Linkage to care, HIV + pregnant mothers, and Early Infant Diagnosis: A three years intervention towards the elimination of MTCT in Igbo-Eze North Local Government of Enugu State

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Abstract

A three-year research and advocacy programme aimed at establishing the degree of people living with HIV in rural community on one hand, and on the other hand, providing linkage services to the HIV treatment centres. We adopted a cross-sectional study carried out in pre-intervention, intervention and post-intervention phases and a total of 40 116 persons between the ages of <6 months to70 years received the HIV Treatment Services (HTS). This project empowered existing community congregational health structures to create demand for screening and referral for HIV and other chronic illnesses among pregnant and non-pregnant women during weekly church services and other congregational activities. The congregation health structures was supported with Treatment Linkage Specialist (TLS) to increase linkage to care of identified HIV positive clients and to overcome HIV-related stigma and discrimination in 25 rural communities of Enugu-Ezike, Enugu State. We used simple descriptive statistics to present HTS results. Our findings show that non-pregnant women represent the highest number (888 or 54.81%) of HIV positives, indicating 5.3538 prevalence rate over the three years of the survey. Adult males are the second highest (459 or 28.33%) HIV positives at a prevalence rate of 5.4127, pregnant women are reported as the third highest (122 or 7.53%) HIV positive with 1.7319 prevalence rate. Mother-to-child-transmission (MTCT) of HIV continuous to occur in the rural communities as children aged 5-9 years and less than 6 months – 4 years represent 2.6% and 2.3% of HIV positive persons respectively. The TLS strategy has, however, to a large extent reduced the poor linkage to care/treatment from the 41.4% linkages in 2018 to 91.8% and 98.3% in 2019 and 2020 respectively. This is a reflection of increased access to HIV testing services and the Treatment Linkage Specialists who bridge the gaps observed in the HIV care spectrum in Enugu-Ezike communities. Although preventing MTCT of HIV remains a difficult task in rural areas due to poverty and illiteracy, robust evidence shows that improved linkage services to care treatment centres will increase awareness level of PMTCT.

Introduction

HIV/AIDS continues to threaten the Global Action Plan of 2030. In Africa, HIV/AIDS presents a major health concern due to the scope and rate of its infection and fatalities. As of 2019, about 38.0 million persons are living with HIV in the world, 36.2 million are adults, and 1.8 million are children between 0-14 years [1]. Although sub-Saharan Africa is home to about 13.4% of the world population [2], the record shows that the region has the highest (25.7 million) number of people living with HIV disease with an increasing number of new infections occurring among key population groups [3]. In sub-Saharan Africa, women and girls accounted for 59% of all new HIV infections in 2019 [1]. Global health, represented by collective action, has set new standards for well-being for all at all ages in the year 2030, but the agenda is becoming increasingly unrealistic with the current HIV infection rate. Every week, around 5 500 young women aged 15-24 years become infected with HIV, and 880 children (approximately) became infected with HIV. The fatality rate indicates about 310 children dying daily from AIDS related causes, mostly due to inadequate access to HIV prevention, care and treatment services [1].

Mother-to-child transmission (MTCT) of HIV remains the most common way children become HIV infected as well as an important source of new infection for babies. Nigeria has more HIV-infected babies in the world [4], and as of 2016, Nigeria accounted for 37,000 of the world's 160,000 new cases of babies born with HIV [5]. The recent HIV data shows that there are 1.9 million people living with HIV in Nigeria as of March 2019, with a national HIV prevalence of 1.4% among adults aged 15-49[6]. The data also notes that women aged 15-49 are more than twice more likely to be living with HIV than men (1.9% versus 0.9%). The HIV prevalence gender disparity between women and men was greatest among younger adults, with young women aged 20-24 years (1.3%) more than three times as likely to be living with HIV as young men (0.4%) in the same age group. Among children aged 0-14 years, HIV prevalence rate is

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0.2% [6]. Nigeria belongs to 23 countries in the world that account for more than 85% of women living with HIV by the 2020 World AIDS Day Report, and among six countries that more than 50% of all the children living with HIV were not on ART, and additional countries with less than 50% pediatric coverage [7]. The high rate of perinatal transmission of HIV is line with the finding that Nigeria is also one of the countries with the slowest decline in new pediatric HIV infections[8].

The global health community has introduced several scientific and operational strategies to prevent mother-to-child transmission of HIV, such as testing for HIV during pregnancy, modified obstetric practices, preventive ARV drug regimens, and modified infant feeding practices among others [9]. In high-income countries, these scientific and operational strategies have largely controlled or resulted in almost zero new pediatric HIV infections or maternal and infant mortalities due to HIV infection [9, 10]. In a medium-income country like Taiwan, 99% of pregnant women underwent HIV testing, with an estimated 200 000 pregnant women screened each year resulting tinMTCT rate at 2.27% as of 2017 [11]. The clinical efficacy of using these array of drugs and tools in the management of pregnant women infected with HIV are lacking in the most health facilities in developing countries of Africa [12].

Just over a quarter (26.9%) of all cases of mother-to-child transmission (MTCT) of HIV in the world happen in Nigeria [13] .In 2016, just 32% of pregnant women living with HIV in Nigeria received antiretroviral treatment to prevent mother-to-child transmission and only 34.7% were tested for HIV as part of their antenatal care. [14] As a result, the rate of mother-to-child transmission has remained high, at an estimated at 22% in 2016. [14] Only 18,556 infants born to mothers living with HIV were tested after two months[15]As such, reducing mother-to-child transmission remains a major target area. Nigeria was selected as one of UNAIDS' 23 priority countries for PMTCT – being one of the nations with the highest HIV burden yet low levels of treatment coverage during pregnancy. The number of pregnant women visiting health facilities remains low, as does the number of health facilities providing PMTCT services, with only 7,265 health facilities providing PMTCT in 2015.

Political commitment towards the HIV/AIDS response remains high and continues to grow. This is exemplified at the global level by the adoption of the Sustainable Development Goals (SDGs) with a target of ending the HIV/AIDS epidemic by 2030.[16] At the regional level, the engagement of African Heads of State and Government through the Abuja +12 declaration united Member States towards the goal of eliminating HIV and AIDS, malaria and tuberculosis in Africa by 2030[17] . The adoption of the regional HIV/AIDS strategy at the Sixty-second session of the Regional Committee; [18] the adoption of the African Union catalytic framework [19] and the increasing allocation of domestic resources have provided further impetus to efforts aimed at scaling up intervention against HIV/AIDS. In Nigeria, national efforts are in place since 2017, an estimated 94.9% of infants exposed to HIV by their mothers have been saved from infection through the implementation of the PMTCT intervention under the National AIDS and Sexually Transmitted Infection Control Programme (NASCP) and across the 36 States and Federal Capital Territory, there are a total of 6,301 PMTCT sites[20].

Nigeria aims to scale up access to PMTCT services in line with UNAIDS's Global Plan to eliminate new HIV infections among children by 2015 (eMTCT).[21] Federal Government of Nigeria has adopted the new PMTCT guidelines released by the World Health Organization [22]. These guidelines recommend that all pregnant women receive Option B+, a regimen that provides them with ART for life, regardless of their CD4 count or clinical stage. To address the challenges of perinatal transmission of HIV, Nigeria aims to have 95% of health facilities providing PMTCT services by 2021.

In recognition of the huge and persistent challenges, the Initiative for Good Health in Nigeria (ICH) adopts context-specific approach to find workable strategies of strengthening HIV intervention and prevention among pediatrics (SHIPS) in Enugu-Ezike, a peri-urban and rural communities of Enugu State. Whereas few people dispute children's right to HIV care and treatment in Nigeria, few efforts (both in the rural and urban areas) are made to ensure that children actually benefit from services that eliminate perinatal transmission of HIV. The objectives of this was threefold: to provide HIV testing services to pregnant women and non-pregnant towards elimination of MTCT of HIV; to conduct Early Infant Diagnosis/ HIV testing services (EID/HTS) for HIV exposed infants towards community PMTCT; and to link all identified HIV positive pregnant women, infants and children to HIV treatment care services in Enugu State.

METHODS

Research design and process

We adopted a cross-sectional study carried out in pre-intervention, intervention and post-intervention phases. A cross-sectional study is observational and descriptive in nature, not causal or relational, meaning that the research does not aimed at determining the cause(s), such as a disease. Researchers record the information that is present in a population. The first phase, the pre-intervention, involved community mapping and engagement, identification and documentation of baseline data, advocacy and training of field work team. Second phase is the intervention, which is

the implementation, it involved the provision of HTS services (counseling and collection of dried blood spot (DBS) sample) to the targeted populations – pregnant women, non-pregnant women, infants, children and men on one hand, and linkage to care/treatment centers (referral). The post intervention phase was the evaluations, and analysis of findings.

Table 1: Implementation framework of intervention and elimination MTCT of HIV

Phase	Activity	Characteristic	Function
Pre-intervention	Stakeholders engagement	Enugu State Ministry Health (Director of Public Health, State AIDS Program Coordinator, Hospital Administrators of Enugu State Hospital Management Board). Chairman, Igbo-Eze North Local Government Area, and his administrative teams. Church leaders and faith based groups (Catholic Bishop of Nsukka, Anglican Bishop of Nsukka, leaders of the Pentecostal Fellowship Churches of Nigeria, Enugu-Ezike Branch, Christian groups – Mothers, Fathers, Youth and others). Traditional rulers, community leaders, town union groups. Chief Medical Officer, District Hospital Enugu-Ezike (DHEE) and sectional Heads. Representatives of Traditional Birth Attendants (TBAs).	Project authorisation, commitment and community relations. Health talk and decision-making Gateway to community members. Mobilization of community members. Addressing the issues of stigma and discrimination of HIV positive persons. Community outreach for HTS. Nominations of CCN, WMN and TLS members.
	Care Cascade Networks (CCN), Ward Mobilisation Networks (WMN) and, Treatment Linkage Specialists (TLS).	Experienced in HIV care Nominated by community stakeholders Interviewed and selected by IGH team Trained by IGH :- HIV testing services (HTS) Use of Lancets and test kits HIV Rapid Test Kits (RTKs) Safety measures Basic hygiene and waste disposal Counseling methods and processes	Pre- and post-HTS counseling Sample collection of DBS HTS Referral – linkage to care/treatment centers Baseline data documentation
Intervention	5 supervisors 25 CCN, and WMN members	IGH team members Trained CCN and WMN members	HIV testing services (HTS) Use of Lancets and test kits HIV Rapid Test Kits (RTKs) Counseling and referral of HIV positive persons. Monthly evaluations. Baseline data documentations.
	TLS	IGH team members Trained CCN, WMN and TLS members	Counseling and referral of HIV positive persons to treatment centers. Monthly evaluations. Mentorship and technical support by IGH team. Baseline data documentations.
Post-intervention	IGH team members Trained CCN, WMN and TLS members	IGH team members Trained CCN, WMN and TLS members.	evaluations, case study analysis, technical support and analysis and dissemination of the findings.

Stakeholder engagement and data gathering

Within the first three months of the project, July – September 2018, IGH team conducted a stakeholder engagement meeting with approximately 100 stakeholders including representatives of Enugu State Ministry Health – Director of Public Health, State AIDS Program Coordinator, Hospital Administrators of Enugu State Hospital Management Board; Chairman, Igbo-Eze North Local Government Area, and his administrative teams; Church leaders and faith based groups such as Catholic Bishop of Nsukka, Anglican Bishop of Nsukka, leaders of the Pentecostal Fellowship Churches of Nigeria, Enugu-Ezike Branch, Parish Priests of Catholic Churches in Enugu-Ezike, Pentecostal Churches in Enugu-Ezike, Christian groups – Mothers, Fathers, Youth and others); Traditional rulers, community leaders, town union groups; Chief Medical Officer, District Hospital Enugu-Ezike (DHEE) and the

Hospital Sectional Heads and representatives of traditional birth attendants (TBAs). The goal (See table 1) was the introduction of the health talks as well as historical characteristics of the study areas, and locations. Helped the community evaluate the HIV status of the community and win stakeholders' commitment to the research project. Stakeholders nominated 48 volunteers, provided the socio-cultural information on Enugu-Ezike community and the information guided IGH team in community mapping and engagement. The outcome of these engagement with the various stakeholders was the consensus to engage around four broad areas of collaboration – nomination of volunteers, mobilisation, and advocacy, information dissemination towards elimination of MTCT.

Capacity building/training workshops

A one-week workshop was held for the 48 nominated volunteers. The IGH team with the Integrated National Training manual on ART, HIV Treatment Services (HTS), and counseling and referral procedures. They were also trained on proper waste disposal of the used lancets and test kits using safety boxes and colour coded bins. Trained volunteers had the basic and specific knowledge on framework for effective prevention of mother-to-child transmission of HIV disease. Twenty four (24) volunteers were selected after interview and categorised as Care Cascade Networks (CCN), Ward Mobilisation Networks (WMN) and Treatment Linkage Specialists (TLS). The CCN, WNM and TLS members were engaged in the accurate dataset – collection of dried blood spot (DBS) samples, counseling services, HIV Treatment Services (HTS), identification and compilation of HIV positive mothers and HIV exposed infants, and linkage to HIV treatment referral centers (see table 1).

Sampling method

Multistage sampling was applied in choosing the study population. We partitioned the entire 38 communities into four subgroups or clusters. The cluster sampling was used because each of the four subgroups has similar characteristics to the entire populations. Also, we adopted voluntary sampling technique to reach at our target population – pregnant women, HIV exposed infants, and parents (males and females) and any interested members of the communities. As [23]notes, a voluntary sample is people who self-select into the survey. Often, these individuals (in case of minors/infant, their parents/guardians) have a strong interest in the main topic of the survey and they volunteer when asked, or respond to an [1]The researcher conducting the survey has no right to choose anyone. HIV/AIDS is a sensitive research area requiring voluntary participants in order for the researcher to gather accurate and dependable data and reduce the non-response rate. Map of Enugu-Ezike and list of the communities compiled during the stakeholders meeting were used to partition the 26 communities in four subgroups: Zone A (7 communities); Zone B (7 communities); Zone C (6 communities) and Zone D (6 communities). Subsequently, a purposive sampling was used and our CCN, WNM and TLS moved from house to house in the cluster collecting data from individuals/parents who volunteered for the survey. Churches were visited during weekly church services, congregational activities and other religious group meetings to collect data from volunteers.

Inclusion criteria

Pregnant women aged 20-49 years, non-pregnant women of child bearing age 19-60 years, men aged 20-69 years, adolescent aged 10-19 years, children of zero months to 9 years that are available and willing to participate in the study.

Exclusion criteria

Single girls and unmarried women who are 20-49 years or older than 49 years and males who are 70+ at the time of the study were excluded from the survey, but those who volunteered to know their HIV status were screened.

Data collection

Data collection took place for three years, from October 2018 to June 2021. Trained Care Cascade Networks (CCN) and Ward Mobilisation Networks (WMN) utilized genealogy chart to conduct home based Early Infant Diagnosis/HIV Testing Services (EID/HTS) of the targeted population. Samples of DBS were collected, stored, and screened. The trained CCN and WMN then provide one stop HTS/EID /PMTCT services. To maintain accurate data all pregnant women and HIV exposed children were re-tested.

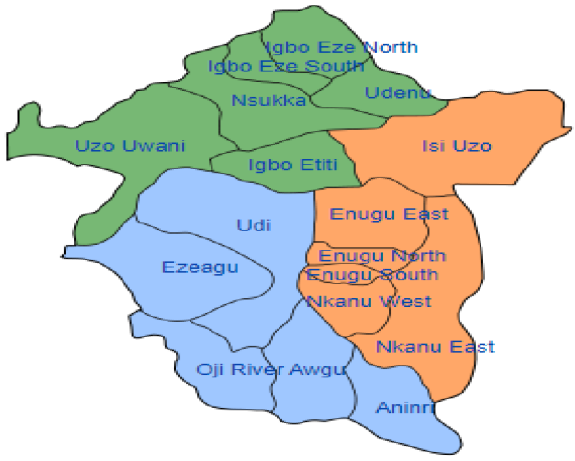
Data processing and analysis

Simple descriptive statistics of tables and data visualisation charts were used to present monthly and yearly testing and HIV status, while line graphs presented trend of events – referral. Comparative, qualitative and quantitative analysis of recorded data were used to measure project's progress. Also, non-numerical data was analyzed by drawing out relationship from variables and making logical inference.

Background of the research

The research was conducted in Enugu State, which is one of the 36 state of the Federal Republic of Nigeria. Generally, Nigeria is a lower-middle-income country with an estimated population of 219,243,344 (49% female and 51% male) [24]. An estimated 1,832,266 people are living with HIV in 2020, and infection rate shows 8 new infections per 10,000 population [25]. The HIV epidemic in Nigeria is also a reflection of the country's large populations.

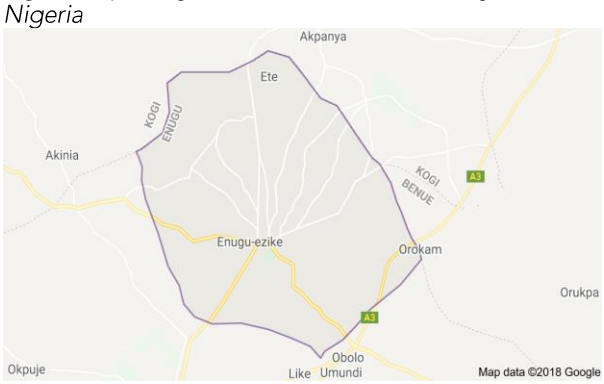
Fig 1: Map of Enugu State showing the 17 LGAs



Source: [26]

Nigeria HIV/AIDS Indicator and Impact Survey (NAIIS) reports that Enugu State HIV prevalence is higher than the national average prevalence. Enugu State has 17 local government areas (**see figure 1**) which includes the Igbo-Eze North Local Government Area (LGA). Igbo-Eze North LGA is located in the North of Enugu state. The local government area is entirely inhabited by Enugu Ezike indigenes (**see figure 2**). Enugu-Ezike is comprised of 38 villages ad reputed to be the single largest community in Black Africa. It has an area of 293km^2 with a population of 259,431(2006 Nigeria population census) and located in Latitudes 60 59/ N and 60 98/ N and Longitudes 70 27/ E and 70 45/ E with land area of 293Km2[27]

Fig 2: Map of Igbo-Eze North LGA of Enugu State of Nigeria



Source: [26]

The indigenes are predominantly Igbo and Christians with a few Muslims inhabiting the villages bordering Kogi and Benue States. In spite of the inhabitants being predominantly Christians, a significant population of the community still practice African Traditional Religion, thus some of the inhabitants harbour mixed religious beliefs and practices. There are deeply rooted traditional and cultural beliefs that shape the behavioural patterns of the inhabitants such as the belief in *Ndishi'*. The *Ndishi* tradition prescribes various punishments ranging from death, sickness and all other forms of reprimand designed to control married women from engaging in extramarital affairs. The same punishments are applied to widows who have sexual relations with other men while residing within the domains of their late husbands. A married man is not bound by the *Ndishi* tradition, therefore, may engage in extramarital affairs but not with married women. The *Nwaulo* practice (concubine), authorised by the customs of the people, is where men (married and unmarried) can have/keep and maintain unmarried women and girls inclusive as lovers, have children with them, claim the males when they deem fit and abandon the girl children for the lovers and their family. Most people involved in these practices often introduce sexually transmitted diseases to their partners. In one way the *Ndishi* tradition seeks to promote marital fidelity (for females only) but in yet another way promotes/encourages high risk sexual behaviour for the men. Few of the indigenes are educated while many others were illiterates or semi-literates. They are mostly farmers or petty traders with few civil servants amongst the populace. Culturally, they are patriarchal. Many females need support and approval of their husbands/male head of their families (this was also noted to be more aggressively enforced in the border communities that were Muslims) for activities such as accessing health care, HIV testing, ANC et cetera. Gender inequalities and discriminations are being promoted by culturally beliefs and practices.

Another characteristic of the study area is their belief that all illness/disease can be inflicted by an enemy and only consultation with the right traditional or religious leader can cure you of the illness. This scenario has played out in many HIV/AIDS cases. The literacy rate in the population is still low as many adults, mostly females, are illiterate or semi-literate. This results in the observed poor acceptance of and access to orthodox health care services. Enugu-Ezike shares border with Obollo-Afor (Udenu LGA, Enugu State) that is a transit hub traversing the Eastern and Northern part of Nigeria. The ripple effect of the transit hub is the presence of many hotels, motels, brothels and shanties leading to multiple societal negative impact which includes a high preponderance of men and women of easy virtue, high level of prostitution, and people who inject Drugs (PWID).

Results

For the three years intervention programs, a total of 40 116 persons between the ages of <6 months to70 years received the HTS. The background characteristics of the participants are adults (male and female), adolescents and infants (see **table 2**). Majority of the participants were females (pregnant and non-pregnant) 24 110 (60.10%) aged 20+ years; followed by the males (adults) 8 480 (21.13%), and the adolescent 3 446 (8.59%). Children aged 5-9 years were 2 157 (5.37%); 1 594

(4.0%) were aged 2-4 years, 301 (0.75%) were aged 6 months-2 years, and the least were the children aged <6 months 28 (0.6%).

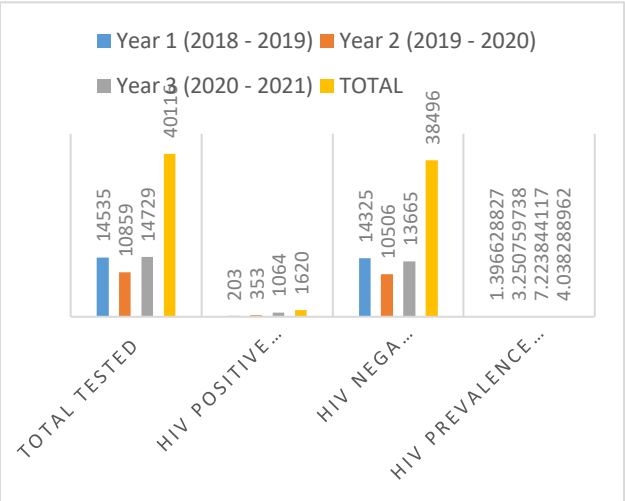
Table 2: demographic information of the participants (n=40 116)

Variables		No. of persons tested for HIV				Per cent
		2018	2019	2020	Total	
Sex	Male (adult 20+)	2,883	2281	3316	8480	21.13
	Female (adult 20+)	9037	6260	8813	24110	60.10
Age group	Adolescents aged 10-19 years	1125	1111	1210	3446	8.59
	Children aged 5-9 years	905	577	675	2157	5.37
	Children aged 2-4 years	474	526	594	1594	4.00
	Children aged 6 months - 2 years	99	93	109	301	0.75
	Children aged <6 months	12	4	12	28	0.06
	Total	14 535	10 852	14 729	40 116	

HIV testing services and status awareness

Figure 3 presents the HIV testing services and results from38 communities of Igbo-Eze North Local Government Area. In 2018, 18 communities received HIV testing services, and 14 535 participants were tested for HIV, and 14 332 (98.6%) participants tested HIV negatives, while 203 (1.4%) participants were HIV positive. In 2019, 11 communities were covered in HTS services, 10 852 volunteers participated, and 10 499 (96.7%) participants tested HIV negative, while 353 (3.3%) tested HIV positive. In 2020, 9 communities with 14 729 volunteers received HIV testing services, and 13 665 (92.77%) tested HIV negative, while 1 064 (7.22%) tested positive. For the three cumulative years, a total of 40 116 participants received the HTS showing a prevalence rate of 4.038 in the local government area (see figure 3).

Figure 3: A three-year HTS results



HIV positive and prevalence among pregnant and non-pregnant women and infants (EID/HTS)

Figure 4 and **5** present the yearly distributions of HIV positive among pregnant and non-pregnant women, and infants born to women living with HIV, and **table 3** is the prevalence rate among different cohorts. As indicates in **figures 4** and **5**, non-pregnant women are the highest number (888 or 54.81%) of HIV positives, indicating 5.3538 prevalence rate over the three years of the survey. Adult males are the second highest (459 or 28.33%) HIV positives at a prevalence rate of 5.4127, pregnant women are reported as the third highest (122 or 7.53%) HIV positive with 1.7319 prevalence rate, while children <6 months – 9 years and the adolescent represent the fourth and fifth HIV positive of 79 (4.87%) and 72 (4.44%) respectively.

Figure 4: yearly distributions of HIV positive among participants

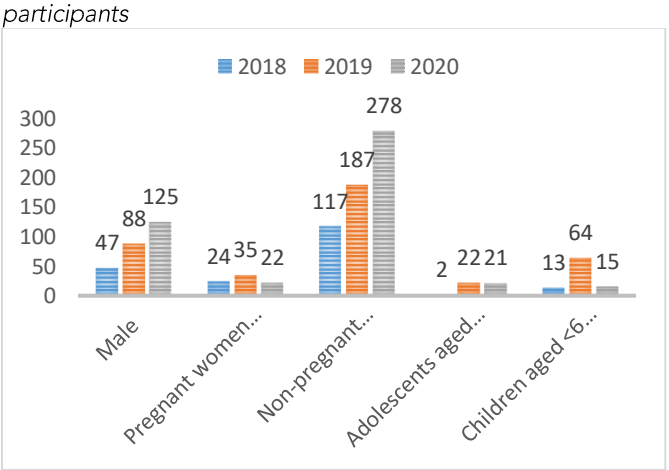


Figure 5: A three-year distribution of HIV positive of participants

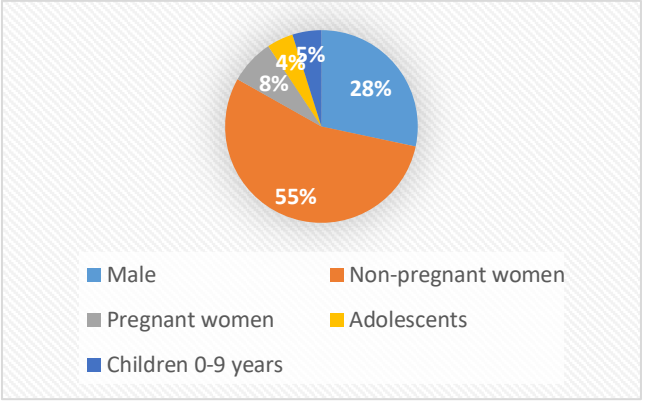


Table 3: HIV positive status amongst different cohorts				
	Total tested	No positive	No negative	HIV Prevalence rate (%)
Pregnant women >25 Yrs	5033	103	4930	2.046493145
Non pregnant women >25 years	14102	755	13347	5.353850518
Pregnant women 20 -24 yrs	1097	19	1078	1.731996354
Non pregnant women 20 -24 yrs	3878	133	3745	3.429602888
Adolescent aged 10 -19 years	3446	72	3374	2.08937899
Children 5 -9 years	2157	42	2115	1.947148818
Children 2 -4years	1594	30	1564	1.882057716
Children 6mths - 2yrs	301	3	298	0.996677741
Children < 6 months	28	4	24	14.28571429
Men	8480	459	8021	5.412735849
TOTAL	40116	1620	38496	4.038288962

Table 4 shows the yearly HIV prevalence among the different cohorts. Pregnant women > 25 years, on average, indicate HIV prevalence of 2% that ranged from 1.13% (2018), 2.18% (2019) and 2.68% (2020). For non-pregnant women > 25, the average prevalence over the three years was 5.4 % ranging from 1.7% (2018), 4.9% (2019) and 9.6% (2020). Pregnant women 20 – 24 years represent an average HIV prevalence rate of 1.7% ranging from 1.66 % (2018), 0.7% (2019) and 2.51% (2020). Non pregnant women aged 20 – 24 years indicate an average HIV prevalence rate of 3.4% ranging from 1.84% (2018), 2.42% (2019), and 6.2% (2020). Adolescent age group 10 – 19 years represent an average HIV prevalence rate of 2.1% ranging from 0.2% (2018), 1.98% (2019) and 3.07% (2020). Children aged 5 – 9 years equally represent an average HIV prevalence rate of 1.9 % (2018 =0.6%, 2019 =2 -2.77%, 2020 =3.1%). Children aged 2 – 4 years indicate an average HIV prevalence of 1.9% ranging from 0.8% (2018), 0.76% (2019) and 3.7% (2020). Children aged 6 months to 2 years indicate HIV prevalence rate of 1% ranging from 0% in 2018, to 1.1 in 2019 and 1.8 in 2020. Children less than 6 months had a positivity rate of 14.3% ranging from 33.3% in 2018 while having 0% rates in the years of 2019 and 2020. For men, the average HIV positivity was 5.4% ranging from 1.63% (2018), 3.9% (2019) and 9.8% (2020).

Table 4: Yearly HIV Prevalence among cohorts				
Participants	2018 HIV prevalence	2019 HIV prevalence	2020 HIV prevalence	Average prevalence rate
Pregnant women > 25 yrs	1.13	2.18	2.68	2
Non pregnant women >25 years	1.7	4.9	9.6	5.4
Pregnant women 20 -24 yrs	1.66	0.7	2.51	1.7
Non pregnant women 20- 24 yrs	1.84	2.42	6.2	3.4
Adolescent aged 10 -19 years	0.2	1.98	3.97	2.1
Children 5 -9 years	0.6	2.77	3.1	1.9
Children 2 -4years	0.8	0.76	3.7	1.9
Children 6mths - 2yrs	0	1.1	1.8	1
Children < 6 months	33.33	0	0	14.3
Men	1.63	3.9	9.8	5.4

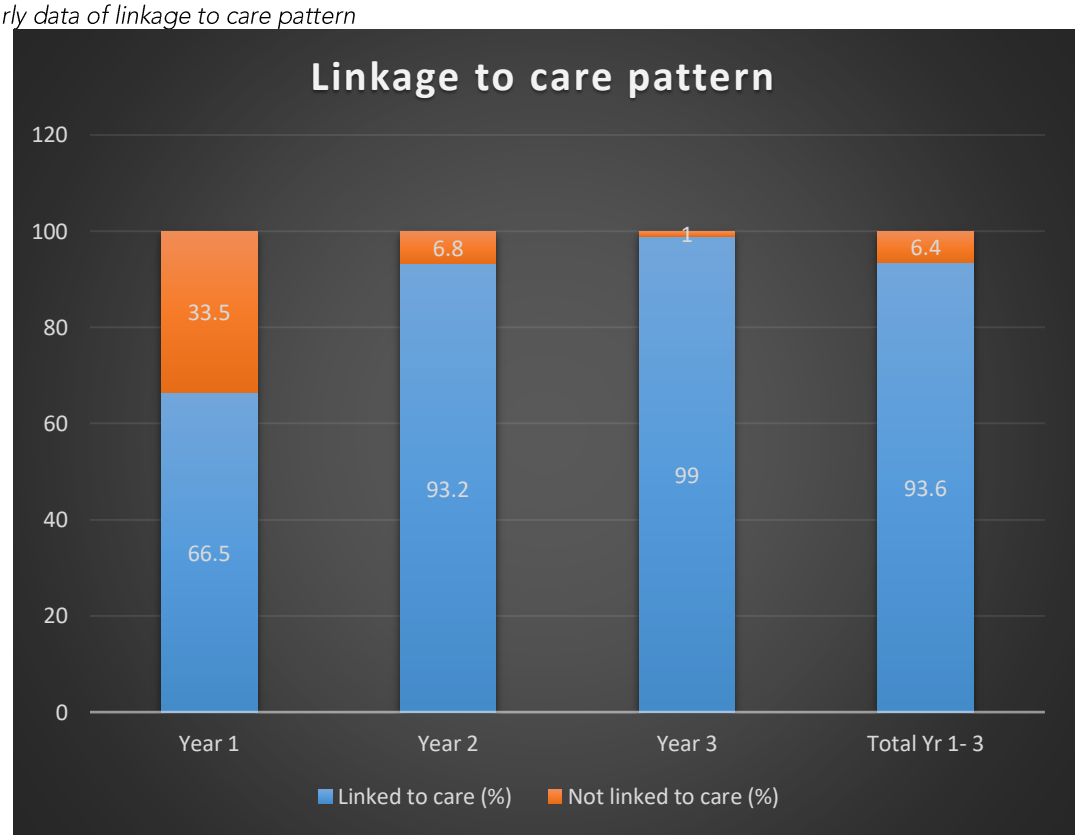
Linkages to HIV care and treatment centers

Data, as presented in table and figure 6 shows linkages to HIV care and treatment centers. Among 203 total population of HIV positive persons identified year 1 of the project, 135 (66.5%) participants were linked out of which 24 (11.8%) of the participants were later reported dead due to HIV-related causes, while 68 people or 33.5% of HIV positive persons were not linked. In year 2, 329 (93.2%) HIV-positive individuals were linked to the treatment center out of which 24 persons (6.8%) persons died from HIV-related diseases. Only 24 (6.8%) of the 353 identified HIV positive in year 2 were not linked. In year 3, 1 064 HIV-positive participants were identified, 1 053 (99%) persons were linked and 23 (2.2%) HIV-related deaths, while a mere 11 (1.0%) HIV-positives were not linked to treatment care centers.

Table 5: Yearly distribution of linkage/death pattern.

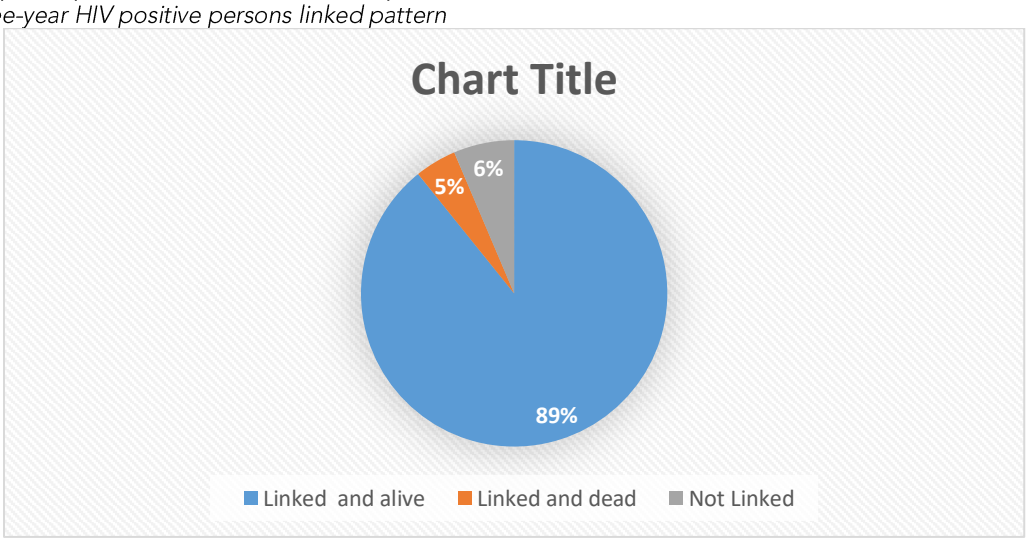
	Total no of positives	Linked to care	Linked to care and died	Not linked to care	% Linked to care	% not linked to care
Year 1: 2018	203	135	24	68	66.50%	33.5%
Year 2: 2019	353	329	24	24	93.20%	6.8%
Year 3: 2020	1064	1053	23	11	99%	1%
Total	1620	1517	71	103	93.60%	6.4%

Fig 6: Yearly data of linkage to care pattern



On aggregate (see **figure 7**), 93.6% (1517) of HIV-positive participants were linked, out of which .5A% (71) participants were linked and reported dead due to HIV-related symptoms, while 6.4% (103) participants were not linked.

Fig 7: A three-year HIV positive persons linked pattern



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Most HIV-positive people are usually stigmatized and face discrimination by the public. Some are treated poorly in health care and education settings. They also may be shunned by family members, peers, and the wider community. A key part of the prevention of HIV is counseling and encouraging people to know their HIV status. The choice to be tested was entirely voluntary. The literacy rate in the population is still low as many adults, mostly females, are illiterate or semi-literate. This results in the observed poor acceptance of and access to orthodox health care services.

Discussion and analysis

Nigerian government recognizes that one of the key health sector responses to the HIV/AIDS epidemic is the prevention of mother-to-child transmission of HIV through National Task Team (PMTCT-NTT). The overall goal of PMTCT is improved maternal health and child survival through accelerated provision of comprehensive and integrated PMTCT services[19]. This goal is in tandem with WHO strategic approaches toward preventing HIV transmission from HIV-infected women to their children, and providing care for HIV-infected mothers and their infants. The three years intervention survey and programme in Enugu-Ezike by the Initiative for Good Health was aimed at achieving national goal of PMTCT-NTT and the global efforts to eliminate MTCT of HIV. The study was basically a community- and congregational-based HIV education, counseling, and testing and linkage services.

Overall, our study provided evidence on number of HIV-positive, linked to care and treatment services for ensuring immediate reduction of MTCT in rural and peri-urban settings. Our HTS coverage indicate that 40 116 participants were tested for HIV and they know their HIV status. Our findings indicate that the participants did not have the opportunity previously to be screened, and others could not know their HIV status due to cost associated with screening in private clinics and laboratories. On average, 1 114 participants were monthly tested for HIV over the three years programme. We identified an increasing numbers of HIV-positive individuals as the survey progressed. In 2018, 203 HIV positive individuals, a significant increase to 353 positive individuals in 2019, and another relative increase to 1 064 HIV-positive individuals in 2020. It is important to note that the 2020 survey was conducted in 9 communities unlike the previous years where 18 and 11 communities were involved in 2018 and 2019 respectively. The indication is that increasing community members have accepted the IGH intervention programme and volunteered for HIV screening. Secondly, there is a greater probability of a higher number of pregnant and non-pregnant women and infants living with HIV considering that only 9 communities out of 38 were covered in 2020, and 14 729 participants screened for HIV and 1 064 are HIV-positive persons. The implication is that several community persons are likely to be living with HIV disease.

Based on community and congregational approach (the involvement of the church leaders) we observed a general increase in HIV testing rate in every successive year, which have been the missing linking on most community outreach programmes. Although our findings indicate a high awareness of HIV/AIDS in the rural community, that do not correspond to willingness to know HIV status of participants. The multi-dimensional approach of the one-on-one pre-HIV test and post-HIV test counseling and house-to-house screening assisted in convincing individual and family members, and our findings indicate that majority of the participants preferred house-to-house education and counseling services. The HIV clinical services provided by the government are inadequate, and one third of the total population do not know their HIV status due to associated cost in private clinics and the long distance to access free HTS in Enugu-Ezike District Hospital in Ogurute. HIV testing remains a key step towards elimination of HIV transmission from mother to child. The implication is that majority of parents, pregnant and non-pregnant women do not know their HIV status and are at the risk of becoming ill with HIV-related symptoms. It also increases the risk of onward transmission of HIV to their sexual partners and children.

The HIV percentage varies across age and sex disaggregation among all categories of participants. Over all, the percentage among non-pregnant women of 20 years and above is at 54.8%, men (adults) has the second highest (28.3%), while women of child bearing age has the third highest rate 6.6%. Following that is men, 4.4% infection rate representing adolescent group, while children aged 5-9 years represents 2.6% and children less than 6 months – 4 years represent 2.3% of HIV positive. Comparatively, both the pregnant and non-pregnant women have a combined prevalence rate of 61.4% HIV positive, which is significantly higher than their men counterpart. A gender-specific inflection point is observed with the HIV positive amongst pregnant and non-pregnant women being substantially higher than that of men of a similar age group. Among the 10-19 year old (adolescents) and children, the difference in prevalence between men and adolescent and children is noticeably greater, with prevalence among adult male and pregnant and non-pregnant women being more than twice as high as among adolescent and children; this pattern continues throughout the three years interventions studies. Several factors are contributing to the gender gap and age distribution of HIV infections, which are related to

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poverty, child marriage, gender-based violence, masculinity and femininity norms, disabilities, harmful traditional rites as well as human rights, legal and political factors. Few of the indigenes are educated while many others were illiterates or semi-literates. They are mostly farmers or petty traders with few civil servants amongst the populace, and culturally, they are patriarchal. Many females need support and approval of their husbands/male head of their families. This is noted to be more prevalence among Muslims communities bordering Benue and Kogi States. Due to their religious beliefs, gender is a key component in determining female HIV testing services (HTS) as well as a barrier in interacting with the community members (only women are allowed to mix with women). Most women need support and approval of their men to even access health care.

Epidemic control can effectively be attained to if new, stable, unstable and long-term clients remain on continuous care and treatment, which is tailored to be responsive to individual needs, preferences, and changing life circumstances. Robust evidence generated from 1 620 HIV negative persons shows that linkage of HIV-positive participants to care and treatment centres recorded 86% rate for three years intervention programme. This is a reflection of increased access to HIV testing services and the Treatment Linkage Specialists who bridge the gaps observed in the HIV care spectrum. Between the onset of field activities in October 2018 and January 2019, IGH had identified 83 HIV positive individuals but only linked 13 of them to care and treatment centres, which represented an appalling 13% linkage to care/treatment completion. Subsequent years improved significantly in both the HTS and linkage services (see **figures 3** and **7**). The TLS strategy equally contributed to the reduction of poor linkage observed at the outset, that is, from the 41.4% recorded in 2018 to a much higher percentage of 91.8% and 98.3% in 2019 and 2020 respectively. Thus, the improvement in the referral completion (both people living with HIV and HIV-related deaths) was due to the special counseling services by Treatment Linkage Specialists and the congregational church-based health structure that deals with the negative impressions (stigmisation and discrimination) associated with HIV/AIDS in the community.

IGH efforts dispelled to a large extent the myth that HIV/AIDS patients are seen as persons suffering terminal diseases such as cancer. The recovery or improved lifestyles of patients referred to care and treatment centres who have adhered to their medications and hospital appointments equally supported in reducing the negative understanding of HIV infections. The impact is equally attributable to HIV positive pregnant women who were linked to and favourably commenced treatment on PMTCT and showing positive results. Early infant diagnosis (EID) increased, with an estimated 44% of HIV-exposed infants being tested before the age of 2 months old. EID programs have been found to be an effective approach for evaluating EMTCT programs in some sub-Saharan African countries [28]. The Treatment Linkage Specialists continued to make the requisite impact on bridging the yawning gaps between the number of identified HIV positive clients and those who were enrolled into HIV care and treatment at the Treatment hubs through one-on-one and house-to-house counseling services.

While HIV awareness, HTS and linkage to care and treatment centers have consistently increased over each successive year, the proportion of the community that have not received HTS is very high. Our findings show that HIV services are not reaching many of the populations most at risk for HIV infection. This agrees with the survey by [29]that access the preferences for HIV testing options among 113 youth in Nigeria. Nwaouru and others indicate that twenty-eight (24.8%) of participants had ever tested for HIV in their lifetime and only 15 (14%) of the study participants had ever heard of HIV self-testing (HIVST) [30]. There is also the high risk sexual behaviours of men with their numerous concubines (*Ndishi* tradition) that increase infection rate and gender inequities that subjugate women and increased their (married, widows and single women) susceptibilities to HIV infection. In addition, there are substantial disparities in access to treatment and care, with men lagging behind in referral cases.

There are, however, some members of the community who still hold the belief in the traditional causes of illnesses and still ascribe to HIV/AIDS as punishment from their 'gods' or ancestral spirits for various misdemeanours. This groups believe that their 'Ndishi' traditions may have been violated and that their 'gods'/ancestral spirits had decided to visit such person with punishment in form of inexplicable sickness. Those who hold these views were also the ones that often seek the intervention of traditional medicine men and women 'native doctors' when they or their families become ill. Therefore, the current coverage of awareness and sensitisation on HIV/AIDS are not adequate despite the extant literature showing a high awareness level on HIV/AIDS in both the rural and peri-urban communities. There should be, on one hand, an increased inter-linkage between PMTCT and community mobilization, sensitization and awareness creation to dispel socio-cultural beliefs systems. On the other hand, awareness of the harmful gender norms (rape, women's dependency on husbands/males to make decisions regarding their own health, access to income et cetera) in the society have been discussed with various community gatekeepers and they made commitments to address the structural basis.

Conclusion

The Initiative for Good Health community-based HIV interventions recorded modicum of success due to strong political leadership commitment and multi-dimension approaches that involved church leaders, Care Cascade Networks, Ward Mobilisation Networks and Treatment Linkage Specialists. We observed a general willingness for HTS due to the use of trained local population for house-to-house and one-on-one HTS provision, the genealogy charts for tracing HIV positive clients and ensuring that all infants of HIV positive mothers are provided with HTS and EID services, and the novelty of working with traditional medicine men/women 'native doctors', thereby providing HIV testing services to hitherto unreached communities. The probability is strong that the more HIV tests that are conducted, the more likely of people living with HIV are identified across all gender and age distributions. Given this, we conclude that the estimated number of people living with HIV in the community is grossly under-reported because greater proportion of the populations in rural and peri-urban areas do not know their HIV status. Therefore, the elimination of mother-to-child transmission, and the attainment of the first 90 of the UNAIDS 90-90-90 goals as well as fast-tracking the national response towards ending AIDS in Nigeria by 2030 can only be realistic through repeated campaigning, counseling and HIV testing services. Our HTS was limited only to a small fraction of the population, therefore, the population of MTCT may have also been under-reported and there is the need for further study that targets greater proportion of the rural populations.

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