HIV Patients Drop Out in Indonesia: Associated Factors and Potential Productivity Loss

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ABSTRAK

Tujuan: *meneliti tentang faktor-faktor yang berhubungan dengan probabilitas drop out yang lebih tinggi bagi pasien HIV, dan potensi produktifitas yang hilang akibat drop out tersebut.* ***Metode:*** *Kami menganalisis data dari 658 pasien HIV dari sebuah database di sebuah rumah sakit rujukan utama di kota Bandung, Jawa Barat, Indonesia dari tahun 2007-2013. Pertama, kami menggunakan metode analisis regresi probit dan mengikutsertakan, antara lain, variabel berikut: status pasien (aktif atau drop out), CD4 cell count, TB dan infeksi oportunistik (IO), status bekerja, jenis kelamin, pengalaman sebagai penasun, dan dukungan dari keluarga dan peers. Kedua, kami menggunakan data tingkat drop out dari database kami dan tingkat penurunan CD 4 cell count dari studi lain untuk mengestimasi produktifitas yang hilang akibat drop out.* ***Hasil:*** *CD4 cell count yang rendah diasosiaikan dengan probabilitas drop out yang lebih tinggi. Dukungan dari peers, hidup bersama keluarga, dan menderita TB diasosiasikan dengan probabilitas drop out yang lebih rendah. Produktifitas yang hilang pada tingkat nasional akibat drop out (dank arena tingkat CD 4 cell count yang menurun) dapat mencapai US$365 juta (menggunakan upah rata-rata).* ***Kesimpulan:*** *pertama, karena tingkat CD 4 cell count yang rendah diasosiasikan dengan probabilitas drop out yang lebih tinggi,kami merekomendasikan (untuk mengoptimasikan) pemberian ARV dini pada tingkat CD 4 cell count yang lebih tinggi, melibatkan pemberian layanan HIV di tingkat komunitas. Kedua, dukungan keluarga dan peer harus diperkuat untuk mendukung kesuksesan dari perawatan HIV. Ketiga, drop out dari layanan ART akan menyebabkan hilangnya produktifitas yang cukup besar.*

Kata kunci: *HIV, sosial-ekonomi, terapi antiretroviral, Indonesia, drop out.*

ABSTRACT

Aim: *this study reported various factors associated with a higher probability of HIV patients drop out, and potential productivity loss due to HIV patients drop out.* ***Methods:*** *we analyzed data of 658 HIV patients from a database in a main referral hospital in Bandung city, West Java, Indonesia from 2007 to 2013. First, we utilized probit regression analysis and included, among others, the following variables: patients' status (active or drop out), CD4 cell count, TB and opportunistic infection (OI), work status, sex, history of injecting drugs, and support from family and peers. Second, we used the drop out data from our database and CD 4 cell count decline rate from another study to estimate the productivity loss due to HIV patients drop out.* ***Results:*** *lower CD4 cell count was associated with a higher probability of drop out. Support from family/peers, living with family, and diagnosed with TB were associated with lower probability of drop out. The productivity loss at national*

level due to treatment drop out (consequently, due to CD4 cell count decline) can reach US$365 million (using average wage). ***Conclusion:*** *first, as lower CD 4 cell count was associated with higher probability of drop out, we recommend (to optimize) early ARV initiation at a higher CD 4 cell count, involving scaling up HIV service at the community level. Second, family/peer support should be further emphasized to further ensure treatment success. Third, dropping out from ART will result in a relatively large productivity loss.*

Keywords: *HIV, socio-economic, antiretroviral therapy, Indonesia, drop out.*

INTRODUCTION

Indonesia is experiencing a fast increase in HIV prevalence (estimated <0.1% in 2001 to 0.4% in 2012)[1] and a change in the HIV epidemic-whereas it was previously concentrated within the intravenous drug users (IDUs) and their couples, and now it moves to general population. The percentage of HIV transmission through injecting drug use decreased from 53% in 2001-2005 to 34% in 2011, while the heterosexual transmission rose from 37% to 71% within the same period.[2]

Indonesia's response to the epidemic have started since the first domestic case was detected which included the continuing support for care and treatment programs.[2,3] In accordance, the need for antiretroviral therapy (ART) was expected to reach around 87,000 patients in 2014.[4] Although the availability of ART in Indonesia is increasing[2], drop out rate is still a significant issue.[5–7] In a more specific context, this phenomenon is apparent in a clinic within a main referral hospital in West Java. Although this clinic has been successful in increasing the quality of HIV-care and reducing mortality rate, it is still facing challenges in reducing a high dropout rate, which is only slightly lower than the national estimate.[6,8] This is crucial as the success of ART will increase quality of life (QoL), productivity, and physical and emotional health.[9–11] These factors in the end will influence the survival of patients.[12]

Given the importance of HIV patients drop out, there is an urgency to answer the following questions: 1) What are the factors influencing the HIV patients drop out rate in Indonesia?, and 2) What is the potential economic impact? There has been a number of studies trying to pinpoint the reasons underlining treatment drop out or non-adherence. Some local studies suspected socio-economic factors as possible causes[13,14], while others suspected psycho-social and biomedical factors[5,7,15], or simply patients' error (e.g. forget to take medication).[16] These factors have also been explored by international studies.[17–21] The results were varied from all of these studies, and required further confirmation to apply in a specific context. Understanding the factors influencing dropout rate will provide valuable input in providing better service and policy input.[6] The research on economic impact of drop out, on the other hand, still limited. This is a very important point for Indonesia since HIV patients drop out is still a problem.

This study analyzed the patients' socioeconomic, demographic, and clinical characteristics, and explored whether these characteristics were associated with the higher/lower probability of HIV patients drop out. This study also estimated the economic impact of drop out in terms of productivity loss. This study was unique for four reasons. First, to our knowledge, studies exploring the factors causing HIV patients dropouts in Indonesia is limited. Second, our study utilizes data from a large number of patients' medical record as a part of a larger cohort database owned by the clinic, providing a lot of valuable information otherwise unattainable. Third, the clinic in our study is utilized by patients from all over the province (and in some cases beyond the province), which gives it a pivotal role in providing evidence for policy making. Fourth, this study estimates the productivity loss as the impact of drop out to provide evidence for policy makers.

METHODS

Study Setting and Study Population

The study was conducted in Bandung, at an HIV/AIDS clinic in the largest public referral

and teaching hospital in West Java province (43 million inhabitants). The clinic is visited by high risk group of patients and the general population, and deliver HIV-related services such as voluntary counseling and testing, ART, and sexually transmitted infections services. The clinic operates at full capacity because it is among the few clinics that deliver ART in Bandung. The clinic generates its own revenues through government, hospital, and private funding. The ART-related services are free, except for hospitalization and the registration fee.

Data Collection and Analysis

We utilized the database of a clinic within a main referral hospital in Bandung city, West Java, Indonesia (2007-2013). Out of the data of 8,184 HIV patients, we only included the data of 658 patients due to incomplete data set. We extracted data related to four categories: patient's current status, socioeconomic, demographic, and clinical characteristics. The detailed variables list from each category is presented in **Table 1**. We used Microsoft Excel 2013 and STATA 13 for data cleaning and analysis. We utilized probit regression analysis to determine the influence of each factor. We only used the patients' clinic ID number throughout the analysis, and none of patients' personal identification is used.

We also combined our dropout rate data and the CD4 decline rate from another study within the same clinic to estimate the productivity loss due to drop out from HIV treatment. We estimated the length of time it took for the CD4 cell count of patients who drop out to reach approximately 50 cells/mm^3 (assuming that they do not seek any treatment after they drop out). We assumed that patients can no longer be productive afterwards due to the onset of various opportunistic infections as patients with CD4 cell count lower than 100 cells/mm^3 was considered to experience immunological failure.[23] The productivity loss was then measured by the loss of income from the moment patients reach the CD4 cell count of 50 cells/mm^3 until the end of productive age using Microsoft Excel 2013. We used average and minimum wage from a publication by ILO[24], and we assumed the productive age of 15-64 years as stated by Bureau of Statistics of Indonesia

Table 1. List of variables

Variable List	Definition	Type
Patient Status (dependent variable)	0 = active, 1= drop out	Dummy
Socioeconomic characteristics		
- Age	Absolute	Continuous
- Sex	0 = female, 1= male	Dummy
- Employment status	0 = unemployed, students, housewife, 1 = employed	Dummy
- Education	0 = primary school/no education, 1 = junior high, 2 = senior high, 3 = university/college	Ordered dummy
- Marital status	0 = not married/divorced/widowed, 1 = married	Dummy
- Have children	0 = no children, 1 = have children	Dummy
- Social insurance membership	0 = not on social insurance, 1 = on social insurance	Dummy
- Live with family	0 = not live with family, 1 = live with family	Dummy
- Support from family/peers	0 = not satisfied, 1 = satisfied	Dummy
Demographic characteristics		
- Place of stay	0 = live in Bandung city, 1 = live outside Bandung city	Dummy
Clinical characteristics		
- CD4 cell count	0 = >349 cells/mm^3, 1 = 150-349 cells/mm^3, 2 = 50-149 cells/mm^3, 3 = 0-49 cells/mm^3	Ordered dummy
- OI	0 = not infected by OI, 1 = infected by OI	Dummy
- IDU history	0 = no history, 1 = with history	Dummy
- TB history	0 = no history, 1 = with history	Dummy
- Length of treatment	0 = less than 1 year, 1 = more than 1 year	Dummy

(BPS). Lastly, we used the discount rate of 3%[25], and the exchange rate of Rp13,230/1US$.[26] We then combined the estimation of productivity loss per person to the whole number of (estimated) drop out patients at the clinic and at national level. **Table 2** summarizes the indicators used in the productivity loss analysis. The estimation of patients undergoing ART and drop out rate at national level were taken from Spiritia.[8]

RESULTS

Table 3 summarizes patient characteristics based on factors presented in **Table 1**. Most patients are at their productive age, and mostly are male, employed, and receive secondary or tertiary education. More than a half of patients are married and have children. Almost all of patients are living with their family and satisfied with peer support. Most patients visit the clinic for the first time with higher than 50 cells/mm^3 CD4 cell count, and around 60% of the patients have IDU history.

Table 2. Productivity loss calculation indicators

Items	Values
Average CD 4 cell count, drop out patients (95% C.I)	123 (91–155)
Number of drop out HIV patients	
- Male/female	55
- Female	29
- National male**	9,510
- National female**	2,506
Monthly wage[24]	
- Minimum	US$ 97.38
- Average	US$ 144.91
Productive age	15 – 64 years (50 years)
Time length for CD 4 cell count to reach approximately 50 cells/mm^3 after dropout*	
- IDU	3.42 years
- Non IDU	3.67 years
IDU***	
- IDU male***	
Dropout rate	
- Clinic rate	12.77%
- National rate[8]	17.90%
Unemployment rate	
- Clinic rate (male)***	36.36%
- National rate[8]	6.10% 27
Female labor participation rate	
- Clinic rate***	31.03%
- National rate[8]	51% 27
Exchange rate[26]	Rp 13,230/US$
Discount rate[25]	3%

* Calculated based on results from Meijerink et al.[22]
** Estimated based on Spiritia[8]
*** from drop out patients

Table 3. Patient characteristics (n=658)

Variable list	Values
Patients who drop out	84 (12.77%)
Socioeconomic characteristics	
- Mean of age (95% C.I)	30 (29.7 – 30.6)
- Male	443 (67.33%)
- Employed	425 (64.59%)
- Education (secondary and tertiary)	635 (96.50%)
- Marital status (married)	393 (59.73%)
- Have children	402 (61.09%)
- Have social insurance membership	87 (13.22%)
- Live with family	585 (88.81%)
- Satisfied with support from family/peers	625 (94.98%)
Demographic characteristics	
- Place of stay (live outside Bandung city)	236 (35.87%)
Clinical characteristics	
- CD4 cell count (<50 cells/mm^3)	213 (32.37%)
- OI	166 (25.23%)
- IDU history	394 (59.88%)
- TB history	163 (24.77%)
- Length of treatment (>1 year)	583 (88.60%)

Factors Associated with Drop Out

Figure 1 presents the marginal effect of the probit regression result. From the factors associated with higher probability of drop out (and significant at 90%, 95%, or 99% C.I), we found that patients with under than 50 cells/mm^3 CD4 cell count had 8.7% higher probability of drop out compared with patients with higher than 349 cells/mm^3 CD4 cell count. This percentage decreased as we move up the CD 4 cell count groups.

From the factors associated with lower probability of dropping out (and significant at

90%, 95%, or 99% C.I), we found that patients who lived with family have 10.2% lower probability of drop out compared with patients who did not. Patients who were satisfied with support from family/peers, had 8.8% lower probability of dropping out, compared to those who were not satisfied. Patients who lived outside Bandung city, and patients who were diagnosed with TB were associated with lower probability of drop out compared to their counterparts. Those who have been undergoing treatment for more than 1 year had a lower probability of dropping out compared to those who were undergoing the treatment for less than one year.

Impact of Drop Out on Productivity Loss

Table 4 presents the productivity loss at the clinic level and at national level. Using clinic dropout rate, the estimated productivity loss over remaining productive lifetime for patients visiting clinic can reach US$18 million. Projecting the clinic dropout rate into the number of HIV patients on ARV at national level, the estimated productivity loss over remaining productive lifetime can reach US$191 million. Using the national dropout rate, these numbers can rise to US$365 million.

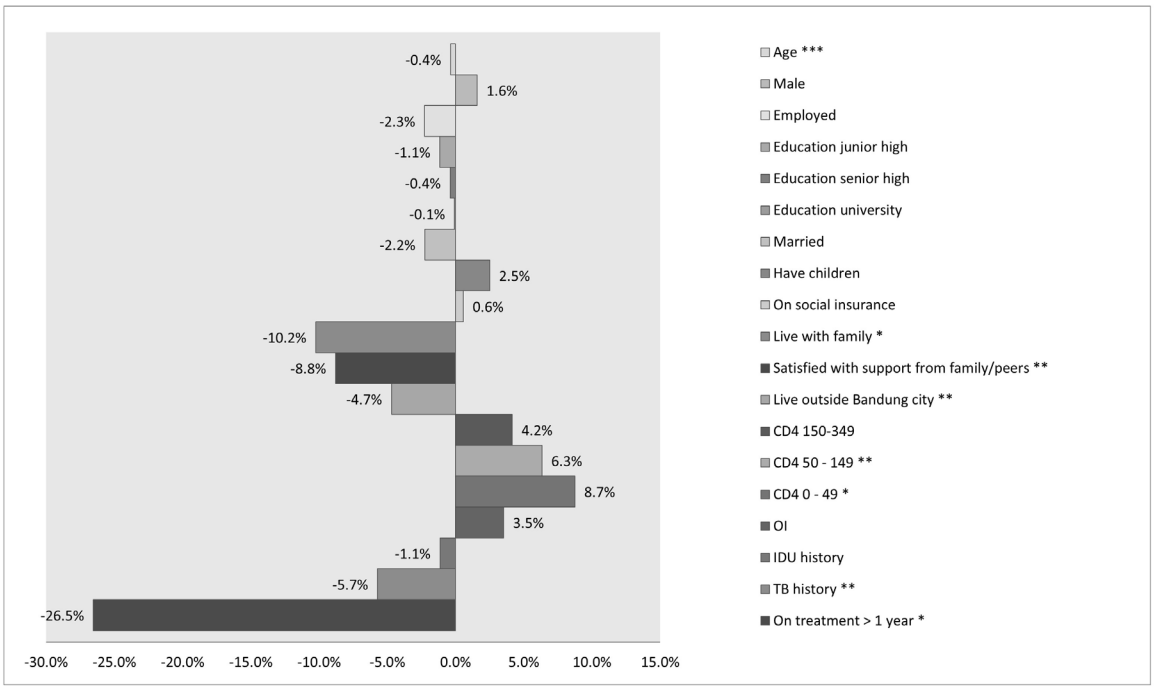
Table 4. Estimated productivity loss over remaining productive lifetime (US$)

Items	Amount
Per person (based on clinic estimate)	
- High estimate*	34,226
- Low estimate**	23,001
Clinic estimation	
- High estimate*	18,607,499
- Low estimate**	12,504,956
National estimation	
Using clinic indicators	
- High estimate*	191,054,269
- Low estimate**	128,395,829
Using national indicators (except for % of IDU)	
- High estimate*	365,041,113
- Low estimate**	245,321,691

*using average wage, ** using minimum wage

DISCUSSION

This study has two aims. First it analyzes the factors associated with HIV patients dropout in the clinic. Second, it estimates the impact of HIV patients dropout on productivity loss over remaining productive lifetime at the clinic and



Note: dependent variable: active = 0, dropout = 1, * α = 1%, ** α = 5%, *** α = 10%

Figure 1. The econometric analysis result using probit regression, presented by the marginal effect results for each variables

national level. Based on these objectives, five observations can be made.

First, as higher CD 4 cell count are associated with lower probability of drop out, in line with a study by Blutinger et al.[21] in India, optimizing early ARV initiation at higher CD 4 cell count is warranted. The benefit of potential costs saving by providing early ART has been discussed in other studies[28–31], and our study adds that it may also reduce the probability of dropout. One of the potential scale up sites are the community clinics, since patients are taking HIV test at this type of clinic at a much higher CD4 cell count compared to those visiting hospitals.[32] In addition, accessing HIV service at the community level will reduce patients' costs and increase adherence of ART.[5,28,33,34] However, the potential budget impact of scaling up and providing early ART[35,36], and the required community staff capacity[37] should be carefully assessed. Given the current prevalence rate of Indonesian HIV epidemic (0.5% for adults age 15-49)[38], it seems that scaling up ART at the community should be conducted at areas with high prevalence setting 39,40 to have a large impact.

Second, our results show that living with family and peer support is significantly associated with lower probability of HIV patients dropout. Another study from Indonesia and some studies from other countries also have similar finding.[15,17,19,20,41,42] Thus, it is clear that family/peer support should be further enhanced to ensure treatment success in the long run. Finding the correct scheme to enhance family/peer support should be done carefully as not all schemes may work (e.g. use of pager).[43] On the other hand, interventions such as text messaging, self-forming group of patients, modified directly observed therapy (mDOT), are able to support ART adherence.[44–47] Indonesia should start to either adopt (or modify if necessary) these already proven interventions or come with a breakthrough approach to improve the current family/peer support for HIV patients.

Third, as patients with TB history is associated with lower probability of drop out, it is a plausible idea to integrate TB and HIV treatment. Studies have shown that this integration have a positive impact on patients and community[48–50], and models from low- and middle-income countries are available.[51] However, the infrastructures and the capacity of health care workers, need to be enhanced for this integration to work.[51,52] Fortunately, this kind of integrated TB/HIV models are also increasing in Indonesia[2], leading to more efficient service deliveries. Therefore, consistent monitoring and evaluation of this scheme is required to produce an even more efficient and better quality HIV/TB integrated services.

Fourth, our study shows that patients with longer than a year length of treatment are associated with lower probability of drop out. This has an important implication because if we are able to reduce drop out rate and keep patients within the treatment, it will lead to an even lower probability of drop out rate, creating a continuous effect.

Fifth, the costs of productivity loss over remaining productive lifetime due to dropout can be high. In our case, it can reach US$365 million: 0.042% of our gross domestic product (GDP) in 2013[53] or 1.36% of total health expenditure in the same period.[54] We need to compare this productivity loss to the costs of treatment if patients are staying in the program. Based on the study by Siregar et al.[28], the cost of treating a patient with ARV is approximately US$1,200 per patient per year for patients with CD4 cell count lower than 50 cells/mm^3 (this cost decreases as the CD4 cell count increases). Multiplying this amount with the number of drop out patients at national level (using clinic dropout rate and the discount rate of 3%) for the rest of their life years (subtracting life expectancy[55] with the age of drop out in the clinic) results in US$301 million, lower than the productivity loss. Thus, it seems that keeping patients within the treatment program is less costly compared to losing them. In addition, the ART provides other benefits aside of treating HIV patients. It also acts as a prevention measure for HIV epidemic[56,57] and will most likely prevent spending more costs. Furthermore, bear in mind that our productivity loss calculation is based only on productivity approach using average and minimum wage. As such, in showing the potential economic impact of HIV patients dropout, we have forgone

other important values such as those stemming from loss of/reduced quality of life, costs to family members, hospitalization costs, OI treatment costs, possible line 2 ART costs, and indirect costs. Therefore, we believe the actual economic impact of dropout should be much higher. However, we need to take into account the currently low health budget of Indonesia if we want to provide ART to all HIV patients.[58]

In addition to our main observations, an important finding, although it is not statistically significant, should be carefully noted. Our analysis shows that higher education is related with higher probability of drop out. This is the opposite of the results by Schilkowsky et al.[20], Waldrop-Valverde et al.[59], and Unge et al.[42]. We suggest to explore this finding further as it has an important implication. If indeed a higher education is associated with higher probability of dropout, then a specific intervention should be designed to target patients with higher education as more than 90% of the patients in our study belong to this group.

On the other note, the history of drug use, surprisingly, does not seem to have a significant influence on the drop out rate. This is supported by another study in the clinic[13], although international studies show otherwise.[59,60] This warrants further investigations since IDUs still hold a crucial role in the Indonesian HIV epidemic.

Study Limitation

There are several limitations in our study. First, the analysis on factors associated with HIV patients drop out is specific to the clinic that we studied, although similar results are found in some other local and international studies. Other clinics in Indonesia, however, may have different patterns. Therefore, applying the same study in more clinics in different settings in Indonesia (e.g. region, culture, religion, and politics) may yield more varied result and may enrich the discussion.

Second, we assume that the drop out patients will not join other ART program at other clinics and that they will not seek treatment afterwards. Of course this may not be true to all patients, as some may visit other clinics to obtain ART once their disease has become more severe and they feel the need for treatment. A more detailed analysis following patients who drop out may provide further insight on the potential economic impact of HIV patients drop out.

Third, there are much incomplete data set per person in our database, cutting our observation from 8,184 to 658 patients. This, will have implication on our results, and having better dataset may have improved our findings. Regardless, given the current number of observation, we have managed to show the significant factors that influence the probability of HIV patients dropout, adding information for the clinic managers and/or policy makers in designing appropriate policy.

Fourth, our productivity loss calculation is based only on productivity approach using average and minimum wage. We believe actual economic impact of drop out should be much higher as we forgone important values such as loss of/reduced quality of life, costs to family members, and hospitalization costs. However, the purpose of our productivity loss analysis is to show the potential economic impact due to the drop out at its most basic state. Our study has shown this and clarifies that this amount can only be higher if it is further calculated.

CONCLUSION

Controlling drop out rate is crucial as the success of ART will increase QoL, productivity, and physical and emotional health which influences the survival of patients. This study has shown that higher CD 4 cell count, satisfied with family/peer support, have been in treatment longer than a year, and have TB history are associated with lower probability of HIV patients dropout. We have also presented the severity of dropout in terms of its consequences on productivity loss. The estimated productivity loss over productive lifetime due to dropout can reach US$312 million for IDU and US$306 million for non-IDU at national level. We recommend to optimize early ART, family/peer support, and TB/HIV service integration to reduce drop out rate and reduce its economic impact.

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