

Evaluation of Prevention of Mother-To-Child Transmission of HIV Services in Selected Health Facilities in Lagos State, Nigeria

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Abstract

Introduction: Prevention of Mother-to-Child transmission (PMTCT) of HIV is a global response to reduce the risk of mother-to-child transmission of HIV which can occur in-utero, during childbirth or during breastfeeding, specific services rendered to HIV positive pregnant women are crucial in preventing vertical transmission, therefore, this study evaluated Prevention of Mother-To-Child Transmission of HIV services in selected health facilities in Lagos State, Nigeria.

Method: The study adopted a descriptive survey design. The sample size was 19 health facilities in Lagos state, a multi stage sampling procedure was used to select the samples. Two instruments were used for data collection, observational checklist and past records of PMTCT activities of the participating facilities from January 2017 to December 2019. The checklist was pre tested with a reliability coefficient of 0.96. Analysis of data was done using descriptive statistics and inferential statistics.

Results: The findings show that in all the selected health facilities 92.8% of the structures in terms of equipment/supplies were available and functional. majority of the health care providers listed were available, there was availability of recommended PMTCT services in all selected health facilities, it was also revealed that there was a positive significant relationship between the available structure and PMTCT services ($r = .347$; $p = 0.0146 < .05$).

Conclusion: The availability of PMTCT structures, resources, equipment/supplies and service providers have significant influence on prevention of mother to child transmission of HIV services provision. Also, PMTCT services have influence on the final outcomes of exposed infants.

Keywords: Evaluation, Prevention of Mother-To-Child Transmission, HIV Services, Health Facilities.

Introduction

Human Immunodeficiency Virus (HIV) is the virus that causes the disease called Acquired immune deficiency syndrome (AIDS). AIDS is a series of symptoms and illnesses that is developed due to immune compromised caused by HIV infections. The mother to child transmission of HIV is one of mode of transmission which is also called vertical transmission of HIV from infected mother to her infant. Prevention of mother-to-child transmission (PMTCT) of HIV services is the intervention to avert mother-to-child transmission. Globally, about 36.7 million people

are living with HIV. Since the start of epidemics, about 76.1 million people have been infected and 35 million deaths are due to AIDS related illnesses (UNAIDS, 2017).

Since the first paediatric AIDS case was documented in 1985, the number of infected children has increased markedly, and the health care for these children is becoming an increasing burden on the public health system. The highest prevalence of HIV infections is in sub-Saharan Africa, where rates of both prevalent and new infections are consistently high among women than men and most women are diagnosed during pregnancy (Hills et al, 2015). Over 90% of children are infected with HIV through Mother-

To-Child Transmission (MTCT). The intervention to prevent MTCT is called Prevention of Mother-To-Child Transmission (PMTCT) of HIV services. Globally, between 2009 and 2014, there was a 48% reduction of new HIV infections in children, due to the success of the World Health Organization (WHO) HIV programme on Prevention of Mother to Child Transmission (UNAIDS, 2017). It has been reported worldwide that access to PMTCT services can decrease the risk of vertical transmission to less than 2%, however, there has been less success in low-income countries due to a variety of factors such as insufficient knowledge of HIV status of individual, limited economic resources and inadequate PMTCT service structure in health facilities (Bokharaei & Jarchi, 2018).

Nigeria has the greatest numbers of new HIV infections among children, MCTC accounts for 90% of the infections (UNAIDS, 2016). Nigeria has the highest population in Africa, the estimation is based on the 2006 national census and an annual growth of 3.2% puts the 2012 population to 171 million. Being the highest populated, can be attributed to the high fertility rate of 5.7%, large percentage of women of child bearing age and low uptake of contraceptives (UNAIDS, 2016). In 2010, it is estimated that 2.95 million people in Nigeria are currently infected with HIV. Heterosexual transmission accounts for nearly 80% of all infections, about 10% of HIV infections are transmitted through mother-to-child transmission (MTCT), while another 10% is transmitted by the use of unsterilized needles and surgical implements, infected blood and blood products (NACA, 2016). Nigeria's contribution to global burden of mother to child transmission of HIV is estimated at over 30%. Mother-to-child transmission of HIV can occur in-utero, intrapartum, or postnatal. Strategies to reduce MTCT focus on these periods of exposure and include the use of ARVs, caesarean section before onset of labour or rupture of membranes, and complete avoidance of breastfeeding. These combined interventions when followed effectively, reduce the risk of MTCT to as low as 1-2% (Iregbu & Fatima, 2014). Without treatment, if a pregnant woman is living with HIV the likelihood of the virus passing from mother-to-child is 15% to 45%. However, antiretroviral treatment (ART) and other interventions can reduce this risk to below

5% (WHO, 2018). Early infant diagnosis (EID) programs can be used to evaluate the impact of PMTCT, as well as substantially improve the survival rates (Iregbu & Fatima, 2014).

The National guidelines on PMTCT of HIV, (2010) specify the minimum site requirements for health facilities providing comprehensive services for PMTCT in the country. These include: having a reasonable flow of antenatal care patients; provision of antenatal care services supervised by a trained health care provider; and HIV counselling and testing services. Other minimum PMTCT site criteria include provision of services: delivery services with capacity for caesarean section (or by referral), care for the newborn including antiretroviral prophylaxis and provision of infant counselling and support among others. Despite the best efforts of government to improve the effectiveness of the PMTCT programmes, there are discrepancies in the implementation of PMTCT guidelines at health facilities level. As such, the outcomes of PMTCT programme implementation vary across the country.

Based on the foregoing, the study evaluated Prevention of Mother-To-Child Transmission of HIV services in selected health facilities in Lagos State, Nigeria, assessed the availability of PMTCT services structure in terms of equipment/supplies and manpower in the selected health facilities, determined the PMTCT services available at the selected health facilities, also determined the relationship between available structures and prevention of mother to child transmission of HIV services.

Materials and methods

A descriptive design of the survey type was utilized. Observational checklist was used to assess the available PMTCT services structures in terms of resources (equipment/supplies) in 19 health facilities. Also, retrospective data from the selected health facilities-database assessing outcome of PMTCT services on exposed infants who had attained 18 months of age and had completed PMTCT programme from January 2017 to December 2019. The target populations for this study are 19 primary health facilities in Lagos State.

Multi stage sampling procedure was used to select the samples.

First stage: purposive sampling, the 20-local government in Lagos state are grouped into three

senatorial districts which are; Lagos west (ten local governments), Lagos east (five local governments) and Lagos central (five local governments). Lagos west senatorial district was purposefully selected for this study because it is the largest district and consists of all types of health facilities to be used for this study (primary, secondary and tertiary health facilities).

Second stage: Total enumeration of thirty-eight (38) health facilities in the selected district

Sampling technique

Facility type	Total number in the district	50% of total number
Teaching Hospitals (tertiary)	2	1
General Hospitals (secondary)	8	4
Comprehensive Health Centers (primary)	28	14
Total	38	19

Description of the site

The research settings were teaching Hospitals, General Hospitals and Comprehensive (Flagship) Primary Health Centers (PHC) that fall within Lagos west senatorial district of Lagos state, these health facilities were established by federal and state Governments as part of their efforts to reduce mortality and morbidity rate and to improve quality of health care. Lagos west senatorial district consists of ten (10) local governments out of twenty (20) states wide; it is the largest senatorial district in Nigeria with population of over 12 million constituents. The local governments are: Badagry, Amuwo-Odofin, Ajeromi-Ifelodun, Ojo, Alimosho, Ikeja, Mushin, Oshodi-Isolo, Agege and Ifako-Ijaye (the Nation, 2018). Within Lagos west senatorial district, there are two (2) teaching hospitals, eight (8) general hospitals and twenty-eight (28) comprehensive health centers, a total of 38 health facilities. 19 facilities were randomly selected through balloting to represent the 50% of total health facilities according to Jacob (2016), which stated that 50% of a population is enough to generalized the study findings.

Data collection

A letter of introduction from School of Nursing, Babcock University was presented to officer in-charge of all selected health facilities;

was done, out of which teaching hospitals were two (2), general hospital eight (8) and comprehensive health centers twenty-eight (28).

Third stage: Simple random sampling technique was used to select one (1) teaching hospital out of two (2), four (4) general hospitals out of eight (8) and fourteen (14) comprehensive health facilities out of twenty-eight (28). The sample size is 19 health facilities.

an observational checklist was used by the researcher and/or trained research assistants to elicit information from each selected health facilities. The research assistants were trained to be familiar with the contents of the checklist; the completed copies of the checklists were collected immediately. The data of the exposed infants was collected through the archived records; the primary source of data collection was the facility PMTCT child follow-up records, which was stored in either hard or soft register. The data were retrieved from medical records department with the support of medical records officers and PMTCT focal persons. An average of four weeks was used for data collection after passing through the normal protocols at each facility.

Statistical analysis

The result was based on a score available functional (2), available not functional (1) and not available (0), which was assigned to each of the items on availability of PMTCT services structure in terms of equipment and manpower. The responses on the completed checklist were coded and data analyzed on an item-by-item basis using descriptive (frequency, percentages and mean). A correlation analysis was used to test relationship between available structures and PMTCT services at P-value < 0.05 level of significance. SPSS version 21 was used for statistical analysis.

Results

Table 1. Descriptive Analysis of available PMTCT services structures in the facilities in terms of equipment/supplies

S/N	PMTCT structures	Available and function	Available not function	Not available
1.	Room for PMTCT services	16(84.2%)		3(15.8%)
2.	Private room for counselling	14(73.7%)	1(5.3%)	4(21.1%)
3.	Laboratory department	19(100%)		
4.	HIV test kit (determine)	19(100%)		
5.	HIV test kit (unigold)	19(100%)		
6.	HIV test kit (stark pack)	19(100%)		
7.	Dried blood spot (DBS) kit	18(94.7%)	1(5.3%)	
8.	CD4 count machine	9(47.4%)	2(10.5%)	8(42.1%)
9.	Reagents	18(94.7%)		1(5.3%)
10.	Microscope	19(100%)		
11.	Centrifuge	19(100%)		
12.	Incubator	15(78.9%)		4(21.1%)
13.	Sharp boxes	18(94.7%)		1(5.3%)
14.	Gloves	19(100%)		
15.	Consulting rooms for doctors	19(100%)		
16.	Maternal and child department	19(100%)		
17.	Hall for antenatal clinic	19(100%)		
18.	Equipped delivery room	19(100%)		
19.	Spacious bedded ward for postnatal	19(100%)		
20.	Family planning unit	19(100%)		
21.	Pharmacy department	19(100%)		
22.	ARV drugs	19(100%)		
23.	ARV Prophylaxis for babies	19(100%)		
24.	Health education unit	13(68.4%)		6(31.6%)
25.	Internet facility for documentation	12(63.2%)	2(10.5%)	5(26.3%)
26.	Power supply	19(100%)		
27.	Running water	19(100%)		
28.	Hand washing items	19(100%)		
	Average %	92.8%	1.2%	6.0%

Source: Field work, 2020

The above table shows the descriptive Analysis of available PMTCT services structures in the facilities in terms of equipment/supplies in all the selected health facilities 92.8% of the structures in terms of

equipment/supplies were available and functional while 1.2% were available but not functional, 6% were not available. CD4 count machine was the least available among the listed resources.

Table 2: Descriptive analysis of PMTCT service provider among the selected facilities in Lagos State

Doctors								
Numbers	2	3	4	5	6			
A=19(100%)	1(5.3%)	4(21.1%)	8(42.1%)	2(10.5%)	4(21.1%)			
Nurses and midwife								
Numbers	2	5	6	7	8	12	13	14
A=19(100%)	1(5.3%)	3(15.8%)	5(26.3%)	3(15.8%)	3(15.8%)	1(5.3%)	1(5.3%)	2(10.5%)
Community Health officer (CHO)								
Numbers	0	1	2	3	4			
NA= 6(31.6%)	6(31.6%)							
A=13(68.4%)		4(21.1%)	6(31.6%)	2(10.5%)	1(5.3%)			
Community Health Extension Workers (CHEW)								
Numbers	0	1	2	3	4	5		
NA=6(31.6%)	6(31.6%)							
A= 13(68.4%)		1(5.3%)	2(10.5%)	5(26.3%)	3(15.8%)	2(10.5%)		
Laboratory scientists								
Numbers	0	1	2	4	5	7		
NA =2(10.5%)	2(10.5%)							
A=17(89.5%)		11(57.9%)	2(10.5%)	2(10.5%)	1(5.3%)	1(5.3%)		
Laboratory technicians								
Numbers	1	2	3	4				
A =19(100%)	2(10.5%)	9(47.4%)	4(21.1%)	4(21.1%)				
Pharmacists								
Numbers	1	2	3					
A =19(100%)	15(78.9%)	2(10.5%)	2(10.5%)					
Pharmacy technicians								
Numbers	1	2	3	4				
A =19(100%)	3(15.8%)	10(52.6%)	4(21.1%)	2(10.5%)				
Record officers								
Numbers	2	3	4					
A =19(100%)	13(68.4%)	5(26.3%)	1(5.3%)					
Social workers								

Numbers	0	1						
NA=18(94.7%)	18(94.7%)							
A= 1 (5.3%)		1(5.3%)						
Health educators								
Numbers	0	1	2	5				
NA= 8(42.1%)	8(42.1%)							
A= 11 (57.9%)		9(47.4%)	1(5.3%)	1(5.3%)				
Mentor mothers								
Numbers	0	1	2	3				
NA= 5(26.3%)	5(26.3%)							
A= 14 (73.7%)		7(36.8%)	6(31.6%)	1(5.3%)				
Computer Operators								
Numbers	0	3	4	5	6			
NA- 14(73.7%)	14(73.7%)							
A= 5(26.3%)		2(10.5%)	1(5.3%)	1(5.3%)	1(5.3%)			

Source: Field work, 2020

key Note: NA= Not Available; A=Available.

Computer operators were 73.7% unavailable, social workers 94.7% unavailable, and health educators 42.1%, unavailable, while doctors, nurses, pharmacies, pharmacy technicians,

medical laboratory scientists and medical record officers were 100% available in all the selected facilities.

Table 3. Availability of PMTCT services at the selected health facilities in Lagos State

S/N	PMTCT services	Available and functional	Available not functional	Not available
1.	Antenatal clinic	ALL	-	-
2.	Voluntary counselling and testing	ALL	-	-
3.	Antiretroviral therapy	ALL	-	-
4.	Antiretroviral prophylaxis for expose infants	ALL	-	-
5.	Safer delivery practice	ALL	-	-
6.	Safer infant feeding practice	ALL	-	-
7.	Family planning services	ALL	-	-
8.	Post-natal services	ALL	-	-
9.	Early infant diagnosis	ALL	-	-
10.	follow up care	ALL		

Source: Field work, 2020.

Table 3 revealed the availability and functionality of PMTCT services among the selected health facilities. The findings showed

that all the recommended PMTCT services were available and functional in all selected health facilities in Lagos State.

Table 4. Correlation between available structures and prevention of mother to child transmission of HIV services in selected health facilities in Lagos State

		Availability structures	Remarks
PMTCT services	Pearson correlation Sig. (2-tailed) N	0.347 .0146 19	There is a positive significant relationship between structure and PMTCT services

*Correlation is significant at the 0.05 level (2-tailed).

The results revealed a positive significant relationship between the available structures and PMTCT services ($r = .347$; $p=0.0146 < .05$). The statement which stated that “There will be no significant relationship between the available structure and PMTCT services” was thereby

rejected by this finding. This implies that availability of structures, resources, equipment/supplies have a positive significant relationship with PMTCT services provided as shown in table 4.

Table 5. Numeracy count of the outcome of PMTCT service, based on the selected health facilities in Lagos State, Nigeria 2017-2019

Type of facilities	Key	Exposed infants after 18mths	Negative infants to HIV	Positive infants to HIV	Exposed babies exclusively breastfeed	Number of exposed babies, fed on infant formula	Number of exposed babies with mixed feeding
Primary	1	38	36	2	34	4	0
Secondary	2	220	212	8	208	10	2
Secondary	3	160	158	2	156	4	0
Primary	4	21	19	3	21	0	0
Secondary	5	108	105	3	104	4	0
Primary	6	17	17	0	17	0	0
Primary	7	23	23	0	23	0	0
Primary	8	90	85	5	90	0	0
Primary	9	59	57	2	59	0	0
Primary	10	23	23	0	22	1	0
Primary	11	72	71	1	66	5	1
Primary	12	28	27	1	28	0	0
Primary	13	18	16	2	18	0	0
Primary	14	16	16	0	16	0	0
Primary	15	73	71	2	69	3	1
Primary	16	53	52	1	53	0	0
Secondary	17	274	270	4	260	10	4
Primary	18	58	55	3	52	5	1
Tertiary	19	263	257	6	245	14	4
		1615	1570 (97.2%)	45 (2.8%)	1541 (95.4%)	61 (3.8%)	13 (0.8%)
N (%)	-	-	-	-	-	-	-
Primary 14(73.7%)	-	-	-	-	-	-	-
Secondary 4(21.1%)	-	-	-	-	-	-	-
Tertiary 1(5.3%)	-	-	-	-	-	-	-

Source: Field survey, 2020

A total of 1615 infants who completed PMTCT programme between January 2017 and December 2019 was recorded out of which 1570 (97.2%) were negative to HIV infection while 45 (2.8%) were positive. 1541 (95.4%) of these infants were exclusively breastfed, 61 (3.8%) were fed with infant formula while 13 (0.8%) with mixed feeding.

Discussion

The study shows that majority of the structures, resources needed for PMTCT services in terms of equipment/supplies were available and functional in all of the selected health facilities, however, CD4 count machines are not available in most the health facilities, this shows

there were minimum requirements for PMTCT at each facility evaluated to offer PMTCT services. This finding is in agreement with submission of Ashipa and Ighedosa (2016) who found out that all assessed facilities met the minimum requirements for PMTCT site and there was availability of needed materials/resources for PMTCT services. This study also reveals the availability of PMTCT service structure in terms of manpower (health care providers) in all selected facilities, doctors, nurses/midwives, pharmacies, pharmacy technicians record officers, laboratory scientist, laboratory technicians were 100% available in all the facility types (primary, secondary and tertiary health facilities), this is in collaboration with Tanzanian PMTCT guide on Organization of the PMTCT Programme, a successful PMTCT programme requires the support and cooperation of the entire health team in the facility. Team members include: doctors, nurses and midwives, laboratory personnel, pharmacists, records personnel, administrative staff, social workers and nutritionists where available. Therefore, availability of manpower in the facilities makes functional all the equipment supplied. Meanwhile, some set of the health workers were not always available they are: Community Health Officers and Community Health Extension Workers were 68.4% available, but they are always available at primary health facilities, social worker 5.3%, health educator 57.9% mentor mothers 26.3% and computer operators were 26.3% available, the unavailability of these man power may affect the strength of the service provided.

The findings showed that all the recommended PMTCT services were available and functional in all selected health facilities in Lagos State due to its basic needs. These services are: antenatal care, Voluntary Counselling and Testing, Antiretroviral therapy and prophylaxis, safer delivery practices, safer infant feeding practices, family planning, postnatal, early infant diagnosis and follow-up care as specified in the National PMTCT Guidelines, 2010. Also corresponds with WHO, (2015) PMTCT services recommendations, who found that the risk of MTCT can be reduced to less than 2% by interventions given to HIV positive women in pregnancy, labour and during breastfeeding, also, ARV prophylaxis giving to exposed infants. Numeracy count of the outcome of PMTCT

service, based on the selected health facilities in Lagos State, between January 2017 to December 2019 revealed that 2.8% of all recorded exposed infants in PMTCT child register of all selected health facilities were positive to HIV infection, therefore, this result is in support with the submission of Avert, (2019) that antiretroviral treatments and other interventions can reduce the risk of mother to child transmission of HIV to less than 5% against 15 – 45% risk without treatments.

This finding revealed a positive significant relationship between the available structures and PMTCT services ($r = .347$; $p = 0.0146 < .05$). This finding conforms with a study conducted by Kwasi and Tropey, (2010) on increasing the uptake of prevention of mother to child transmission of HIV services in a resource-limited setting, it was concluded that the uptake of PMTCT services depends on the availability of structure and resources, therefore, shortage of both human and material resources will adversely affect the availability of PMTCT services in a facility.

Conclusion

Based on the findings of the study, it is concluded that majority of the structures in terms of equipment/supplies and manpower were available and functional. In view of this, availability of structures, resources, equipment and supplies have significant influence on prevention of mother to child transmission of HIV services. Also, PMTCT services have influence on the final outcome of exposed infants.

Recommendations

The National guidelines on PMTCT of HIV services should be strictly followed and adhered to Unavailable structures in terms equipment/supplies should be supplied like, CD4 count machine, in order to strengthen PMTCT service provisions.

References

- [1]. Adeleke, S., Mukhtar-Yola, M., Gwarzo, D., & Ladan, Z.F. (2009). Preliminary investigation of adherence to antiretroviral therapy among children in Aminu Kano Teaching hospital, Nigeria African journal of AIDS Research, 5 (2), 141-144.
- [2]. Agboghroma, C.O., Sagay, S.A., & Ikechebelu, J.I (2013). Nigeria prevention of mother to child transmission of human Immuno deficiency Virus.

Journal of HIV and Human Reproduction. Retrieved from www.j-hhr.org

[3]. Ammann, A., Hernandez, W., Goyanes, M., Miguez, M.J., & Shor-Posner, G. (2017). Prevention of Mother-to-Child Transmission (PMTCT) of HIV. Retrieved from <https://doi.org/BMJ>, 329 (7475), 1147-1150.

[4]. Avert, (2019). Global information and education on HIV and AIDS. Retrieved from www.avert.org.

[5]. Bokharai, S.F., Jarchi, M., Esghaei, M., Kiani, S.J (2018). The frequency of HIV -1 Infection in Iranian children and determination of the Transmitted Drug Resistance in treatment –naïve children. Current HIV Research journal retrieved from <http://doi.10.2174/1570162x17666191106111211>

[6]. Chukwuemeka, I.K., Fatima, M.I., Ovavi, Z.K., & Olukayode, O., (2014). The impact of HIV prevention of mother to child transmission program in a Nigerian early infant diagnosis centre. Niger Med J, 1 (3), 204–8.

[7]. Cleary, Paul D., & O'kane, & Margaret E. (2014). Evaluating the Quality of Health care: Comparati effectiveness of congregation versus clinic-based approach to prevention of mother-to-child HIV-transmission: Study protocol for a cluster randomized controlled trial. Retrieved from <http://www.esourceresearch.org/tabid/794/default.aspx>.

[8]. Dabis, F. (2014). Prevention of mother to child Transmission of HIV: Evaluation Centre. Evaluation of a Pilot Programme in a District Hospital in rural Zimbabwe. Retrieved from www.wmich.edu/evalctr/checklists/cippchecklist.htm.

[9]. Fasawe O, Avila C, Shaffer N, Schouten E, & Chimbwandira Fl. (2013). Cost-effectiveness analysis of Option B+ for HIV prevention and treatment of mothers and children in Malawi. Retrieved from <http://www.pubmedcentral.nih.gov/articlerender.fcgi>.

[10]. Federal Government of Nigeria, (2010). National Guidelines on Prevention of Mother to Child Transmission (PMTCT) of HIV in Nigeria. 4th Ed. Abuja.

[11]. Federal Ministry of Health (2009). Technical Report 2008 National HIV sero-prevalence sentinel survey among women attending antenatal clinics in Nigeria. National AIDS/STI Control Programme (NASCP). Abuja.

[12]. Federal Ministry of Health, (2008). Technical Report 2008 National HIV sero-prevalence sentinel survey among women attending antenatal clinics in Nigeria. National AIDS/STI Control Programme (NASCP). Abuja.

[13]. Ferguson, W., Goode, M., Walsh, A., Gavin, P., & Butler, K. (2011). “Evaluation of 4 weeks' neonatal antiretroviral prophylaxis as a component of a prevention of mother-to-child transmission program in a resource-rich setting,” *Pediatric Infectious Disease Journal*, 3 (5), 408–412.

[14]. Hill, A., Dauncey, T., Levi, J., Heath, K., & Pérez, C. (2015). Higher risks of mother-to-child HIV transmission in countries with lower HIV prevalence: UNAIDS 2013 results for 32 countries with generalised epidemics. *Journal of Virus Eradication*. Retrieved from <https://doi.org/PMid>: 2748242 PMCID: PMC4 946657.

[15]. Horwood, C., Haskins, L., Vermaak, K., Phakathi, S., Subbaye, R., & Doherty, T. (2015). Prevention of Mother to Child Transmission of HIV (PMTCT) programme in KwaZulu-Natal, South Africa: an evaluation of PMTCT implementation and integration into routine maternal, child and women's health services. *Trop Med Int Health*, 15 (9), 992–9.

[16]. Iregbu, C.I., Fatimo, I., Kabiru, Z.K., & Olukayode, O. (2014). The impact of a HIV prevention of mother to child transmission program in a Nigerian early infant diagnosis centre. *Niger Med Journal*, 55 (3), 204-208.

[17]. Marilyn, K., Simon, & Jim G. (2013). Dissertation and scholarly research: Expost facto research; Recipes for success. Retrieved from www.dissertationrecipes.com.

[18]. Mateus R, Bolzan A, Gomes P, Brito J, Carvalho AP, & Cardoso Y. (2014). Cost-effectiveness of early infant HIV diagnosis of HIV-exposed infants and immediate antiretroviral therapy in HIV-infected children under 24 months in Thailand. *Journal medi*, 9 (3), 914.

[19]. Myer, L., Phillips, T., Zerbe, A., (2018). Integration of postnatal services improves MCH and ART National Agency for the Control of AIDS. Retrieved from <http://dx.doi.org/10.1371/journal.pmed.1002547>.

[20]. NACA, (2011). Fight AIDS to finish: update on HIV/AIDS epidemic and response in Nigeria. Retrieved from <http://naca.gov.ng/content/view/423/lang.en/#epidemiology>.

[21]. Neubert, J., Pfeffer, M., & Borkhard, A. (2013). “Risk adapted transmission prophylaxis to prevent vertical HIV-1 transmission: effectiveness and safety of an abbreviated regimen of postnatal oral Zidovudine,” *BMC Pregnancy and Childbirth*, 13 (22), RF <https://doi.org/>

[22]. Nielsen-Saines, K., Watts, D.H., & Veloso, V.G. (2012). “Three postpartum antiretroviral regimens to

prevent intrapartum HIV infection,” *The New England Journal of Medicine*, 366 (25), 2368–2379.

[23]. Perez, F., Orne-Gliemann, J., Mukotakwa, T., Miller, A., Glenshaw, M., Mahomva, A., Perez, T., Peña, R.R.N., Tavaréz-Rojas, M., Peña, C., Quiñonez, S., Buttler, M., Ammann, A., Hernandez, W., Goyanes, M., Miguez, M.J., & Shor-Posner, G. (2014). Preventing Mother –to-Child HIV Transmission in a Developing Country: The Dominican Republic Experience. *JAIDS*, 34 (5), 506–511.

[24]. Polit, D.F., & Beck, C. T. (2017). *Nursing Research: Generation and Assessing Evidence for Nursing practice* (10th ed) Wolters Kluwer, Philadelphia programmes with other health services for preventing HIV infection and improving HIV outcomes in developing countries. Retrieved from <https://www.ncbi.nlm.nih.gov/pubmed/21678382>.

[25]. Radin, A. K., Abutu, A. A., Okwero, M. A., Adler, M. R., Anyaike, C., & Asiimwe, H. T., (2017). Confronting challenges in monitoring and evaluation: Innovation in the context of the global plan towards the elimination of new HIV infections among children by 2015 and keeping their mothers alive. *Journal of Acquired Immune Deficiency Syndromes*, 75 (1), 66–75.

[26]. Redmond, A.M., & McNamara, J.F., (2015). The road to eliminate mother –to- child HIV transmission. *Journal pediatr (Rio J)* 91 (6), 509–511.

[27]. UNAIDS, (2016). United States Presidents Emergency Plan for AIDS Relief (PEPFAR), United Nations Children's Fund (UNICEF), On the Fast-Track to an AIDS-Free Generation: The Incredible Journey of the Global Plan Towards the Elimination of New HIV Infections Among Children by 2015 and Keeping Their Mothers Alive. Geneva, Switzerland.

[28]. UNAIDS, (2015). Global Plan Progress Report: Towards the Elimination of New HIV Infections Among Children and Keeping Their Mothers Alive. Geneva, Switzerland.

[29]. Warren, Charlotte E., Abuya, Timothy, Kanya, Lucy, Obare, Francis, Njuki, Rebecca, Temmerman, Marleen and Bellows, Ben (2015) A cross sectional

comparison of postnatal care quality in facilities participating in a maternal health voucher program versus non-voucher facilities in Kenya. *BMC Pregnancy and Childbirth*, 15 (1). 1471–2393.

[30]. Wiegert, K., Dinh, T.H., Mushavi, A., (2014). Integration of prevention of mother-to-child transmission of HIV (PMTCT) postpartum services with other HIV care and treatment services within the maternal and child health setting in Zimbabwe, Retrieved from <https://www.ncbi.nlm.nih.gov/pubmed>

[31]. World Health Organization, (2019). Global Health Observatory (GHO) data, Retrieved from https://www.who.int/gho/hiv/epidemic_response/PM TCT_text/en/

[32]. World Health Organization, (2015). Guideline on when to start antiretroviral therapy and on pre-exposure prophylaxis for HIV'. Retrieved from <https://apps.who.int/irrs/bitstream>

[33]. World Health Organization (2016) United Nations Children's Fund (UNICEF), Elizabeth Glaser Pediatric AIDS Foundation. The Double Dividend: A Synthesis of Evidence for Action to Improve Survival of HIV “Exposed” Children in the Era of EMTCT and Renewed Child Survival Campaigns. New York. Retrieved from <http://www.childrenandaids.org/css/Synthesis>

[34]. World Health Organization. (2016) Consolidated Guidelines on the use of Antiretroviral Drugs for Treating and Preventing HIV Infection: Recommendations for a Public Health Approach. Geneva: World Health Organization. Retrieved from <http://apps.who.int/iris/bitstream>.

[35]. World Health Organization, (2016). Mother-to-child transmission of HIV; 2016. Technical Consultation on the Integration of HIV Interventions into Maternal, New-born, and Child Health Services. Report of a WHO Meeting, Geneva, Switzerland, Retrieved from <http://apps.who.int/iris/bitstream>.

[36]. World Health Organization, (2010). Antiretroviral drugs for treating pregnant women and preventing HIV infection in infants. Retrieved from <http://apps.who.int/iris/bitstream>.