Social, Economic, Political and Quality of Life across Human Immunodeficiency Virus

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Abstract

Human Immunodeficiency Virus prevalence was predicted using cluster analysis technique. A retrospective design was employed. We deployed surrogate measures for social, economic, political and quality of life. Data mining strategies were trailed to gather data. Factors that affect HIV prevalence were represented with surrogate measures by brainstorming activity. Data were taken from world reports from reliable sources. Using an algorithm, data were analyzed using MiniTab software: partitioning, centroid-based, hierarchical and density based methods. This article introduced three contending models on the interplay of the factors towards its influence on HIV prevalence. It culminates with the integration of a holistic model, which can provide a theoretical basis in predicting HIV prevalence. An integrative model was elevated from its substantial form to a more formal application. From HIV prevalence to a communicable disease prevalence, this provides a more wide application.

Keywords: social, economic, political, quality of life, HIV prevalence

1.0 Introduction

The increase prevalence and incidence rate of human-immunodeficiency virus (HIV) are highly linked to socioeconomic status (SES) as evidenced by many public health researchers (Fortson, 2008). HIV epidemic is one of the greatest challenges in the nation's health and development (Bärnighausen, Hosegood, Timaeus, & Newell, 2007). It is a noted threat to the safety of the community. Various measures were adopted among nations to stem the spread of this debilitating virus. Consequently, it affects the patients and the family's psycho-social well being (Ingram & Hutchinson, 1999; Ji, Li li, Lin, & Sun, 2007).

According to UNAIDS (2011), a total of 34 million (31.4 million–35.9 million) different races and ethnic minorities were affected with HIV. As of 2011, there were 2.5 million (2.2 million–2.8 million) people newly infected cases. In 2010, 2.7 million of new cases were found. Moreover, 25 countries have 50 % or greater drop of new cases since 2001. As of 2011, recent infections among children were noted, 43 % decreased in 2003, and 24 % lower than 2009.

Many private organizations such as United Nations, WHO and other public sectors continually aid the underdeveloped countries in (1) health promotion; and (2) prevention of viral transmission.

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There are also countries with good governance (education, jobs, employment) that promotes superior quality of life to its citizens (Brenner, n.d.). Quality of life programs has a strong emphasis on health programs.

Literature reveals the complexity in the relationship between SES and HIV (Mumah, 2011). Some literature claimed that SES indicators are diverse and wider in scope than HIV (Wojcicki, 2004). Identifying a specific area in SES may be difficult to pinpoint. This may range from: (1) employment (Fujishiro & Gong (2010); (2) literacy (Fujishiro & Gong (2010); (3) tourism (Farsari & Postacos, 1999); and (4) growth development per capita (Europian Commission DG Environment, 2006). There are even more variables available that we failed to enumerate. In our study, we apportioned SES into its more specific components: (1) social; and (2) economic.

After scrutinizing the enumeration, we agreed to add the following indicators: (1) political factor represented by government policy, specifically health expenditure (Schieber & Poullier, 1989; Schieber, 1990); and (2) quality of life measured by the human development index (UNDP, 2012) and congestion, expressed in land area per person (Thomas, Veary & Mahlangu, 2011). These have potential roles to play in the prevalence rate. Though, studies were done on some of the listed measures, there was no attempt to lump them up for cluster analysis.

2.0 Conceptual Framework

In this study, GDP per capita (current US$) and tourist arrival are identified as indicators for economic factor. As cited in Hervé Boulhol, Alain de Serres and Margit Molnar (2008), GDP is widely utilized for its simplicity and flexibility. It is an empirical framework to assess the influence of economic geography determinants augmented with human capital (Solow, 1956). This helps explain differences across countries in income levels and growth patterns. Tourist arrival is another economic indicator according to the Economic Research Organization at the University of Hawaii (n.d.). We identified this because tourist expenditures are straightforward conditions of gauging inputs to economic movement. Personally, we believe that, aside from its economic influence, it also has theoretical association with HIV prevalence.

Health expenditure can increase the health of individuals. This government spending can make life better. We consider health expenditure to represent government policy. We deliberately link this to represent the political factor. In the article of Tanu Kulkarni (2012), Rudiger Krech, Director, Department of Ethics and Social Determinants of Health, at the World Health Organisation (WHO), believed that improving access to health care is necessary.

Matthew Morgan (2008) identified literacy rate and the unemployment rate as indicators for social factor. That being literate and employed are both good measurement of how educated the people are; however, we do not subscribe on this idea. UNESCO (2006) defined literacy as knowing how to read and write. It is a good measure of how they are able to communicate – necessary in formal and informal social dynamics. Employment rate is a good measure of those who are receiving money for living which is indispensable to fuel filial and social dynamics.

"Wealth is evidently not the good we are seeking; for it is merely useful and for the sake of something else."

Aristotle in Nicomachean Ethics

The Human Development Index delivers amalgamated measure of three breaths: (1) life expectancy; (2) adult literacy and enrolment (primary to tertiary); (3) purchasing power parity and income. Although not an all-inclusive measure

of human development but it provides a more expanded coverage for viewing human progress, complex relationship, income and well being (Human Development Indicator, 2006).

"Development can be seen… as a process of expanding the real freedoms that people enjoy."

Amartya Sen, 1999

There is minimal attention in assessing the relationship between prevalence rates to spatial consideration (Thomas, Vearay & Mahlangu, 2011). We are interested in determining such association. In this study, congestion is measured as total land area over the total number of population. We believed that when geographical area is more congested, the higher the prevalence rate of HIV.

Collectively, we expect the probability of interaction between and/or among factors or variables in the prevalence of HIV. Furthermore, this needs to be established with the data.

3.0 The Problem

The purpose of the study is to understand and develop formal theory concerning factors associated with the prevalence of HIV using worldwide data extracted from data mining. Factors include economic, social, political and quality of life.

4.0 Design and Methods

We employed retrospective design (Polit & Beck, 2008) where predictors of HIV prevalence were identified. Factors are picked as indicators to prevalence of HIV. These were identified through a brain storming exercise (Padua, 2013) and aided by multiple literature review to mine data. A cyclical process between brainstorming and data mining activities was done. The following factors were identified: (1) economic; (2) social; (3) political; and (4) quality of life. Economic factor is measured by: (1) GDP; and (2) tourism. Social factor by: (1) literacy; and (2) unemployment. Political factor by health expenditure, while the quality of life by: (1) human development index; and (2) congestion.

Databases were explored to gather information for analysis:

Table 1. Worldwide Databases for Analysis

Factors	Variables	Databases
Economic	- GDP per capita (current US$) - Tourist Arrival	- World Bank Data Base (2011) - CIA World Fact Book (2009)
Social	- Literacy rate, adult total (% of people ages 15 and above) - Unemployment, total (% of total labor force)	- World Bank Data Base (2010) - World Bank Data Base (2010)
Political	- Health expenditure per capita (current US$)	- World Bank Data Base (2010)
Quality of Life	- Human development index - Congestion in sq km/person (total land area/total population)	- United Nation Development Program (2011) - World Bank Data Base (2011)
Dependent		**Database**
Prevalence of HIV, total (% of population ages 15-49)		- World Bank Data Base (2011)

Basing from the World Bank Report, 213 countries were initially identified. Elimination process was done purposively. A country with lacking entry in any of the indicators was eliminated. From 213 countries, 45 were retained in the roster for analysis.

5.0 Data Analysis

The data was subjected for cluster analysis using Minitab Statistical Software Release 13.20. Cluster analysis is defined as a process of grouping a set of variables into classes of similar objects (Han & Kamber, 2006). Algorithm analysis was an amalgamation of partitioning, centroid-based, hierarchical and density-based methods. This facilitated in the development of the model. Conceptualization was founded from the: (1) tabular presentation of the variables vis-à-vis to three clusters for numerical analysis; and (2) dendrogram for a more visual analysis. The number of clusters was predetermined. To present a more visual representation of the dendrogram, we rerun the data in IBM-SPSS Version 20.

After understanding the interaction of the different factors/variables. Models were formulated to demonstrate the processes involved. Initially, 3 competing substantive theories were created. These substantive theories were collapsed, and a more formal one was crafted. Substantive theory is framed for a specific area of social concern while formal theory is shaped for a broad or general application (Glor, 2008; Advanced Qualitative Research, 2010). Finally, an alternative conceptualization was presented to provide a different lens to the phenomenon.

6.0 Results and Discussion

This research study utilized the most recent database available in analyzing the factors associated with HIV prevalence rate, specifically: (1) gross development product (GDP); (2) tourism; (3) health expenditure; (4) unemployment; (5) literacy rate; (6) human development index; and (7) total land area per person in worldwide scope. The identified countries were clustered accordingly and findings revealed in the table as shown.

Table 2. Analysis of Variables Using Three Clusters

Variables	Cluster 1	Cluster 2	Cluster 3	Grand Centroid
Prevalence rate	0.2902	0.4000	0.5000	0.3067
GDP per capita	28924.3659	42377.0000	38719.3333	29876.3111
Unemployment	8.7000	9.3000	12.7000	8.9800
Literacy rate	97.1780	99.0000	98.3667	97.2978
Total land area per person	0.0371	0.0100	0.0167	0.0351
Tourist arrival	6746219.5122	7.676400E+07	5.010033E+07	1.119244E+07
Health expenditure	2498.7561	4691.0000	4831.0000	2702.9556
Human development index	0.8298	0.8800	0.8867	0.8347

As shown in Table 2, clusters 2 and 3 remarkably entails high HIV prevalence rate of 0.4000 and 0.5000 respectively, compared to cluster 1 with below the grand centroid of 0.3067. Those clusters with high prevalence rate are those with high GDP. Surprisingly, the clusters with high GDP showed high unemployment rate despite high human development index.

To provide a more comprehensive discussion in the findings of the study, we formulated three dynamic models in analyzing the variables mentioned. These models serve as framework tool in examining the evidences behind the HIV prevalence rate worldwide. According to Fawcett (2005), conceptual model provides a coherent, unified and orderly way of envisioning related events or processes relevant to a discipline. It simply processes the variables why and how it affects the others. These models are shown in graphical presentation.

Model 1
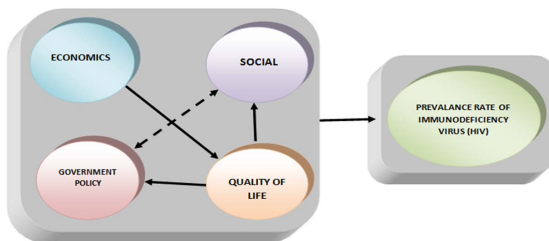
The first model stressed that economics directly influence the quality of life among highly develop countries. Nations with high economic stability were capable of influencing one's quality of life. However, this does not directly affect social dimensions as manifested by high unemployment rate of clusters 1 (9.3) and 2 (12.7). Still, quality of life is directly associated with the social factor and government policy. While both latter enumerations indirectly affect each other.

Xu (2012) claims that economic growth intensify human development of workforce capacity along with opportunities for their efficient use, it provides better job opportunities, creates an enabling environment for businesses growth and supports better democracy. High level of GDP among progressive countries expects elevated HDI. It is expected that the former has a vast contributory factor to the latter. Though, it is also projected that high economy increases employment rate, there is no direct relationship between the two factors which demonstrate incongruence of expectations. Increase in the unemployment rate may still be possible due to other elements.

Relating it to HIV prevalence, the augmented HDI specifically technological and medical advancement could somehow attract foreigners (migrants and tourists) for it increases the power of health confidence while in the area (Hicks & Streeten, 1979). Although migrants has extensive health screening, this is not strictly implemented among tourists which can be a possible human vector of HIV (Australian Government Department of Immigration and Citizenship, 2012). Though extensive screening is done among migrants, this is not an assurance that they cannot become vectors, considering: (1) window period (European Centre for Disease Prevention and Control, 2011); and (2) HIV related activities after extensive screening (Centers for Disease Control and Prevention, 2012).

Positioning the other influences of unemployment as mentioned above, influx of migrants, sometimes masked as tourists for entry level, compete with the available job positions (Jordan, 2009; Somerville & Sumption, 2009; Jens, Hiscox & Margalit, 2011a/b/c). This is being mitigated with the locals dependence to the government due to the financial support it gives to the unemployed (Beach & Tyrrell, 2012). This further retains the problem of unemployment. In high GDP and HDI countries, government support among the unemployed is well positioned. Locals

have the tendency to become dependent to the government (Handley, 2011). These scenarios may pose to the increase in HIV prevalence rate. Unemployed locals, with nothing to do, has high chances of engaging in: (1) sexual activities brought about by boredom (Gana, Trouillet, Martin, & Toffart, 2001; Chaney & Chang, 2005); (2) prostitution for work; and (3) cross cutting through sharing of needles (Hurley, Jolley & Kaldor, 1997) – considering drug related activities are high among unemployed. The enumeration contributes to the increase prevalence rate. In addition, outsourcing such as BPO industries were channeled to developing countries like India (BBC, 2003; Hossain & As-Saber, 2008), Philippines and China which delimits the possible options for work.
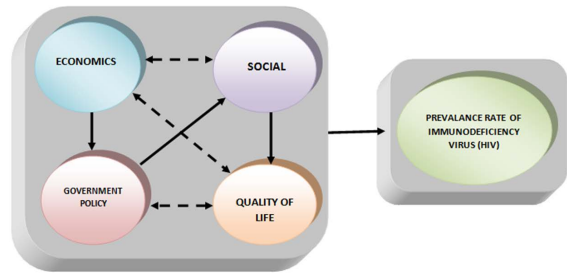
Government policy is indirectly associated with the social factor. We argue that the society subtly influence policy making. This predominantly refers to parameters, philosophies, regulation and undertakings that assume the living circumstances favorable to social benefit. Policy is focused on those aspects of the society that are essential and the measures by which it can be delivered (Newburn, 2012; Malcolm Wiener Center, 2006).

Model 2
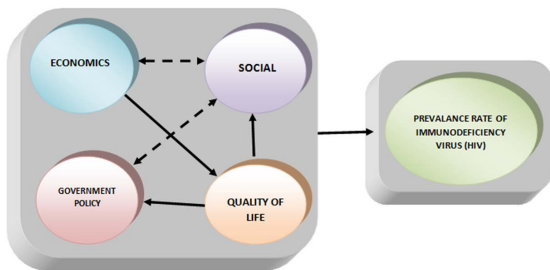
The second model is similar to the first model with a slight deviation. In this model, an indirect relationship is assumed between the economic factor and social factor. A more comprehensive discussion of this segment is presented in model 3.

Model 3

Unlike the previous two models, the last model identified economics as a major factor affecting the utility of the government policy whereby social dimensions is influenced by it and indirectly interrelated to economics. As Gerdtham, Sogaard, Anderson and Johnson (1992) claimed in their studies indicate that health care systems contribute significantly to health care expenditure variation in different countries. These are evident in the findings of our data in first world countries like USA, Spain, Italy and France as being clustered as 2 and 3 that endowed high health expenditure in an attempt to curb the high HIV prevalence rate of 0.40 and 0.50 respectively as compared to other countries with low prevalence rate.

Furthermore, due to their high GDP, the allocation for health services and programs are also high. Kanavos and Mossialos (1999) cited empirical researches that supported our claim. These studies reported significant causality and relationship between health spending and gross domestic product (GDP). Certainly, health funding is central to public health planning and clinical practice as Evans and Pritchard (2000) asserted. This is also true in the study of Hitiris and Posnett (1992) that further highlighted the importance of GDP as a determinant of health spending, with estimated income elasticity at or around unity. Clearly, both GDP and health expenditure is interrelated in most first world countries. As Schieber and Poullier (1989), and Schieber, (1990) determined that USA's

health spending continues to widen the gap in other countries. These findings resembled that as gross domestic product continually grows, the health expenditure also increases relatively to the needs of their country. The health expenditure gap between and among first world countries to others continuously widen remarkably in the period of time depending on the consequence of gross domestic product. As evidenced in the findings of our study, clusters 2 and 3 significantly almost doubled the health expenditure with 4691.0 and 4831.0 compared in other countries that supported the previous claims. It was observed that the increase in HIV prevalence may result from increase GDP brought about by high health expenditure in first world countries. This high health expenditure allocated by the government helped to increase the chance of screening HIV positive individual. The screening facilities and HIV specialist doctors are upgraded and highly trained. Thus, the HIV screening is highly functional and observed compared to developing countries with low HIV screened individual.

In addition to economic growth linking to government policy, the increase tourism relatively affects the increase health care expenditure among countries with high gross development product. As de Arellano (2007) found out that patients from USA and other developed countries continues to increase rapidly, as the result of medical tourism which attracts foreigners with the aim to acquire health care services. This resulted to emphasize highly technological driven tertiary care for foreigners. In relation to our study, clusters 2 and 3 with high tourist arrival of 76 million and 50 million per year respectively, considerably affect the health care expenditure to increase.

On the other hand, government policy attributes to social dimensions brought about by the increase economic growth and it is indirectly associated with each other. According to (Truffer, Keehan, Smith, Cylus, Siskos and Poisal, 2012) that the unemployment and

economic recession are the factors that affect health spending during 2009-2019. The high prevalence rate affects the social dimension particularly the employability of an individual. As the findings suggested, clusters 2 and 3 with high prevalence rate marginally affected the increase unemployment of 9.30 and 12.70 respectively, and productivity among HIV positive individual. This is greatly supported on the studies of Arndt and Lewis (2005) that the HIV positive individual may experience declining labor productivity due to signs and symptoms as manifested.

The social dimensions affect the quality of life as evidenced in the literacy and employment rates towards human development index. Despite high human development index in first world countries, the literacy and unemployment rates are also high. This happened when high human development index evidently attracts people in highly industrialized countries wherein competition is present. When there is competition brought about by certain higher degree of qualifications and the locals also compete to the foreign workers.

We have estimated that true disease incidence is hard to retrieved since national surveillance systems have poor monitoring and reporting of HIV incidence. Furthermore, in some countries like Philippines there is no law that dictates us to check randomly HIV status among the people; as well as, some people doesn't undergo HIV testing due to fear of diagnosis

Integrated Model
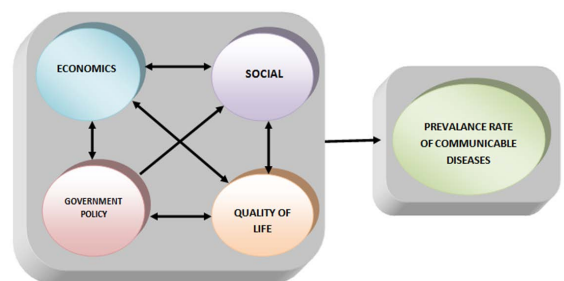
Considering all models as useable representation of reality, this integrative model collapsed each component and aggregates a holistic interrelationship between economics, social, government policy and quality of life. These factors are part of the package, which constantly affect directly or indirectly to each other. The aggregate effect in the formulation of these factors lead to the prevalence rate of HIV. If you notice, the dependent variable is elevated into its more general form. We decided to elevate our substantive theory into a more formal theory to widen its scope.

From an Alternative Lens

Interestingly, it is not expected that increase GDP can be equated to increase the prevalence as stated by the epidemiological theory. If the data we are utilizing is the actual representation of objective reality, then our theory refutes the previous one. However, if the epidemiological theory is more logical to use, then the prevalence rate may not be the actual reality. Considering that countries with increased GDP have increased Heath expenditures, it is logical to note that: (1) access to screening technology is available; and (2) programs for HIV promotion and prevention are established. This means that HIV cases in increased GDP countries are well-documented than those in decreased GDP. This argument brings us back to the idea that the HIV cases in high GDP might not be the actual number.

7.0 Conclusion

The aggregate effect of economic, social, government policy and quality of life primed the prevalence rate of communicable diseases. The shared interactions are the pull and push factors. Controlling the problem requires operant changes in each of the factors. This can only be achieved with good government policies that will help reshape the other factors. Although transformation of each requires ample time to accommodate new health actions, reforming and restructuring will only push-through if the government is serious in controlling this deleterious health phenomenon.

Knowing that the interaction of economic, quality of life, governance and social forum serve to determine the prevalence of communicable diseases globally, their continued persistence may therefore be attributed to the failure to address the key issues surrounding each of these causative factors. On the whole, governments of various countries have not seen successful in addressing core poverty issues (economic) which translate into quality of life. Poverty breeds many societal ills including, but not limited to, a tacit acceptance of prostitution as a way of life and a means of livelihood. Such social acceptance of an otherwise unacceptable practice in more affluent nations further aggravate a loose, sense of socially acceptable behavior such as multiple partners, same-sex relationships and others. On one hand, government policies and religious dogmas deter the spread of (sexually) communicable diseases, social norms and acceptable behavior are often functions of the quality of life and economic stability of the nation. Thus, prevalence of (sexually) communicable diseases can only be minimized if a wholistic consideration of all four (4) main drivers of their spread is made.
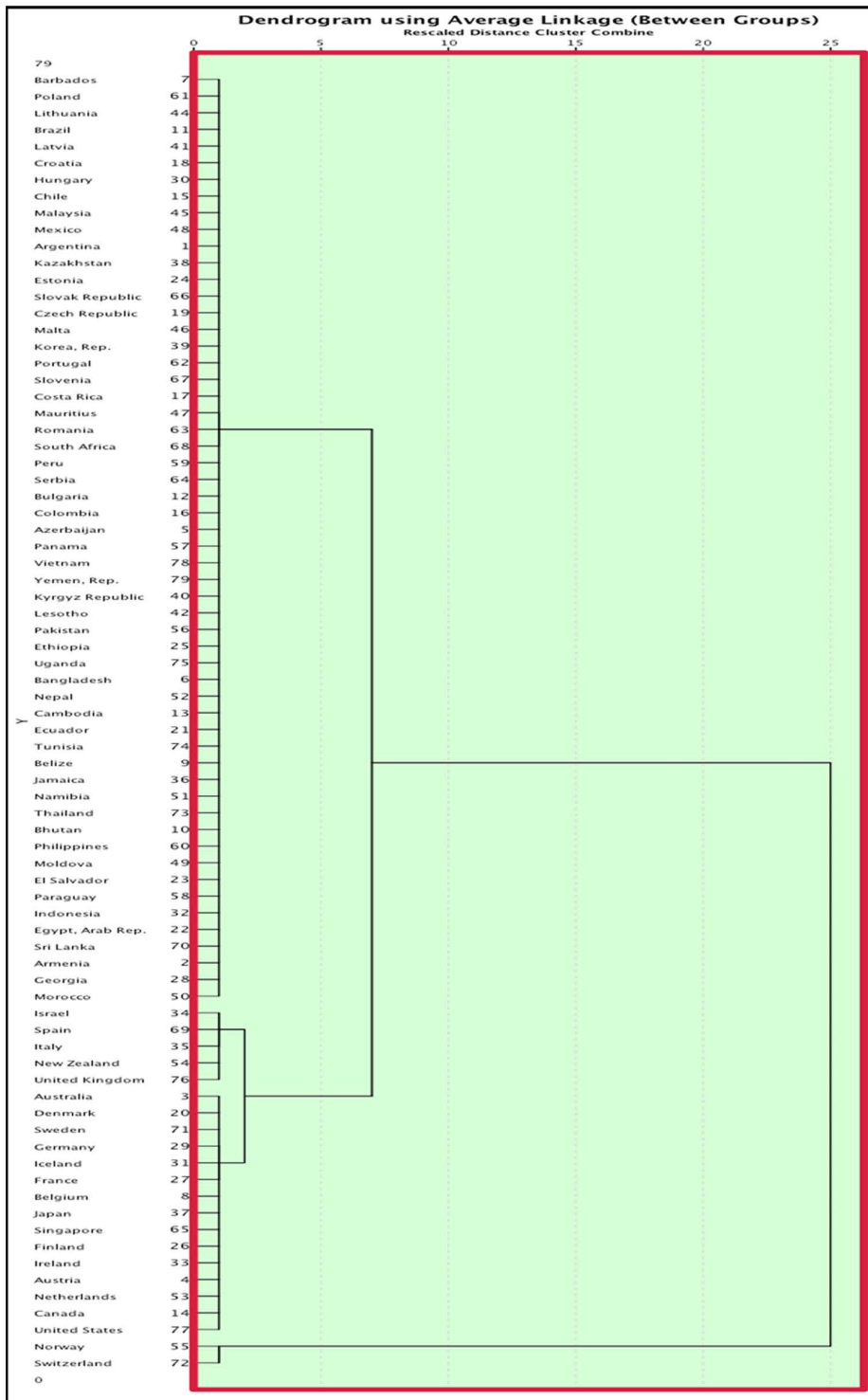
Figure 1. The Dendogram using Average Linkage between Groups

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