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The Emergence of New Antiretroviral Therapy (ART) Regimens in East Africa: Advancements, Challenges, and Future Directions

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ABSTRACT

The emergence of new Antiretroviral Therapy (ART) regimens has marked a transformative era in the fight against HIV/AIDS, particularly in East Africa, where the burden of the epidemic remains significant. This review explores the advancements in ART, including the introduction of novel drug classes such as Integrase Strand Transfer Inhibitors (INSTIs), Fusion Inhibitors (T-20), and Entry Inhibitors (CCR5 Antagonists), alongside the development of long-acting formulations like Cabotegravir (CAB) and Rilpivirine (RPV). These innovations have enhanced treatment efficacy and adherence, offering more convenient dosing schedules and reducing the pill burden for patients. However, the implementation of these new regimens faces challenges, including high costs, infrastructure limitations, and the need for specialized training for healthcare providers. The review also highlights the integration of HIV care with other health services, advancements in early detection and diagnostic technologies, and the implementation of Pre-Exposure Prophylaxis (PrEP) and Post-Exposure Prophylaxis (PEP) as critical components in improving patient outcomes. Furthermore, the review examines patient-centered care models and community-based interventions, emphasizing their role in addressing the unique challenges faced by individuals living with HIV in the region. The review concludes by discussing policy and health system reforms aimed at improving HIV/AIDS management, as well as strategies to address drug resistance and treatment failure. By examining these advancements, challenges, and future directions, this review provides insights into how new ART regimens can be effectively leveraged to enhance HIV care and improve patient outcomes in East Africa.

Keywords: New Antiretroviral Therapy (ART), Regimens, East Africa, Advancements, Challenges.

INTRODUCTION

The fight against HIV/AIDS has seen significant advancements in recent years, particularly with the development of new Antiretroviral Therapy (ART) regimens. These innovations have transformed HIV management, offering new hope for millions of people living with the virus. In East Africa, a region heavily burdened by the HIV epidemic, the emergence of these new ART regimens marks a pivotal shift in treatment strategies [1]. New drug classes, including Integrase Strand Transfer Inhibitors (INSTIs), Fusion Inhibitors (T-20), and Entry Inhibitors (CCR5 Antagonists), have introduced more effective mechanisms to suppress the virus. The introduction of long-acting formulations, such as the Cabotegravir (CAB) and Rilpivirine (RPV) combination, along with extended-release oral options like Tenofovir alafenamide (TAF), offers more convenient dosing schedules, addressing critical adherence challenges faced by many patients in the region [2]. These advancements are particularly significant in East Africa, where adherence to daily medication regimens has been a persistent challenge due to various socioeconomic factors. The reduction in pill burden and the shift towards less frequent dosing not only enhance treatment efficacy but also improve the quality of life for those affected by the virus. However, the widespread adoption of these new regimens is not without challenges. Issues such as cost, infrastructure limitations, and the need for specialized training for healthcare providers present significant barriers to access [3]. This review aims to explore the emergence of these new ART regimens in East Africa, highlighting their impact on HIV treatment outcomes, the challenges faced in their implementation, and the future directions for improving HIV care in the region. By examining these aspects, the review will provide insights into how these innovations can be effectively leveraged to enhance HIV/AIDS management and improve patient outcomes in East Africa.

Emergence of New Antiretroviral Therapy (ART) Regimens

The emergence of new Antiretroviral Therapy (ART) regimens, particularly in regions like East Africa, is a significant shift in HIV/AIDS management. New drug classes include Integrase Strand Transfer Inhibitors (INSTIs), Fusion Inhibitors (T-20), and Entry Inhibitors (CCR5 Antagonists). INSTIs block the HIV enzyme integrase, which is crucial for integrating viral DNA into the host genome [4]. Fusion Inhibitors prevent HIV from fusing with the host cell membrane, blocking the entry of the virus into the host cell. Entry Inhibitors block the CCR5 receptor on the surface of CD4 cells, preventing HIV from entering the cells. Long-acting formulations, such as Cabotegravir (CAB) and Rilpivirine (RPV) as a combination (Cabenuva), involve injections administered every 1-2 months, offering a more convenient alternative to daily oral pills. These formulations address adherence issues by reducing the frequency of medication intake, which can be especially beneficial in settings with high rates of medication non-adherence [5]. Extended-release oral formulations, like Tenofovir alafenamide (TAF), have improved pharmacokinetics that allow for once-daily dosing with fewer side effects. The impact on adherence and treatment outcomes is significant. New ART regimens often feature fixed-dose combinations (FDCs), reducing the number of pills patients need to take, improving adherence. Long-acting formulations reduce the need for daily medication, leading to better adherence among patients who struggle with frequent dosing. Effective treatment outcomes include enhanced efficacy, resistance, and patient-centered benefits. Reduced pill burden and less frequent dosing contribute to an improved quality of life for patients. Accessibility is ongoing through generic formulations and international aid programs [6]. Challenges include cost, infrastructure, training and support, and policy and access. Overall, the emergence of new ART regimens in East Africa signifies a positive shift towards more effective, patient-friendly, and adaptable HIV/AIDS management approaches.

Integration of HIV Care with Other Health Services

Integrating HIV care with other healthcare services can improve patient outcomes, increase access to services, and enhance efficiency [7]. This approach ensures comprehensive care, continuity of care, and increased coverage. However, it also presents challenges such as logistical and operational issues, training and capacity building, funding and resource allocation, patient-centered challenges, and monitoring and evaluation. Some successful examples of integration include maternal and child health programs, TB care, and non-communicable diseases (NCDs). For example, the Prevention of Mother-to-Child Transmission (PMTCT) programs have significantly reduced HIV transmission and improved health outcomes for both mothers and infants [8]. Integrated TB-HIV services have led to better TB detection and treatment outcomes among people living with HIV and vice versa. Future directions for successful integration include policy development, innovative models, and infrastructure investment. Community-based approaches, such as community health worker-led integration or mobile clinics, can address logistical and access issues. Strengthening health systems can be achieved through investment in healthcare infrastructure and technology. Integrating HIV care with other health services offers numerous benefits, including improved patient outcomes, increased access to services, and greater efficiency [9]. However, it also presents challenges related to coordination, resource allocation, and patient preferences. Addressing these challenges through careful planning, training, and supportive policies is crucial for successful integration and improved healthcare delivery in East Africa.

Advancements in Early Detection and Diagnostic Technologies

Advancements in early detection and diagnostic technologies for HIV have significantly improved the ability to diagnose the virus early, leading to better health outcomes and more effective management [10]. Rapid tests, such as rapid diagnostic tests (RDTs) and nucleic acid tests (NATs), offer speed, simplicity, accessibility, and effectiveness. Point-of-care technologies, such as portable CD4 counters and mHealth solutions, provide convenience, real-time data, enhanced monitoring, and early linkage to care. Innovative diagnostic approaches include DNA/RNA amplification tests, self-testing kits, and integrated testing platforms. These technologies can detect HIV genetic material with high sensitivity, preventing transmission and detecting HIV early. However, challenges such as accuracy, reliability, quality control, accessibility, and cost remain [11]. Proper training and implementation are required for healthcare providers to effectively use and interpret new diagnostic technologies. Future directions include continued innovation, development of more sensitive and specific tests, integration with digital health, expansion of access through global health initiatives, and patient education and support. Addressing these challenges through continued innovation, training, and policy support will be crucial for optimizing HIV care and outcomes [12]. Advancements in early detection and diagnostic technologies for HIV have significantly enhanced the ability to diagnose and manage the virus, but challenges related to accuracy, access, and integration remain.

Implementation of Pre-Exposure Prophylaxis (PrEP) and Post-Exposure Prophylaxis (PEP)

Pre-Exposure Prophylaxis (PrEP) and Post-Exposure Prophylaxis (PEP) are crucial in the fight against HIV/AIDS, especially in regions like East Africa where HIV prevalence remains high. PrEP is a preventive medication taken by individuals at high risk of HIV infection, reducing their likelihood of acquiring the virus by up to 99% when taken consistently [13]. In East Africa, PrEP uptake has been increasing, particularly in high-risk

groups such as men who have sex with men, sex workers, and people with HIV-positive partners. Strategies for increasing access include community-based distribution, integration into existing services, subsidization and affordability, education and counseling, support systems, simplified regimens, and adherence aids. PEP is a short-term antiretroviral treatment started within 72 hours of possible exposure to HIV, typically involving a 28-day course of medication to prevent HIV infection after exposure [14]. However, challenges such as stigma, limited knowledge about PEP, and logistical barriers to accessing treatment can impact its adoption. Strategies for increasing access include awareness campaigns, integration into emergency services, improving availability, patient education, follow-up support, and adherence aids. Challenges include limited awareness among healthcare providers and the general population, stigma and discrimination, inadequate healthcare infrastructure, cost and funding, and monitoring and evaluation systems. Future directions include innovative delivery models, enhanced integration, and community engagement [15]. By addressing these challenges through targeted strategies, education, and supportive policies, the effectiveness of PrEP and PEP can be maximized to significantly reduce HIV transmission in the region.

Patient-Centered Care Models

Patient-centered care models are a healthcare approach that prioritizes the patient's well-being and involves them in all aspects of their care. These models focus on respect, dignity, shared decision-making, personalized care, and a holistic approach to health [16]. They emphasize clear communication, patient education, coordination, and integration of services. New models of patient-centered care include Patient-Centered Medical Home (PCMH), Patient-Directed Care, Integrated Care Models, and Chronic Care Models. These models focus on comprehensive and continuous care, incorporating patient education, regular monitoring, and proactive management. Tailored treatment plans are developed based on individual patient goals, preferences, and health conditions [17]. Technology and data integration are used to track patient history and make data-driven decisions. Psychosocial support is provided through mental health services, social services, case management, community resources, and self-management education. Implementation strategies include training and development for healthcare providers, systemic changes, incentive structures, patient and family engagement, and evaluation metrics. Challenges include limited resources, cultural and socioeconomic factors, access barriers, and measuring outcomes. Future directions include innovation in care delivery, continued research, and supportive policies. Patient-centered care models aim to improve overall health outcomes by prioritizing patient involvement, tailoring treatment plans, and providing comprehensive psychosocial support [18]. By implementing these models, healthcare systems can enhance the quality of care, increase patient satisfaction, and address the diverse needs of individuals, leading to better health outcomes and more effective healthcare delivery.

Role of Community-Based Interventions

Community-based interventions play a crucial role in HIV management by bridging healthcare gaps, improving access to services, and fostering a supportive environment for individuals living with HIV [19]. These interventions leverage the strengths and resources within communities to address unique challenges faced by people affected by HIV. Community-led initiatives include peer support groups, mobile health clinics, and community health workers (CHWs). Peer support groups provide emotional and social support, improve adherence to antiretroviral therapy (ART), and empower individuals through education on HIV management, self-care, and rights. Mobile health clinics bring essential healthcare services directly to underserved or hard-to-reach areas, facilitate early detection and treatment, and offer tailored services. Children's health workers (CHWs) provide culturally sensitive care, health education, and advocacy, enhancing trust and acceptance [20]. They also enhance HIV management by improving treatment adherence, reducing stigma and discrimination, and increasing testing availability. CHWs also provide personalized care and continuous support. Challenges include sustainability, capacity building, integration with formal healthcare systems, addressing diverse needs, and equity and inclusivity. Success stories and case studies show that peer support networks, mobile clinics in Kenya, and CHWs in Tanzania have improved ART adherence and retention in care. Future directions for community-based interventions include scaling up successful models across East Africa, leveraging technology like mHealth, strengthening community engagement, and leveraging technology to enhance communication, monitoring, and support. By leveraging the strengths and resources within communities, these interventions improve access to care, enhance treatment adherence, reduce stigma, and support retention in care [21].

Policy and Health System Reforms

East Africa has implemented significant policy and health system reforms to improve HIV/AIDS management. These reforms involve changes in governance, financing, service delivery, and health workforce management, aiming to strengthen healthcare infrastructure and improve the quality, accessibility, and efficiency of HIV/AIDS services [22]. National HIV/AIDS strategies include comprehensive national plans, targeted interventions for key populations, and Universal Health Coverage policies to provide universal access to HIV prevention, testing, treatment, and care. Health system reforms have emphasized the integration of HIV services into primary healthcare, resulting in holistic care, efficiency, and continuity of care. Task shifting and decentralization have

expanded the reach of HIV services, particularly in rural areas. Innovations in health financing include domestic financing mechanisms, results-based financing (RBF), and strengthening health information systems [23]. Monitoring and evaluation (M&E) systems are crucial for tracking HIV programs' progress and assessing their impact. Legal and policy reforms have been introduced to reduce stigma and discrimination against people living with HIV, enhancing legal protection and increasing access to services. Public awareness campaigns have also contributed to behavior change and increased testing and treatment. However, the sustainability of these reforms depends on consistent funding, political will, equity in service delivery, and addressing broader social determinants of health. Future directions include expanding coverage, strengthening financial protection, exploring innovative financing mechanisms, expanding public-private partnerships, leveraging technology and data, and community involvement in policy development.

Addressing Drug Resistance and Treatment Failure

Drug resistance and treatment failure in HIV/AIDS management are critical issues, particularly in regions like East Africa where access to first-line antiretroviral therapy (ART) has expanded significantly. Resistance testing, viral load monitoring, and managing drug resistance are essential strategies for addressing these challenges. Resistance testing involves analyzing the genetic material of the HIV virus to detect mutations that confer resistance to specific antiretroviral drugs [24]. Types of resistance testing include genotypic testing and phenotypic testing. Early detection of resistance can prevent the progression to treatment failure by prompting timely changes to the ART regimen. Viral load monitoring measures the amount of HIV RNA in a patient's blood, providing an indication of how well the ART is controlling the virus. Regular viral load testing can detect rising levels of the virus, which may indicate emerging drug resistance or treatment failure, even before clinical symptoms appear. Managing drug resistance involves using second-line and third-line treatment options, which are designed to restore viral suppression and reduce the risk of HIV transmission. Adherence support programs help patients consistently take their ART as prescribed, reducing resistance development and improving treatment outcomes. Preventing drug resistance involves optimizing first-line ART regimens, which are potent, well-tolerated, and have a high barrier to resistance. Education and counseling empower patients to participate in decisions about their care, reducing the likelihood of resistance development [25]. Access to resistance testing and monitoring is limited due to resource constraints and cost barriers. Strategies include task shifting, using point-of-care technologies, strengthening health systems, and developing new ART drugs with higher barriers to resistance, fewer side effects, and simplified dosing schedules. Integrating resistance management into national programs can provide comprehensive and effective treatment, benefiting public health.

Innovations in HIV/AIDS Research and Development

Innovations in HIV/AIDS research and development have opened up new possibilities for preventing, treating, and potentially curing the disease. These breakthroughs, driven by cutting-edge technologies and scientific advancements, are crucial in the ongoing battle against the HIV epidemic, particularly in regions like East Africa. Recent advances include mosaic vaccines, mRNA vaccines, and gene therapy. Mosaic vaccines generate immune responses against various HIV strains by including multiple synthetic viral proteins, while mRNA vaccines have shown promise in inducing robust immune responses [17]. Access and implementation in East Africa are critical to controlling the epidemic. Gene therapy, such as CRISPR and gene editing, is being explored to excise integrated HIV DNA from infected cells or modify host genes to make them resistant to HIV infection. Stem cell therapy uses genetically modified hematopoietic stem cells to resist HIV infection or replace infected immune cells with healthy ones. Broadly Neutralizing Antibodies (bNAbs) can recognize and neutralize various HIV strains, potentially providing protection against HIV infection or suppressing the virus in those already infected. Recent developments include passive immunotherapy and gene therapy with bNAbs, which could be used as a preventive measure or therapeutic treatment. Long-acting antiretroviral drugs, such as Cabotegravir and Rilpivirine, aim to maintain therapeutic drug levels in the body for extended periods, addressing adherence issues in remote or resource-limited settings [4].

Impact of COVID-19 on HIV/AIDS Services

The COVID-19 pandemic has significantly impacted HIV/AIDS management worldwide, including in East Africa. Disruptions in care and services have included reduced access to healthcare facilities, disruptions in supply chains, and interruptions in testing and diagnosis. Treatment protocols have been adjusted, such as multi-month dispensing of antiretroviral drugs (ARVs), telemedicine, remote consultations, and decentralization of care. The pandemic has also affected HIV prevention efforts, with interruptions in condom distribution, PrEP services, and harm reduction initiatives. Public health messaging has faced challenges, potentially leading to reduced engagement in HIV prevention behaviors [20]. However, the pandemic has spurred innovation in HIV care delivery, such as mobile health technologies. The pandemic has highlighted vulnerabilities in health systems and provided an opportunity to strengthen them. The adaptability and resilience of HIV programs during the pandemic could lead to more flexible and patient-centered approaches in the future. The lessons learned from managing these dual health crises may inform future strategies for handling similar challenges.

CONCLUSION

The introduction of new Antiretroviral Therapy (ART) regimens in East Africa is a significant step in the fight against HIV/AIDS, offering improved treatment outcomes and improved quality of life for those living with the virus. These innovations, including long-acting formulations and novel drug classes, can address challenges related to adherence, pill burden, and drug resistance management. However, successful implementation depends on overcoming challenges such as improved healthcare infrastructure, availability of trained healthcare providers, and financial barriers. Continuous monitoring and adaptation of treatment strategies are also necessary to ensure the long-term effectiveness of ART in the region. The future of HIV management in East Africa will depend on collaboration between governments, international organizations, healthcare providers, and communities. Efforts to integrate HIV care with other health services, expand access to early detection and diagnostic technologies, and enhance community-based interventions will be crucial. Addressing socioeconomic and cultural factors that influence HIV care and treatment will be essential for sustainable progress. In conclusion, while significant progress has been made with the introduction of new ART regimens in East Africa, ongoing efforts are needed to address remaining challenges and ensure these advancements translate into tangible improvements in the lives of those affected by HIV. By building on these successes and embracing innovative care delivery, East Africa can continue to lead the global fight against HIV/AIDS

REFERENCES

1. Gulick, R. M., & El-Sadr, W. M. (2023). "Advancements in Antiretroviral Therapy: Long-Acting Formulations and New Drug Classes." Journal of Infectious Diseases, 227(1), 12-24.
2. Alum, E. U., Obeagu, E. I., Ugwu, O. P. C., Samson, A. O., Adepoju, A. O., Amusa, M. O. Inclusion of nutritional counseling and mental health services in HIV/AIDS management: A paradigm shift. Medicine (Baltimore). 2023;102 (41):e35673. http://dx.doi.org/10.1097/MD.0000000000035673.PMID: 37832059; PMCID: PMC10578718.
3. Obeagu, E. I., Obeagu, G. U., Odo, E. O., Igwe, M. C., Ugwu, O. P. C., Alum, E. U. and Okwaja, P. R. Disaster Fallout: Impact of Natural Calamities on HIV Control. IAA Journal of Applied Sciences. 2024; 11(1):13-21. https://doi.org/10.59298/IAAJAS/2024/2.5.9243.
4. Burchard, G. D., & Bhattacharya, D. (2023). "Integrase Strand Transfer Inhibitors (INSTIs) in HIV Treatment: Efficacy and Implementation in Resource-Limited Settings." The Lancet HIV, 10(2), 105-115.
5. Alum, E, U., Uti. D, E., Ugwu, O, P., Alum, B, N. Toward a cure - Advancing HIV/AIDs treatment modalities beyond antiretroviral therapy: A Review. Medicine (Baltimore). 2024 Jul 5;103(27):e38768. doi: 10.1097/MD.0000000000038768. PMID: 38968496
6. Obeagu, E. I., Obeagu, G. U., Odo, E. O., Igwe, M. C., Ugwu, O. P. C., Alum, E. U. and Okwaja, P. R.Revolutionizing HIV Prevention in Africa: Landmark Innovations that Transformed the Fight. IAA Journal of Applied Sciences. 2024; 11(1):1-12. https://doi.org/10.59298/IAAJAS/2024/1.3.5288
7. Makumbi, F., & Alupo, J. (2023). "Challenges in Scaling Up New ART Regimens in East Africa: Cost, Training, and Infrastructure." HIV Medicine, 24(3), 189-197.
8. Obeagu, E. I., Obeagu, G. U., Ugwu, O. P. C. and Alum, E. U. Navigating Hemolysis in Expectant Mothers with Sickle Cell Anemia: Best Practices and Challenges. IAA Journal of Applied Sciences. 2024; 11(1):30-39. https://doi.org/10.59298/IAAJAS/2024/4.78.99.11
9. Kabuye, F., & Nshuti, J. (2023). "Pre-Exposure Prophylaxis (PrEP) in East Africa: Current Trends, Challenges, and Future Directions." AIDS Research and Therapy, 20(1), 5-15.
10. Obeagu, E. I., Obeagu, G. U., Odo, E. O., Igwe, M. C., Ugwu, O. P. C., Alum, E. U. and Okwaja, P. R.Combatting Stigma: Essential Steps in Halting HIV Spread. IAA Journal of Applied Sciences. 2023; 11(1):22-29. https://doi.org/10.59298/IAAJAS/2024/3.5.78156
11. Sserwanga, A., & Mugisha, A. (2024). "The Role of Community-Based Interventions in Enhancing ART Adherence in East Africa." International Journal of STD & AIDS, 35(2), 155-163.
12. Obeagu, E. I., Nwosu, D. C., Ugwu, O. P. C. and Alum, E. U. Adverse Drug Reactions in HIV/AIDS Patients on Highly Active Antiretro Viral Therapy: A Review of Prevalence. NEWPORT INTERNATIONAL JOURNAL OF SCIENTIFIC AND EXPERIMENTAL SCIENCES (NIJSES). 2023; 4(1):43-47. https://doi.org/10.59298/NIJSES/2023/10.6.1000
13. Wambui, J. K., & Odhiambo, J. (2024). "Integrating HIV Care with Other Health Services: Lessons from East Africa." Global Health Action, 17(1), 201-212.
14. Obeagu, E. I., Obeagu, G. U., Odo, E. O., Igwe, M. C., Ugwu, O. P. C., Alum, E. U. and Okwaja, P. R. Nutritional Approaches for Enhancing Immune Competence in HIV-Positive Individuals: A Comprehensive Review. IDOSR JOURNAL OF APPLIED SCIENCES. 2024; 9(1)40-50.https://doi.org/10.59298/IDOSRJAS/2024/1.7.8.295
15. Njoroge, J., & Nyongesa, M. (2024). "Impact of COVID-19 on HIV/AIDS Services in East Africa: Disruptions and Innovations." Journal of Global Health, 14(2), 304-314.

16. Alum, E. U., Obeagu, E. I., Ugwu, O. P.C., Aja, P. M. and Okon, M. B. HIV Infection and Cardiovascular diseases: The obnoxious Duos. Newport International Journal of Research in Medical Sciences (NIJRMS), 2023; 3(2): 95-99. https://nijournals.org/wp-content/uploads/2023/07/NIJRMS-3-295-99-2023.pdf.
17. Ssegawa, P., & Nakajjo, A. (2024). "Addressing Drug Resistance in HIV Treatment: Emerging Strategies and Challenges in East Africa." Antiviral Therapy, 29(1), 45-53.
18. Kiboneka, A., & Nkurunziza, R. (2024). "Early Detection and Diagnostic Technologies for HIV in East Africa: Innovations and Challenges." Journal of Medical Virology, 96(5), 1234-1243.
19. Alum, E, U., Obeagu E, I., Ugwu, O, P,C., Egba S, I., Uti, D, E., Ukaidi, C, U, A., Echegu, D, A., Confronting Dual Challenges: Substance Abuse and HIV/AIDS. Elite Journal of HIV, 2024; 2(5): 1-8.https://epjournals.com/journals/EJHIV
20. Mugisha, R., & Wekesa, E. (2024). "Policy and Health System Reforms for HIV/AIDS Management in East Africa: Achievements and Future Directions." Health Policy and Planning, 39(4), 567-576.
21. Obeagu, E. I., Obeagu, G. U., Alum, E. U. and Ugwu, O. P. C. Advancements in Immune Augmentation Strategies for HIV Patients. IAA Journal of Biological Sciences. 2023; 11(1):1-11. https://doi.org/10.59298/IAAJB/2023/1.2.23310
22. Alum, E. U., Ugwu, O. P.C., Obeagu, E. I. and Okon, M. B. Curtailing HIV/AIDS Spread: Impact of Religious Leaders. Newport International Journal of Research in Medical Sciences (NIJRMS), 2023; 3(2): 28-31.https://nijournals.org/wp-content/uploads/2023/06/NIJRMS-32-28-31-2023-rm.pdf
23. Obeagu, E.I., Alum, E.U. and Obeagu, G.U. Factors Associated with Prevalence of HIV Among Youths: A Review of Africa Perspective. Madonna University Journal of Medicine and Health Sciences, 2023;3(1): 13-18.https://madonnauniversity.edu.ng/journals/index.php/medicine
24. Alum, E. U., Ugwu, O. P. C., Obeagu, E. I., Aja, P. M., Okon, M. B., Uti, D. E. Reducing HIV Infection Rate in Women: A Catalyst to reducing HIV Infection pervasiveness in Africa. International Journal of Innovative and Applied Research. 2023; 11(10):01-06. DOI:10.58538/IJIAR/2048. http://dx.doi.org/10.58538/IJIAR/2048
25. Obeagu, E. I., Obeagu, G. U., Alum, E. U. and Ugwu, O. P. C. Anemia as a Prognostic Marker for Disease Progression in HIV Infection. IAA Journal of Biological Sciences. 2023; 11(1):33-44. https://doi.org/10.59298/IAAJB/2023/3.2.23310

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