

PREDICTION OF STAGE-BASED HUMAN IMMUNODEFICIENCY VIRUS (HIV) AND ACQUIRED IMMUNODEFICIENCY SYNDROME (AIDS) CASES IN SURABAYA FROM 2018 UNTIL 2022

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Abstract

Introduction: The development of the presence of HIV and AIDS in the world is increasingly alarming. The number of cases is increasing every year in all regions of Indonesia. Surabaya is one of the cities in East Java which has the highest number of HIV and AIDS cases. Early detection of HIV and AIDS cases will affect the quality of life of people with HIV and AIDS. The purpose of this study was to develop predictive models of HIV and AIDS cases diagnosed at the stages of HIV and AIDS from 2018 until 2022.

Materials and Methods: The present research was a quantitative descriptive study with time series analysis as the research approach. Secondary data was used. The variable was the number of cases at the stages of HIV and AIDS.

Results: The results of this study confirmed that prediction of HIV and AIDS cases found over the next five years always experienced an increase. It increases every year, both at the stages of HIV and AIDS. Based on the results of the prediction, there is a higher number of cases found at the stage of HIV. This indicated that early cases findings in Surabaya were quite good.

Conclusion: The present research reveals the prediction of HIV and AIDS cases in Surabaya has increased over the next five years. They are more commonly found at the stage of HIV, but there are still many cases found at the stage of AIDS.

Keywords : HIV, AIDS, Prediction, Stage

Introduction

Acquired Immune Deficiency Syndrome (AIDS) is a collection of symptoms or syndromes and infections that arise due to damage to the human immune system caused by the infection of *Human Immunodeficiency Virus* (HIV) which belongs to the *retroviridae* family. The HIV virus can be transmitted through body fluids, such as blood, sharing needles or other equipment used among drug users or having

unprotected sexual relations with HIV sufferers. Pregnant women who are infected with HIV can also transmit the virus to the foetus they conceive during pregnancy, childbirth or breastfeeding (1).

The development of the situation of HIV and AIDS in the world is increasingly alarming. More than 78 million people have been infected with HIV and 39 million have died since 1981. There were an estimated 36.7

million (34.0 million - 39.8 million) people living with HIV in 2015 with an increase of 3.4 million compared to the rate in 2010. Also, 2.1 million people were found having new cases of HIV, but WHO noted a decrease in mortality in the same report (2). Since AIDS was first discovered in late 2015, 34 million people died and there were 1.1 million deaths related to AIDS in 2015, a decrease compared to 2010 which amounted to 1.5 million deaths (3).

The HIV and AIDS epidemic in Indonesia has been going on for more than 25 years since the first case was discovered in 1987. The number of cases is increasing every year in all regions of Indonesia. Based on a report from the Directorate General of Disease Control and Environmental Health of the Ministry of Health of the Republic of Indonesia, the total cumulative number of HIV and AIDS cases until the end of 2016 in Indonesia was 232,953 for HIV cases and 85,707 for AIDS cases with a reported 13,449 AIDS deaths (4).

The most transmission of HIV and AIDS was heterosexual (74% in AIDS cases and 35.5% in HIV cases) followed by homosexuals (26.1% in HIV cases and 15.8% in AIDS cases), perinatal 3.8 % in AIDS and IDU cases in 2016 (2.6% in AIDS cases and 1.9% in HIV cases). In addition to these factors, HIV transmission can also be transmitted through bisexual and blood transfusions even though the percentage is small (5).

The number of HIV infections reported per province until 2016 showed that East Java ranked second after DKI Jakarta. Cases of HIV reported in 2016 in East Java were 27,575 cases and ranked the first within the province which reported the highest cumulative AIDS cases until 2016 with a total of 16,431 cases (6).

Surabaya is one of the cities in East Java which has the highest number of HIV and AIDS cases (5). The cumulative number of PLWHA in Surabaya since 1996 - 2017 was 10,807 cases, with 934 new cases in 2017. HIV and AIDS cases in Surabaya have spread in 31 sub-districts.

The HIV cases tend to be fluctuating every year.

Most HIV sufferers in Surabaya were found in stages of HIV compared to the stages of AIDS. Early case finding of HIV cases will affect the quality of life of HIV patients in the future. The delay in diagnosis is known as one of the health problems that is very closely related to increasing mortality and morbidity rates (7). Comparing to HIV patients who were found early, those who were diagnosed late had a 10-fold risk of death in the first year after diagnosis. Therefore, we need further studies on the prediction of HIV cases diagnosed at the stages of HIV and AIDS, so that appropriate deterrence and prevention can be done to deal with the situation. The utilization of HIV and AIDS data in Surabaya for article writing has gone through the licensing process to the Surabaya District Health Office.

Based on the description above, the researchers were interested in observing the prediction of stages-based HIV cases in Surabaya.

Methods

The present research is a quantitative descriptive study with time series analysis as the research approach. Secondary data was used with units of analysis, i.e. cases of AIDS/HIV in the Surabaya District Health Office from January 2008 to December 2017 in 8457 cases. The variable was the number of cases at the stages of HIV and AIDS.

Results

Data on HIV and AIDS cases in Surabaya over the past ten years have shown a fluctuating trend. The following are data on stage-based HIV and AIDS cases in Surabaya in 2008-2017

Based on the data in Table 1, the results show that HIV cases tend to be found more at the stage of HIV than the stage of AIDS. The results of the analysis of the trend method for stage-based HIV cases in Surabaya in 2008-2017 is shown in Table 2.

Based on Table 2, the results of the largest R square value are in the quadratic model, because the determination of prediction of HIV cases in Surabaya is more suitable using the Quadratic model.

Table 1: Data on HIV cases in 2008-2017 in Surabaya

Years	Number of HIV stages	Number of AIDS Stage	Total
2008	350	584	934
2009	390	386	776
2010	403	302	705
2011	429	382	811
2012	418	334	752
2013	501	253	754
2014	572	363	935
2015	652	281	933
2016	627	296	923
2017	672	262	934
TOTAL	5014	3443	8457

Table 2: Result of analysis of the trend method in stages-based HIV cases

Stage characteristics	R Square result		
	Linier	Quadratic	Choice
a. HIV	0.931	0.942	Quadratic
b. AIDS	0.511	0.657	Quadratic

Prediction of HIV cases in Surabaya in 2018-2022 based on the stages of 2008-2017 are as follows:

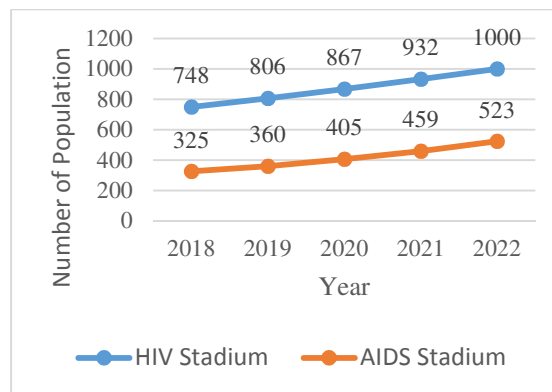


Figure 1: Results of Prediction of HIV Cases in Surabaya from 2018 until 2022

Based on Graph 1, it can be seen that the results of the time series analysis with the trend method produce prediction of HIV cases found over the next five years. The HIV cases always have an increase and most of them are at the stage of HIV. The prediction of HIV cases every year has increased, both at the stage of HIV and the stage of AIDS.

Discussion

The increase of cases every year in the next five years is in accordance with estimates from the Ministry of Health which states that the estimated number of HIV cases in Surabaya is 23,022 cases. The cumulative cases of HIV until 2017 have been found for 10,807 cases. There are 12,215 cases still not found.

Based on the results of the prediction, a higher number of the cases were found at the stage of HIV. This indicates that the case findings in Surabaya were quite good. Early case findings and the provision of appropriate ARV therapy can increase life expectancy. By doing early case findings, it will provide benefits to both the patients and health services, because patients will have an increase in life expectancy, and can reduce costs related to care both during the hospitalization or other administrative costs. For this reason, the initiatives for information dissemination are needed regarding the availability of HIV tests for early detection if they are infected by HIV.

Early detection of HIV cases will be affected when the patients acquire care, support and treatment (CST) services and receive ARV therapy. This is important since it will be able to optimize patient treatment outcomes and also be able to prevent the spread of HIV transmission.

Apart from being found in stages of HIV, several HIV cases were discovered when it was at the stage of AIDS. It is the last stage of HIV which has a fairly high severity and patients at this stage usually experienced several opportunistic infections. Patients found at the AIDS stage can be classified as patients with HIV who are late in being diagnosed.

In several studies, it was stated that the patients with HIV who were late in being diagnosed or diagnosed with AIDS at the time of ARV treatment were not effective enough to reduce the risk of death, especially in the first year after diagnosis. In HIV patients with AIDS stage who did not start ARV treatment, 10% of them died in the first three months after being diagnosed (7).

Also, another study stated that more than 10% of patients with HIV who were diagnosed late died within the first three months after being diagnosed (8). In the United Kingdom, HIV sufferers found at the stage of AIDS die without being able to receive ARV therapy (9). There have been many patients who are late in being diagnosed; thus, found at the stage of AIDS and their deaths could have been prevented through early case finding and appropriate ARV therapy.

Delay in diagnosis is one of the main reasons for delayed ARV therapy, which causes weak immunity and an increase in the number of viruses in the body. Besides, late diagnosis has also been identified as a key factor in HIV transmission (7). If it is not immediately diagnosed, those who have contracted HIV will unknowingly transmit the virus to others (especially to sexual partners).

In several studies conducted in The Netherlands it was also found that those who

had been diagnosed with AIDS were mostly diagnosed at the hospital because patients came to the hospital with other diseases (opportunistic infections) and then showed symptoms of HIV, and when they were tested for HIV, they then found out their HIV status (3).

Research from Wig, et al. in Kusuma, H found that the quality of life of HIV patients was also influenced by the clinical degree of the disease or stages of the disease (11). Patients who are in a more severe stage will feel the effects of the disease due to the decline in their health status with the complications of various diseases that will limit the activity and make these patients depending on the treatment to be able to move (11). In a study conducted at Cipto Mangunkusumo Hospital, Jakarta, the results showed that a more severe stage had a risk of 4.35 fold to have a poorer quality of life compared to HIV patients who were at an early stage. Therefore, early case findings of HIV cases are very important since it affects various aspects of the lives of HIV sufferers.

Conclusion

The prediction of HIV cases in 2018-2022 confirms that there has been an increase in the number of cases over the next five years. More cases of HIV are found at the stage of HIV, but there are still many cases found at the stage of AIDS. Early case finding is important in the survival of HIV sufferers, so more effort needs to be made to improve the method of early case findings.

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