12-5-2021

HIV/AIDS After the Crisis: The Evolution of an Epidemic

Emma Paras
Grand Valley State University

HIV/AIDS After the Crisis: The Evolution of an Epidemic

Emma Paras

Department of Biomedical Sciences, Grand Valley State University

HNR 499: Honors Senior Project

Professor Doug Graham

December 15, 2021

HIV/AIDS After the Crisis: The Evolution of an Epidemic

In the U.S. alone, around 1.2 million people are currently living with HIV, with 14 percent not knowing that they have the virus. Around the world, the number of people with HIV reaches closer to 38 million. From these statistics, one thing becomes clear: HIV and AIDS is still a worldwide epidemic that continues to impact many different cultures. In America, trends in injection drug use, homophobia and transphobia, and lack of access to HIV prevention, testing and treatment have all contributed to HIV remaining an issue for the past four decades. In sub-Saharan Africa, AIDS continues to be the leading cause of death. Poverty, inadequate medical care, and sexual violence cause rapid spread of the virus, and consequently many children are born with HIV through vertical transmission.

HIV can be traced back to the 1920s, when simian immunodeficiency virus (SIV) was passed from chimpanzees to humans. In the early 1980s in the U.S., cases of severe immune deficiency was found to be affecting mostly gay men, injection drug users, and hemophiliacs. This immunodeficiency was termed “gay-related immunodeficiency” before the CDC officially used the term AIDS (acquired immunodeficiency syndrome). By the mid-80s, every region in the world was reporting cases of AIDS. In 1987, zidovudine (AZT) was released as the first antiretroviral drug to treat HIV. In 1995, the FDA approved highly active antiretroviral treatment (HAART), which was highly effective in preventing AIDS-related deaths and hospitalizations in the countries that could afford the treatment. In the 2010s, more than half of the global population living with HIV were receiving antiretroviral therapy. Most recently, in 2020 the CDC announced that HIV-related deaths in the U.S. have fallen by half from 2010 to 2017, likely as a result of early testing and treatment, and helping people with HIV stay on their antiretroviral treatment.

June of this year marked the 40 year anniversary of AIDS in America. In the last 40 years, great strides have been made in the field of HIV/AIDS. Vaccine trials are ongoing, although so far results have not been hopeful. A major study that began in 2016, called the HVTN 702 trial, just recently fell short of expectations. The vaccine was tailored toward the subtype of HIV found in South Africa, but the trial showed no evidence of efficacy (Cohen, 2020). However, this should not be seen as a failure by any means. The very nature of the virus and its ability to replicate, mutate, and hide from the immune system makes it almost impossible to generate an effective vaccine. Researchers continue to investigate the mechanisms of HIV to determine the best course of action for treatment. Other studies in the HIV Vaccine Trials Network (HVTN) are still ongoing, so there is still plenty of hope to be had for the future of HIV vaccines and treatments.

This paper will review the impact of HIV/AIDS in several less-developed countries, examine how societal aspects of the virus have evolved, and look at current as well as future HIV treatments. These are key areas that must continue to be studied in order for the virus to be eradicated. Careful attention must be paid not only to the physical wellbeing of HIV-positive individuals, but also to their mental state and how they are viewed by society.

Global Impacts of HIV/AIDS

HIV in Asia, Europe, and South America

With all of the stigma and assumptions that are behind HIV/AIDS infection, it's easy to see how certain cultures may be less tolerant of the virus and how it is spread. A crucial step in preventing the spread of HIV is education about safe practices. A study done in Beijing, China showed that the percentage of college students with comprehensive knowledge of HIV/AIDS decreased from 50% in 2006 to 40% in 2016 (Zheng, 2020). Results showed that less students

were being adequately educated on HIV/AIDS health in 2016; for example, most students in the survey knew that having one sexual partner reduced their risk of HIV transmission, but many students still thought that a person can get HIV from a mosquito bite. Based on this, it is clear that more emphasis needs to be put back into the education of college students. It's important that the Chinese government recognize that the main way that students in Beijing receive information now is through social media, so there should be more effort put into reaching young adults through this avenue.

A study done in the Arabian Peninsula also quantified education and knowledge of HIV/AIDS, as well as attitudes toward the virus. The results were slightly surprising: 74.4% of participants demonstrated adequate knowledge about HIV/AIDS, but more than half also displayed negative attitudes towards HIV/AIDS (Aldhaleei, 2020). The findings about attitude put into question the quality of education people in the Arabian Peninsula are receiving about HIV. There may certainly be elements of cultural taboos that are associated with HIV/AIDS. For instance, the study describes how college students in Saudi Arabia believe that HIV is a punishment from God. Because many in the Arabian Peninsula are devoutly religious and share beliefs similar to the students from Saudi Arabia, the education in this area needs to focus on better understanding the disease, and drawing a clear line between HIV and religion. In this way, attitudes about HIV/AIDS can be improved and stigma surrounding the virus can begin to lessen.

A similar study examined governmental HIV/AIDS programs in the Jayawijaya district of Indonesia. The study showed that the current community empowerment in the implementation of the HIV/AIDS prevention program in the Jayawijaya district is the involvement of non-governmental organizations (Resubuna, 2019). The community was seemingly not involved at all in the HIV/AIDS program planning process. This makes it extremely difficult to track

community members with HIV/AIDS, and many who are initially recognized as having HIV/AIDS are lost to follow-up by the program because community leaders as well as religious leaders are not involved. For patient retention of treatment to be increased, the government must consider involving the community more in their programs. It is clear from these results that the government in Indonesia puts little effort into improving their HIV/AIDS prevention programs. In order for HIV prevention to be increased in the community, more effort needs to be put into community empowerment in this area.

In Pakistan, a study aimed to assess the quality of life of people in the country living with HIV. Results showed that more than half of participants reported being extremely anxious or depressed (Ahmed, 2021). However, there was a significant correlation between ART adherence and quality of life. The study found that people living with HIV/AIDS in Pakistan who were very adherent to their antiretroviral therapy had a good overall quality of life, although still higher depression than people without HIV/AIDS. Similar to the Arabian Peninsula, sociocultural taboos about HIV are very popular. Therefore, more education, particularly psychological education, needs to happen to decrease negative attitudes towards the virus and encourage adherence to ART.

A trend seen in Asia is negative attitudes towards HIV/AIDS and ART that stems from lack of education and cultural mores. However, HIV rates in Europe are high as well; it was ranked second in new infections in 2020 by the World Health Organization. A study on HIV/AIDS in Europe explains that infection varies significantly across regions in Europe, and reflects a shifting and increasingly divided political landscape (Rosengarten, 2020). In Germany, many HIV incidences come from prisons, where prisoners are not often seen as deserving patients and are therefore not provided with clean needles or syringes or even condoms. In

Turkey, problems with HIV stem from refugees who, once again, do not seem to be as deserving of proper healthcare as other citizens of Turkey. In Europe, it seems that HIV/AIDS incidence is associated with citizenship status and that citizenship is indeed defined differently depending on the country.

HIV/AIDS in South America is significantly different from Asia and Europe, and lessons can be learned from how the region is handling the epidemic. Despite its large population, Brazil is among the leading countries towards achieving UNAIDS' goals for HIV/AIDS (Benzaken, 2019). When Brazil was first hit with the pandemic in the 1980s, the country responded by offering free antiretroviral therapy (ART) to all people living with HIV. Brazil's decision to treat all people with HIV, regardless of CD4+ T cell count has also contributed to their drop in AIDS-related deaths. Brazil also has universal and free-of-charge public health care. In the context of HIV/AIDS, this vastly helps patients receive the drugs they need as well as adhere well to them. However, this universally free health system for HIV/AIDS may be unsustainable long-term, as antiretroviral drugs are expensive. This highlights the need for treatment besides ARVs, such as a vaccine. As mentioned earlier, vaccine trials are still in the works, but Brazil is at the forefront of research and will no doubt continue to benefit from their role in HIV treatment.

HIV in Africa: A Humanitarian Crisis

None of the regions described above compare with the amount of HIV and AIDS in Africa, particularly the sub-Saharan region. The HIV/AIDS crisis in Africa can truly be described as a humanitarian crisis, as the virus has continued to run rampant in the region for nearly 40 years, and ultimately reveals the complex nature of the deficiencies in the health sector and in the HIV/AIDS related care programs in many countries. An article by a priest in Nigeria

challenges the responsibility of care within institutional structures, and how the victims of HIV/AIDS do not receive the justice they deserve (Umunna, 2010). People living with HIV/AIDS in African countries often face a scarcity of antiretroviral drugs, stigmatization, discrimination, and lack of adequate care and support. Their very dignity as humans deserving of fair treatment is ignored as HIV positive people face rejection from local communities and institutions. There is a vast need in Africa for equal access to education and health care to be guaranteed to all social groups, especially to young women.

In countries across Africa, young women have been the primary victims of HIV and AIDS. This is a consequence of disparities in sexual relationships and marriages and the traditional patriarchal societies that are common in African countries, as well as trends in sexual violence among many communities. A study done in South Sudan assessed women's knowledge and attitudes about HIV, with only 21% of women having adequate knowledge and positive attitudes towards people with HIV/AIDS (Mude, 2020). Knowledge and attitudes were found to largely be shaped by differing levels of poverty, education, and different geographical settings. It was also found that HIV interventions that were provided to South Sudan were disproportionately delivered to urban and educated populations. Therefore, great strides need to be taken in removing gender-based health inequities and protecting the rights of those at most risk for contracting HIV. Interventions must be targeted to the uneducated women in rural areas. Only when education is available to all women will there be a more significant decrease in HIV/AIDS deaths in Africa.

A similar study done in Ghana compared the experiences of men living with HIV and women living with HIV in the country. Unsurprisingly, there were significant differences between the two experiences. Women were more likely to be housing insecure, unemployed, less

likely to have revealed their HIV status to family members, and had more challenges regarding their healthcare (Owusu, 2020). The women were also mostly single and living in near-abject poverty. Conversely, men living with HIV usually expected, demanded, and had support from their wives. Almost every experience of men was opposite to that of the women. This once again highlights the vital need for policies to focus on women. The current system does not give women living with HIV the social protection they need and deserve, and if public education were to highlight the extra burden of HIV/AIDS on women, the public may be more inclined to empathize with them instead of allowing them to suffer in silence.

A study done in rural communities in Uganda and Kenya examined the method with which HIV testing and treatment was carried out. They postulated that universal HIV treatment would lower incidence of HIV infection, and found that viral suppression was indeed higher in groups that received this universal care than those that received standard care (Havlir, 2019). The annual incidence of HIV infection also decreased by 32% over the 3 years that the study took place. This shows that the way in which care is delivered is important to clinical outcomes. As was evidenced from Brazil's approach to caring for people with HIV/AIDS, a universal and patient-centered approach to HIV treatment seems to result in a lower number of new HIV infections and better overall health.

It is clear that countries in Africa are suffering under the burden of HIV/AIDS. Lack of health care and social attitudes contribute to high rates of AIDS-related deaths. One study that examined global trends in HIV/AIDS found an association between GDP per capita of countries and incidence of HIV/AIDS (Baghaei Lakeh, 2017). In addition, more affluent countries publish more biomedical papers on HIV/AIDS research, which in turn lends these countries to have a better understanding of the virus. Around half of the world's people who live in extreme poverty

live in sub-Saharan Africa, so HIV testing and treatment as well as general understanding of HIV is scarce. There are widespread consequences to this humanitarian crisis. The average life expectancy in Africa is decreasing as the number of orphans due to AIDS deaths is increasing. This in turn leads to loss of labor, which decreases the economic growth of African countries. Therefore, not only is the AIDS crisis in Africa an issue of ethics and social justice, it has so affected the region that it has turned into an economic and political problem as well. More attention must be put into improving HIV education, testing, and treatment, particularly among women.

Social Attitudes about HIV/AIDS

Effects of Stigma on the HIV-Positive Individual

Stigma against the HIV-positive individual exists for a number of reasons. HIV is largely associated with marginalized groups of people: minorities, members of the LGBTQ+ community, and people who use injection drugs. A study sought to examine how people living with HIV respond to this stigma in their communities. The results found significant associations between perceived community stigma and interpersonal outcomes (such as social support and trust in physicians) were mediated by internalized stigma and anticipated stigma (Turan, 2016). Thus, HIV-related stigma in communities seems to cause people with HIV to internalize and anticipate stigma. This results in negative health and psychosocial consequences. These consequences can include subpar medication adherence, higher depression, and lower quality of life altogether. Based on these results, a change is needed in communities to decrease stigma and empower HIV-positive individuals. It may also be helpful to better treat depression and other mental health issues among people living with HIV. By treating the psychosocial health of these individuals, adherence is consequently increased, resulting in better physical health as well.

Another study focused specifically on transgender women, of which one-fifth are living with HIV. Transgender individuals with HIV face sigificantly more discrimination than cisgender people with HIV, and thus often have a difficult time accessing HIV care. It was found that transgender women receiving HIV care were more likely to identify as a racial minority and less likely to have stable housing than cisgender individuals (Klein, 2020). In particular, black transgender women were much less likely to reach viral suppression than any other group of people. This highlights the need for HIV care to be widely available to every person living with HIV, regardless of gender, race, or sexual orientation. In the past, HIV treatment operated under the assumption that transgender women and cisgender men who have sex with men had the same risk factors and could be reached in the same way. However, this study shows that transgender-specific outreach is needed, as the disparities in viral suppression between these two groups are great.

Stigma and discrimination against HIV has become so engrained in society that even people who are simply associated with HIV/AIDS even face stigma. These are the nurses, physicians, and other healthcare workers who help to care for HIV-positive patients. The unfounded fear that HIV infection can occur from merely interacting with someone who is HIV-positive causes barriers to healthcare workers who would seek preventative treatment for a needle-stick injury or early diagnosis (Hewko, 2018). Workplace policies and quality assurance initiatives targeted at HIV/AIDS stigma are warranted to reduce incidence of HIV/AIDS in healthcare workers and encourage new innovations in HIV/AIDS treatment. Currently, there are major gaps in workplace policies when it comes to HIV/AIDS. Interventions need to be organization-wide and explicit in targeting HIV/AIDS stigma. People living with HIV should not

have to deal with the stigma that comes along with the virus, and the workers providing care for the patients should especially be saved from discrimination based on misinformation.

Perceptions and Representations of People Living with HIV

Those in high school and young adults are some of the population at the most risk for contracting HIV. Young people with HIV often have difficulty adhering to treatment, so it is important that prevention from HIV and other STIs is taught early. A study on high school students' perceptions and representations about HIV/AIDS consisted of the terms "condom, disease, prevention, and sex" (de Amorim Barreto, 2019). Therefore, although they may not know many of the specifics about HIV, they know that they can use condoms to prevent its transmission, same as most other STIs. However, there is still fear of social exclusion that is associated with HIV, so if a student is HIV-positive, they are less likely to reveal their serostatus, putting them at very high risk of transmitting the virus. The dialogue about using condoms is a good start to having an open dialogue about safe sexual practices, but schools also need to make sure to emphasize the idea that there is not shame surrounding HIV status.

As young adults leave high school, they begin in engaging in more high risk behaviors that put them at greater risk of HIV infection. Adults in their late teens and early twenties makeup more than one-fourth of new infections in the U.S., and behaviors such as alcohol use as an HIV-positive individual tend to accelerate HIV disease progression. This population also has low rates of ART adherence. To improve these behaviors, a study was done using an intervention for HIV-positive young adults called Healthy Choices. The intervention consisted of in-depth discussions with the individuals and personal motivational interviews, as well as guiding the development of individualized plans of action to reduce unhealthy behaviors. The study found that, after a year of the Healthy Choices intervention, 35% of participants had an undetectable

viral load (Naar, 2020). This came as a result of a decrease in high-risk behaviors such as alcohol consumption. This gives an idea of the direction that HIV interventions should be heading in the future to continue to suppress viral loads. A clinic-based intervention that focuses on motivation and individualized goals seem to be the best course of action when encouraging young adults living with HIV.

Another group at extremely high risk for spreading HIV is sex workers. Many sex workers engage in sexual activities with clients without using protection, putting them at even greater risk for spreading HIV, not to mention numerous other STIs. Sex workers cite the dilemma of needing to use sex as a source of livelihood and clients who prefer not to use protection. A study that analyzed the HIV/AIDS knowledge of sex workers found that 72.2% of sex workers engaged in intercourse with clients without protection in exchange for a larger amount of money, while at the same time 61.7% of workers had adequate knowledge about HIV (Freire de Araújo Patrício, 2019). These are curious statistics, as one might assume that if a sex worker has adequate knowledge of HIV that they will do what they can to prevent it. However, it is worth mentioning that for many of these sex workers, sex is their only means of income for their survival, and they will do what they can if they can earn more. This is a difficult problem to solve, as it ultimately traces back to the unequal power dynamic between men and women. Female sex workers know the risks, but feel that they cannot deny a client his wishes of not using protection, especially if he is paying extra. It's unclear if more HIV education for sex workers would lessen HIV transmission in this group. It's possible that teaching female sex workers how to negotiate with clients to use protection may help, but ultimately that still leaves a very large burden on the backs of these sex workers. It's important that clients who visit these

establishments are aware of the risks to not only themselves, but to sex workers and any other sexual partners they have if they don't use protection.

The Changing World of HIV/AIDS

Current Trends in Testing and Treatment

To understand the treatments that have developed for HIV, one must first understand the basic mechanism by which HIV works in the body. There are two types of HIV infections: HIV-1 and HIV-2. HIV-1 is what is most widely known by people, as it is aggressive and can lead to AIDS if untreated. HIV-2 is similar, but is less aggressive and mostly contained to Western Africa. Contrary to popular belief, the major route of HIV transmission is through heterosexual contact. However HIV can also be transmitted parenterally or perinatally. After infection, HIV can be detected in plasma by nucleic acid amplification of viral RNA or by detection of the viral core protein p24 (Melhuish, 2018). Four to six weeks later, antibodies are detectable. After three months, seroconversion occurs and the person with the infection is officially HIV antibody-positive. Initially, high levels of circulating virus cause symptoms in the patient (this is called seroconversion illness), but the patient becomes asymptomatic for a few years when viral levels decline, although the virus still remains. CD4+ T cell levels decline from the viral killing, causing decreased immune response. People with HIV will often speak of their T cell count, which serves as an indication of their viral load, or how much virus is in the body.

Antiretroviral therapy (ART) is the most common treatment for HIV that has been used since the late 90s, but ART is not a cure for HIV; rather, it helps to keep viral load low and T cell count high enough to function and live a full life. There are also issues with ART, such as cost and toxicity. One study sought to examine some of the newer approaches towards a cure for HIV/AIDS. Problems with trying to treat HIV include dealing with the latent viral reservoir,

boosting the host immune response, and reaching relevant viral compartments in the body (Bailon, 2020). The ultimate goal with HIV treatment is to achieve viral control without the need for antiretroviral treatment. Researchers have begun to identify agents that can reactivate the latent virus in vivo and boost cellular and humoral immunity. Of particular interest are broadly neutralizing antibodies, or bNAbs, which so far have been able to stop HIV from infecting human cells in the laboratory. Not many people with HIV naturally produce bNAbs, but researchers have been able to isolate them from the blood of people with HIV. Other treatments such as vaccines have also been tested, but so far with little evidence of significant effectiveness.

ART has been able to greatly increase the life expectancy of people with HIV. However, treatment has not yet reached the point where individuals with HIV have the same life expectancy as people without HIV. A study comparing the comorbidity-free life expectancies between adults with and without HIV lived 6.8 fewer years overall and 9.5 fewer years without major chronic comorbidities (Marcus, 2020). Thus, although the life spans are similar, people living with HIV are more likely to have other health problems in their life. The immunodeficiency of HIV-positive individuals means that they are more susceptible to comorbidities such as cancer and cardiovascular disease. Furthermore, ART is known to be toxic and can contribute to diabetes, kidney and liver disease, and high cholesterol, among other things. This is just one reason why it is important for new treatments for HIV to be investigated. Treatments besides ART may have the ability to decrease some of the comorbidities suffered by HIV-positive individuals.

Another common HIV treatment is pre-exposure prophylaxis, commonly known as PrEP. PrEP involves the use of daily or event-based antiretroviral drugs to reduce the risk of HIV infection. PrEP has been most popular among men who have sex with men (MSM), who are at

high risk of acquiring the virus. There are challenges in providing optimal PrEP services for MSM. There is a need for more positive therapeutic alliance between the patient and the prescriber in supporting adherence to PrEP regimens, as well as a need for PrEP availability through different methods of delivery to the MSM community (Hillis, 2020). Young MSM who are also racial minorities are far less likely to be seeking HIV testing, diagnosis, or treatment. Therefore, special care needs to be put into providing these groups most at risk with the services that they need. PrEP is a vital treatment for individuals who are not HIV-positive but engage in high risk behaviors, and it is important that this group adheres to the regimen. Otherwise, there could be many more positive HIV diagnoses in the future.

In order to identify the need for treatment with PrEP and ART, there first needs to be adequate testing. One way to reduce incidence of HIV infection is universal testing and treatment. Universal testing and treatment has been found to reduce population-level incidence of HIV infection by around 30% (Hayes, 2019). Prevention intervention with universal ART includes utilizing home-based HIV testing delivered by community workers and also home-based HIV care and ART adherence. Testing and HIV care that was delivered in this way resulted in more viral suppression and better adherence to medication. This is especially important in reaching young people and minorities, who are often neglected when it comes to HIV care. Early and frequent testing leads to better prevention and ultimately lower incidence of the virus.

The Future of HIV/AIDS Treatment

HIV/AIDS has come a long way since the 1980s, both in medical treatment and social attitudes. With new advancements in science and technology everyday, the future of HIV/AIDS can remain hopeful. Ultimately, a safe and efficacious HIV vaccine would be the most ideal

treatment for the virus, although so far there has been no significant success in investigating this treatment. A relatively new method for investigating an HIV vaccine is becoming more popular: the use of bioengineering approaches to modulate immune responses (D'Souza, 2019). For other autoimmune disorders, regulating and controlling the immune system through the use of engineered nucleic acids, proteins, biomaterials, cells, and tissues has been promising. The National Institute of Allergy and Infectious Diseases (NIAID) and the National Institute of Biomedical Imaging and Bioengineering have begun combining efforts to expand and facilitate the adaptation of engineering principles and techniques into the design of a possible vaccine. It is the hope that these new strategies will translate well to a clinical setting.

With new strategies and hope, the Joint United Nations Programme on HIV/AIDS (UNAIDS) announced a bold plan in 2019 to end the HIV epidemic in the U.S. by 2030. For this to happen, the number of new HIV infections and AIDS-related deaths would need to decrease by 90% between 2010 and 2030 (Assefa, 2020). The World Health Organization also cited a 90-90-90 target by 2020: 90% of people living with HIV know their HIV status, 90% of people who know their HIV-positive status are accessing treatment, and 90% of people on treatment have suppressed viral loads. As optimistic as these plans are, unfortunately they are not so realistic. Although incidences of new HIV infections continue to decline, the progress is slower than is required to reach the 2030 goal. Project 2030 can get back on track if focus stays on preventing and diagnosing infection, linking people to care, and providing ART. HIV will not go away after 2030, and HIV prevention and control programs must remain robust.

Conclusion

Looking at the many setbacks in the world of HIV/AIDS can make the future for HIV-positive individuals and those at risk look disheartening. The unsuccessful vaccine, the

failure of the 2030 plan, and the continued issue of HIV/AIDS in Africa are all problems that still need to be fixed. However, it is important to remain positive and hopeful about where the future of HIV/AIDS will take us. Science is evolving everyday, and although the first couple vaccine trials have not yet shown success, there are so many trials that are still in progress. And now more than ever, social acceptance and normalization of HIV-positive individuals is on the rise. Celebrities are now using their platforms to spread awareness of the virus and banish the shame that used to be associated with a positive HIV infection.

As hope and positivity are spread around the United States, it is important to remember those that do not have the luxury to be hopeful about HIV. The devastating HIV crisis in Africa continues to be far worse than any other continent, and will most likely remain this way. Stories of young women and children in rural parts of Africa having the virus violently forced upon them should remind us that, although not as many people are dying of AIDS in America, AIDS deaths are extremely prevalent in sub-Saharan countries and these rural communities need a cure more than anyone. So much attention has been put on preventing HIV that it seems like a true cure might never happen. Many articles on the topic of HIV/AIDS warn that there is too much of a “biological” approach to a cure for HIV and not enough personal and individualized approaches. But maybe now the opposite is true. HIV is such a complex virus that more efforts need to be put into studying its mechanisms. For the time being, PrEP and ART are keeping the virus at bay. Now, let us continue the research necessary to completely eradicate HIV once and for all.

References

Ahmed, A., Saqlain, M., Bashir, N., Dujaili, J., Hashmi, F., Mazhar, F., Khan, A., Jabeen, M., Blebil, A., & Awaisu, A. (2021). Health-related quality of life and its predictors among adults living with HIV/AIDS and receiving antiretroviral therapy in Pakistan. *Quality of Life Research: An International Journal of Quality of Life Aspects of Treatment, Care and Rehabilitation - An Official Journal of the International Society of Quality of Life Research*, 1. https://doi.org/10.1007/s11136-021-02771-y

Aldhaleei, W. A., & Bhagavathula, A. S. (2020). HIV/AIDS-knowledge and attitudes in the Arabian Peninsula: A systematic review and meta-analysis. *Journal of Infection and Public Health*, *13*(7), 939–948. https://doi.org/10.1016/j.jiph.2020.04.002

Assefa, Y., & Gilks, C. F. (2020). Ending the epidemic of HIV/AIDS by 2030: Will there be an endgame to HIV, or an endemic HIV requiring an integrated health systems response in many countries? *International Journal of Infectious Diseases : IJID : Official Publication of the International Society for Infectious Diseases*, *100*, 273–277. https://doi.org/10.1016/j.ijid.2020.09.011

Baghaei Lakeh, A., & Ghaffarzadegan, N. (2017, June 23). Global Trends and Regional Variations in Studies of HIV/AIDS. *Scientific Reports*, *7*(4170). doi:10.1038/s41598-017-04527-6

Bailon, L., Mothe, B., Berman, L., & Brander, C. (2020). Novel Approaches Towards a Functional Cure of HIV/AIDS. *Drugs*, *80*(9), 859–868. https://doi.org/10.1007/s40265-020-01322-y

Benzaken, A.S., Pereira, G.F.M., Costa, L. et al. Antiretroviral treatment, government policy and economy of HIV/AIDS in Brazil: is it time for HIV cure in the country?. AIDS Res Ther 16, 19 (2019). https://doi.org/10.1186/s12981-019-0234-2

Cohen, J. (2020). Combo of two HIV vaccines fails its big test: South African trial halted early because of "futility." *Science*, *367*(6478), 611.

de Amorim Barreto, M. A. da S., Suto, C. S. dos S., de Oliveira, J. S. B., Miranda, J. V. B., Porcino, C., & Moraes, A. A. da S. (2019). Social Representations of Public High School Students on Hiv/Aids Prevention. *Ciencia, Cuidado e Saude*, *18*(4), 1–7. https://doi.org/10.4025/cienccuidsaude.v18i4.45285

D'Souza, M., Rele, S., Hayes, B. F., Hu, D. J., Kaplan, D. L., Mamaghani, S., & Rampulla, D. (2020, January 10). Engineering immunity for next generation HIV vaccines: The intersection of bioengineering and immunology. *Vaccine*, *38*(2), 187-193. doi:10.1016/j.vaccine/2019.10.036

Fauci, A. S., & Lane, C. H. (2020, July 2). Four Decades of HIV/AIDS - Much Accomplished, Much to Do. *New England Journal of Medicine*, *383*(1), 1-4. doi:10.1056/NEJMoa1809866

Ferreira Feitosa, J. M., Nunes da Conceição, H., Teixeira Câmara, J., Silva Chaves, T., Mourão Pereira, B., Pinheiro Moura, L. R., Silva Barreto, C., & Assunção Barros, L. A. (2020). Epidemiological and Space Analysis of Hiv/Aids in Children and Pregnant Women. *Journal of Nursing UFPE / Revista de Enfermagem UFPE*, *14*, 1–8. https://doi.org/10.5205/1981-8963.2020.243437

Freire de Araújo Patrício, A. C., Peixoto Bezerra, V., Almeida Nogueira, J., Silva Paredes Moreira, M. A., Vizeu Camargo, B., & de Souza Santos, J. (2019). Knowledge of sex workers about HIV/AIDS and its influence on sexual practices. *Revista Brasileira de Enfermagem*, *72*(5), 1311–1317. https://doi.org/10.1590/0034-7167-2018-0590

Havlir, D. V., Balzer, L. B., Charlebois, E. D., Clark, T. D., Kwarisiima, D., Ayieko, J., ... Petersen, M. (2019, July 18). HIV Testing and Treatment with the Use of a Community Health Approach in Rural Africa. *New England Journal of Medicine*, *381*(3), 219-229. doi:10.1056/NEJMoa1809866

Hayes, R. J., Donnell, D., Floyd, S., Mandla, N., Bwalya, J., Sabapathy, K., ... Fidler, S. (2019, July 18). Effect of Universal Testing and Treatment on HIV Incidence - HPTN 071 (PopART). *New England Journal of Medicine*, *381*(3), 207-218. doi:10.1056/NEJMoa1814556

Hewko, S. J., Cummings, G. G., Pietrosanu, M., & Edwards, N. (2018). The Impact of Quality Assurance Initiatives and Workplace Policies and Procedures on HIV/AIDS-Related Stigma Experienced by Patients and Nurses in Regions with High Prevalence of HIV/AIDS. *AIDS & Behavior*, *22*(12), 3836–3846. https://doi.org/10.1007/s10461-018-2066-9

Hillis, A., Germain, J., Hope, V., McVeigh, J., & Van Hout, M. (2020, April 9). Pre-exposure Prophylaxis (PrEP) for HIV Prevention Among Men Who Have Sex with Men (MSM): A Scoping Review on PrEP Service Delivery and Programming. *AIDS and Behavior*, *24*, 3056-3070. doi:10.1007/s10461-020-02855-9

Klein, P. W., Psihopaidas, D., Xavier, J., & Cohen, S. M. (2020). HIV-related outcome disparities between transgender women living with HIV and cisgender people living with HIV served by the Health Resources and Services Administration's Ryan White HIV/AIDS Program: A retrospective study. *PLoS Medicine*, *17*(5), e1003125. https://doi.org/10.1371/journal.pmed.1003125

Marcus, J. L., Leyden, W. A., Alexeeff, S. E., Anderson, A. N., Hechter, R. C., Hu, H., ... Silverberg, M. J. (2020, June 15). Comparison of Overall and Comorbidity-Free Life Expectancy Between Insured Adults With and Without HIV Infection, 2000-2016. *JAMA Network Open*, *3*(6). doi:10.1001/jamanetworkopen.2020.7954

Melhuish, A., & Lewthwaite, P. (2018, June). Natural History of HIV and AIDS. *Medicine*, *46*(6), 356-361. doi:10.1016/j.mpmed.2018.03.010

Mude, W., Oguoma, V. M., Gesesew, H. A., Ameyaw, E. K., Njue, C., Nyanhanda, T., Adeleye, A. O., Dune, T., Kaambwa, B., & Mwanri, L. (2020). HIV/AIDS knowledge and attitudes assessment among women of child-bearing age in South Sudan: Findings from a Household Survey. *PloS One*, *15*(12), e0243969. https://doi.org/10.1371/journal.pone.0243969

Naar, S., Robles, G., Kolmodin MacDonell, K., Dinaj-Koci, V., Simpson, K. N., Lam, P., ... Starks, T. J. (2020, August 26). Comparative Effectiveness of Community-Based vs Clinic-Based Healthy Choices Motivational Intervention to Improve Health Behaviors Among Youth Living With HIV: A Randomized Clinical Trial. *JAMA Network Open*, *3*(8). doi:10.1001/jamanetworkopen.2020.14650

Owusu, A. Y. (2020). A gendered analysis of living with HIV/AIDS in the Eastern Region of Ghana. *BMC Public Health*, *20*(1), 751. https://doi.org/10.1186/s12889-020-08702-9

Quay, W. G. (2017). Building on the Intrinsic Resiliency of Children/Youth Impacted by HIV/AIDS: A Participatory Study in India. *Transformation*, *34*(1), 12–25. https://doi.org/10.1177/0265378816631247

Resubuna, T. F., Darmawansyah, Abdullah, M. T., Amiruddin, R., & Manyullei, S. (2019). HIV/AIDS Control Program in Health Office of Jayawiya District: Empowerment and Logistic Study. *Indian Journal of Physiotherapy & Occupational Therapy*, *13*(4), 201–205. https://doi.org/10.5958/0973-5674.2019.00161.8

Rosengarten, M., Sekuler, T., Binder, B., Dziuban, A., & Bänziger, P.-P. (2021). Beyond biological citizenship: HIV/AIDS, health, and activism in Europe reconsidered. *Critical Public Health*, *31*(1), 1–4. https://doi.org/10.1080/09581596.2020.1851656

Turan, B., Budhwani, H., Fazeli, P. L., Browning, W. R., Raper, J. L., Mugavero, M. J., & Turan, J. M. (2016, June 7). How Does Stigma Affect People Living with HIV? The Mediating Roles of Internalized and Anticipated HIV Stigma in the Effects of Perceived Community Stigma on Health and Psychosocial Outcomes. *AIDS and Behavior*, *21*, 283-291. doi:10.1007/s10461-016-1451-5

Umunna, G. E. (2010). Social justice and HIV/AIDS in Africa. *AFER*, *52*(4–1), 171–194.

Zheng, Y., Zhang, X., Sun, X., Shi, Y., & Chang, C. (2020). Evaluation of the college-based HIV/AIDS education policy in Beijing, China: a mixed method approach. *Environmental Health and Preventive Medicine*, *25*(1), 50. https://doi.org/10.1186/s12199-020-00890-5