JATI-Journal of Southeast Asian Studies, Volume 26(2), December 2021, 115-131
ISSN1823-4127/eISSN 2600-8653

TREND OF NEW HIV INFECTIONS IN THE SOUTHEAST ASIAN REGION FROM 2010-2019

Edward Laurence Opena
Biology Department, Cebu Normal University
Cebu, Philippines
(openae@cnu.edu.ph)
DOI: https://doi.org/10.22452/jati.vol26no2.5

Abstract

Since its detection in the 1980s, infection of the human immunodeficiency virus (HIV) has affected at least 40 million people and has claimed at least 20 million lives, putting the infection on a pandemic scale. The Southeast Asian Region (SEAR) has been considered to be one of the hardest-hit regions of the HIV infection pandemic, next to Africa. Understanding an updated trend of infection within the region could help formulate appropriate responses from various agencies. This paper analysed the reported new cases of HIV infections from 2010-2019, using the data from UNAIDS, the arm of the United Nations to combat the AIDS pandemic. The highest recorded cases were that of Myanmar, Thailand, Viet Nam and the Philippines, while it is lowest in Timor-Leste, Sri Lanka, Lao People's Democratic Republic, and Cambodia. The most notable increases of new infections were that of the Philippines and Timor-Leste. It can then be suggested that more special monitoring and more intense intervention programs are needed, especially in the Philippines. Overall, a decreasing number of cases was observed over the last 10 years. Based on the available literature, sex education and a consistent support group system are proven to significantly reduce the risk of transmission of the virus across different communities. The continuous information campaign, introduction of newer and more effective antiviral drugs, and other interventions from both public and private sectors will be critical in sustaining this downward trend of new infections in the coming years. Thus, epidemiological analyses on available data must be carried out in providing fresh perspectives in containing the said infection.

Keywords: human immunodeficiency virus, HIV, Southeast Asia

Introduction

Human immunodeficiency virus, or commonly known as HIV, causes a pandemic that infects around 40 million people worldwide, with more than 20 million deaths. The infection of HIV will lead to a disease known as acquired immunodeficiency syndrome (AIDS). HIV infection and its epidemiological impacts has exceeded human expectations since its detection in the 1980s. Since then, the infection has crossed borders around the world, making significant impacts on several nations' population structure, economic progression, and social capitalisation (Piot, Bartos, Ghys, Walker, & Schwartländer, 2001).

HIV are classified as a form of a retrovirus, which means that it contains RNA. The viral RNA molecules will then insert itself to the host cells' DNA where it directs the production of molecules that are necessary for the formation of new viruses. This would result to the exhaustion of the host's cellular resources, thus depleting the cell of resources that are necessary for cellular reproduction. HIV specifically infects CD4+ T-cells in the human body. Since CD4+ T-cells are vital for the integrity of the entire immune system of the human body, its destruction (cellular depletion) by the HIV cripples a person's specific defense mechanism. This leaves those that are HIV-infected individuals to be more susceptible to other infections. The Centers for Disease Control and Prevention identified several secondary infections, including certain cancers (invasive cervical cancer, lymphoma) tuberculosis, and pneumonia (Centers for Disease Control and Prevention, n.d.).

There are various conspiracy theories that surround the origin of HIV, particularly HIV-1 (type 1). As of today, the exact origin of the said virus remains unknown. However, there are series of studies that show the primate *Cercocebus atys* (sooty mangabey) is the virus' reservoir. A similar virus known as the simian immunodeficiency virus (SIV) were also traced to infect primates in west central Africa such as *Pan troglodytes troglodytes* (wild chimpanzees) and *Gorilla gorilla gorilla* (gorillas). Just like other viruses, SIVs are species-specific where a viral type infects only a species. About 40 species of African primates were known to be infected with their own SIV, where some of these infections were traced to be non-pathogenic. In chimpanzees, SIV the mechanism of infection is quite similar to that of HIV, where SIV also depletes the CD4+ T-cells, increasing the wild chimpanzees' mortality rate. Thus, the mode of infection and mortality rate in primates (which is highly similar to that of humans) make AIDS more ancient compared to HIV-1's origins (Sharp & Hahn, 2010).

HIVs are suspected to be mutated versions of SIV. Viruses have the capacity to mutate to form a novel virus that will infect newer species of organisms. There are several possibilities on how this virus from African primates

were transferred to humans. A certain research identified some of the socio-cultural factors that may have contributed to the HIV epidemic which originated in Africa. These includes the traditional hunting of bushmeat (specifically in French Equatorial Africa), and other colonial practices such as unsterilised vaccination programs and labor camps. Once the mutation of SIV to HIV was completed, a new phylogenetic lineage emerged, this time it infects humans (Chitnis, Rawls, & Moore, 2010).

In another study, it revealed that the origin of the other HIV variant (HIV-2) was estimated to be between 1940-1956 (HIV-2 subtype A) and 1945-1959 (HIV-2 subtype B). The infection's rapid and exponential growth patterns in this West African country Guinea-Bissau happened between 1955-1970. The researchers also divulged that they have evidences to conclude that HIV-2 have grounds to be considered as a zoonotic infection, and whose transmission rate is greatly affected by the war for independence of the said country (Lemey et al., 2003).

What made this HIV pandemic very trivial is that the virus itself has the capacity of having high mutation rate at the individual level and within the population, resulting to different lineages of HIV in humans (Hemelaar, 2012). Rambaut, Robertson, Pybus, Peeters, and Holmes (2001) acknowledged that epidemiologically, HIV infections are primarily acting within human populations and not between species. Since then, various modes of transmission of the said virus from one human to another has been identified, where the infection is primarily sexually-transmitted, followed by mother-child transmission, and transmission via cutaneous (dermal) inoculation (Shaw & Hunter, 2012); this then signals the start of an epidemic that gradually progressed into one of the most notable pandemics of all time.

Historically, HIV/AIDS were first recorded in Asia in the mid-1980s, and in the 1990s HIV epidemics became established in various countries. And at the turn of the millennium, Asia harbored 40% of the total global cases. In 2019 alone, UNAIDS report around 390,000 new cases around Asia and the Pacific. In this region, HIV epidemics showed great diversity in terms of severity and timing, where several factors are known to contribute to its infection rate. Factors such as the practice of unprotected sex, use of injectable drugs, and mother-child transmissions are the top of the list. Due to the magnitude brought about by HIV infection, it has become one of the defining public cases of public health history (McCutchan, 2006; Ruxrungtham, Brown, & Phanuphak, 2004; Hoare et al., 2010; Wolffers, 1997; Simon, Ho, & Karim, 2006).

HIV infections, which will lead to AIDS if left untreated, have higher incidence in specific groups within a population. Sex-workers, men-having-sex-with-men, and those that belong to the marginalised groups particularly in

developing countries are at risk. Hence, the incidence of HIV infections also has demographical, ethnographical and historical connections in the society (Hunter, 2007).

In 2010, the World Health Organisation had estimated around 3.5 million people within the Southeast Asian Region that live with HIV. With this number of infected individuals, Southeast Asia has become the second most infected region in the world, after Africa (Trotter et al., 2013). An updated perspective of the trends of the infection may help in a more appropriate approach in the global efforts in containing the said infection.

Due to the existing interventions such as environmental changes, drug developments, information campaign, and more rigorous generation and storage of data, a shift of epidemiological trend of HIV has been observed (Lau, Wang, & Saksena, 2007). Hence, this paper will explore a 10-year trend of reported new HIV cases within the country-members of Southeast Asia from 2010-2019.

Methods

New recorded cases of human immunodeficiency virus (HIV) infections were obtained from the data base of UNAIDS, an agency of the United Nations whose aim is to end the incidence of acquired immunodeficiency syndrome (AIDS) through multisectoral efforts ("AIDSinfo", n.d.). Data of new transmission from 2010-2019 among the 11 nation-members of Southeast Asian Region (SEAR) were included. Since Brunei Darussalam and Indonesia showed no data for the inclusive years, they are excluded in the statistical analyses; thus only 9 countries were analysed (Cambodia, Lao People's Democratic Republic, Malaysia, Myanmar, Philippines, Sri Lanka, Thailand, Timor-Leste, Viet Nam). The graphs for the total number of cases from the inclusive years in every country, trend of total cases among the nations from the inclusive years, and the trend of total cases per country were generated. The analysis of variance (ANOVA) on the annual reported new cases, and on the difference of the reported new cases per country for the study period, were analysed. Single factor ANOVA was also conducted to determine the significance of the trend of HIV infections in every country. Results of the statistical analyses were all generated using Microsoft Excel 2016.

Results and Discussion

As shown in Figure 1, Myanmar has the highest total number of the newly reported HIV cases among SEAR (133,000), followed by Thailand (103,400), Viet Nam (102,200), Philippines (96,700) and Malaysia. Lowest total recorded new cases within 10 years are Timor-Leste (1310), Sri Lanka (2,230), Lao People's Democratic

Republic (9,200) and Cambodia (13,240). Though a slight increase in 2014 was noted, generally there seems to be a decreasing trend of reported new cases in the past 10 years as shown in Figure 2.

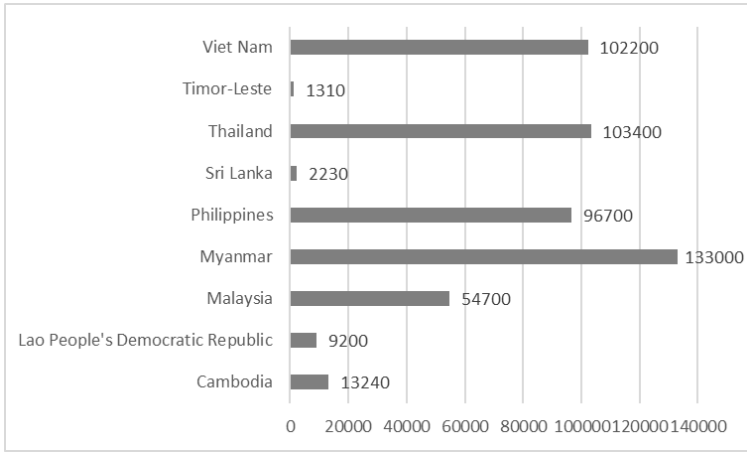

Figure 1: Total number of HIV cases by countries from 2010-2019 (Source: UNAIDS [n.d.].)

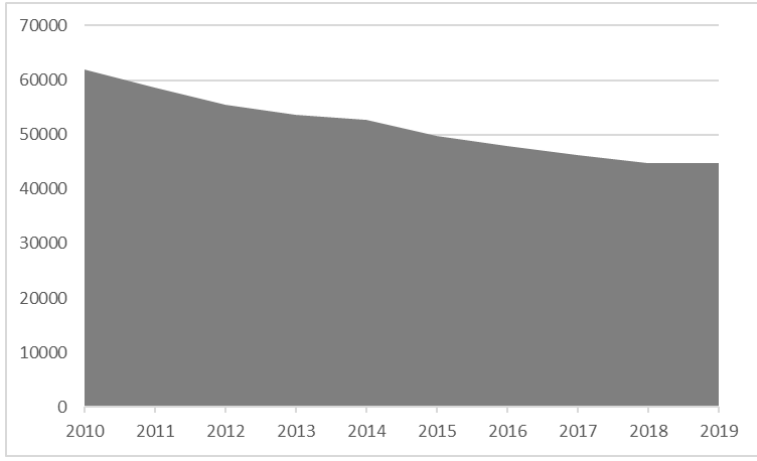

Figure 2: Trend of the total number of new HIV cases among Southeast Asian countries from 2010-2019 (Source: UNAIDS [n.d.].)

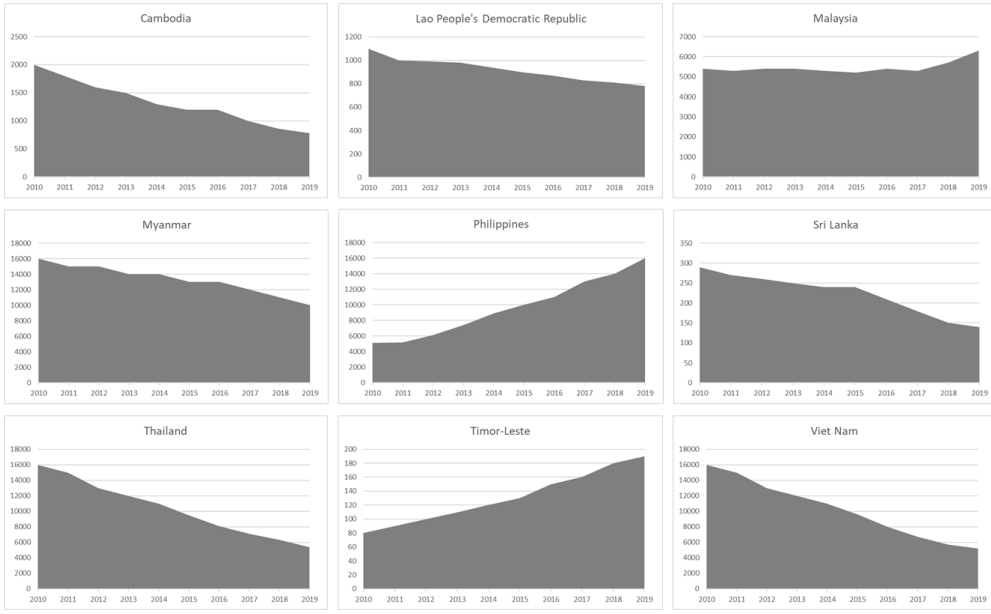

Figure 3: Trend of new HIV infections among Southeast Asian countries from 2010-2019

(Source: UNAIDS [n.d.].)

Considering now the trend of new cases per country (Figure 3), Cambodia, Lao People's Democratic Republic, Myanmar, Sri Lanka, Thailand and Viet Nam all showed decreasing trend. Such decreasing trend may have started even before 2010, since Hoare et al. (2010) had reported this. Meanwhile, cases in Malaysia, Philippines, and Timor-Leste are increasing.

As reflected in Table 1, the P-value of the total number of cases per year is 0.999051. This means that annually, reported cases among SEAR has no significant difference. The non-unanimous trend among SEAR may have contributed to such result. This further could mean that the overall decreasing cases through the years may not still be sufficient. Countries with increasing cases must be given additional monitoring, particularly Philippines since it showed the most alarming increase of new HIV cases. Thus, special attention from both national and international health agencies must be provided, especially among those countries with rising cases. Agencies then can formulate programs that can mitigate such cases, and may include the most effective efforts that were conducted in countries with decreasing cases.

Table 1: Analyses of variance of the yearly reports of new HIV cases from 2010-2019

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	35224151	9	3913795	0.12193	0.999051	1.999115
Within Groups	2.57E+09	80	32098662			
Total	2.6E+09	89				

Table 2: Analyses of variance of the difference of newly reported cases in every country

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	2.19E+09	8	2.73E+08	52.9611	5.08E-29	2.054882
Within Groups	4.18E+08	81	5157866			
Total	2.6E+09	89				

The analysis of new reported cases per country showed a P-value of 5.08E-29 (Table 2). Such value reflects a contrasting trend of cases among SEAR, where some countries are extremely increasing, while others are extremely decreasing. This value statistically confirms the trend as shown in Figure 3. Further confirmatory analyses showed that each country's trend, whether decreasing or decreasing, are all significant (Table 3).

Table 3: Summative P-values of new reported HIV cases within countries

Countries	*P-value*	*Trend*
Cambodia	4.76E-06	Significantly decreasing
Lao People's Democratic Republic	1.47E-17	Significantly decreasing
Malaysia	1.19E-15	*Significantly increasing*
Myanmar	2.06E-12	Significantly decreasing

Philippines	5.41E-06	*Significantly increasing*
Sri Lanka	1.42E-24	Significantly decreasing
Thailand	2.66E-06	Significantly decreasing
Timor-Leste	5.08E-27	*Significantly increasing*
Viet Nam	5.89E-06	Significantly decreasing

The general decrease of HIV cases in SEAR is a continuation of the observation in 2010 (Bridge et al., 2010). In their paper, they acknowledged that unlike some regions in Europe, cases of HIV in the Asian regions have stabilised, and that the infection's incidence is generally falling (amidst some areas whose incidence is rising, as in the case of the Philippines and Timor-Leste).

Global Trend

At the molecular level, rate of new HIV infections was deemed complicated. There were various observations that the virus and its subtypes are rapidly changing in different regions across the globe. Such molecular changes pushed the challenge further into the development of HIV vaccines (Hemelaar et al., 2019). The virus has this capacity to change its molecular configuration, where it can genetically recombine. With its natural capacities, the HIV can efficiently escape the neutralising effects of the immune system. This genetic recombination events had resulted to epidemics that are now being experienced in Africa, Asia and South America. These three regions are considered as recombination hotspots, since it was noted that newer subtypes of the virus keep on emerging on countries in these regions (Lau & Wang, 2013).

After a dramatic decrease (81%) of HIV cases in Ethiopa between 1995-2007, the country saw a steady increase each year of new HIV infections among the adults. One study in 2018 saw that the annual increase rate across different age group is at 36% (Girum, Wasie, & Worku, 2018). However, amidst this increase, the country showed that more people are aware of their infection status, which resulted to a decline in HIV-related deaths (78%), thanks to the consistent antiviral treatments. And in Amsterdam, it was found out that the transmission of a type of HIV (type 1) has declined in a particular period (1994-2002). However, it was emphasised that a consistent monitoring of this trend is still needed (Bezemer et al., 2004).

A study in 1997 predicted that by the turn of the millennium, the Far East, which includes Southeast Asia, will be the epicenter of the rapid infections of HIV, especially among the developing countries. Men-having-sex-with-men (MSM), prostitution, mother-child transmission, and use of injectable drugs, are still the most common causes of new infections (Fowler, Melnick, & Mathieson, 1997).

Central Asia, particularly the countries of Uzbekistan, Turkmenistan, Tajikistan, Kyrgyzstan, and Kazakhstan) is fast becoming a hotspot of HIV infections. This current situation in this region is primarily driven by their populations' use of injectable drugs. Turkmenistan, in particular, undermined the significance of having honest record on the connection of drug abuse and the increase of HIV infection rate. Kazakhstan is also suffering from such increase since it reduced financial support to centers dealing with HIV infection, and liberalising drug use. In contrast, both Kyrgyzstan and Uzbekistan showed interest in reducing HIV cases by creating policies that strengthen their respective nation's intervention programs, and by partnering with international organisations (Ancker & Rechel, 2015).

In China, a shift of the rate of infection was observed. Xing et al. (2014) noted that there was an increase in the HIV-infected: AIDS patients. Also, there was a shift in male: female ratio where a gradual increase was observed among infected adults (>50 years old). They also noted in their spatial distribution analyses that there was a cluster distribution in this shift throughout the country, calling for a more focused and highly specialised intervention programs for the older HIV-infected population in China.

Interventions

Accordingly, one study suggested that proper interventions are effective in reducing risks of HIV infections. In their study, they used information campaign where a group of HIV positive men and women where taught various strategies in practicing safe sex. They also included support group system that will monitor the subjects for six months. Their results further implied that there has been a significant reduction of incidence of unprotected sexual intercourse, particularly the use of condom. This leads to a lower risk of HIV positive-HIV negative transmissions among the general population (Kalichman et al., 2001).

A research also carried an intervention study for a period of three years, where they distributed stories of role-model, bleach and condoms among populations that are high-risk of infections in selected areas, and compared it to communities without any interventions. These areas include communities with members observed male-male intercourse (MSM), injectable drug users, sex workers, and other high-risk populations. At the end of their study, they noted

that the study group with HIV intervention efforts showed a positive response, where the subjects of the intervened communities were more likely to use bleach and condom. They concluded that such interventions may lead to wider communities applying what are the best practices in reducing the risk of HIV infections (Wolitski et al., 1999).

Among males, circumcision was noted to produce a degree of protective effect for the HIV infection. This is very important especially in Africa (sub-Saharan regions), where cases of the said infection is at the highest (Auvert et al., 2005). Another male-specific study was conducted by Johnson et al. (2005). Their study focused on the effectiveness of interventions among men-who-have-sex-with-men (MSM) for at least seven years. It was participated by more than 16,000 subjects. In this study, they have numerous (54) small-group interventions. They found out that unsafe sexual intercourse among MSMs was reduced by as high as 27%.

A study was carried to know the efficiency of different interventions among a population of Afro-American adolescents. This study's interventions include the following: support group system, sex education (condom use), and emphasis on healthy relationships, nutrition and exercise. This 3-year study concluded that: there was frequent and consistent use of condom, reduced number of sexual partners, and even reduced risk of developing unwanted pregnancy and chlamydia infections (DiClemente et al., 2004). A similar study conducted by Villarruel, Jemmott, and Jemmott (2006). In their study among the Latino youth, module-based interventions in the study group revealed efficiency in reducing sexual urge and increase in condom use among the subjects.

Accordingly, interventions such as those mentioned above can be taught and practice even at the primary level. In their studies, they demonstrated that intervention programs can be effective even at the youngest age possible. For example, through proper interventions, females can delay (or decrease) their sexual activity (females), and increase in the use of condom (especially males). They also noted that such intervention programs are more effective with proper infrastructure (Maticka-Tyndale, Wildish, & Gichuru, 2007).

With the advances in the sciences, molecular diagnostics and comparative analyses between vulnerable and less vulnerable populations can be employed. Genetic analyses, coupled with bioinformatics techniques are today's most effective way in analysing trends of diseases. Also, identifying and revising the above-mentioned interventions that are no longer effective can be considered, especially that demographics of HIV cases change from time to time. As new cases threaten the younger population, a more aggressive information campaign using

various social media platforms, echoed by young influencers that are health advocates, can be helpful, especially in our highly digital world.

Current Challenges

Though there are various HIV infection interventions that were carried out in Asia by various sectors, still it is not enough to cover at 60% of the region to control the epidemic (van Griensven & van Wijngaarden, 2010). This means that more intensified programs are needed that can specifically address the varying trends in nations of Southeast Asia.

Though several interventions that can help prevent in the rise of the cases of HIV infections are already identified, the most common threats to these preventive measures remain. First is the increase in sexual activities among the adolescents, where there is higher risk that couples that engage primarily in premarital, group, and men-to-men (MSM) intercourse have greater tendencies to perform such acts unprotected. This is particularly among young Asian women who are known to be the more vulnerable group. In the case of MSMs, it has long been established that this group is at higher risk of contracting HIV. Several political probations (banning of LGBT events, anti-same-sex marriage) have contributed to a more difficult preventive intervention within this group. Second is the use of injectable drugs. The failure of the eradication of injectable drugs also contributed to the rise of HIV cases. There is a strong trend of using these drugs among sexually active groups, particularly the MSMs and the sex workers. Third is human trafficking where most end up as sex workers. In several Southeast Asian countries like Cambodia, Indonesia and Thailand, risky sex workers are considered as a major factor in the rise of HIV infections. In Asia, it is noted that around 51% of sex workers do not use condom during sexual contact. Fourth is the lack of enforcements on preventive measures. In the Philippines, for example, what makes it more difficult to reach high-risk populations is the evident discrimination to those that are HIV-positive and AIDS patients; such discrimination discourages patients to participate in programs that may help in preventing the spread of infection. Aside from that, there are also regions where there are inadequate infrastructure and training of health staff on how to deal with these patients. This is amidst the existing anti-discriminatory laws. Other challenges in controlling the HIV pandemic are poverty, unstable societies, powerlessness, and to some extent wars. As a result of these still emerging threats, high correlation between HIV infection and other infectious diseases such as hepatitis C and tuberculosis was noted (Gubhaju, 2002; Bridge et al., 2010; Ortega, Bicaldo, Sobritchea, & Tan, 2005; Hankins, Friedman, Zafar, & Strathdee, 2002; DeHovitz, Uuskula, & El-Bassel, 2014).

Aside from the health impacts brought about by HIV infections, they too have serious economic impacts. Though cases were also recorded in economically-advanced countries, the developing countries with high HIV incidence are the most affected. Patients' loss of income, diversion of household expenditure to sustain medical expenses which may drive family members that are students to stop going to school, and other expenses during death, are known to affect the financial stability of families that battle HIV/AIDS. This is especially true to low-income individuals in the population such as agricultural workers and laborers. Aside from the vulnerability of the marginalised groups of society, the access to quality treatment like anti-retroviral drugs remains a major challenge in many developing countries around Southeast Asia. This is driven by the fact that most of those infected individuals cannot afford the usually expensive medical care such as the regular check-up and purchase of medication. Overall, the increase of HIV infection within a nation will ultimately affect various economic contributors such as those in different businesses and different sectors like health, agriculture, and education. Thus, at the macroeconomic scale, HIV/AIDS will affect a country's human capital that may potentially affect the generations to come, where if not given enough attention, the HIV pandemic may result to an economic catastrophe that is far beyond the reach of governments (Tan, 1993; Bollinger & Stover, 1999; Pitayanon, Kongsin, & Janjareon, 1997; Veenstra & Whiteside, 2005; Altman, 1999).

A paper in 2008 identified similar effective interventions mentioned above like behavioral interventions, effective communications, and preventive programs such as sex education. But in their study, they emphasised that though the pathophysiology of HIV infection is complex, the concept should be further simplified for community consumption. Also, they emphasised that for such programs to succeed, there should be mutual cooperation between different communities through funding, planning, and executing all possible preventive measures; and only then there will be visible progress against HIV infections (Coates, Richter, & Caceres, 2008).

However, the decreasing trend in Southeast Asia of new reported cases (also observed in Africa (Vermund, 2014)) showed promising results of both government and private sectors' efforts in eliminating the said infection. Continuous information campaign, coupled with the advancements in drug discoveries, and other interventions will be critical in the coming years. Continuous epidemiological analyses based on the available global data can be conducted to further understand the patterns of HIV infections that can be the basis of newer interventions.

A changing climate is also a great challenge for HIV epidemiology, not only for agriculture and biodiversity. Increase in environmental temperature

would most likely result to higher HIV prevalence. It was noted that regions with warmer temperature leads to the increase of behavioral activities such as male migration and sexual contacts (Baker, 2020).

Lastly, the current Covid-19 pandemic that wreak havoc among different societies is an emerging challenge to those infected with HIV. Presently, it is not yet clear how this Covid-19 pandemic can affect the HIV/AIDS population. But one thing is certain: the relationship of one pandemic to another deserves to be studied in order to preserve the lives of those that are directly or indirectly affected.

Conclusion

The trend of new HIV infections in the Southeast Asian Region was conducted in this study. It found out that overall, there was a significant decrease in the trend in the past 10 years, especially in Cambodia, Thailand and Viet Nam. However, amidst the decreasing cases, there are countries whose cases are increasing, particularly the Philippines, Malaysia and Timor-Leste. Since these three nations showed increase in new infection rates, special focus on these countries must be provided.

There were also different trends observed across different regions globally, where one of the major culprit is the ability of the virus to adapt to its environment resulting to the formation of new subtypes of viruses. And per availability of literature, support group system, and the awareness of the infection status of HIV patients, are perhaps the most effective strategies in reducing the risk of HIV infection among several communities. It was also noted that such strategy is effective even in the youngest possible members of the population.

The continuous information campaign, introduction of more effective antiviral drugs, and deeper and updated epidemiological analyses will be crucial in sustaining this downward trend.

References

AIDSinfo: Global data on HIV epidemiology and response. n.d. https://aidsinfo.unaids.org/

Altman, D. (1999). Globalization, political economy, and HIV/AIDS. *Theory and Society*, *28*(4), 559-584.

Ancker, S., & Rechel, B. (2015). Policy responses to HIV/AIDS in Central Asia. *Global Public Health*, *10*(7), 817-833.

Auvert, B., Taljaard, D., Lagarde, E., Sobngwi-Tambekou, J., Sitta, R., & Puren, A. (2005). Randomized, controlled intervention trial of male circumcision for reduction of HIV infection risk: the ANRS 1265 Trial. *PLos Med*, *2*(11), e298.

Baker, R. E. (2020). Climate change drives increase in modeled HIV prevalence. *Climatic Change*, *163*, 237–252 .

Bezemer, D., Jurriaans, S., Prins, M., van der Hoek, L., Prins, J. M., de Wolf, F., Berkhout, B., Coutinho, R. & Back, N. K. (2004). Declining trend in transmission of drug-resistant HIV-1 in Amsterdam. *AIDS*, *18*(11), 1571-1577.

Bollinger, L., & Stover, J. (1999). The economic impact of AIDS in South Africa. USAID's website. https://pdf.usaid.gov/pdf_docs/Pnacm921.pdf

Centers for Disease Control and Prevention. (n.d.). https://www.cdc.gov/hiv/basics/livingwithhiv/opportunisticinfections.html

Chitnis, A., Rawls, D., & Moore, J. (2000). Origin of HIV type 1 in colonial French Equatorial Africa? *AIDS Research and Human Retroviruses*, *16*(1), 5-8.

Coates, T. J., Richter, L., & Caceres, C. (2008). Behavioural strategies to reduce HIV transmission: how to make them work better. *The Lancet*, *372*(9639), 669-684.

DeHovitz, J., Uuskula, A., & El-Bassel, N. (2014). The HIV epidemic in eastern Europe and central Asia. *Current HIV/AIDS Reports*, *11*(2), 168-176.

DiClemente, R. J., Wingood, G. M., Harrington, K. F., Lang, D. L., Davies, S. L., Hook III, E. W., ... Hardin, J. W. (2004). Efficacy of an HIV prevention intervention for African American adolescent girls: a randomized controlled trial. *Jama*, *292*(2), 171-179.

Fowler, M. G., Melnick, S. L., & Mathieson, B. J. (1997). Women and HIV: Epidemiology and global overview. *Obstetrics and Gynecology Clinics of North America*, *24*(4), 705-729.

Girum, T., Wasie, A., & Worku, A. (2018). Trend of HIV/AIDS for the last 26 years and predicting achievement of the 90–90-90 HIV prevention targets by 2020 in Ethiopia: a time series analysis. *BMC Infectious Diseases*, *18*(1), 320.

Gubhaju, B. B. (2002). Adolescent reproductive health in Asia. *Asia Pacific Population Journal*, *17*(4), 97-119.

Hankins, C. A., Friedman, S. R., Zafar, T., & Strathdee, S. A. (2002). Transmission and prevention of HIV and sexually transmitted infections in war settings: implications for current and future armed conflicts. *AIDS*, *16*(17), 2245-2252.

Hemelaar, J. (2012). The origin and diversity of the HIV-1 pandemic. *Trends in Molecular Medicine*, *18*(3), 182-192.

Hemelaar, J., Elangovan, R., Yun, J., Dickson-Tetteh, L., Fleminger, I., Kirtley, S., ... & Agwale, S. (2019). Global and regional molecular epidemiology of HIV-1, 1990–2015: A systematic review, global survey, and trend analysis. *The Lancet Infectious Diseases*, *19*(2), 143-155.

Hoare, A., Kerr, S. J., Ruxrungtham, K., Ananworanich, J., Law, M. G., Cooper, D. A., Phanuphak, P. & Wilson, D. P. (2010). Hidden drug resistant HIV to emerge in the era of universal treatment access in Southeast Asia. *PLoS One*, *5*(6), e10981.

Hunter, M. (2007). The changing political economy of sex in South Africa: The significance of unemployment and inequalities to the scale of the AIDS pandemic. *Social Science & Medicine*, *64*(3), 689-700.

Johnson, W. D., Holtgrave, D. R., McClellan, W. M., Flanders, W. D., Hill, A. N., & Goodman, M. (2005). HIV intervention research for men who have sex with men: A 7–year update. *AIDS Education & Prevention*, *17*(6), 568-589.

Kalichman, S. C., Rompa, D., Cage, M., DiFonzo, K., Simpson, D., Austin, J., ... & Pinkerton, S. (2001). Effectiveness of an intervention to reduce HIV transmission risks in HIV-positive people. *American Journal of Preventive Medicine*, *21*(2), 84-92.

Lau, K. A., Wang, B., & Saksena, N. K. (2007). Emerging trends of HIV epidemiology in Asia. *AIDS Rev*, *9*(4), 218-29.

Lau, K. A., & Wong, J. J. (2013). Current trends of HIV recombination worldwide. *Infectious Disease Reports*, *5*(Suppl. 1), e4.

Lemey, P., Pybus, O. G., Wang, B., Saksena, N. K., Salemi, M., & Vandamme, A. M. (2003). Tracing the origin and history of the HIV-2 epidemic. *Proceedings of the National Academy of Sciences*, *100*(11), 6588-6592.

Maticka-Tyndale, E., Wildish, J., & Gichuru, M. (2007). Quasi-experimental evaluation of a national primary school HIV intervention in Kenya. *Evaluation and Program Planning*, *30*(2), 172-186.

McCutchan, F. E. (2006). Global epidemiology of HIV. *Journal of Medical Virology*, *78*(S1), S7-S12.

Ortega, N. L., Bicaldo, B. F., Sobritchea, C., & Tan, M. L. (2005). Exploring the realities of HIV/AIDS-related discrimination in Manila, Philippines. *AIDS Care*, *17*(Sup2), 153-164.

Piot, P., Bartos, M., Ghys, P. D., Walker, N., & Schwartländer, B. (2001). The global impact of HIV/AIDS. *Nature*, *410*(6831), 968-973.

Pitayanon, S., Kongsin, S., & Janjareon, W. S. (1997). The economic impact of HIV/AIDS mortality on households in Thailand. In D. E. Bloom & P. Godwin (Eds.), *The economics of HIV and AIDS: The case of South and South East Asia* (pp. 53-101). Delhi: Oxford University Press.

Rambaut, A., Robertson, D. L., Pybus, O. G., Peeters, M., & Holmes, E. C. (2001). Phylogeny and the origin of HIV-1. *Nature*, 410(6832), 1047-1048.

Ruxrungtham, K., Brown, T., & Phanuphak, P. (2004). HIV/AIDS in Asia. *The Lancet*, *364*(9428), 69-82.

Sharp, P. M., & Hahn, B. H. (2010). The evolution of HIV-1 and the origin of AIDS. *Philosophical Transactions of the Royal Society B: Biological Sciences*, *365*(1552), 2487-2494.

Shaw, G. M., & Hunter, E. (2012). HIV transmission. *Cold Spring Harbor Perspectives in Medicine*, *2*(11), a006965.

Simon, V., Ho, D. D., & Karim, Q. A. (2006). HIV/AIDS epidemiology, pathogenesis, prevention, and treatment. *The Lancet*, *368*(9534), 489-504.

Tan, M. L. (1993). Socio-economic impact of HIV/AIDS in the Philippines. *AIDS Care*, *5*(3), 283-288.

Trotter, A. B., Hong, S. Y., Srikantiah, P., Abeyewickreme, I., Bertagnolio, S., & Jordan, M. R. (2013). Systematic review of HIV drug resistance in the world health organization Southeast Asia region. *AIDS Reviews*, *15*(3), 162-170.

UNAIDS. (n.d.). https://www.unaids.org/en

van Griensven, F., & van Wijngaarden, J. W. D. L. (2010). A review of the epidemiology of HIV infection and prevention responses among MSM in Asia. *AIDS*, *24*, S30-S40.

Veenstra, N., & Whiteside, A. (2005). Economic impact of HIV. *Best Practice & Research Clinical Obstetrics & Gynaecology*, *19*(2), 197-210.

Vermund, S. H. (2014). Global HIV epidemiology: A guide for strategies in prevention and care. *Current HIV/AIDS Reports*, *11*(2), 93-98.

Villarruel, A. M., Jemmott, J. B., & Jemmott, L. S. (2006). A randomized controlled trial testing an HIV prevention intervention for Latino youth. *Archives of Pediatrics & Adolescent Medicine*, *160*(8), 772-777.

Wolffers, I. (1997). Culture, media, and HIV/AIDS in Asia. *The Lancet*, *349*(9044), 52-54.

Wolitski, R. J., Fishbein, M., Higgins, D. L., Rietmeijer, C., Guenther-Grey, C. A., & Johnson, W. D. (1999). Community-level HIV intervention in 5 cities: Final outcome data from the CDC AIDS community demonstration projects. *American Journal of Public Health*, *89*(3), 336-345.

Xing, J., Li, Y. G., Tang, W., Guo, W., Ding, Z., Ding, G., ... Mahapatra, T. (2014). HIV/AIDS epidemic among older adults in China during 2005–2012: results from trend and spatial analysis. *Clinical Infectious Diseases*, *59*(2), e53-e60.

How to cite this article (APA):

Opena, E. L. (2021). Trend of new HIV infections in the Southeast Asian region from 2010-2019. *JATI-Journal of Southeast Asian Studies*, 115, 131

Date received: 5 January 2021 Date of acceptance: 16 December 2021