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Collaborative Approach to Prevent Leprosy and HIV Coinfection in Abia, Ebonyi and Oyo States of Nigeria - Best Practices for a Healthier Population

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1. Introduction

The human immunodeficiency virus (HIV) pandemic has disproportionately affected many developing countries including Nigeria especially where dermatoses like leprosy is endemic. Though leprosy is an infectious disease, the risk of developing it is low. It is estimated that about 16,000 people are infected with leprosy annually. Early in the HIV epidemic, researchers feared that HIV infection would threaten leprosy control programmes, as have occurred with tuberculosis. It was suspected that patients with leprosy and HIV infection would have increased risk of lepromatous disease as well as clinical advancement. Moreover, that treatment for leprosy with HIV coinfection would be very difficult. Incidentally, reports on these concerns are to the contrary unlike what was noted with HIV and tuberculosis interaction. This paper, which will be organized in four sections, describes the various public health disease control programmes for leprosy and HIV infections in Nigeria. It details interaction between leprosy and HIV infection by evaluating and presenting the current situations. The paper will review the risks patients with leprosy and HIV coinfection face in clinical evolution, and likely difficulties encountered during treatment. Strengths and weaknesses in the entire programmes will be emphasized.

The potent effects of leprosy and HIV infections on the human immune system, and the dearth of current information on the prevalence of co-infected patients make this area of investigation necessary. The review of the epidemiological, clinical, and pathological data relating to leprosy and HIV coinfection will provide information on the interaction between leprosy and HIV in developing countries. This will give insight to the problem by providing proper understanding of the classification system of the interaction which includes (1) leprosy and HIV true coinfection, (2) opportunistic leprosy disease, and (3) leprosy related to highly active antiretroviral therapy. Therefore, research on clinical, and management aspects of this coinfection is reviewed.

In this review, some studies confirmed that in developing countries, there exists large cohort of patients concurrently infected with HIV and M. leprae. Sparse but provoking evidence exists that infection with HIV may increase the incidence of leprosy among individuals with sub-clinical infection with M. leprae. Similarly, it was postulated that concurrent infections with certain other viral and bacterial pathogens in HIV-positive patients may aggravate mycobacterial leprae disease and accelerate the progress of HIV infection to AIDS. The interplay between HIV and leprosy infection and the impact on the lives of the cases is highlighted. Possible effects of HIV epidemic on leprosy control programmes and few guidelines for the clinical care of co-infected patients as outlined by the World Health Organization (WHO) are emphasized. Also the WHO responses to conventional therapeutic regimens which appear to be excellent, though, no follow-up data were observed even in larger reported field studies are indicated. The introduction of highly active antiretroviral therapy (HAART) for HIV has been lifesaving, but few patients undergoing HAART are reported to experience clinical deterioration caused by immune reconstitution inflammatory syndrome (IRIS). For leprosy, it can be easily treated with 6-12-months course of multi-drug therapy (MTD). This treatment has been highly effective with few side effects; low relapse rates and no known drug resistance was noted. Although some researchers argue that treating leprosy patients with HIV coinfection may not affect public health services but the true effect remains to be clarified because leprosy has a wide range of clinical manifestations, which sometimes impose a clinical challenge that leads to misdiagnosis. If coinfection is properly documented it may help to unmask the true scenario of leprosy and HIV co-infection, particularly in areas where these disease conditions are highly endemic.

Further the paper describes significant contributions made by the government, stakeholders and International organizations of Anti-Leprosy Associations (ILEP) like, Damien Foundation of Belgium (DFB), German Leprosy and Tuberculosis Relief Association (GLRA), Netherlands Leprosy Relief (NLR) and others towards the well-being of those affected by leprosy and HIV.

Although awareness of the relevance of leprosy and human immunodeficiency virus (HIV) coinfection is increasing worldwide, there is need for research on leprosy and HIV coinfection in a developing country like Nigeria because several aspects of this coinfection is yet to be understood. This means that co-infection with human immunodeficiency virus (HIV) and *Mycobacterium leprae* represent unique opportunities for more investigation on the interaction between both pathogens.

In this paper, report of 3 leprosy patients who were diagnosed HIV-positive patients and were on HAART initiation as well as on multidrug therapy (MTD), will be reported. The 3 patients were among the sample studied in three leprosy settlements who were infected with leprosy and HIV co-infection. During the study, there were misconceptions that HIV could be transmitted through casual social contact and saliva. This was influenced by the patients' behavior as they reported that they avoided interactions with some family members. For instance, one of the patients commented that: "because of the fear that her daughter will get HIV, she stopped cooking, bathing and drinking from same cup with her daughter."

This paper includes counseling as an important technique in improving HIV related knowledge among the sample. The paper further highlights the beneficial effects of peer counseling as an intervention. Leprosy has now been reported as presenting immune

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reconstitution disease among patients commencing highly active antiretroviral treatment (HAART). Little or no studies in interactions between leprosy and HIV are available. Therefore, further research on all aspects of the coinfection especially the clinical and management aspects are warranted.

Assessment of leprosy and HIV control programmes is an essential component of intervention research effort aimed at addressing the strengths and limitations of the programmes for optimum benefit of the patients. Assessing available services is part of Public Health intervention that fills an important gap in the literature for public health researchers, practitioners, scholars, trainers, donors and students. This study is necessary because the well-being of those with leprosy and HIV should attract attention in research. The study will help in generating resources for academic contributions.

For the purposes of organizing this work, there will be four sections. The first section provides background information on leprosy and HIV work in Nigeria. It will emphasize the design and implementation of public health disease control programmes by examining the strengths and weaknesses of the programmes.

The paper details interaction between leprosy and HIV infection by evaluating and presenting the current situations. The second section will review the risks patients with leprosy and HIV coinfection face in clinical evolution, and likely difficulties encountered during treatment. It will include the roles of international bodies, stakeholders and others in care and support of the patients. Highlight of the guidelines of the clinical care of co-infected patients will be emphasized. The third section contains interventions needed to improve HIV related knowledge among HIV positive individuals. Theoretical and practical bases for planning rehabilitation and other activities for patients will be highlighted. This section also contains information on how materials and financial supports are obtained for intervention services. Strategies for continuing the intervention beyond its initial phase will be noted. The true effects of public health services would be clarified because leprosy has a wide range of clinical manifestations. The final section examines current work and problems encountered by the patients as well as projecting future trends and/or activities useful in meeting the needs of the patients.

2. Background information on leprosy and HIV prevention programmes in Nigeria

This section gives some historical information on leprosy and HIV work in Nigeria. It outlines various prevention programmes and the organizations that supported these programmes. It gives account of how each disease prevention programme was conducted and highlights the progresses made. It starts with giving vivid account of how leprosy prevention programmes were conducted.

3. Leprosy prevention programmes

Leprosy work started in 1920s with the establishment of leprosy colonies where Christian Missionaries provided care and support to those infected. In other to assist these Missionaries and the Nigerian government to provide quality leprosy control programmes, International Federation of Anti-Leprosy Association (ILEP) Partners like Damien

Foundation of Belgium (DFB), German Leprosy and Tuberculosis Relief Association (GLRA) and Netherlands Leprosy Relief (NLR) volunteered material and human resources. Four events characterized this period. These are the establishment of high standard medical intervention for detecting and treating cases, building of leprosaria, working as advocates for those affected with leprosy, and providing personal and professional staff development to meet the needs of patients. These international organizations that pioneered these services during the Nigerian civil war(1966-1970) left to their respective countries and handed over the management of these services as well as the affairs of the leprosaria to the government and other interested stakeholders. The unstable nature of the social and economic well-being of Nigeria during the civil war affected the smooth running of leprosy programmes as well as that of the leprosaria. Most inmates took to the streets to beg for alms for survival.

4. Types of leprosy programmes carried out

Leprosy work in Nigeria concentrated on reducing the incidence of leprosy through early case detection and ensuring that Multi-drug Therapy and hospital services were widely available. A vital part of this work includes Prevention of Disability and rehabilitation of people affected by leprosy. The followings are the main leprosy control programmes conducted:

5. Orthopaedic project

Workshops for producing protective footwear and other orthopaedic gadgets were established. In these workshops protective footwear like sandals and other orthopaedic appliances to improve the quality of life of people affected by leprosy were produced and shared to those in need.

5.1 Training

Health workers were trained to detect and provide leprosy care. Also some inmates in the leprosaria were trained in crafts like weaving, tailoring, sewing, and others so as to enable them live a life of fulfillment. In addition, health education was used to create awareness at the grassroots on the cause and prevention of leprosy.

Also through training, discharged patients and their family members learnt how to protect themselves from injury and further disability using long term self care routines. This was considered very important because the patients were equipped with how to avoid ulcers, infections, as well as the benefits of strengthening exercises, and wearing protective footwear on anaesthetic feet.

5.2 Socio-Economic Rehabilitation (SER)

Through SER programmes, people affected by leprosy were empowered and enabled to become economically independent. Those who completed vocational training were allowed micro-credit schemes to enable them form cooperative where making and marketing of their local crafts and souvenirs were organized.

5.2 Leprosy referral hospital

A good number of the religious groups assisted with financial and professional support in the provision of services to people affected by leprosy. For instance, Church of Scotland Mission in 1927, Qua Iboe Church in 1932, and Methodist Church in 1937 established hospitals where healthcare services were provided to people affected by leprosy as well as to the local population. These hospitals accepted leprosy referrals from all over Nigeria. Patients self-help groups were formed after treatment. These groups were encouraged to regularly meet in their respective communities so as to support each other in self-care routines.

5.3 Advocacy

The Missionaries, in partnership with leprosy organizations, hospitals, governments and communities worked to reduce the negative attitudes surrounding leprosy. International networking and advocacy organizations served as a powerful voice for those stigmatized by leprosy. These organizations worked hard to eliminate leprosy as a public health problem. The activities they carried out in order to realize their aims laid solid foundations in attaining the goal of World Health Assembly proposal of 1991 in which leprosy as a public health problem was estimated to achieve a global level of leprosy prevalence of less than one case per 10 000 population in the year 2000. Consequently, the Strategic Plan for Leprosy Elimination for 2000-2005 was initiated to mobilize support by encouraging leprosy-endemic countries to ensure that leprosy services would be available and accessible to all persons affected by leprosy at their nearest health facility. Leprosy campaigns during this period centered on increased coverage through mass campaigns and a widespread reduction of the global prevalence of cases registered for treatment.

6. Community rehabilitation services

While much of the leprosy services concentrated on the medical by detecting, treating and curing those affected by leprosy, some aspects of holistic and integrated rehabilitation approaches like counseling, advocacy, distribution of mobility gadgets, micro-credit loan to cater for the needs of those affected by leprosy were undertaken. To ensure livelihoods and economic independence for these patients, they were encouraged to take up their traditional occupations, start new vocations or set up small businesses. This means that individuals were empowered to live productive and dignified lives, through improving mobility and creating opportunities to earn a living. By this method, beneficiaries became powerful advocates for reducing the stigma of leprosy in their respective communities. Also for those with disabilities, physiotherapy and mobility aids were provided.

7. Background information on HIV prevention programmes in Nigeria

HIV and AIDS were first noted in Nigeria in 1985. In 1987 the Nigerian health sector established the National AIDS Advisory Committee (NAAC) and the National Expert Advisory Committee on AIDS (NEACA). These two committees were charged with matters connected with HIV and AIDS prevention. In 1991, exactly four years after forming the two committees, the Federal Ministry of Health on assessing Nigeria's AIDS situation, noted that the government was slow in responding to the increasing rates of HIV transmission. The

results of the Federal Ministry of Health's assessment showed that HIV prevalence rose from 3.8% in 1993 to 4.5% in 1998 indicating urgent intervention to slow the trend.

In 1999, when Olusegun Obasanjo became the president of Nigeria, meaningful progress in the activities of HIV prevention, treatment and care in Nigeria was noticed. During this period, HIV and AIDS prevention and control became one of the government's primary concerns. To assist him realize the goal of increasing HIV prevention to reduce HIV prevalence in Nigeria, the President formed Presidential Committee on AIDS (PCA) as well as the National Action Committee on AIDS (NACA). Subsequently, the government formed the corresponding Committees on HIV and AIDS at State level, State Action Committee on AIDS (SACA) and at Local Government level, Local Action Committee on AIDS (LACA). Consequently, the government in 2001 set up strategies for achieving these goals by outlining a three-year HIV and AIDS Emergency Action Plan (HEAP).

Despite the government's efforts to control HIV epidemic, by 2006 it was noted that only 10 percent of HIV-infected individuals were receiving antiretroviral therapy while 7 percent of pregnant women were receiving treatment to reduce the risk of mother -to -child transmission of HIV.

Ten years after establishing NACA, precisely in 2010, NACA launched its comprehensive National Strategic Framework to cover 2010 to 2015 implementation of HIV prevention. The aims of this framework are to:

- reach 80 percent of sexually active adults and most at-risk populations with HIV counselling and testing by 2015;
- ensure that 80 percent of eligible adults and 100 percent of eligible children are receiving anti-retroviral therapy (ART) by 2015 and,
- to improve access to quality care and support services to at least 50 percent of people living with HIV by 2015.

Despite the laudable aims of National Strategic Framework as itemized, Nigeria being the largest oil producing country in Africa, and the 12th largest in the world, is still faced with huge financial challenges in fighting its HIV and AIDS epidemic. It has been estimated that the Nigerian government is contributing only 5 percent of the funds for the antiretroviral treatment programmes. The majority of the funding comes from development partners like, in 2002, the World Bank alone loaned US\$90.3 million to Nigeria to support her 5-year HIV/AIDS Programme Development Project. In 2008 PEPFAR provided US\$448 million to Nigeria for HIV/AIDS prevention, treatment and care while Global Fund offered US\$95 million to expand treatment, prevention, and prevention of mother-to-child transmission programmes.

8. How HIV is transmitted in Nigeria

It has been documented that in Nigeria, HIV is transmitted by three main routes such as:

- Heterosexual sex, this accounts for approximately 80-95 percent of HIV infections in Nigeria. Factors that contribute to this mode of HIV transmission include lack of information about sexual health, low levels of condom use, and high prevalence of sexually transmitted diseases among adolescents. Reports have shown that females are more affected by HIV infection than males. For instance, in 2009 females accounted for 56 percent of all adults aged 15 and above living with HIV virus.
- **Blood transfusions,** this second mode of HIV transmission accounts for the second largest source of HIV infection in Nigeria. It is disheartening to note that some Nigerian

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hospitals do not have the technology to effectively screen blood and thereby exposing individuals to the risk of using unsafe or contaminated blood. To check this ugly trend, the Nigerian Federal Ministry of Health have sponsored a legislation that requires hospitals to only use blood from the National Blood Transfusion Service, which is assumed has far more advanced blood-screening technology than other hospitals. However, it has been noted that not all hospitals use blood from the National Blood Transfusion Service.

- **Mother-to-child transmission**, this is the third mode of HIV transmission. It is estimated that 360,000 children are living with HIV in Nigeria. Most of these children were infected from their mothers.

A number of studies have indicated a rise in HIV prevalence among injecting drug users. Although HIV transmission through injecting drug is not among the main HIV transmission routes, there is need to mention it because reports show that HIV transmission through injecting drug use now account for an increasing number of new HIV infections.

HIV treatment and care in Nigeria

In early 1990s when antiretroviral drugs (ARVs) were introduced in Nigeria, the drugs were only available to those who paid for them. The drugs were unaffordable because the overwhelming majority of Nigerians were living on less than \$2 a day. That is, only the wealthy minority was able to afford the treatment.

In 2002 the Nigerian government introduced antiretroviral treatment programme, which was aimed at providing treatment to 10,000 adults and 5,000 children yearly. To realize this aim, \$3.5 million worth of ARVs were imported from India. This was to be delivered at a subsidized monthly cost of \$7 per person. At this time the programme was applauded because it was regarded as 'Africa's largest antiretroviral treatment programme. Two years later, precisely in 2004, the programme suffered a major setback. There was an expanding waiting list of patients because of lack of drugs to meet the high demands. Some patients waited for more than three months before receiving more drugs. The result was that patients who were on treatment had to wait for three to four months before more drugs were supplied. This caused severe reverse to the progress the drugs had already made thereby increased the risk of HIV resistance to the ARVs.

To this end, the Nigerian government had to set 2010 as the year of providing universal access to HIV prevention, care, and treatment. The government outlined and implemented a number of strategies to scale up HIV prevention as follows:

Sex education

The discussion of sex with teenagers in Nigeria is often seen as a taboo. Attempts to provide sex education to young people are usually hindered by religious and cultural objections. In 2009, only 23 percent of schools provided HIV education, and just 25 percent of men and women between the ages of 15 and 24 could correctly identify ways to prevent sexual transmission of HIV without any misconceptions about HIV transmission.

In most regions of Nigeria, girls marry relatively young, and most times, to much older men. For instance, in North Western Nigeria, half of the girls marry between the ages of 15 to 18 years. Studies have confirmed that women who marry at a younger age lack correct knowledge about HIV and AIDS than those who marry later in life. To this group of women, it is assumed that they were not exposed to sex education especially HIV and AIDS before marriage. Studies have recommended that HIV and AIDS education initiatives should center on this class of young married women, because of their limited knowledge of health information.

9. Condom use

Restrictions on condom promotion by individuals especially religious leaders hampered HIV prevention efforts in Nigeria. Religious leaders saw condom as a taboo and therefore condemned its use. As a result, most adolescents use condom clandestinely. In 2001, a radio advertisement by the Advertising Practitioners Council of Nigeria (APCON) was suspended because they promoted messages suggesting that it is safe to engage in premarital sex as long as a condom is used. Members of the religious bodies frowned at this and cautioned the advertising company to desist from such advertisement in the interest of youths. In 2006 APCON also started another advertisement on condom and this time it enforced stricter regulations on condom advertisements that encouraged 'indecency in the use of condom. By APCON's advertisement, youths were advised to ensure that they carry with them condom always.

10. Media campaigns and public awareness

Several people in different parts of Nigeria were reached using media campaigns. Media campaigns are useful because they are the practical ways of reaching many people to raise HIV awareness. For instance, "Future Dreams", radio campaign programmes created by the Society for Family Health in 2001 have recorded tremendous success in increasing knowledge and changing behaviour of many individuals on HIV and AIDS. "Future Dreams" are serial broadcast made in nine different languages on 42 different radio channels which focused on encouraging consistent condom use, increasing knowledge and skills for condom negotiation among sexually active individuals between the ages of 18 and 34.

In 2005, another campaign, which raised more public awareness of HIV/AIDS than others, was launched in Nigeria. This campaign sent text messages with information about HIV/AIDS to at least 9 million owners of mobile phones.

Further, a high profile media campaign to create more HIV awareness was fronted by Femi Kuti, the son of Fela Kuti, the famous Afrobeat musician who died of AIDS in 1997. Fela Kuti's pictures were put on billboards alongside the roads throughout Nigeria with the slogan 'AIDS: No dey show for face', which means you can not identify someone who has AIDS by looking at the face. This message was very popular and had a lot of impression on youths who desired to prevent HIV infection.

11. Prevention of mother-to-child transmission of HIV

The programme to prevent the transmission of HIV from mother to child (PMTCT) started in Nigeria in July 2002. Initially, this programme of strengthening PMTCT interventions, suffered a major setback due to inaccessibility and un-affordability of anti-retroviral drugs. Records in 2007 show that only 5.3 percent of HIV positive women are on antiretroviral drugs to reduce the risk of mother-to-child transmission. However, by 2010, the percentage

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of HIV positive women on antiretroviral drugs rose to 22 percent, but still this falls far short of the recommended universal access targets.

12. HIV testing programmes

In 2007, only 3 percent of the health facilities in Nigeria had functional HIV testing and counselling services. Also 11.7 percent of women and men aged 15-49 had received an HIV test to find their sero-prevalence.

In 2009 HIV counseling services translated to merely one HIV testing and counselling facility for approximately every 53,000 Nigerian adults. This shows the extent to which the government desperately needs to scale up HIV testing and counseling services. There is evidence to show that in Nigeria, health care facilities that offer HIV testing scarcely follow the international standards on confidentiality and ethics. For instance, a survey carried out on HIV testing showed that half of the people interviewed reported that they were not aware that they were being tested for HIV virus. Also one in six health care professionals interviewed admitted that they do not receive informed consent for HIV tests before they test their clients.

The government's National HIV and AIDS Strategic Framework for 2005 to 2009 planned to provide ARVs to 80 percent of individuals with advanced HIV infection as well as 80 percent of HIV-positive pregnant women by 2010. However, out of this goal, only 31 percent of people who needed treatment for advanced HIV infection received it. There is need to beef up HIV counseling and testing services to meet the needs of clients.

13. Constraints in providing disease control programmes

In Nigeria, several constraints are encountered in the process of carrying out disease control programmes. For instance, there is a distinct lack of political will among some of the leaders. Disease prevention programmes on both leprosy and HIV are poorly funded by government. These leaders, by their actions lack the intention to ensure sustainability of disease control programmes. They do not promote integration within the general health system. This results to lack of focus on issues that encourage quality services, especially to the underserved communities. There is no effective partnerships that would further reduce the disease burden. Another constraint is government's poor implementation of the country's specific strategies and plans of action aimed to sustain and provide high quality services to individuals and their families affected by leprosy and/or HIV. Therefore, there should be activities based on current evidence, professional knowledge and best practices for the implementation of leprosy and HIV coinfection control. This will ensure that laws and policies that would encourage the mitigation of HIV and institutionalization of best practices in care and support for people living with HIV and AIDS are maintained.

Nigeria's public health care system has deteriorated because of lack of resources and more especially, a "brain drain" of Nigerian doctors and nurses to other countries. Because Nigeria is yet to fully recognize the gravity of the epidemic of leprosy and HIV, provision of care, treatment, and prevention services to those with coinfection remains inadequate and the level of unmet need continues to increase.

The fact is that resources needed to provide sufficient treatment and care for those affected by leprosy and HIV in Nigeria are seriously lacking. Health workers lack sufficient training on treatment and disease prevention techniques especially on leprosy and HIV. Also a good number of the health facilities lack enough medications, equipment and materials for disease control activities.

Leprosy and HIV coinfection

The current situation concerning leprosy endemicity and HIV prevalence in Nigeria as well as in other developing countries emphasizes the importance of monitoring co-infections. Leprosy takes a long time to develop and patients may die from other causes resulting from HIV infection before leprosy becomes clinically apparent. The effect of this is a lowering of resistance to a wide range of opportunistic and other infections. Lepromatous leprosy may make the patient more susceptible to HIV, since leprosy also presents with a depression in the cell-mediated immunity (CMI) to M. leprae. Therefore, it is essential to detect HIV infection in areas where leprosy is endemic for a better understanding of the risk of spreading the mycobacterial disease in the community. Co-infections with human immunodeficiency virus (HIV) and *Mycobacterium leprae* represent unique opportunities for investigating the interaction between both pathogens.

The present study was undertaken to find out the prevalence of HIV infection in the population of those affected by leprosy. The low percentage of HIV infection among these leprosy patients suggests that HIV does not pose a serious problem in already M. leprae-specific subjects. The clinical presentation and disability grade of HIV infected leprosy patients were similar to that of leprosy patients without HIV infection. Our results indicate that HIV infection does not contribute to a more serious clinical presentation of leprosy among leprosy patients in leprosy settlements.

Although many studies reported more seropositivity in lepromatous patients than in tuberculoid patients, in our study no clear association between these groups was noted. Various other studies have also noted a similar non-association between BL/LL leprosy and HIV. Further, some authors stressed that leprosy could develop with HIV infection. However, in the present study, none of the leprosy patients reported being infected with HIV before leprosy infection.

Three case reports of leprosy patients who developed human immunodeficiency virus (HIV) infection are presented. The three co-infected leprosy patients were among the 227 leprosy patients studied in the three settlements in Nigeria. The coinfected patients were on highly active antiretroviral therapy (HAART). The result indicates low prevalence of leprosy and HIV coinfection. However, the reports from the three patients suggest that they had leprosy acute inflammatory episodes which probably were triggered off by HAART immune reconstitution.

Therefore, coinfection is possible because during the study, a good number of the patients were seen either pregnant or nursing babies without being properly married. This suggests that multiple sexual relationships were common among the leprosy patients in the settlements. The leprosy patients studied showed poor knowledge of HIV modes of transmission. For instance, during the study, there were misconceptions that HIV could be transmitted through casual social contact and saliva. This was influenced by the patients' behavior as they reported that they avoided interactions with some family members so as to protect them from being infected. For example, one of the patients commented that: "because of the fear that her daughter will get HIV, she stopped cooking, bathing and

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drinking from same cup with her daughter." To further show scanty knowledge about HIV transmission among the patients, the study noted that scarcely could 20% of the patients give two correct modes of HIV transmission during counselling. This suggests that national HIV prevention programmes may not be available to the leprosy patients. These observations suggest the need to include leprosy patients in national HIV prevention programmes.

The present study was considered necessary because understandably, leprosy and HIV infections are both greatly feared in developing countries because of the stigma, rejection and ostracism individuals affected by the two attract in the society.

In conclusion, the prevalence of HIV and leprosy coinfection in leprosy settlements in Nigeria is low. It can be said that HIV related knowledge among the patients was very low and positively influenced by HIV counseling. In addition, counseling by peers was effective in improving the knowledge of HIV among the patients. Hence, HIV related knowledge of these subjects should be assessed periodically and counseled.

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Microbes, Viruses and Parasites in AIDS Process Edited by Prof. VladimÃr Zajac

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The main goal in compiling this book was to highlight the situation in Africa in terms of AIDS and opportunistic diseases. Â Several chapters reveal great poverty, an apocalyptic situation in many parts of Africa. Â Global migration of people resulted in their exposure to pathogens from all over the world. This fact has to be acknowledged and accepted as African reality. New, unconventional hypotheses, not determined by established dogmas, have been incorporated into the book, although they have not yet been sufficiently validated experimentally. Â It still applies that any dogma in any area of science, and medicine in particular, has and always will hinder progress. According to some biologists, in the future, AIDS is very likely to occur in a number of variations, as a direct result of the ongoing processes in the global human society. Thus, we urgently need a comprehensive solution for AIDS, in order to be ready to fight other, much more dangerous intruders.

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