HIV INFECTION DISPARITIES IN THE DEVELOPING AND DEVELOPED COUNTRIES

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ABSTRACT

Around 33.3 million people in the whole world are living with Human immune deficiency virus (HIV). Although HIV is found in all over of the world, some parts are more badly affected than others. This study will help to determine the personal and environmental characteristics of the countries that considerably contribute to the increasing incidence of HIV infections. Among the nine characteristics recognized, only four of them have significantly influenced HIV occurrence namely: unemployment rate, literacy rate, geographical location and race and only three characterisctics differentiated between high and low HIV occurrence countries; population density, national average income per capita and total health expenditure. The study also revealed that eighty countries with significant increase in the speed of the spread of infections, while the rest has insignificant change of the number of infections.

Keywords: HIV Infection, Global Voronoi Mapping, Factors Affecting HIV infections

INTRODUCTION AND RATIONALE OF THE STUDY

Human Immunodeficiency Virus (HIV) infection is a viral and deadly disease that has plagued the globe for centuries. In three decades since HIV was first discovered, the disease has become a devastating pandemic, taking the lives of 30 million people all over the world. In 2010 alone, HIV killed 1.8 million people, 1.2 million of whom were living in sub-Saharan Africa (ONE International, 2012).

Furthermore, it is important to note that thirty-five million people are currently living with HIV; an average of 7,100 people are newly infected each day according to The Hunger Project (2011). Developing countries accounted for the highest rates of infection, with sub-Saharan Africa alone accounting for over 70% of new infections and nearly 23 million of the total number of people is living with the virus worldwide.

Till date, most of the available HIV prevalence statistics around the world reported that HIV infection is higher in the developing countries as compared in the developed regions. This reality awakened the curiosity of the proponent to explore the characteristics of these countries and possibility associated with HIV infections. According to Cempron and Palompon (2011), there are various studies that have revealed the link between the rate of HIV infections to marital arrangement, national average income per capita, population density, unemployment rate, literacy rate, geographical location, legality of prostitution and total health expenditure. This study determined the association between the economic statuses of the countries vis a vis the HIV infections and its associated variables mentioned earlier.

In addition, the proponent would like to establish critical determinants and differentiating factors of HIV infections between developing and developed countries. This could be helpful in developing appropriate programs since this serious disease is highly preventable if the populace is empowered with accurate information and freed from the societal taboos.

REVIEW OF RELATED LITERATURE AND STUDIES

There are a range of studies that have revealed disparity of HIV occurrence between developed and developing countries. The variation may be linked to several characteristics that a country possesses such as marital arrangement, national average income per capita, population density, unemployment rate, literacy rate, geographical location, legality of prostitution and total health expenditure

According to Nationsonline (2012), developed countries have a smaller population density than developing countries. Asia and Africa are the continents with the highest *population density* in the current world population while Americas, Carribean and European regions have the least.

In terms of *marital arrangement,* Cempron and Palompon (2011) found that most of the developed countries are practicing polygamy while those in developing nations are practicing both monogamy and polygamy. This result however is negated by Barber (2012) reporting that polygamy works well in underdeveloped tropical countries but not so well for developed high-latitude countries. Third, developed countries are highly urbanized and it is very difficult to raise large families in cities because children are such a drain on finances that it is impossible for most men to support multiple families. In agricultural societies, by contrast, kids contribute to the family economy by working.

Unemployment rate in many non-industrialized countries revealed to be 30% combined with unemployment and underemployment while developed countries typically 4%-12% unemployment in 2007 (Index Mundi, 2012).

Supported by UNESCO (1998), 98% of all non-literates live in developing countries. In the least developed countries, the overall illiteracy rate is 49%. This data suggested that developed countries have much higher *literacy rate.*

Looking at *legality of prostitution*, many developing countries support the legalization of prostitution because of the economic benefits. If prostitution were legalized it would allow governments to count prostitutes as among their workforce which would lower their unemployment rates and would allow governments to tax the industry and its workers which would increase national revenue. But while the government id tring to emphasize the perceived benefits of such a decision; they are ignoring the facts (United Families International, 2010).

In the *health care expenditure* aspect, National Bureau of Economic Research (2012) found that US and other developed countries experienced a rapid increase for some time. In the US, for example, health care expenditures as a share of GDP have tripled since 1950, from 5% then to 15% today.

In terms of *geographical location* and race, African countries and the negroids were at high risk of acquiring HIV, Caucasians were at moderate risk and Asians were at low risk (Cempron and Palompon, 2011).

HYPOTHESIS

Based on the previous studies gathered in the literature review, the following hypothesis is formulated:

People living in the developing countries has higher HIV infection rate, population density and unemployment rate but lower in literacy rate and total health expenditure.

OBJECTIVES

This study aimed to establish critical determinants and differentiating factors of HIV infections between developing and developed countries.

Specifically, this answers the following queries:

1. To determine the characteristics of developing and developed countries.

2. To determine the factors that significantly influenced HIV occurrence and the discriminating characteristics between developing and developed countries.

METHODOLOGY

Data mining was utilized in this study (Note: Some data utilized by Cempron and Palompon, 2012 were also used in this research with permission). Available data and statistics were retrieved such as HIV prevalence rates all over the world, Population Density, Unemployment rate, Literacy rate, Geographical Location, Marital Arrangement, Legality of Prostitution and Total Health Expenditure.

Multiple regression and discriminant analysis were used in determining the significant factors that influenced HIV infections and in determining the discriminating factors of developed and developing countries, respectively. There were 168 countries and all the actual data were utilized during multiple regression and discriminant analysis. In data processing, minitab version 13 software was utilized.

In order to have cognitive clarity of the variables under study, the following variables are operationally defined:

HIV prevalence rate is an estimate of the percentage of adults (aged 15-49) living with HIV. The adult prevalence rate is calculated by dividing the estimated number of adults living with HIV at yearend by the total adult population at yearend. The exact figures presented where taken per country and were classified as follows, 1 for 0-1.9 (low), 2 for 2-10 (moderate) and 3 for more than 10 (high).

National average income per capita is defined as the average of value added by all resident producers plus any product taxes (less subsidies) not included in the evaluation of output plus net receipts of primary income that is divided by total population and were coded as follows: 1 for 3,400 or less (low), 2 for more than 3,400 but less than 19,000 (moderate) and 3 for more than 19,000 (high).

Population density however is defined as the number of people per unit of area per square kilometre that is calculated per country which may include or exclude cultivated or potentially productive area. The classifications were: 1 for 0-50,000 (low), 2 for 50,000 – 100,000 (moderate) and 3 for more than 100,000(high).

In addition, unemployment is defined as the number of unemployed persons divided by the labor force, where the labor force is the number of unemployed persons plus the number of employed persons. Literacy rate is defined as the percentage of population aged 15 years and above with the ability to read and write and with understanding of a short simple statement on his/her everyday life. Divide the number of literates by the corresponding age-group population and multiply the result by 100. These data were categorized as follows: 1 for less than 30 (low), 2 for 31-70 (moderate) and 3 for more than 70(high).

Geographical location is classified into ten continental regions namely: Africa, Asia, Central America, Eastern Europe, European Union, Middle East, North America, Oceania, South America and the Caribbean. The race is a group of people united or classified together on the basis of common history, nationality, or geographic distribution. They are classified into four races specifically Caucasian-mongoloid/asian, negroid/blacks/congoid and australoid. Then it was sorted as 1 for Caucasians, 2 for mongoloid/asian, 3 for australoid and 4 for negroid/blacks/congoid.

Prostitution is engaging in sexual activity with another person in exchange for compensation, such as money or other valuable goods. Legality refers to the status of prostitution (not activities surrounding prostitution such as brothels, pimping etc) by country. It can be categorized into two, either legal(1) or illegal (2). However, marital arrangement refers to the sexual practices and preference of the person, may be monogamous (1) or polygamous (2). And lastly, total health expenditure is the sum of general government expenditure on health and private expenditure on health in a given year (in international dollars). The Total health expenditure is the percentage of Gross Domestic Product (GDP) and was classified into three; 1 for less than 500 (low), 2 for 500-1,000 (moderate) and 3 for more than 1,000 (high).

RESULTS AND DISCUSSION

This section presents the discussion and interpretation of the results of the study

Table 1. Distribution of Countries

	N	%
Developed Countries	39	23
Developing Countries	129	77
	168	**100**

The proponents included 168 countries with complete data and evidently, a huge percentage showed that most of the countries are still developing (refer to table 1). This result is consistent with the data on world population statistics which showed that developed countries account for less than one third of the world's total population.

Characteristics of the Developed and Developing Countries

It is reflected in table 2 that out of nine (9) characteristics of the country as classified into developing and developed, they only differed in the three (3) characteristics namely, national average income per capita, unemployment rate and geographical location.

In terms of national average income per capita (which refers to the average of value added by all resident producers plus any product taxes, less subsidies, not included in the evaluation of output plus net receipts of primary income that is divided by total population), developed countries is much higher than the developing countries. This result is according to the expectation because the classification of countries' economic development is based on gross domestic product (GDP), level of industrialization and general standard of living (Investopedia, 2012). Thus, if a country is classified as developed, then it follows that the country has a high national average income per capita and vice versa.

Table 2. Characteristics per Country Classification

Characteristics	Developed	Developing
HIV Infection	Low	Low
National Average Income per capita	*Moderate*	*Low*
Population Density	High	High
Unemployment Rate	*Low*	*Moderate*
Literacy Rate	High	High
Geographical Location	*Asia*	*Africa*
Race	Caucasian	Caucasian
Marital Arrangement	Monogamous	Monogamous
Legality of Prostitution	Illegal	Illegal

Looking more closely at unemployment rate, it is noticeable that developing countries has higher unemployment rate. The main reasons are corruption in the government employees, incompetence due to lack of education, bureaucracy accompanied by lawlessness or inability to implement the laws provided, lack of property rights and poor educational systems. Certainly, there is a persistently high unemployment rate among developing countries as compared to the developed (United Nations New York, 2011).

In geographical location on the other hand, most of the developed countries are from Asia while most of the developing countries are from Africa. African countries and negroids were at high risk of acquiring HIV, Caucasians were at moderate risk and Asians were at low risk (Cempron and Palompon, 2011).

Critical Determinants of HIV Infections

As shown in the regression results in table 3, national average income per capita and population density do not have significant effect on HIV incidence rate. Also, HIV prevalence rate is independent with marital arrangement and legality of prostitution. In addition, HIV prevalence rate is not affected and insensitive of the total health expenditure of the country. However, it can be concluded from the results that among the identified nine (9) characteristics, only four (4) of them are significantly influenced the HIV prevalence rates, namely: (a) developmental status of the country, (b) unemployment rate, (c) literacy rate, (d) geographical location of the country and race. Based on the prevalence profile, high HIV infection is greater in African countries, black race, low unemployment rate and high literacy rate. The socio-economic implication derived from these findings shows that those who are well-educated and have income are the ones who have capabilities of hiring sexual market services which can increase HIV susceptibility.

Table 3. Regression Analysis of Factors Affecting HIV Infection

Predictor	Coefficient	SE Coefficient	T	P
Constant	-5.471	2.959	-1.85	0.066
Development	*1.3678*	*0.9556*	*1.43*	*0.010*
National	0.00000659	0.00003224	0.20	0.838
Population	-0.00000007	0.00000035	-0.21	0.838
Unemployment	*0.06214*	*0.01809*	*3.44*	*0.001*
Literacy	*0.05154*	*0.01975*	*2.61*	*0.010*
Geography	*-0.3319*	*0.1210*	*-2.74*	*0.007*
Marital Status	-0.6064	0.6902	-0.88	0.381
Legality	-0.9292	0.6452	-1.44	0.152

S = 3.559   **R-Sq = 31.9%**   R-Sq (adj) = 28.0%

All the results except for the data regarding the development of the countries were consistent with the findings of Cempron and Palompon (2011) on their study on Global Voronoi Mapping of HIV Infections. Referring to the findings of unemployment rate in table 2, it can be noted that there is moderate unemployment in the developing countries while low in developed countries. If a country has higher unemployment rate, the people tend to seek for any jobs, even risky jobs like prostitution. Legal, moral and social censure of prostitutes has increased dramatically since the advent of HIV. As has been the case throughout history, sex-trade workers are seen as the "vectors of disease." Female prostitutes in particular are perceived as the bridge between an HIV-infected "underworld" and the "general population" (Cempron and Palompon, 2011).

However, literacy rate significantly influenced the HIV infections. Although the majority of the countries are having high literacy rate, HIV infections can still increase because in the first place, literacy rate doesn't specifically measures the literacy of HIV. The result actually is supported by the majority of studies investigating this issue. Researchers have found a positive relationship between literacy rate and HIV infection, that is, HIV prevalence is higher among educated individuals. As cited in Cempron and Palompon (2011), this was found at the population level in data from Rakai, Uganda in 1990 and 1992; from Mwanza, Tanzania in 1991-1996 and amongst women attending ante-natal clinics in Fort Portal, Uganda in 1991-4 and in Zambia in 1994 and 1998.

Additionally, race and geographical location significantly affected HIV infections. Some researches revealed that HIV is more common among blacks and in African countries. A recent study claims that nonwhites living in South US have greater HIV infections than people of different races and geographical location living in other parts of the country. There is an estimated 5.6 million people living with HIV in South Africa in the year 2009, the highest number of people in any country (AVERT, 2011). The UNAIDS statistics for the global distribution of HIV infection rates in 1997 and 2007 are Sub-Saharan Africa, 7.4% and 5.0%; Caribbean, 1.9% and 1%; everywhere else, less than 1% in both years, respectively.

Country's level of development also significantly affects HIV prevalence rate. Although both the developing and the developed countries have a low prevalence rate of HIV as illustrated in table 2, still the development can potentially affect the incidence rate of HIV because they differ in some practices (work or health-related). As an example, people in developing country who do not have an opportunity to have a decent job would seek for any work just to earn a living, even a more risky jobs like prostitution. Additionally, developing country does not have enough financial budgets to offer HIV treatment that is accessible and affordable.

CONCLUSION

Therefore it is concluded that only four of the characteristics that is under review have significantly influenced HIV occurrence namely:

1. Development of the country,
2. Unemployment rate,
3. Literacy rate,
4. Geographical location and Race.

Moreover, only population density, national average income per capita and total health expenditure differentiate between high and low risk countries. Thus the voronoi map illustrated that most countries in the African countries have a high risk in the incidence of HIV occurrence. Thus this study determined the personal and environmental characteristics of the countries that significantly contributed to the increasing HIV infections and will help in further studies and control of the disease.

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