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PUBLIC HEALTH PRACTICE | HIV IN PRIMARY CARE

Early Infant Diagnosis of HIV in Primary Health Care Centers

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ABSTRACT

Background: Early diagnosis of HIV to identify infected children for early therapy is aimed at preventing high mortalities associated with child HIV infection. Early infant diagnosis (EID) intervention occurs across the three tiers of the Nigerian health care delivery system, including the primary health care centers (PHC). This study evaluates the implementation of early infant diagnosis of HIV in PHCs in a southern state of Nigeria.

Methods: This was a cross-sectional descriptive study that took place between September and November 2019. Primary data were obtained from an interviewer-administered questionnaire on 120 health workers in six Local Government Areas (LGA) that were selected through a multi-stage, random sampling method. Secondary data were from the records of program implementation at the state headquarters of Ministry of Health and the PHCs.

Results: A total of 116 (96.6%) health workers were interviewed; 17.2% were males, and 82.8% were females. More than two-thirds of respondents were aged between 41 and 60 years and 84.5% of them had worked in the PHC system for 11 years and above. Rural or urban location of the PHC, educational level of the health workers, and years of service in the PHC system did not have any significant effect on implementation of EID program in the health facilities. Implementation of EID program was ineffective in both rural and urban PHCs of Akwa Ibom state with the p-value of 0.337. In multiple regression analysis, access to EID program and provision of adequate supplies significantly affected implementation of the program with $p = 0.001$ and $p = 0.000$ respectively.

Conclusion and Implication for Translation: The study indicates general ineffectiveness in the implementation of EID in a Southern State of Nigeria. There is need to improve access to EID services and provide needed supplies if the state, and by extension Nigeria, hopes to meet the target of joining the global community in ending HIV by 2030.

Key words: • Primary health care • Human Immunodeficiency virus • Early infant diagnosis of HIV • HIV exposed infants • Nigeria • Program implementation • Global health • Health workers • Early therapy • Mortality • Health care delivery • Ministry of Health

1. Introduction

The Nigerian National Health Policy[1] is based on the primary health care (PHC) system with two sub-systems, namely the hospital sub-system (made up of secondary/general and specialist/teaching hospitals), and the PHC services sub-system. The PHC services sub-system is composed of PHC components and its implementation is the responsibility of the Local Government Areas (Districts). The current state of implementation of the PHC sub-system in Nigeria is abysmal, with only about 20% of the 30,000 PHC facilities in the country functioning effectively.[2] Fragmentation of implementation of PHC has been identified as the most significant problem facing the PHC sub system in the country.[2]

A major public health challenge on the Nigerian health system in the last three decades is Human Immunodeficiency Virus (HIV) and Acquired Immunodeficiency Syndrome (AIDS), which Nigeria has the second-highest disease burden in the world after South Africa.[3] In Nigeria, 3.5 million people lived with the virus in 2015, including 1.9 million women of reproductive age (15 to 49 years) and 260,000 children aged zero to 14 years.[4] Program data from the HIV and AIDS unit of the Akwa Ibom State Ministry of Health, indicate that 304,447 adults lived with HIV by 2016, with pregnant women constituting 9.7% of this number, the second highest in the country.[4,5] A 2018 population-based survey indicated a prevalence rate of 5.6%, which, though lower than the previous sentinel survey rate of 9.7% (2015), places the state as one with the highest HIV prevalence in the country.[4] In the absence of interventions to prevent mother-to-child transmission, an estimated 36.7% of the exposed infants may be infected with HIV.[6] Such interventions include antiretroviral therapy for the mothers and early infant diagnosis (EID) followed with antiretroviral treatment for infected infants. The goal of these is to prevent a third or half of these HIV infected babies dying within their first or second year. [6]

The National Health Policy that identifies PHC as the framework for achieving improved health for the population has 10 components (services), including maternal and child health (MCH).[1] Early Infant Diagnosis (EID) of HIV is an integral component of the MCH. Ideally, the PHC services sub-system should deliver a high-quality and effective EID program through the PHCs, if adequate capacity and infrastructure are available. The objective of this study was to evaluate the effectiveness of the EID program implemented in the PHCs in a southern state in Nigeria. The specific aims were to evaluate the effectiveness of the EID program implemented within the PHC centers in Akwa Ibom State, to identify the challenges of EID program implementation, and to make recommendations to enhance EID program implementation in PHCs in the state.

2. Methods

2.1. Study Design

This was a cross-sectional study, using both quantitative and qualitative research strategies and conducted between September and November 2019. The study setting was Akwa Ibom (AKS), a State in the southern part of Nigeria. The state occupies the South-Easter part of Nigeria's Niger Delta Area, with an estimated population of six million and a landmass of 8, 500 km^2. About 70% of the population that live in rural areas are engaged in agriculture, 25% in small-scale commercial businesses, while 10% engages in the civil and public services. The State is made up of 31 Local Government Areas (LGAs) or districts. Three of the six LGAs (Ikot Ekpene, Uyo, and Abak) selected for the study were categorized as urban while the other three, Oron, Nsit Ubium and Ikono were categorized as rural.[7] This rural-urban categorization was deliberately adopted for this study to identify any geographical or socio-economic factors that may be associated with the implementation of EID program. The study population consisted of six Directors (heads) of health in the LGAs, and 115 other health workers in all the 65 (out of 255 in the 31 LGAs of the state) PHC centers in the six LGAs selected for the study.

2.2. Sampling Technique

The state, with 31 LGAs was stratified into three zones, and separated into rural and urban areas drawn from senatorial district arrangement of the Independent National Electoral Commission

(INEC)).[7] A simple random sampling was used to select three LGAs each from the urban and rural groups to make up six LGAs selected for the study. This was purposively selected and included all the six heads of the PHC departments in the six selected LGAs and all the health workers involved in delivering EID services to clients in the 65 primary health care centers in the six LGAs.

2.3. Data Collection

Primary data were obtained from an interviewer-administered questionnaire on 120 health workers selected in six LGAs.The questionnaire was developed to answer the following research questions: is the EID program implemented in urban and rural PHCs in AKS effective; what are the challenges militating against the implementation of EID of HIV in PHCs in AKS; and what are the recommendations to enhance the implementation of EID in PHCs AKS? One hundred and sixteen (116) of the 120 respondents completed the questionnaire. Secondary data were from desk review of State verified data domiciled in the Health Management Information System (HMIS) office of the Ministry of Health Headquarters and cross-checked by data from the source documents in PHCs.

2.4. Study Variables

The dependent variable was EID implementation, while the independent variables were factors that affect effective implementation of the program in primary health care centers in the Local Government Areas. The independent variables included educational qualification, years of service in PHCs, access to EID programme, charges for services, EID local personnel training, adequate supplies for EID, awareness of EID implementation in PHC, and rural-urban location of PHC.

2.5. Statistical Analysis

Data collected were analyzed quantitatively with the use of SPSS Version 22. Ethical approval was sought for and obtained from the ethical committee of the Akwa Ibom State Ministry of Health. Approvals were also obtained from all the six Directors (Heads of facilities) and consent to participate was obtained from all 120 participating health workers.

3. Results

3.1. Socio-demographic Characteristics

Results indicate that 20 (17.2%) of the respondents were males while 96 (82.8%) were females. The disparity in the ratio of female to male PHC workers agrees with another report that indicated women prefer female health workers to the males when they need maternal and child health care services.[8] More than two-thirds, 98 (84.5%) of the respondents indicated years of service in the PHC system to be from 11 years and above. This implies a workforce that is experienced in PHC services implementation and therefore fit to respond to the issues under investigation in this study.The educational level attained by the respondents was University/Higher Diploma, 91 (74.4%), Lower Diploma, including Community Health Extension Workers (CHEWs) 16 (13.8%) and Secondary/non formal, 9 (7.8%). All except the

Table 1: Socio-demographic characteristics of respondents

Local Government Areas	No. of respondents (N)	Percent (%)
Ikot ekpene	21	18.1
Uyo	27	23.3
Abak	19	16.4
Oron	16	13.8
Nsit ubium	16	13.8
Ikono	17	14.7
Total	116	100.0
Sex of respondents		
Male	20	17.2
Female	96	82.8
Total	116	100.0
Length of service in PHC (years)		
1 – 10	18	15.5
11 – 20	20	17.2
21 – 30	27	23.3
31 and above	51	44.0
Total	116	100.0
Educational level		
PhD/Master's	4	3.4
First degree/higher	87	75.0
Lower diploma/chew	16	13.8
Secondary school	7	6.0
Non formal education	2	1.7
Total	116	100

secondary/non formal workers, 9 (7.8%), were trained health professionals, either as nurses, midwives, health educators or public health nurses. This indicates that all the relevant categories of health workers were available for implementation of EID program within the PHC centers in this study (Table 1).

3.2. Early Infant Diagnosis Implementation

Almost all (111 out of 116) of the respondents (95.7%) indicated awareness of EID program implementation in the PHCs. However, slightly above average, 60 of 116 (51.7%) fully understood the concepts of EID in terms of mother to child transmission of HIV and use of anti retroviral drug therapy, where only two, thirds 70 (60%) of the respondents indicated antiretroviral drugs were effective as therapy for HIV infection in infants. On average, 51% (59 of 116) of respondents indicated physical accessibility to EID services was good, 27% said it was fair and 20% said it was poor. This is similar to observations in Togo and North-central Nigeria.[9,10]

Only 51% (59 of 116) of the workers had ever been trained on the provision of the EID services, while only 18 of 116 (15.5%) had the national guideline for EID implementation and 24% (28 out of 116) had the testing kits for collection of dry blood spots samples. A significant program documentation tool (National Child Follow up register) for recording and monitoring the program implementation was available in only 41 of 116 (35%) of the health centers.

Although the RNA PCR testing is not performed at the PHC centers, the time interval between dry blood spot sample collection and receipt of results and commencement of therapy was also examined in this study. This is significant in EID program implementation that aims at early commencement of life-saving care for the infected child. Results from the study indicate a turn around time (TAT) of between six weeks and five months, with a mean of eight weeks. Reports from some African and other developing countries[11,12,13,14,15] show a similar pattern of 6-8 week TAT. This long TAT has a negative effect on the early commencement of therapy[13,15] as evidence indicates early administration of ARV drugs to the infected infants save their lives.[16]

Report indicates that PHC centers, when properly supported with equipment, training and adequately funded can deliver EID services within the PHC centers.[16] The study found that only 12 of 116 (10.3%) of the PHC facilities had adequate supplies of consumables required to collect dry blood spot samples and implement the EID program. Other findings included lack of trained personnel on EID, 11 (9.4%), poor funding, 8 (6.9%), lack of utility vehicle, ill-motivated staff 6 (6%) and lack of constant supply of electricity, 5 (4.3%). These were in addition to poor water supply, poor remuneration of staff, and poor attitude of staff to work.

3.3. Geographical Location of PHC

Implementation of EID program was compared in the PHCs located in the rural (67 PHCs) and urban LGAs (49 PHCs) to identify any socio-economic and geographical influences on the program implementation. The assumption was that there was a significant difference in EID program implementation between the urban and rural PHCs, with the rural PHCs being disadvantaged.[17] The probability value (0.064) is greater than 0.05, thus, indicating equal variances between implementation in urban and rural Local Government Areas. Further analysis with the independent sample test, gave a probability value of 0.337, which is greater than 0.05. The conclusion is that implementation of EID program was ineffective in both urban and rural LGAs in the state as our p-value of 0.337 was greater than our pre-determined p-value <0.05 (Table 2).

Analysis of the independent variables (factors) that affected EID program implementation is presented in Table 3. Results indicate that access to EID program ($p = 0.001$) and adequate supplies for EID ($p = 0.000$) were the only two statistically significant factors that affected the effective implementation of EID in the study area. Charges for services had negative effects on effective implementation of EID but such effect was statistically insignificant as the probability value of 0.238 was greater than 0.05.

The EID program data in the state Ministry of Health headquarters were reviewed and cross-checked with source documents at the PHCs to evaluate the performance of the EID program

Table 2: EID implementation in urban and rural Local Government Areas

EID was effectively implemented	Levene's test for equality of variances		T-test for equality of means						
	F	Sig.	t	df	Sig. (2-tailed)	Mean difference	Std. Error difference	95% Confidence interval	
								Lower	Upper
Equal variances assumed	3.505	.064	-.965	114	.337	-.176	.182	-.537	.185
Equal variances not assumed			-.941	93.365	.349	-.176	.187	-.546	.195

Table 3: Results of regression analysis of EID program implementation on independent variables

Independent variables	unstandardized regression coefficients		Standardized coefficients	t	p-value
	B	Std. error	Beta		
Highest education qualification	.147	.113	.118	1.301	.196
Category of health workers	.001	.073	.001	.014	.988
Years of Service in PHCs	-.025	.083	-.029	-.301	.764
Access to EID program	.334	.098	.292	3.411	.001
Charges for services	-.464	.391	-.098	-1.186	.238
EID focal personnel training	.158	.171	.080	.921	.359
Adequate supplies for EID	.362	.082	.400	4.401	.000
Awareness of EID implementation in PHC	-.032	.281	-.009	-.115	.909

Table 4: Early infant diagnosis results (2013 – 2016) from PHCs in the six Local Government Areas under study

LGA	HIV Exposed Infants (2013 -2016)	Total EID performed (2013 – 2016)	Per cent of EID performed (2013-2016)
Ikono	36	0	0
Ikot Ekpene	331	32	9.7
Abak	153	32	20.9
Nsit Ubium	95	9	9.5
Oron	226	206	91.2
Uyo	286	103	30
Total	1,127	385	34.2

Source: Ministry of Health, Uyo, Akwa Ibom State (2017)

implemented from January 2013 to December 2016. The reports show that only 385 (34.2%) of 1,127 HIV exposed infants (HEIs) had access to EID program for the four-year period (Table 4). A program coverage of 34.2% was just about a third of the 90% program target set at commencement in 2013.[18] The ineffectiveness of program implementation seen in this study provides evidence of some of the factors responsible for the poor performance of the program over the four-year period.

3.4. Other Variables

Other variables that were examined in the study were charges for services and presence or absence of community participation. Payment for EID services was identified in 12 (10.3%) of the 116

health facilities. Clients were charged between fifty Naira (N50) (about US $0.15) and one hundred Naira (N100) (US $0.30) as registration fee or for some other items before they were provided with EID services. Community participation remains a key factor in improving and maintaining community health outcomes.[19] Only four of 112 (3.4%) respondents indicated that there is community participation in EID program implementation. Eighty-four percent (97 of 116) of respondents indicated community participation in the EID program in PHC centers would enhance implementation and improve service coverage.

4. Discussion

A key principle in PHC is the decentralization of services (including EID services) to the Local Government primary health centers. This is to make such services closest to rural communities where 70% of the people live and work.[7,19] The decentralization of EID services in Akwa Ibom State with a pediatric HIV prevalence rate of 9.9%[5] will enhance access to such services, as the PHC system is identified as providing a framework for addressing the health needs of persons located in remote communities.[19] Almost all (99%) of the respondents in this study identified this role of the PHCs but failed to have a good understanding of the concept of EID as a child welfare and survival strategy, within the MCH component of the PHC services sub-system. Understanding this role and relationship is significant since, if present, will invoke commitment towards quality program implementation.[20]

The capacity of PHC centers to provide EID services is linked to the availability of needed equipment, knowledge of the providers and adequate funding.[21] This study revealed lack of essential supplies as 39 out of 116 (33.6%) had testing kits, and (42 of 116) 36% had monitoring and evaluation tools). This gap can negatively affect the capacity of the health center to deliver EID services. The inadequacies found in this study are similar to what was seen in the Northern part of Country.[22] The 60% (70 of 116) of the respondents in the study that had a good knowledge of the effectiveness of ARV drugs in the treatment of pediatric HIV infection, also points to knowledge gap the some of the providers, since there are no specialization in service provision at the PHC level. This can affect service provision negatively.[13]

The provision of health services to individuals, families and communities is the responsibility of the health system,[23] such as the PHC system. Access to such health care services involves quality of care, geographical accessibility, availability of the right care, financial accessibility and acceptability of services.[24] In Nigeria, reports indicate that about 17% of infants die before the age five years from causes related to poor access to adequate health care, with such causes linked to geographical, financial, availability and acceptability of services.[25] In this study, the geographical and availability domains of accessibility were found to affect EID service accessibility significantly ($p = 0.001$), in agreement with earlier findings.[24,25,26]

Medical equipment are so significant to health care delivery, that the WHO considers it an agenda and emphasizes its availability, accessibility, appropriateness and affordability and a means of ensuring its use to improve health.[27] Although the availability and utilization of health equipment remain indispensable to the effective functioning of any health system, reports indicate a disproportionate availability between resource-endowed and resource-constrained countries.[28] This study found the influence of medical equipment very significant ($p=0.000$) in the implementation of EID services. This is similar to findings in hospitals and the primary health care centers in some other parts of Nigeria.[29,22]

None of the PHC centers had the capacity to diagnose infant HIV on site and so dry blood spots are sent to the only testing centre in the state, contributing to the long turn around time (TAT). A long TAT prevents the effective implementation of the EID program, as it results in delayed commencement of therapy and high loss-to-follow-up before ART initiation.[6, 12,13] The average of five months TAT obtained in this study is in contrast to the 28 day cycle recommended by the WHO.[16] The respondents in this study attributed such delays to

transportation challenges and delays at testing site (University of Uyo Teaching Hospital) due to sample overload at the only testing center in the state. Other challenges identified include supply chain management limitations, inadequate infrastructure, including potable water supply, electricity, poor remuneration of staff, and poor attitude of staff to work, similar to an earlier report in the six geopolitical regions of Nigeria.[22]

Payment for EID services in the health centers studied. These fees, minimal as they would appear, are significant in a society where 50% of the population lives in extreme poverty.[18] A similar situation had earlier been reported in a secondary health facility in the same state.[30] These reports might mean this practice is widespread and possibly with varying amounts of money collected. The collection of fees negates the PHC principle of equity that ensures everyone has a fair opportunity to access healthcare and not be disadvantaged because of economic or social situation.[31,32,33] This factor was not significant in this study (p=0.238), contrary to earlier findings in other parts of the country.[33,34] It however, goes against the State Government's policy of free health care services to pregnant women, children under five years of age and the elderly and also the policy on HIV treatment and care.[19] Finding of these 'unofficial' charges should necessitate a further investigation to ascertain its spread and variations in the amounts and effects, with regards to the different health services provided in the state.

Community participation, as one of the principles of PHC, is critical in the successful implementation of EID programme.[15, 16, 24] This is so as community participation builds trust between service providers and consumers, improves and maintains the EID program and fights against stigmatization.[17,34,35]

4.1. Limitations of the Study

The small population size of six LGAs (districts) out of 31 and 102 PHCs (28%) out of 363 may affect generalization of the results. However, the results will still be useful since all the LGAs in the state utilize the same operational plan to implement the EID program within the PHC sub system. Further studies involving a larger sample size and other factors that affect accessibility to EID services within the PHC system are recommended.

5. Conclusion and Implications for Translation

This study indicated that implementation of EID program in the PHC centers was ineffective in both the urban and rural PHC centers in the state. Poor access to EID services and inadequate supplies of necessary tools and equipment were significant factors identified as contributing to the poor performance of the program. Other factors like charges for services and work experience of healthcare workers may need to be investigated further to establish their significance in EID or other PHC service delivery. The ineffective implementation of early infant diagnosis program in this region of the country impacts negatively on Nigeria's ability to meet the national and global targets of elimination of HIV by 2030.[36] Hence, there is need to address the issues identified and others as the target date draws close.

Compliance with Ethical Standards

Conflicts of Interest: *The author discloses no conflict of interest in the study.* ***Financial Disclosure:*** *None.* ***Funding/Support:*** *There was no funding support for this study from any source.* ***Ethical Approval:*** *Ethics approval was obtained from the ethical committee of the State Ministry of Health, Directors of Health in the six LGAs and from all respondents in the study* ***Disclaimer:*** *None.*

Key Messages

- The ineffectiveness in implementation of early infant diagnosis of HIV program in southern Nigeria can result in the death of a third of the infected infants within the first two years of life.
- Significant factors identified as causes of this ineffectiveness include lack of access to the services and inadequate supply of necessary equipment and tools.
- There is therefore the need for governments at the three tiers and stakeholders to synergize efforts to avert these mortalities and help eliminate HIV by 2030.

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