were on anti-retroviral (ARV) and only 24% of those on ARV treatment already had their viral load suppressed<sup>5</sup>. However, in 2018, the proportion of people living with HIV on treatment in Nigeria increased to 87%<sup>6</sup>. The WHO and UNAIDS recommended increased investment by the Government of Nigeria in order to accelerate reduction in HIV infection burden and to fast-track the attainment of the universal goal<sup>1</sup>.

Achieving universal access to HIV treatment will require investment in human and material resources to provide the right information on HIV infection, counselling, diagnosis, and treatment services to people irrespective of social status and location<sup>7</sup>. Generally, HIV counselling and treatment (HCT) is an integrated service delivery that involves counselling of clients with decision to

opt out of HIV testing and post-test counselling irrespective of outcome of the results<sup>7</sup>. Healthcare providers routinely offer HCT at clinical service delivery points, including antenatal care, during labour and post-natal clinic, and during community outreaches. Usually, all pregnant women are given opportunity to know their HIV status at ANC; and anti-retroviral drugs are offered to those who are HIV positive, and are counselled on mode of delivery and feeding options to reduce mother-to-child transmission of HIV infection<sup>7,8</sup>. It is important that HCT service is offered early in pregnancy in order to achieve optimal benefit to reduce the risk of perinatal transmission.

Nigeria is currently ranked fourth, after South Africa, India, and Mozambique, among countries with high burden of HIV/AIDS, with an average national prevalence of 1.5 % among adults aged 15-64 year<sup>9</sup>. The prevalence is two times higher in women as compared to men<sup>9</sup>. Nigeria has the highest burden of perinatal new HIV infection in children, largely attributable to poor utilization of prevention of mother-to-child transmission of HIV (PMTCT) services<sup>2</sup>. The Government of Nigeria rolled out the integration of HCT service as part of the primary healthcare revitalisation agenda to improve quality of care and universal access to HIV testing, diagnosis and linkage to ARV treatment centres<sup>10</sup>. However, only two-thirds of pregnant Nigerian women attend antenatal care, and about one-third of these women are delivered by skilled birth attendants at public health facilities<sup>11,12</sup>. Other reported barriers to successful PMTCT programme include lack of awareness of HCT service, fear of being diagnosed HIV-positive and follow-up stigmatization threats, financial constraints, lack of spousal support to consent to HIV testing, long distance to facility and poor attitudes of healthcare providers<sup>13</sup>.

The WHO has discouraged the use of Traditional Births Attendants (TBAs) as care providers for antenatal and intrapartum care services in Low-Middle income countries due to the overwhelming evidence of associated poor quality of care including avoidable errors and complications<sup>14</sup>. Despite this recommendation, some countries in sub-Saharan Africa including Nigeria still clandestinely tolerate use of TBAs as an alternative to skilled health workers on the excuse of lack of manpower in the maternity services, especially in rural communities<sup>15,16</sup>. For example, some states in

Nigeria commissioned projects that encourage training of TBAs to manage women during ANC including conducting HCT services and childbirth<sup>16-18</sup>. The Federal Government of Nigeria through the Ministry of Health is no longer in support of TBA-led maternity service delivery in the country, but there is no legislation against states or organisations that are still supporting their service delivery.

There are studies that have investigated missed opportunities or possible barriers to successful PMTCT programmes, most of them either focused on specific interventions or provided information in their catchment areas<sup>19</sup>. Outcomes from these studies make generalisation almost impossible. Furthermore, there is no information on other critical aspects of HCT algorithm to fully appreciate the extent of these missed opportunities at service delivery points in the country. Therefore, this study determined the frequency and determinants of missed opportunities associated with HCT service delivery during antenatal care in Nigeria. The results were compared between various cadres of care providers including women that engage TBAs. Specifically, the analysis explored the stages of missed opportunities within HCT algorithm, regional variations, and associated factors.

## Methods

### *Study design and sampling*

This study was a secondary analysis of data from the 2018 National Nutrition and Health Survey (NNHS), conducted to assess the impact of the Saving One Million Lives Programme for Results (SOML PforR) in Nigeria. The SOML PforR was a maternal and child health initiative by the Government of Nigeria, launched in 2014, and supported by the World Bank as an interventional response to the annual 900,000 deaths among children and mothers in the country<sup>20</sup>. The programme was built on six pillars: (1) improving maternal, newborn, and child health; (2) improving routine immunization coverage and polio eradication; (3) eliminating mother-to-child transmission of HIV; (4) scaling up access to essential medicines and commodities; (v) malaria control; and (vi) improving child nutrition. The project was implemented in all 36 States of Nigeria, including the FCT. States are rewarded based on results attained in selected indicators specially designed to assess the progress they make in implementing the six pillars. The indicators are

measured through National Health Facility Surveys (NHFS) and National Nutrition and Health Surveys (NNHS). The first NHFS was conducted in 2016 while the NNHS were conducted in 2014, 2015, and 2018. The NNHS utilised a cross-sectional study design and the Standardized Monitoring and Assessment of Relief Transitions (SMART) methodology to collect nationally representative data from all 36 States and Federal Capital Territory. Essentially, a two-stage cluster sampling technique was used to select respondents who were women aged 15-49 years in union. The first stage of sampling was selection of 36 clusters from census enumeration areas by probability proportion to size in each state of the Federation. The second stage involved selection of 20 households from the enumeration areas (EAs) by the systematic random sampling technique. Data were also collected on under-five children. Detailed description of sample design and data collection processes for the NNHS is available in the report<sup>21</sup>.

### *Data collection and statistical analysis*

Data were collected between February and May 2018 by trained interviewers with Open Data Kit installed on Galaxy tablets. A total of 24,985 women were successfully interviewed and data were collected on 19,471 under-five children.

Data analysis was restricted to 8,239 women that had childbirth within two years before the NNHS survey. The variables used in the analysis included the type of ANC provider, age of respondent, union status, geopolitical zone and state. Type of provider was classified as professional (doctor, nurse, midwife, auxiliary midwife, or community health worker), traditional birth attendant and relative. Age of respondent was categorized into 5-year age groups from 15-19 to 45-49. Union status was a dichotomous variable that showed whether respondents were married/living with a man or not. For analysis, each stage of "missed opportunity" was cross-tabulated against the other variables described above. Frequencies and percentages were reported. As a further exploration of difference in missed opportunities across background characteristics, logit models were fitted to estimate unadjusted and adjusted Odds Ratio (OR) with 95% Confidence Intervals (CI). Model fit was assessed using the Hosmer Lemeshow goodness of fit test. Analysis was done using Stata MP version 14.

### **Calculating the frequency of missed opportunities**

In pursuit of the objective of the study, missed opportunities for HIV testing were assessed in four stages. The first stage was antenatal care. All women who gave birth in the two years preceding the survey were asked whether they saw anyone for antenatal care (ANC). The response was either “Yes” or “No”. Those who answered “No” were classified to have missed the opportunity to get information on HIV testing. This categorization assumed that information on HIV counselling and testing is routinely provided to pregnant women at ANC clinics. Women that answered “Yes” to the question on ANC were further asked if they were offered information on HIV during their ANC visit [“Yes” or “No”]. Those who answered “No” were classified as second stage of missed opportunity because they did not receive information on HIV.

The third stage of missed opportunity involved women that did not have HIV testing. Those women who answered in the affirmative, that they received information about HIV, were asked about being offered HIV testing [“Yes” or “No”]. A negative response to this question was classified as “missed opportunity for HIV test”. The fourth stage of missed opportunity was the collection of HIV test result. Ideally, after HIV testing, clients should be informed about the results and given post-test counselling irrespective of the outcome. Those found to be HIV positive are to be referred to ARV treatment clinics for further management. This is based on the fact that knowledge of HIV status is an important component of prevention strategies. Furthermore, those tested for HIV were asked whether they “got the results” [“Yes” or “No”]. The respondents that answered “No” to this last question were classified as missed opportunity for HIV test results and post-test counselling information. Figure 1 shows the flowchart of the methods for calculating the four stages of missed opportunities.

## **Results**

### **Characteristics of the respondents**

Of the 8329 eligible women, about one-third (32.0%) were domiciled in the North West of Nigeria, while 21.6% resided in the North East. South East and South West had 7.7% and 9.0%,

**Table 1:** Background characteristics of women who gave birth in two years preceding the NNHS, Nigeria, 2018 (N=8329)

<b>Age group</b>	<b>Frequency</b>	<b>Percentage (%)</b>
15-19	654	7.9
20-24	1845	22.2
25-29	2222	26.6
30-34	1766	21.2
35-39	1121	13.4
40-49	721	8.7
<b>Union status</b>		
Not currently in union	405	4.9
Currently in union	7924	95.1
<b>Region</b>		
North Central	1543	18.5
North East	1800	21.6
North West	2663	32.0
South East	645	7.7
South South	932	11.2
South West	746	9.0

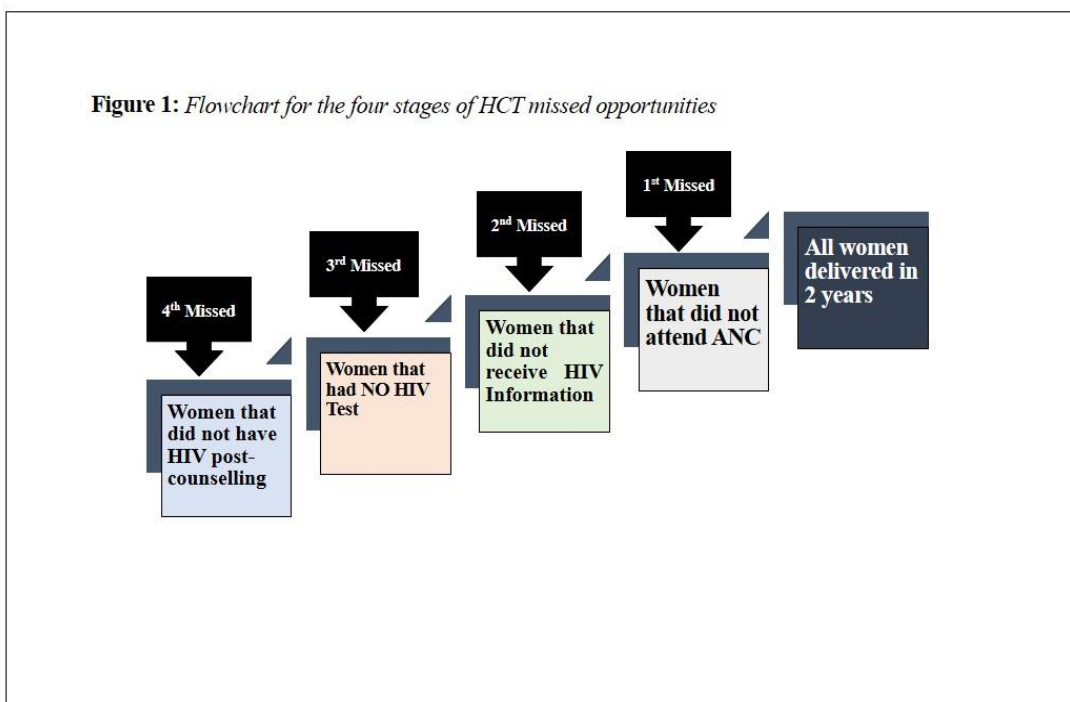
respectively. As shown in Table 1, the highest percentage of participants were women aged 25-29 years (26.6%), followed by those aged 20-24 (22.2%). The youngest age group (15-19 years) and the oldest (40-49 years) constituted 7.9% and 8.7%, respectively. The majority (95.1%) of the women were currently in union.

### **Frequency of missed opportunities**

Of the 8329 women that gave birth within 2 years before the survey, 2327 (27.9%) missed opportunity for antenatal care (ANC). Among those who received ANC, 24.9% missed HIV information. Of this percentage, 4.0% missed HIV testing. Finally, among ANC attendees who received HIV information and got tested, 18.2% missed their results.

### **Missed opportunity for ANC**

Table 2 shows that missed ANC was most common among the youngest (32.7%) and oldest (30.7%) women. Wide variations were also observed across geo-political regions, with North West (43.3%) and North East (30.0%) having the highest proportion of women who missed ANC. The results of logit models indicated that age difference was statistically significant for those in age group 30-34 years, who were less likely to miss ANC, compared to women aged 40-49 years (OR=0.80, CI: 0.66-0.97).



**Figure 1:** Flowchart for the four stages of HCT missed opportunities

**Table 2:** Missed opportunity for ANC among childbearing women in Nigeria, NNHS, 2018 (N=8329)

Age group	n (%)	Unadjusted OR (95%CI)	Adjusted OR (95%CI)
15-19	214 (32.7)	1.10 (0.88-1.38)	0.89 (0.70-1.13)
20-24	555 (30.1)	0.97 (0.81-1.17)	0.89 (0.73-1.08)
25-29	587 (26.4)	0.81 (0.68-0.98)	0.84 (0.69-1.02)
30-34	449 (25.4)	0.77 (0.64-0.93)	0.80 (0.66-0.97)
35-39	301 (26.9)	0.83 (0.68-1.02)	0.89 (0.72-1.11)
40-49	221 (30.7)	1.00	1.00
<b>Union status</b>			
Not currently in union	110 (27.2)	1.00	1.00
Currently in union	2217 (28.0)	1.04 (0.83-1.30)	0.75 (0.59-0.95)
<b>Region</b>			
North Central	335 (21.7)	2.34 (1.80-3.04)	2.33 (1.79-3.03)
North East	540 (30.0)	3.62 (2.81-4.67)	3.61 (2.79-4.66)
North West	1152 (43.3)	6.43 (5.04-8.23)	6.45 (5.04-8.25)
South East	30 (4.7)	0.41 (0.27-0.64)	0.41 (0.26-0.63)
South South	191 (20.5)	2.18 (1.64-2.89)	2.13 (1.61-2.83)
South West	79 (10.6)	1.00	1.00
Overall	2327 (27.9)	-	-

Regional variations were statistically significant, with higher odds of missing ANC in North Central, North East, North West and South South, compared to South West. Women from South East were less likely to miss their ANC (Table 2).

**Missed opportunity for HIV information, testing and results**

Table 3 shows the results of women who missed HIV information among those that attended ANC.

About a quarter (24.9%) was not given information on HIV. The proportion was higher among women who received ANC from traditional birth attendants (TBAs) compared to other providers. The highest proportion of those who did not receive information on HIV was among the youngest age category. Similarly, 30.2% of the women that were not in marital union missed HIV information during ANC. There were more women from the South East (31.9%) and North West (30.1%) regions missing

**Table 3:** Missed opportunity for HIV information among ANC attendees in Nigeria, NNHS, 2018 (N=6002)

Variables	n (%)	Unadjusted OR (95%CI)	Adjusted OR(95%CI)
<b>ANC Provider</b>			
TBA	177 (72.5)	8.92 (6.69-11.89)	8.98 (6.69-12.05)
Health worker	1316 (22.9)	1.00	1.00
<b>Age group</b>			
15-19	126 (28.6)	1.19 (0.89-1.59)	1.21 (0.89-1.64)
20-24	336 (26.1)	1.05 (0.82-1.33)	1.04 (0.81-1.33)
25-29	387 (23.7)	0.92 (0.73-1.16)	0.92 (0.72-1.17)
30-34	303 (23.0)	0.89 (0.69-1.13)	0.85 (0.66-1.09)
35-39	215 (26.2)	1.05 (0.82-1.36)	1.04 (0.80-1.35)
40-49	126 (25.2)	1.00	1.00
<b>Union status</b>			
Not currently in union	89 (30.2)	1.00	1.00
Currently in union	1404 (24.6)	0.76 (0.58-0.98)	0.81 (0.62-1.05)
<b>Region</b>			
North Central	284 (23.5)	0.94 (0.76-1.18)	1.03 (0.82-1.30)
North East	194 (15.4)	0.56 (0.44-0.70)	0.58 (0.45-0.73)
North West	455 (30.1)	1.32 (1.07-1.63)	1.40 (1.13-1.74)
South East	196 (31.9)	1.43 (1.12-1.83)	1.31 (1.02-1.69)
South South	200 (27.0)	1.13 (0.89-1.44)	0.98 (0.76-1.26)
South West	164 (24.6)	1.00	1.00
<b>Overall</b>	<b>1493 (24.9)</b>	-	-

**Table 4:** Missed opportunity for testing among ANC attendees offered HIV information, Nigeria, NNHS, 2018 (N=4550)

Variables(n=4550)	n (%)	Unadjusted OR (95%CI)	Adjusted OR (95%CI)
<b>ANC Provider</b>			
TBA	11 (10.3)	2.87 (1.51-5.45)	3.05 (1.59-5.88)
Health worker	169 (3.8)	1.00	1.00
<b>Age group</b>			
15-19	22 (6.9)	1.56 (0.81-2.99)	1.32 (0.68-2.56)
20-24	48 (5.0)	1.11 (0.63-1.95)	1.04 (0.59-1.84)
25-29	40 (3.2)	0.69 (0.39-1.24)	0.70 (0.39-1.26)
30-34	33 (3.2)	0.71 (0.39-1.28)	0.72 (0.39-1.31)
35-39	20 (3.3)	0.72 (0.37-1.39)	0.77 (0.40-1.50)
40-49	17 (4.5)	1.00	1.00
<b>Union status</b>			
Not currently in union	12 (5.8)	1.00	1.00
Currently in union	168 (3.9)	0.65 (0.36-1.20)	0.61 (0.33-1.14)
<b>Region</b>			
North Central	26 (2.8)	0.47 (0.28-0.81)	0.47 (0.27-0.80)
North East	57 (5.3)	0.93 (0.59-1.48)	0.90 (0.56-1.43)
North West	52 (4.9)	0.85 (0.53-1.36)	0.81 (0.50-1.31)
South East	6 (1.4)	0.24 (0.10-0.58)	0.22 (0.09-0.55)
South South	10 (1.8)	0.31 (0.15-0.64)	0.31 (0.15-0.64)
South West	29 (5.7)	1.00	1.00
<b>Overall</b>	<b>180 (4.0)</b>	-	-

ANC HIV information session than other regions. The adjusted odds ratio showed that women who received ANC from TBAs were significantly more likely to miss HIV information (OR=8.98, CI: 6.69-12.05). The ANC attendees from the North West (OR=1.40, CI: 1.13-1.74) and South East (OR=1.31, CI: 1.02-1.69) regions were more likely to miss HIV

information compared to those in the South West region.

Of the 4550 ANC attendees that were offered HIV information, only 180 (4.0%) reported that they were not tested. Further disaggregation of the data in Table 4 showed that women who received ANC from TBAs were the most affected of those

**Table 5:** Missed opportunity for results and counseling among ANC attendees offered HIV information and testing Nigeria, NNHS, 2018 (N=4370)

Variables	n (%)	Unadjusted OR (95%CI)	Adjusted OR (95%CI)
<b>ANC Provider</b>			
TBA	21 (21.9)	1.25 (0.77-2.04)	1.22 (0.74-2.01)
Health worker	772 (18.1)	1.00	1.00
<b>Age group</b>			
15-19	75 (25.1)	1.55 (1.06-2.26)	1.43 (0.97-2.11)
20-24	176 (19.2)	1.10 (0.80-1.51)	1.12 (0.81-1.55)
25-29	219 (18.0)	1.02 (0.75-1.38)	1.04 (0.76-1.42)
30-34	165 (16.7)	0.93 (0.67-1.27)	0.97 (0.70-1.34)
35-39	94 (16.0)	0.88 (0.62-1.24)	0.89 (0.62-1.27)
40-49	64 (17.8)	1.00	1.00
<b>Union status</b>			
Not currently in union	45 (23.1)	1.00	1.00
Currently in union	748 (17.9)	0.73 (0.52-1.02)	0.77 (0.54-1.11)
<b>Region</b>			
North Central	109 (12.0)	0.81 (0.59-1.12)	0.79 (0.58-1.10)
North East	290 (28.7)	2.39 (1.80-3.20)	2.32 (1.73-3.11)
North West	136 (13.4)	0.93 (0.68-1.27)	0.89 (0.65-1.22)
South East	118 (28.3)	2.36 (1.69-3.29)	2.32 (1.67-3.25)
South South	71 (13.3)	0.91 (0.64-1.31)	0.92 (0.64-1.31)
South West	69 (14.4)	1.00	1.00
<b>Overall</b>	<b>793 (18.2)</b>	-	-

that were not tested for HIV (10.3%). Women aged 15-19 years had the highest proportion of those that were not tested for HIV.

Regarding the regions, the percentage of women that were not tested for HIV was higher in South West (5.7%), North East (5.3%) and North West (4.9%) regions than other regions. The adjusted logit models showed that TBA clients were three times as likely not to be tested compared to those who patronized health workers for ANC (OR=3.05, CI: 1.59-5.88). Across regions, the odds of not testing for HIV was significantly lower in North Central (OR=0.47, CI: 0.27-0.80), South East (OR=0.22, CI: 0.09-0.55) and South South (OR=0.31, CI: 0.15-0.64) than South West.

Among the 4,370 women that were tested for HIV, 793 (18.2%) did not know their results. The percentage among TBA and health workers' clients was 21.9% and 18.1%, respectively (Table 5). The proportion of women that did not know their HIV test results was highest among those in the youngest age category (25.1%) and those that were not in marital union (23.1%). Women in the North East (28.7%) and South East (28.3%) had the highest proportions of those that were tested but did not know their HIV test results. None of the explanatory factors were found to significantly predict the probability of missed opportunity to know HIV test results in the multivariable model.

## Discussion

This study examined a critical aspect of antenatal service delivery for the reduction of mother-to-child transmission of HIV infection, an important step to reduce new HIV infections in newborns and children under the age of 5-years. Generally, this study found that nearly one-third of women never had any form of ANC; about a quarter never received any information or counselling on HIV; only relatively few people missed HIV testing after receiving counselling and about one in five did not know the outcome of their HIV test.

Regarding missed opportunity for ANC, women from the North Central, North East, North West, and South South regions were more likely never to have had any ANC. This has also been described in other Nigerian studies<sup>22</sup>. For example, Adewuyi *et al.* found that 33.9% of the women interviewed during the 2013 Demographic Health Survey did not use ANC in their last pregnancy and the majority of these women were from the northern regions<sup>23</sup>. In another study by Fagbamigbe *et al.*, that used the 2012 National HIV/AIDS and Reproductive Health Survey (NARHS Plus II) in a secondary analysis, the results showed that the majority of the women that did not utilize ANC were from the North East region of Nigeria<sup>24</sup>. Conversely, women in the middle age of 30 years above and in a marital union

were less likely to report never attending ANC. Studies have shown that women who got pregnant outside marital union or have unintended pregnancy were less likely to attend ANC and have supervised delivery<sup>25</sup>. This is more common among pregnant adolescents who are usually not supported for their pregnancies<sup>26</sup>.

The poor antenatal clinic attendance among adolescents in Nigeria has also been associated with fear of stigma from people, including other adult pregnant mothers in the clinic, and sometimes the healthcare providers who were not trained to offer teenage pregnancy care<sup>27</sup>. Other factors associated with non-use or underutilization of ANC include being from rural communities, shorter birth interval, lack of access to radio, poor education status, financial constraints or lack of health insurance and lack of partner support<sup>22</sup>.

The lack of access to HIV information among a quarter of women that had had ANC in this analysis is worrisome. Expectedly, these women were more among those who patronized TBA for their ANC. Although some policy makers advocate integration of TBA into maternity care service delivery in Nigeria, the evidence from published research has been conflicting<sup>14,18</sup>. However, the Nigerian government, through the Ministry of Health, has not recognized TBA as a licensed healthcare provider to offer ANC to pregnant women because of several deficient skills, including HIV counselling and testing services<sup>28</sup>. The increased patronage of TBA for maternity service compared to healthcare workers has been associated with socio-cultural belief, better accommodating attitude, flexible timing of service delivery and better mutual trust. Generally, TBA services have been documented in all regions in Nigeria, particularly in rural areas and they are more popular in northern regions than southern regions<sup>18</sup>. The high prevalence of lack of access to HIV information or counselling services in the North might also reflect relative shortage of healthcare providers in the region compared to other regions.

The relatively lower proportion of women missing HIV test after counselling, compared to other missed opportunities considered, might be suggestive of high acceptability for screening given the opportunity. Previous studies found high acceptance of HIV testing by pregnant women during antenatal and labour<sup>29</sup>. However, it is not surprising that women who patronized TBAs were

more likely to have missed HIV testing, because most TBAs do not have access to HIV diagnostic kits to offer the service. The high proportion of those with no result of HIV test among adolescents might be due to the general effect of poor antenatal care utilization among adolescents<sup>30</sup>. Although a significant number of women missed getting their HIV results, which may also suggest lack of opportunity for post-test counselling, none of the explanatory factors considered were significant. However, the pattern of missed opportunities was similar across the different stages. This further underscore the need to identify the characteristics of pregnant women that are missing critical services within the health system.

The outcome of this analysis should be interpreted with caution. First, there was no information on the level of healthcare where these missed opportunities occurred. This might make it difficult to fully understand the challenges associated with each of the missed opportunities. Second, there was no information on whether the healthcare providers that these women met during ANC were trained in offering HCT or not. This analysis also did not consider the specific differences in the implementation of HCT at the state level. For example, some states allow TBA to offer part of HCT services, while in others they are not allowed to offer any service for pregnant mothers, including HCT<sup>31,32</sup>. In addition, there is possibility of social desirability bias from the respondents, as some participants might not be comfortable to share information that could potentially embarrass them. This might lead to underreporting. For example, some participants might not be willing to share information that they consulted TBAs because of the government regulation against such patronage<sup>31,33</sup>. Another limitation of this study is the lack of explanation on the reasons for the missed opportunities in the various stages. Perhaps, a mixed methods study design that includes qualitative study would have deepened the understanding of the reasons for each missed opportunity which could help to the design of interventions.

Despite all these limitations, the major strength of this survey is the robust study design that was used as well as the nationally representative sample, thus making the findings generalizable. In conclusion, this study showed that Nigerian pregnant women encountered cascades of missed opportunities on HCT services even when they have

accessed ANC. The commonest missed opportunity in HCT algorithm was lack of access to HIV counselling and testing services. The burden of missed opportunity was generally more among women living in the northern region and who used TBA services. For Nigeria to actualize the 90-90-90 target and also remove its name from among the major contributors to the global burden of perinatal transmission of HIV, HCT service delivery needs to be prioritized and monitored to minimize missed opportunities which may be a threat to the effectiveness of HIV treatment and management. There is also the need for public health awareness that emphasises the importance of ANC and HCT services to pregnant women to improve quality of care and ultimately reduce perinatal transmission of HIV, particularly in Northern Nigeria.

## References

- UNAIDS: 90-90-90: Treatment for all. Available from <http://www.unaids.org/en/resources/909090> (Accessed 20/04/2019). 2019.
- UNAIDS: Global HIV and AIDS statistics — 2018 fact sheet. Available from <http://www.unaids.org/en/resources/fact-sheet> (Accessed 19/04/2019). 2019.
- Bain LE, Nkoke C and Noubiap JN. UNAIDS 90–90–90 targets to end the AIDS epidemic by 2020 are not realistic: comment on “Can the UNAIDS 90–90–90 target be achieved? A systematic analysis of national HIV treatment cascades”. *BMJ Global Health* 2017, 2(2):e000227.
- UNAIDS: The AIDS Epidemic can be ended by 2030. Available from [http://www.unaids.org/sites/default/files/media\\_asset/UNAIDS\\_with-your-help\\_en.pdf](http://www.unaids.org/sites/default/files/media_asset/UNAIDS_with-your-help_en.pdf) (Accessed 19/04/2019). 2016.
- World Health Organisation: Nigeria (HIV Country Profile): 90-90-90 progress towards 2020 targets. Available from [https://www.who.int/hiv/data/Country\\_profile\\_Nigeria.pdf?ua=1](https://www.who.int/hiv/data/Country_profile_Nigeria.pdf?ua=1) (Accessed 24/07/2019). 2016.
- Avert: Nigeria 90-90-90 Progress (2018): Global information and education on HIV and AIDS. Available from <https://www.avert.org/infographics/nigeria-90-90-90-progress-2018> (Accessed 24/07/2019). 2018.
- World Health Organisation: HIV Testing and counselling: the gateway to treatment, care and support. *WHO Available from* [https://www.who.int/3by5/publications/briefs/hiv\\_testing\\_counselling/en/](https://www.who.int/3by5/publications/briefs/hiv_testing_counselling/en/) (Accessed 28/04/2019) 2019.
- World Health Organisation: Mother-to-child transmission of HIV. *WHO Available from* <https://www.who.int/hiv/topics/mtct/en/> (Accessed 29/04/2019) 2019.
- NAIIS: The 2018 Nigeria HIV/AIDS Indicator and Impact Survey (NAIIS) Summary fact sheet. *Federal Ministry of Health (FMOH) and National Agency for Control of AIDS (NACA) Available from* <https://www.naiisng/resource/factsheet/NAIIS%20PA%20NATIONAL%20FACTSHEET%20FINAL.pdf> (Accessed 28/04/2019) 2019.
- Tilley-Gyado R, Filani O, Morhason-Bello I and Adewole IF. Strengthening the Primary Care Delivery System: A Catalytic Investment Toward Achieving Universal Health Coverage in Nigeria. *Health Systems & Reform* 2016, 2(4).
- National Population Commission (NPC) [Nigeria] and ICF International: Nigeria Demographic and Health Survey 2013. Abuja, Nigeria, and Rockville, Maryland, USA: NPC and ICF International. Available from <https://dhsprogram.com/pubs/pdf/fr293/fr293.pdf> (Accessed 25/04/2019). 2014.
- Adeyinka DA, Agogo EA, Ozigbu CE, Aboje S, Anyaie C, Asadu EC, Odoh D and Ganiyu J. Missed opportunities in the prevention of mother-to-child transmission of HIV infection: experience from a national programme in Nigeria. *Int J STD AIDS* 2016, 27(14):1338-1341. doi: 1310.1177/0956462416665027. Epub 0956462416662016 Aug 0956462416665011.
- Ogunbosi BO, Oladokun RE, Awolude O, Brown BJ, Adeshina OA, Kutu MA, Taiwo B, Berzins B, Kyriacou DN, Chadwick EG, Osinusi K, Adewole IF and Murphy RL. Missed opportunities for Prevention of Mother-to-Child Transmission of HIV (PMTCT) in Ibadan, Southwest Nigeria. *World Journal of AIDS* 2014, 4:356-364.
- Harrison KA. Are traditional birth attendants good for improving maternal and perinatal health? No. *BMJ*. 2011;342:d3308.
- Turinawe EB, Rwemisisi JT, Musinguzi LK, de Groot M, Muhandi D, de Vries DH, Mafigiri DK, Katamba A, Parker N and Pool R. Traditional birth attendants (TBAs) as potential agents in promoting male involvement in maternity preparedness: insights from a rural community in Uganda. *Reproductive Health*. 2016;13(1):24.
- Van den Boogaard J, Arntzen B, Chilwana J, Liyungu M, Mantingh A, Stekelenburg J. Skilled or Traditional Birth Attendant? Choices of Communities in Lukulu District, Rural Zambia. *World Health & Population*. 2008;10(1):34-43.
- Wilson A, Gallos ID, Plana N, Lissauer D, Khan KS, Zamora J, MacArthur C and Coomarasamy A. Effectiveness of strategies incorporating training and support of traditional birth attendants on perinatal and maternal mortality: meta-analysis. *BMJ*. 2011;343:d7102.
- Ana J. Are traditional birth attendants good for improving maternal and perinatal health? Yes. *BMJ*. 2011;342:d3310.
- Asiyanbola O, Adejumo PO and Arulogun OS. Appraisal of HIV counseling and testing services provided for pregnant women in selected government hospitals in Ibadan metropolis, Nigeria. *SAGE Open* 2016, 6(2):2158244016643350.
- Federal Ministry of Health. National Health Facility Survey 2016. Available from: <https://ngfrepository.org.ng:8443/bitstream/1234567>

- 89/3147/1/NHFS-Final-Report-for-Printing\_VI.pdf (2 July 2022). 2017.
21. National Population Commission (NPC) [Nigeria] National Bureau of Statistics and Federal Ministry of Health N: National Nutrition and Health Survey (NNHS). Available from <https://www.unicef.org/nigeria/reports/national-nutrition-and-health-survey-nnhs-2018> (Accessed 27/04/2019). 2018.
  22. Chukwuma A. A-Ohoo, Wosu AC, Mbachu C and Weze K. Quality of antenatal care predicts retention in skilled birth attendance: a multilevel analysis of 28 African countries. (1471-2393 (Electronic)).
  23. Adewuyi EA-O, Auta A, Khanal V, Bamidele OD, Akuoko CP, Adefemi K, Tapshak SJ and Zhao Y. Prevalence and factors associated with underutilization of antenatal care services in Nigeria: A comparative study of rural and urban residences based on the 2013 Nigeria demographic and health survey. (1932-6203 (Electronic)).
  24. Fagbamigbe AF and Idemudia ES. Barriers to antenatal care use in Nigeria: evidences from non-users and implications for maternal health programming. *BMC Pregnancy Childbirth* 2015;15:95. doi: 10.1186/s12884-015-0527-y.
  25. Abame DE, Abera M, Tesfay A, Yohannes Y, Ermias D, Markos T, Goba G: Relationship Between Unintended Pregnancy and Antenatal Care Use During Pregnancy in Hadiya Zone, Southern Ethiopia. *J Reprod Infertil* 2019, 20(1):42-51.
  26. Ronen K, McGrath CJ, Langat AC, Kinuthia J, Omolo D, Singa B, Katana AK, Ng'Ang AL and John-Stewart G. Gaps in adolescent engagement in antenatal care and prevention of mother-to-child HIV transmission services in Kenya. *J. Acquired Immune Defic. Syndrome* 2017, 74(1):30-37.
  27. Helleringer S. Understanding the adolescent gap in HIV testing among clients of antenatal care services in West and Central African countries. *AIDS Behav* 2017, 21(9):2760-2773.
  28. Morhason-Bello IO and Ekele BA. Adolescent pregnancy: a review of the associated complications. In: *Child Health Edition. Dokita* 2008, 33(1):85-91.
  29. Amutah-Onukagha N, Rodriguez M, Opara I, Gardner M, Assan MA, Hammond R, Plata J, Pierre K, Farag E. Progresses and challenges of utilizing traditional birth attendants in maternal and child health in Nigeria. *International journal of MCH and AIDS* 2017, 6(2):130-138.
  30. Miller T and Smith H. Establishing partnership with traditional birth attendants for improved maternal and newborn health: A review of factors influencing implementation. *BMC pregnancy and childbirth* 2017, 17(1):365-365.
  31. Bello FA, Ogunbode O, Adesina OA, Olayemi O, Awonuga O and Adewole IF. Acceptability of counselling and testing for HIV infection in women in labour at the University College Hospital, Ibadan, Nigeria. *Afr Health Sci*, 2011 Mar;11(1):30-5
  32. Chizoba AF, Pharr JR, Oodo G, Ezeobi E, Ilozumb J, Egharevba J, Ezeanolue EE and Nwandu A. Increasing HIV testing among pregnant women in Nigeria: evaluating the traditional birth attendant and primary health center integration (TAP-In) model. *AIDS Care* 2017, 29(9):1094-1098.
  33. Olakunle BO, Wakdok S, Olaifa Y, Agbo F, Essen U, Ojo M, Oke M and Ibi S. Improving the coverage of prevention of mother-to-child transmission of HIV services in Nigeria: should traditional birth attendants be engaged? *Int J STD AIDS* 2018, 29(7):687-690.