

Factors Contributing to the Increasing number of HIV Infections among teenagers

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ABSTRACT

HIV/AIDS infection is on the rise, particularly among teens. HIV is still a significant problem for worldwide public health. Around 5% of all HIV-positive individuals and 11% of new adult HIV infections are adolescents. Blood, breast milk, semen, and vaginal secretions are just a few of the bodily fluids from infected people that can be exchanged, along with contaminated needles and syringes. Sexual contact is another way that HIV infection can spread, as can the sharing of contaminated objects like needles and syringes. The primary method of anal or vaginal sex-to-sex HIV/AIDS virus transmission. Compared to contact with sperm, saliva presents a lower risk of HIV/AIDS infection. Some behavioral factors that contribute to HIV infection include drinking alcohol, using social media, getting married young, engaging in early sexual activity, and other vices like smoking and cocaine use. A lack of understanding regarding the health hazards linked to HIV infection is one of the additional factors. By starting a campaign to raise awareness of the risk of HIV infection, putting preventative strategies into place, and employing clean injecting equipment, the World Health Organization is trying to create an AIDS-free generation.

Keywords: *HIV/AIDS pandemic, infection rates, HIV/AIDS transmission, risk factors, immune system, HIV/AIDS mechanism, and HIV/AIDS prevention*

INTRODUCTION:

HIV infection has been a major factor in numerous illnesses and fatalities since the first pediatric AIDS was identified in the US in 1982. Pneumocystis curing pneumonia, which typically manifests between the ages of 3 and 6 months and accounts for 33% of all AIDS-defining diseases and 57% of those in newborns under the age of one, is the most prevalent AIDS-defining illness in HIV-infected children. (Pandav, 2006). In Chennai in 1986, female sex workers were found to have the country's first cases of HIV infection. At the outbreak's start, high-prevalence states included Andhra Pradesh, Karnataka, Maharashtra, Tamil Nadu, and the northeastern states of Manipur and Nagaland. (antenatal women >1% HIV positive). Conditions differ significantly in their HIV prevalence, with some having rates close to the national average of 0.21 percent infected and others having rates above 1%. Infections predominated in patients aged 15 to 49, and 39% of all cases were female. Adult HIV prevalence has increased in some formerly low-prevalence states and UTs, including Assam, Chandigarh, Delhi, Jharkhand, Punjab, Tripura, and Uttarakhand. AIDS is brought on by the retrovirus known as the human immunodeficiency virus (HIV), which affects 42 million people globally at the moment. (WHO, 2002).

One of HIV infection's primary cellular targets is the CD4+ T helper lymphocyte. In the acute phase, HIV-specific CTLs increase along with the first spike in HIV load, whereas CD4+ T cells decrease. As the blood's CD4+ T cell count gradually drops below 200 AIDS begins to spread, making patients more vulnerable to opportunistic infections. Increases in the virus load, a decline in HIV-specific CTL, and an increase in neutralizing antibodies are the next developments. To allow cell entry, the HIV envelope (Env) glycoprotein interacts with the CD4 and CXCR4 or CCR5 chemokine receptors. AIDS begins to spread, making patients more vulnerable to opportunistic infections. Increases in the virus load, a decline in HIV-specific CTL, and an increase in neutralizing antibodies are the next developments. To allow cell entry, the HIV envelope (Env) glycoprotein interacts to the CD4 and CXCR4 or CCR5 chemokine receptors. The viral RNA reverse-transcribes into DNA once it reaches the cytoplasm, where it is randomly incorporated into the genome of the host cell. When the host cell is active, there is an increase in the production of viral proteins. When the virus exits the cell and uses the plasma membrane as its envelope, these proteins assemble (Alimonti et al., 2003)

At all stages of HIV infection, plasma levels range from 50 to 11×10^6 virions ml⁻¹. The majority of HIV-infected T cells die from the virus or receptor-mediated apoptosis after an in vivo half-life of between 12 and 36 hours. (Alimonti et al., 2003). The three primary methods by which the HIV virus spreads are unprotected sexual contact, blood transfusions using contaminated needles, and vertical transmission, which is when the infection passes from a mother to her foetus. Mother-to-child transmission is by far the most major route of infection, with unsafe blood transfusions and infected needles only exposing a small portion of children under the age of 15. (Naik et al., 2020).

LITERATURE REVIEW:

HIV/AIDS infection rates:

Teenagers are currently highly prevalent HIV carriers in the United States and other countries across the world, thus being genuine to oneself requires that. Adolescents experience the highest rate of STDs compared to other sexually active individuals. During the 1990s, there will probably be a noticeable rise in the prevalence of HIV among teenagers. (Hein, 1993).

The World Health Organization (WHO) estimated that 33.2 million people worldwide were living with AIDS or HIV in 2007. There were 330,000 children, 2.5 million new cases, and an estimated 2.1 million fatalities in the previous three years despite the high death toll. (Lewthwaite & Wilkins, 2009).

In the initial years following their first sexual encounter, women have a higher risk of contracting HIV/AIDS than do males. In this study, teenage mothers in Ogun State, Nigeria, were compared to more experienced mothers to see how well the teenage mothers understood and utilised treatments designed to prevent mother-to-child transmission (PMTCT). (Amoran et al., 2012).

HIV prevalence in the overall population of sexually active people is 0.8%. Between the ages of 30 and 34 for men and 35 to 39 for women, respectively, HIV prevalence has been found to be greater. (Rojas et al., 2011).

Between the ages of 15 and 24, girls and young women (GYW) are still more likely to develop HIV than men (AGYW). Thirty-two hundred and ninety-two AGYW were tested and interviewed for HIV; 11.4 percent of the results were positive. Teenage girls had a significantly lower overall HIV prevalence than did adolescent women. (17.4%) (Mabaso et al., 2018).

Dependency on HIV/AIDS infection transmission:

Human immunodeficiency virus (HIV) infection has affected close to 28 million people, and sexual contact is the primary means of transmission for 75–85 percent of these illnesses. Different HIV exposure levels affect the viral dose, whether the exposure happened between or inside exposure channels, and if the virus travels through the bloodstream or a mucosal membrane (DNA, 1997).

Street adolescents are the most at risk for HIV/AIDS of the three types of adolescents: students, slum dwellers, and street kids. Even though heterosexual encounters continue to be the predominant method of transmission, more and more newborns who were infected before birth are now growing up (Naswa & Marfatia, 2010).

The oral cavity and its four potential sexual sites—the vagina, the rectum, and the penis—can be made receptive by intrusive combinations during oral sex. All eight allow for saliva interaction, but only one of the combinations—receptive penile-oral intercourse—can expose the receptor to semen. Evidence at this time points to the hazard of contact with sperm being far greater than the risk of HIV transmission from saliva exposure (Rothenberg et al., 1998).

HIV/AIDS infection-causing factors:

HIV/AIDS spreads more quickly when prophylactic measures like condoms aren't used consistently. Alcohol can raise the risk of contracting HIV/AIDS and spreading it through sexual activity in a number of ways, including by affecting judgments about having sex and selecting a partner, making it harder for people to agree to wear condoms during sex, and by impaired judgement. (Freeman, 2016).

Commercial sex was very common, and dangerous sexual behaviours like premarital sex, early sexual encounters, and frequent sexual engagements were also very common. This implied that many respondents lacked acceptable sexual behaviour. (Mavhandu-Mudzusi & Asgedom, 2016).

Early sexual activity and marriage, low rates of contraception usage, poor levels of education, low

socioeconomic position, ignorance of sexual and reproductive health, gender inequities, and 7When this was investigated, it was discovered that a number of significant traits stood out, including physical and sexual Physical and/or sexual assault were among the significant aspects that stood out in the examination of this (Kaphagawani & Kalipeni, 2017).

The current study discovered an association between the online community that young people are exposed to through social media and a rise in sexual risk behaviours.. As an illustration, about a third of the participants acknowledged engaging in sexual activity with someone they met online. Studies show that people who look for sexual partners online are more likely to have extra risk factors that make them more vulnerable to contracting HIV and other STDs.(Barman-Adhikari et al., 2016).

Drug use, especially cocaine use, is another behavioural component causing an increase in the prevalence of STDs. A sexual stimulant known as cocaine temporarily increases the desire to mate (Cates, 1991). According to long-held ideas, relationships between younger women and older men help young women become infected with HIV. They have more frequent sex, their partners are older rather than younger, and they hardly ever use condoms (Gregson et al., 2002).

Studies have connected alcohol consumption to teens' risky sexual behaviour, which is widely cited as raising adolescents' risk of contracting HIV.(Morrison et al., 2003).

People with HIV/AIDS (PLWHA) smoke far more frequently than the general population, which is unfortunate. In fact, compared to 21% of US adults generally, it is anticipated that 45 to 74 percent of adult PLWHA smoke. Currently, tobacco smoking is the main factor contributing to HIV-related morbidity and mortality.The most significant lifestyle factor that can be changed to prevent cardiovascular disease in HIV-positive people is tobacco use (Rubinstein et al., 2014).

Show that men between the ages of 15 and 19 are more likely than women to engage in dangerous activities like drug, sex, and contraception usage, all of which are associated to AIDS. Drug users and those in many relationships are more likely to use condoms infrequently. The use of condoms is a preventive measure that negatively correlates with most risky behaviors (Ku et al., 1992).

HIV-positive and HIV-negative REACH respondents had a significant rate of vitamin D deficiency, which could be brought on by the fact that these disadvantaged children, mainly youth, receive minimal exposure to the sun. 1,25-Dihydroxyvitamin D plasma levels are changed by HIV/AIDS Infection (Stephensen et al., 2006).

Violence affects millions of women worldwide from all socioeconomic origins. Violence and the prospect of violence put more and more women at risk of contracting the human immunodeficiency virus (HIV).(Sexual Violence.Pdf, n.d. et al., 1996).

The recurrent notion is that teens will be drawn into sexual activity by sex education itself. Schools and other educational and health channels will preferably speak rather than remain mute. Sexuality makes sexual abstinence the only choice in a world of dread and danger (Ehrhardt, 1996).

The attitudes of 194 female and 154 male sexually active teenagers in Scotland were analyzed, as well as their practices for HIV prevention (aged 16–18 yrs). The health belief model (HBM)-specified factors and preventative intentions were measured using a postal questionnaire. It has been determined that factors including health beliefs, gender, age, sexual experience, and prior condom use account for 17.8 to 24.3% of the variation in reported preventative intentions (Abraham et al., 1992).

Prevalence of HIV/AIDS in teenagers in China:

Between 2008 and 2017, the prevalence and cases of HIV/AIDS among Chinese adolescents rose considerably among males aged 14 to 22. College and university students made up more than 3,000 of these cases, and more than 80% of these included guys who had intercourse with other men. HIV/AIDS has become the most common infectious cause of mortality among children and teenagers in China, particularly among boys. Lack of information about HIV/AIDS prevention and high-risk sexual behaviour appear to be significant causes to the increased HIV prevalence.(Dong et al.).

AIDS and HIV cases found in Africa:

Between adolescence and the beginning of early adulthood, the prevalence of HIV among women rises quickly. all over southern Africa. Adults in South Africa are 16.8% more likely to have HIV than the global average of 23 percent (23 percent in Swaziland, 26.5 percent, and 23 percent in Botswana).It is important to take into account the intricate and varied causes of the high HIV incidence in this population. The combined effects of

gender inequity, high fertility, HIV infection, and poor mental health result in vulnerable situations and significant structural hurdles. (Harrison et al., 2015).

In southern Africa, there are two million HIV-positive adolescents; this population has a low rate of care retention and a high mortality rate. Almost no research has been done to determine what aspects of healthcare can increase adolescents' self-reported retention (Mavedzenge et al., 2014).

The WHO estimated that during the first ten years of the AIDS pandemic, there were roughly 500 000 cases of AIDS in women and children. Aids is currently the number one killer of sub-Saharan African women aged 20 to 40 in important urban centres of the Americas and Western Europe. The death rates for infants and children could increase by 30% in certain cities. (Chin, 1990).

Sexual commerce, migration, polygamy, and teenage marriages continue to be issued in the Sub-Saharan region. What triggers HIV infection explicitly? The region's population mobility worsens the HIV/AIDS prevalence (Mbirimtengerenji, 2007).

Information about teens in Iran who have HIV/AIDS:

41% (CI = 36-53) of Iranian youth appear to participate in sexual activity. The findings showed that Iranian youths who are single place a high priority on sexual connections. Friendships made before marriage, one's attitude, feelings of loneliness, the environment, the scholastic environment, and how western culture is portrayed in the media are all factors in the rise in HIV infections among young people (Vakilian et al., 2014).

Teenage HIV/AIDS Infection and Mental Health:

The welfare and mental health of families and other groups afflicted by HIV/AIDS are at risk at every ecological level, from the biological through the family to the larger community and culture (Betancourt et al., 2013).

HIV infection increases the likelihood of severe depression in IV drug users, and depression is also possible in a specific population. Natural killer cells, CD8 T lymphocytes, and NK cells from CD4 T lymphocytes are all essential for the body's defence against HIV infection. but can be affected by depression symptoms (Arsenio et al., 2014).

Significance of treating juvenile HIV/AIDS infections:

Girls and young women are disproportionately at risk of catching HIV, thus it is important to focus on them in order to attain the noble goals of an AIDS-free generation and epidemic containment.

Enrolment of teenagers in biological HIV prevention studies and the delivery of easily accessible and comprehensive SRH-HIV preventive programs (Dellar et al., 2015).

The issue of diagnosis disclosure becomes increasingly important as this population ages and is given extensive medical treatment. The significance of revelation is closely related to the child's growing autonomy, treatment compliance, sexual experimentation, and fears associated with impending mortality (Mothers, 1999).

The five successful STI/HIV intervention programmes were found to share a common theme of gender roles and STI and HIV knowledge. They should be included in prospective, gender- and culturally-appropriate intervention initiatives. (Lee et al., 2013).

It will take coordination between the healthcare systems to reach teenagers at risk for HIV infection care system community-based organizations that work with adolescents, especially organizations serving high risk (Kipke et al., 1990).

Previous pregnancies have been linked to an increased risk of HIV and HSV-2 infection. Due to the alarmingly high rates of teenage pregnancy found in this study, more research is urgently required to improve access to sexual and reproductive health services and medical assistance for these children. (Karim et al., 2014).

There is strong proof that improving IDU access to and use of sterile injecting equipment can reduce HIV infection rates (Injection Drug Users). Needlestick programs don't just reduce HIV infection; they also have other beneficial benefits (World Health Organization, 2004).

Teenagers are educated about HIV/AIDS in school and are informed of the advantages and disadvantages of having sex. Results typically reveal that men and women seem to have different ideas or justifications for engaging in sex or no (Hoppe et al., 2004).

A person's understanding of how AIDS spreads, willingness to explore behavioral changes, and perceived susceptibility to infection are all measured by their HIV risk perception. Particularly about young people, we still don't fully comprehend what drives risk perception (**Macintyre et al., 2004**).

Using individual-focused biological and behavioral variables to assess the determinants of HIV infection is usually insufficient. To track the HIV epidemic, a comprehensive strategy that considers macro-indicators representing social, economic, and political aspects must be devised (**De Vogli & Birbeck, 2005**).

Instead of addressing the more excellent contextual and structural landscape, many therapies concentrate on altering individual-level behaviors. Given the complexity of the factors influencing HIV risk, a combined strategy integrating supporting behavioral, structural, and pharmacological interventions will be necessary (**Pettifor et al., 2013**).

The approach depends on condoms for STD prevention and oral contraceptives for pregnancy prevention. But the problem with condom-based treatments is that physicians frequently are not aware of the limitations of the STD protection offered by condoms (**McIlhane, 2000**).

Only a tiny portion of the Sexual Revolution's long-term effects can be averted through screening, immunization, STI treatment, and birth control. Doctors must be knowledgeable about the risks and the significance of them, and they must also let young patients know that only mutually loyal, uninfected couples engage in healthy sex. (**Malhotra, 2008**).

It is crucial to consider the impact of social networks to comprehend the dynamics and spread of behaviour change in response to AIDS. The influence of social networks extends to spousal communication about AIDS risk, and contacts with network partners seem to improve the likelihood of husband-wife communication about the illness regardless of how each partner assesses their own risk (**Kohler et al., 2007**).

The model predicts that HIV prevalence in Africa would be around 0.3% at the amount of transmission in the United States. According to the model in this study, it would cost about \$300 to expand the STI treatment program to include the entire continent million annually (**Celum et al., 2005**).

Kenyan teenagers' sexual behaviour The relative risk of HIV infection based on the age of the partner was known, which decreased teen pregnancy by 28%. These data indicate that adolescents are receptive to danger warnings. (**Dupas, 2011**).

Over the past two decades, significant scientific advancements have reduced the morbidity and mortality in the US from opportunistic infections linked to AIDS. Teenagers, young women, and people of colour are more likely to get HIV, and a growing number of young people live with a family member who is infected.. A comprehensive theoretical framework is necessary to comprehend HIV risk behavior (**Donenberg & Pao, 2005**).

METHODOLOGY:

Information was gathered on basic demographics, family structure, and health-related issues, as well as on education, sexual behaviour, and knowledge and awareness of HIV/AIDS. The search for journal articles started in October 2022. From 1991 until 2021, publications and review articles were considered. Grey literature and duplicate reports were removed during the screening process. The incidence, prevalence, and comparison of HIV/AIDS among teenagers and adults, as well as the infection rate in different nations, were also examined.

Authors evaluated these papers and re-examined any disputes before reviewers made the necessary adjustments and chose publications to be included in the research. It adheres to the PRISMA flow chart, which lists the number of articles that were included, excluded, and subjected to screening.

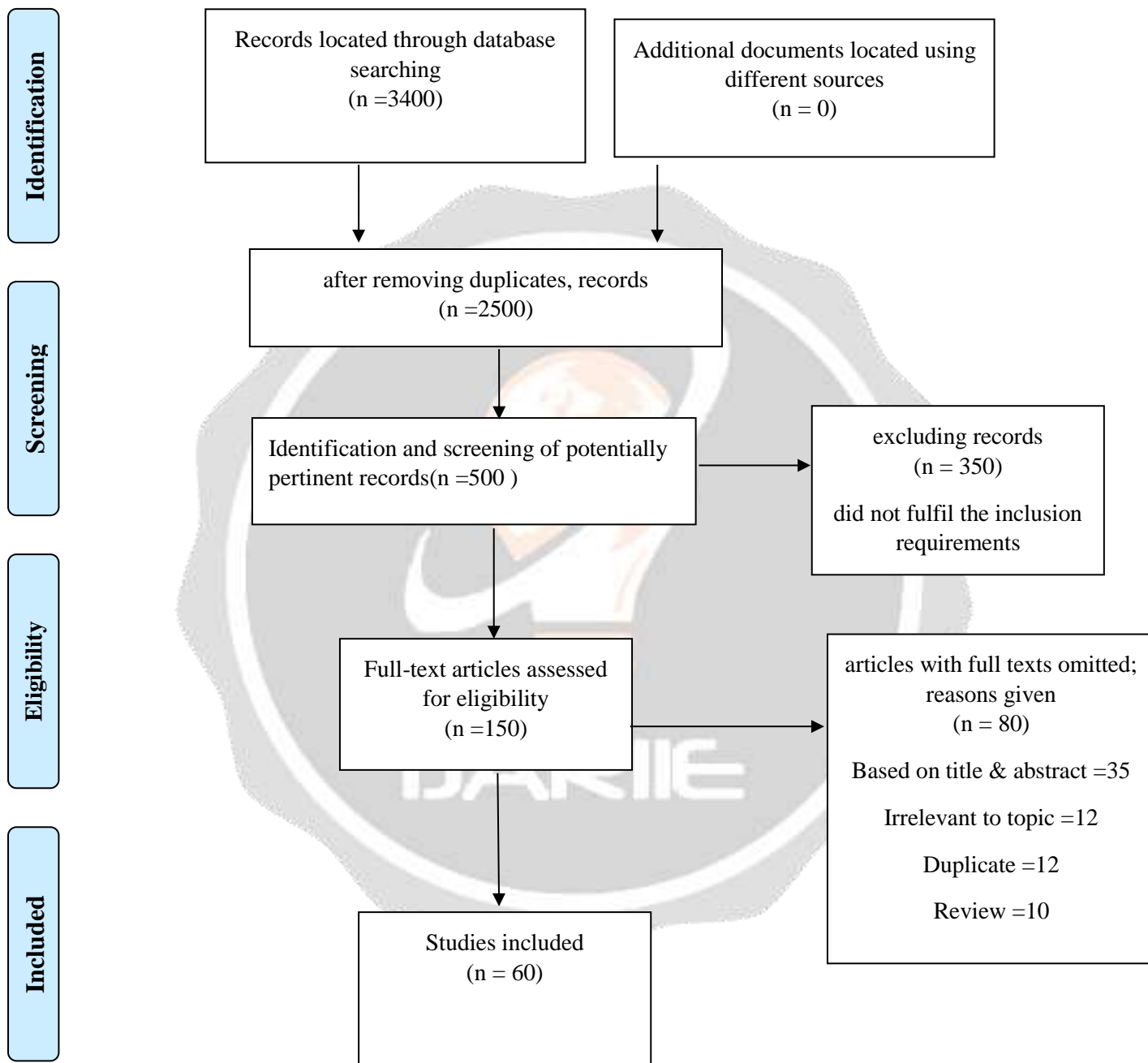
Analysis:

The preferred reporting item for systematic reviews and meta-analysis (PRISMA) technique is the one that is employed. Following the review and summarization of every article that made it through the selection process, consideration was given to the goals, the year the article was published, the amount of citations, and any recommendations for additional research.

Criteria for inclusion and exclusion

The be included in current study, studies have to meet some criteria

(a) Studies have included some kind of selection criteria (Factors contributing to HIV, work place). These criteria limited the number of studies (b) Accordingly excluded the studies in which it based on irrelevant information there is no proper Title, Abstract & Review



Final data set :

After searching 3400 research articles were found in the research database after searching all possible keywords. The same article could be found in two databases after scanning the title. 2500 articles remain once the duplicates are eliminated. five hundred items in all were examined. 350 articles were disqualified because they didn't fit the requirements.

Articles accessed for eligibility are 150 articles. A Total number of 80 articles excluded based on title and abstract (35) Irrelevant to topic (12) Duplicate (12).

The final data set consists of 60 articles.

The oldest included study was published in the year 1991 and the most recent study was conducted on 2021. The Entire process is shown in figure.

DISCUSSION:

Teenage HIV infection is a big problem nowadays because the infection rate is increasing daily for a number of reasons, with social media use being one of the main contributors. Social media and the internet are frequently used by young people. Users turned to social media to find sex partners. The globe has a critical priority in reducing teen HIV/AIDS infection rates since teen HIV infection affects their mental health and raises their risk of suicide. WHO is taking a number of steps to reduce HIV infection, including campaigns, increasing public awareness of the illness, raising the legal age for girls to get married from 18 to 21, and more. Biological and behavioural factors that could lower the prevalence of HIV/AIDS among teenagers must also be given attention.

CONCLUSION:

In the light of the analysis, the researchers have drawn the following conclusions

Increasing HIV/AIDS infections among teenagers have become the most significant threat for the society. Prevalence among teenagers is more than adults due to various factor discussed earlier, it is perceived through this searching that negligence of teenagers during their sexual activity is taking them towards fatal sexual transmitted diseases HIV/AIDS. It is found through this research that sexual activity without contraceptives and lack of knowledge into developing countries increasing prevalence and risk of HIV/AIDS not only in teenagers but also in adults. this increasing numbers of infection can be controlled while HIV prevalence and its prevention campaigns are conducted throughout undeveloped and rural areas. Prevention is the best treatment for this life threaten disease once succumbed by teenagers aren't being subdued by medical treatment.

Reference

- Alimonti, J. B., Ball, T. B., & Fowke, K. R. (2003). Mechanisms of CD4+ T lymphocyte cell death in human immunodeficiency virus infection and AIDS. *Journal of General Virology*, 84(7), 1649–1661. <https://doi.org/10.1099/vir.0.19110-0>
- Barman-Adhikari, A., Rice, E., Bender, K., Lengnick-Hall, R., Yoshioka-Maxwell, A., & Rhoades, H. (2016). Social Networking Technology Use and Engagement in HIV-Related Risk and Protective Behaviors Among Homeless Youth. *Journal of Health Communication*, 21(7), 809–817. <https://doi.org/10.1080/10810730.2016.1177139>
- Cates, W. (1991). Teenagers and sexual risk taking: The best of times and the worst of times. *Journal of Adolescent Health*, 12(2), 84–94. [https://doi.org/10.1016/0197-0070\(91\)90449-V](https://doi.org/10.1016/0197-0070(91)90449-V)
- Celum, C., Glaeser, E., Kaplan, E., Katz, L., Kremer, M., Larson, U., Mahal, A., Peled-leviatan, S., Shapiro, J., Shleifer, A., Thornton, R., & Werker, E. (2005). *Sexually transmitted infections, sexual behavior, and the hiv/aids epidemic* e. May*.
- De Vogli, R., & Birbeck, G. L. (2005). Potential impact of adjustment policies on vulnerability of women and children to HIV/AIDS in sub-Saharan Africa. *Journal of Health, Population and Nutrition*, 23(2), 105–120.
- Dellar, R. C., Dlamini, S., & Karim, Q. A. (2015). Adolescent girls and young women: Key populations for HIV epidemic control. *Journal of the International AIDS Society*, 18(2), 64–70. <https://doi.org/10.7448/IAS.18.2.19408>

- Donenberg, G. R., & Pao, M. (2005). Youths and HIV/AIDS: Psychiatry's role in a changing epidemic. *Journal of the American Academy of Child and Adolescent Psychiatry*, 44(8), 728–747. <https://doi.org/10.1097/01.chi.0000166381.68392.02>
- Freeman, R. C. (2016). Toward Development of Enhanced Preventive Interventions for HIV Sexual Risk among Alcohol-Using Populations: Confronting the 'Mere Pause from Thinking.' *AIDS and Behavior*, 20(1), 1–18. <https://doi.org/10.1007/s10461-015-1179-7>
- Gregson, S., Nyamukapa, C. A., Garnett, G. P., Mason, P. R., Zhuwau, T., Caraël, M., Chandiwana, S. K., & Anderson, R. M. (2002). Sexual mixing patterns and sex-differentials in teenage exposure to HIV infection in rural Zimbabwe. *Lancet*, 359(9321), 1896–1903. [https://doi.org/10.1016/S0140-6736\(02\)08780-9](https://doi.org/10.1016/S0140-6736(02)08780-9)
- Harrison, A., Colvin, C. J., Kuo, C., Swartz, A., & Lurie, M. (2015). Sustained High HIV Incidence in Young Women in Southern Africa: Social, Behavioral, and Structural Factors and Emerging Intervention Approaches. *Current HIV/AIDS Reports*, 12(2), 207–215. <https://doi.org/10.1007/s11904-015-0261-0>
- Hein, K. (1993). "Getting real" about HIV in adolescents. *American Journal of Public Health*, 83(4), 492–493. <https://doi.org/10.2105/ajph.83.4.492>
- Kaphagawani, N. C., & Kalipeni, E. (2017). Sociocultural factors contributing to teenage pregnancy in Zomba district, Malawi. *Global Public Health*, 12(6), 694–710. <https://doi.org/10.1080/17441692.2016.1229354>
- Karim, Q. A., Kharsany, A. B. M., Leask, K., Ntombela, F., Humphries, H., Frohlich, J. A., Samsunder, N., Grobler, A., Dellar, R., & Karim, S. S. A. (2014). Prevalence of HIV, HSV-2 and pregnancy among high school students in rural KwaZulu-Natal, South Africa: A bio-behavioural cross-sectional survey. *Sexually Transmitted Infections*, 90(8), 620–626. <https://doi.org/10.1136/sextrans-2014-051548>
- Kipke, M. D., Futterman, D., & Hein, K. (1990). HIV infection and AIDS during adolescence. *Medical Clinics of North America*, 74(5), 1149–1167. [https://doi.org/10.1016/S0025-7125\(16\)30508-9](https://doi.org/10.1016/S0025-7125(16)30508-9)
- Kohler, H. P., Behrman, J. R., & Watkins, S. C. (2007). Social networks and HIV/AIDS risk perceptions. *Demography*, 44(1), 1–33. <https://doi.org/10.1353/dem.2007.0006>
- Lee, Y., Ph, D., Dancy, B., Ph, D., Florez, E., Holm, K., & Ph, D. (2013). *Factors Related to Sexual Practices and Successful Sexually Transmitted Infection / HIV Intervention Programs for Latino Adolescents*. 30(5), 390–401. <https://doi.org/10.1111/phn.12039>
- Mavhandu-Mudzusi, A. H., & Asgedom, T. tesfay. (2016). The prevalence of risky sexual behaviours amongst undergraduate students in Jigjiga University, Ethiopia. *Health SA Gesondheid*, 21, 179–186. <https://doi.org/10.1016/j.hsag.2015.11.002>
- Mothers, B. H. (1999). *Hiv/aids*. 13(1), 41–45.
- Naik, P. A., Zu, J., & Owolabi, K. M. (2020). Global dynamics of a fractional order model for the transmission of HIV epidemic with optimal control. *Chaos, Solitons and Fractals*, 138, 109826. <https://doi.org/10.1016/j.chaos.2020.109826>
- Pandav, C. S. (2006). *Epidemiology of HIV / AIDS in India*. 47(1), 21–39.
- Pettifor, A., Bekker, L. G., Hosek, S., DiClemente, R., Rosenberg, M., Bull, S. S., Allison, S., Delany-Moretlwe, S., Kapogiannis, B. G., & Cowan, F. (2013). Preventing HIV among young people: Research priorities for the future. *Journal of Acquired Immune Deficiency Syndromes*, 63(SUPPL. 2), 155–160. <https://doi.org/10.1097/QAI.0b013e31829871fb>
- Rojas, P., Malow, R., Ruffin, B., Rothe, E. M., & Rosenberg, R. (2011). The HIV/AIDS epidemic in the Dominican Republic: Key contributing factors. *Journal of the International Association of Physicians in AIDS Care*, 10(5), 306–315. <https://doi.org/10.1177/1545109710397770>
- Rothenberg, R. B., Scarlett, M., Del Rio, C., Reznik, D., & O'Daniels, C. (1998). Oral transmission of HIV. *Aids*, 12(16), 2095–2105. <https://doi.org/10.1097/00002030-199816000-00004>
- Rubinstein, M. L., Harris, D. R., Rudy, B. J., Kapogiannis, B. G., Aldrovandi, G. M., & Mulligan, K. (2014). Exploration of the effect of tobacco smoking on metabolic measures in young people living with HIV. *AIDS Research and Treatment*, 2014. <https://doi.org/10.1155/2014/740545>

Vakilian, K., Mousavi, S. A., & Keramat, A. (2014). Estimation of sexual behavior in the 18-to-24-years-old Iranian youth based on a crosswise model study. *BMC Research Notes*, 7(1), 2–5. <https://doi.org/10.1186/1756-0500-7-28>

