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# Validation of a Community Pediatric HIV Risk Assessment Screening Checklist Among 0 to 19 Years Old in Selected Communities of Taraba State, Nigeria

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**Abstract:** In Nigeria, many children die from AIDS-related illnesses, because they lack access to HIV testing and care early due to perceived low risk of HIV infection by their caregivers. Early diagnosis through community-based HIV testing is being used more widely to increase coverage, but the positivity yield is very low compared to facility-based testing, hence the importance of targeted testing. Partners in Nigeria have used different HIV risk assessment tools to screen children and provide targeted testing to increase yields. The Federal Ministry of Health harmonized these tools to come up with a country-specific tool used in screening children and adolescents for HIV infection. The Society for Family Health through the Lafiya Yara project carried out validation of the tool among children and adolescents in Taraba State. The Lafiya Yara project is an HIV-focused program implemented in 8 of the 16 Local Government Areas of Taraba state. Informed consent was sought from caregivers and the (standard) harmonized HIV risk stratification checklist with 14 screening questions was administered to 3,001 children 0-19 years in 10 communities randomly selected from 5 Local Government Areas. The children after being classified as "at risk" and "not at risk" based on the stratification tool were tested for HIV, and SPSS version 25 was used to analyse data. Out of the 3,001 children screened, 1,565 (52.1%) were males, their mean age was 10.37±5.60, and 932 (31.1%) were in the age group 15 to 19 years. The tool classified 2,257 to be at risk, with 31 of them being HIV positive when tested. Out of the 744 classified as not being at risk, 6 of them were HIV positive, thus the sensitivity of the tool was 1.4% and specificity was 99.2%. The prevalence of HIV among the population was 1.2%, with the age-group 15 to 19 years having the highest HIV prevalence of 2.7%. The HIV risk stratification tool has a low sensitivity and a high specificity which make suggest it is not the best tool for use. There is therefore a need to review the tool to make it more targeted and increase its sensitivity. Different tools may also be adapted for different age bands such as younger children and the adolescents.

**Keywords:** HIV Risk Assessment Tool, Lafia Yara Project, Sensitivity, Specificity

## 1. Introduction

In Nigeria, the prevalence of HIV infection among children aged 0-14 years is 0.2%. [1] Many children die from AIDS-related illnesses, not having access to HIV testing and care, [2] sometimes because of perceived low risk of HIV infection among caregivers and their children. [3-7] This evidence supports the requirement for enhanced targeting and cost effective testing. Thus, screening children with perceived low risk using a risk stratification tool could help identify those that are more likely to be at risk for testing and

link those infected to care.

HIV risk assessment entails using a set of predetermined criteria to decide if an HIV test is indicated or not. [8] Early HIV diagnosis through community-based testing is being more widely used to increase coverage of HIV testing, however, the positivity yield is significantly lower than that of the facility-based testing. [9] Untargeted community-based testing may thus not be cost -efficient in a resource limited setting. [10] Therefore, the use of a pre-testing screening tool to identify children and adolescents may increase positivity yield and cost efficiency in large population and resource-limited settings. [11]

The National strategies and guidelines for HIV Testing Services (HTS) in Nigeria stipulate that all children should be tested for HIV, [12] however with the prevalence of 0.2% significant resources would be needed to identify HIV positive cases among children. Hence, innovative strategies that can improve the yield of HIV case identification among children will need to be prioritized and adapted. HIV Risk stratification checklist is one of such strategies that have been used by healthcare providers to increase the precision of the Provider Initiated Testing and Counselling (PITC) approach across various facilities, [13] and at the community level by the Orphan and Vulnerable Children (OVC) project implementing partners to identify those at risk of HIV and prioritize them for testing. Understanding the validity of this HIV Risk Stratification Tool is essential in its recommendation for use within the Nigeria HIV program as it has been done in other African countries and beyond.

In Nigeria, various partners supporting HIV services have used different versions of HIV risk assessment/stratification checklists to screen children, but these tools were not context or age specific nor were they validated. The National AIDS and STIs Control Program (NASCP) organized a national Paediatric HIV/AIDS stakeholders meeting to harmonize the various HIV Risk Stratification checklists being used by all HIV Implementing Partners and came up with a HIV risk stratification checklist that is context-specific and age-appropriate for use in the facility and community among children and adolescents' sub-population. Among these stakeholders was Society for Family Health, who is currently implementing the Lafiya Yara project targeted at pregnant women, children and adolescents in Taraba state. This project is funded by Aidsfonds and ViiV Health Care.

The major objective of this study was to validate the harmonized community-based HIV risk stratification checklist, thereby determining the specificity and sensitivity of the tool among children and adolescent (0-19 years) in Taraba State. Taraba state has the highest prevalence of HIV in the Northeastern part of Nigeria. [1]

## 2. Methods

The HIV risk stratification checklist was validated across selected communities in Taraba state, Northeastern part of Nigeria. Ten communities were randomly selected in 5 of the 8 local government areas where the Lafiya Yara project is currently being implemented. The study employed a cross sectional design among randomly selected children and adolescents between the ages of 0 to 19 years. All eligible children and adolescents were given equal opportunity to participate using the random route walk approach. Data collectors were trained on various interviewing techniques and the use of electronic mobile data collection App (kobocollect). Consent was sought from caregivers or guardians of participants who were between 0-17 years while 18-19 years old gave their own consent.

The inclusion criteria were:

1. All children and adolescents aged 0 – 19 years with unknown HIV status who agreed to be tested with parental consent and their assent.
2. All children and adolescents who tested HIV negative 6 months or more prior the study.

The exclusion criteria were:

1. All children and adolescents 0-19 years who are HIV positive as they have already been diagnosed of HIV infection in the past.
2. All children and adolescents aged 0-19 years who do not have parental consent to have screening conducted on them.

The community-based checklist contains 14 screening items which were targeted at caregivers to respond to, and they are in "Yes" and "No" format. A child or adolescent was assumed to be at risk of HIV infection if the response to any of the screening questions is "Yes". The instrument is captured in Appendix 1 below:

***Table 1.*** *Cross Tabulation between outcome of the risk stratification checklist and HIV status.*

| HIV status | Risk Assessment | | |
|---|---|---|---|
| | **At risk** | **Not at Risk** | **Total** |
| HIV Positive | a (True Positive) | b (False Negative) | a + b |
| HIV Negative | c (False Negative) | d (True Negative) | c + d |
| Total | a + c | b + d | |

1. Sensitivity=[a/(a+c)] ×100
2. Specificity=[d/(b+d)] ×100
3. Positive Predictive Value (NPV) = [a/(a+b)] ×100
4. Negative predictive value (NPV)=[d/(c+d)] ×100.

# 3. Results

A total of 3001 children aged 0-19 years were sampled across 10 communities spread within Bali, Gassol, Jalingo, Karim Lamido and Sardauna local government areas in Taraba state. Majority of the children and adolescents were from the rural communities in Taraba state (70%); those from the urban areas constitute thirty percent of the sample population.

Out of the 3,001 children and adolescents enrolled for the community risk assessment, 2,257 (75.2%) were at risk while 744 (24.8%) were not at risk. Out of the 2,257 who were at risk for HIV, 2,226 (98.6%) tested negative for HIV while 31 (1.4%) tested positive for HIV. (Figure 1).

As shown in the table 3 below, more than fifty percent are male (52.1%) with an average age of 10.37±5.60 year. The average age of those who tested positive for HIV was 13.98±6.00 years while those who tested negative were 10.32±5.58 years. This mean difference is statistically significant at 95% CI (P<0.05).

The overall HIV prevalence rate was 1.2%. However, the prevalence was highest among older adolescents 15 – 19 years at 2.7%. The outcome of HIV results has a significant relationship with the age categories (P<0.05). Among those who tested HIV positive, 67.6% were older adolescents. (Table 3).

***Table 2.*** *Sensitivity, Specificity, Positive and Negative Predictive Values of the Screening tools.*

| Age | Sensitivity% | Specificity% | PPV% | NPV% |
|---|---|---|---|---|
| 0 - 4 | 1.1 | 100 | 0 | 26.2 |
| 5 - 9 | 0.7 | 100 | 0 | 27.1 |
| 10 - 14 | 0.6 | 100 | 0 | 27.5 |
| 15 - 19 | 2.6 | 96.8 | 24 | 20.2 |
| Overall | 1.4 | 99.2 | 16.2 | 24.9 |

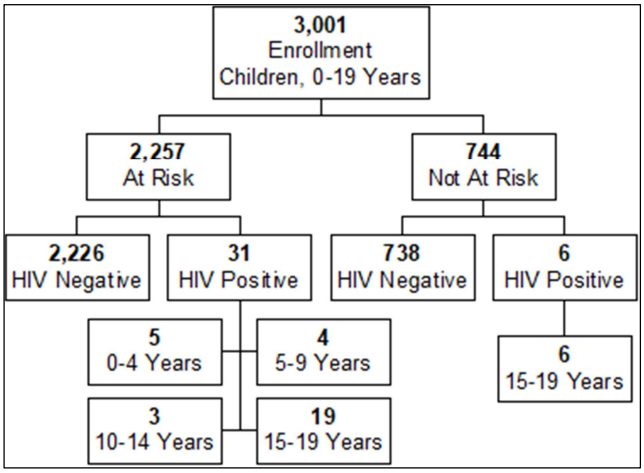


***Figure 1.*** *Cascade of risk stratification and testing.*

***Table 3.*** *Association between the demographic characteristics and HIV status.*

| Variable | Negative | Positive | Total | df | Chi-square | P-value |
|---|---|---|---|---|---|---|
| Child's Sex | | | | | | |
| Male | 1550 (52.3) | 15 (40.5) | 1565 (52.1) | 1 | 2.023 | 0.104 |
| Female | 1414 (47.7) | 22 (59.5) | 1436 (47.9) | | | |
| Total | 2964 (98.8) | 37 (1.2) | 3001 (100.0) | | | |
| Age group | | | | | | |
| 0-4 | 584 (19.7) | 5 (13.5) | 589 (19.6) | 7 | 23.819 | 0.000 |
| 5-9 | 807 (27.2) | 4 (10.8) | 811 (27.0) | | | |
| 10-14 | 666 (22.5) | 3 (8.1) | 669 (22.3) | | | |
| 15-19 | 907 (30.6) | 25 (67.6) | 932 (31.1) | | | |
| Total | 2964 (98.8) | 37 (1.2) | 3001 (100.0) | | | |
| Mean (Age±SD) | 10.32±5.58 | 13.98±6.00 | 10.37±5.60 | 2999 | t=3.961 | 0.000 |

# 4. Discussion

Early identification and initiation on anti-retroviral therapy (ART) by people living with HIV (PLHIV) is one of the control strategies of achieving epidemic control of HIV. Provider initiated testing and counselling (PITC) was recommended for persons living in high prevalence areas who present at health facilities, however, in a situation where there is poor health seeking behaviour of the populace, the chances of identifying persons infected with HIV early is very unlikely.

Children and adolescents, because of dependence on their caregivers may be the worst affected as they may not be taken to the health facility until the disease has become advanced. A community screening tool to identify children at risk and carry out targeted testing is therefore being considered, especially in the face of meagre health resources.

Our study therefore tested the validity of a community-based checklist with fourteen screening questions for the risk of HIV infection among children and adolescent in Taraba state. The screening tool showed a low sensitivity and high specificity to identifying children and adolescent living with HIV in the communities. Though the sensitivity is low, it is higher among the older adolescents compared to the other age groups. Previous study conducted in Zimbabwe among adolescents showed a high level of sensitivity (80.4%) and specificity (66.3%). In the Zimbabwe study however, the number of screening questions were just four, [14] while that of our study were fourteen; the questions in the Zimbabwe study may therefore be more targeted towards HIV infection, hence making it more sensitive and more specific.

A further deep dive in our screening tool revealed some questions in the checklist may falsely put some people at

risk, for example, almost half of our study population have experienced any of frequent cough, long lasting fever, diarrhea, and loss of weight in the last three months, and a yes to any of these questions makes them to be at risk.

In addition, unlike our study where the questionnaire was applied to children across all age group up to 19 years of age, the two studies carried out by Bandason et al in Zimbabwe were applied to narrower age range of 6 to 15 years and 8 to 17 years. [14, 15] Respondents belonging to a close age range may have similar characteristics, which would be reflective in their responses to the questions, but respondents with a wide age range may give varying responses. The sensitivity of the tool being higher among the older adolescents compared to its sensitivity generally in our study corroborates this.

The negative and positive predictive value of a screening tool depends on the prevalence of HIV and prevalence of the factors that constitute the screening tool. With an overall HIV prevalence rate of 1.2%, the positive and negative predictive values were 16.2% and 24.9% respectively. The positive predictive value of the screening tool among the older adolescents (15 to 19 years) was however about a quarter, this is not surprising though as the prevalence rate among this group is the highest compared to other age groups.

Unlike the sensitivity, the specificity of the tool was found to be high, even though it misclassified 6 older adolescents who were positive as not being at risk, which means this can give a false sense of assurance to these adolescents with undiagnosed HIV in need of an HIV test.

## 5. Conclusions and Recommendations

The risk stratification checklist showed high specificity and low sensitivity values. Therefore, the results of the screening tool should not be considered conclusive, a tool with higher sensitivity than what obtains in this study would be more appropriate. There is a need to review this instrument, such as removing those questions with insignificant relationship with the outcome of the HIV result. A different screening tool may also need to be developed for younger children (age) and another for the adolescents. Further studies will need to be carried out on a refined tool as part of this project and in other paediatric HIV projects in Africa.

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