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Determinants of Health Professionals' Migration in Africa: a WHO based Assessment

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Abstract

Purpose – How do economic prosperity, health expenditure, savings, price-stability, demographic change, democracy, corruption-control, press-freedom, government effectiveness, human development, foreign-aid, physical security, trade openness and financial liberalization play-out in the fight against health-worker crisis when existing emigration levels matter? Despite the acute concern of health-worker crisis in Africa owing to emigration, lack of relevant data has made the subject matter empirically void over the last decades.

Design/methodology/approach – A quantile regression approach is used to assess the determinants of health-worker emigration throughout the conditional distributions of health-worker emigration. This provides an assessment of the determinants when existing emigrations levels matter.

Findings – Findings provide a broad range of tools for the fight against health-worker brain-drain. As a policy implication, blanket emigration-control policies are unlikely to succeed equally across countries with different levels of emigration. Thus to be effective, immigration policies should be contingent on the prevailing levels of the crisis and tailored differently across countries with the best and worst records on fighting health worker emigration.

Originality/value – This paper has examined the theoretical postulations of a WHO report on determinants of health-worker migration.

JEL Classification: D60; F22; I10; J24; O15
Keywords: Welfare; Health; Human Capital; Migration; Africa

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1. Introduction

The fate of global health and development in the 21st century significantly lies in the management of human resource crisis in the health sector (Joint Learning Initiative, 2004). A health-worker crisis is overwhelming the world and the need for medical professionals is arguably greatest in Africa. The continent is facing an acute human resource crisis in the health sector owing to emigration. Over the past two decades its population has increased substantially, with a significant rise in the disease burden due to HIV/AIDS , recurrent communicable diseases and a spurring incidence of non-communicable diseases (Kitua, 2007, p.148; Anyanwu, 2007; Anyanwu & Erhijakpor, 2009; Asongu, 2014a). Unfortunately, this increased demand for health services has been met with a rather low supply of health workers. To put this worrisome fact into perspective, Africa has 25% of the global disease burden with a share in population of 13.76% but has only a 1.3% share in health workers (Packer et al., 2007, p.18).

In the light of the increasing flow of skilled professionals from low-income to high-income countries, the Wealth Health Organization (WHO) recently presented some theoretical postulations on the determinants of health-worker crisis (Packer et al., 2007). In the conclusion of the report, health professional crisis in low-income countries is presented as a serious and pressing challenge that requires urgent address. This work assesses the validity of the theoretical postulations of the WHO report on the determinants of health-worker migration in Africa. In substance, the paper seeks to investigate how dynamics of job security (economics prosperity and health expenditure), economic considerations (savings, inflation and population growth), political establishments (democracy & corruption-control), physical security (press-freedom & government effectiveness), quality of life (human development, development assistance & HIV infection rate) and globalization (trade openness & financial liberalization) play-out in

determining health worker emigration (physicians & nurses) when existing emigration levels matter? The paper's contribution to the literature is threefold.

First, despite the abundant theoretical literature on the subject matter, lack of relevant data on health professional migration has made the debate empirically void over the last decades. Thus, we complement existing theoretical literature by providing a pioneering empirical dimension to the health sector migration-development nexus.

Second, the WHO (Packer et al., 2007) report on globalization and health worker crisis presents to the best of our knowledge, the most exhaustive and detailed theoretical underpinnings of the health-worker crisis. Empirically investigating the hypothetical determinants postulated in the report could have relevant policy implications.

Third, examining determinants of health professional migration through-out the conditional distribution of health-worker emigration further provides results with more focused policy measures. The logic behind this dynamic analysis is that, best and worst fighters of health-worker emigration may respond differently to the determinants upheld by the WHO report. Thus if existing emigration-levels matter in the assessment of emigration determinants, then blanket emigration-control policies are unlikely to succeed equally across countries with different levels of emigration. It follows that, effective immigration policies would have to be contingent on the prevailing levels of the crisis and tailored differently across the best and worst brain-drain fighting countries.

Against the above background, we employ a quantile regression estimation technique that investigates the underlying determinants throughout the conditional distributions of the dependent variables such that the effects on countries with low and high emigration levels are clearly articulated. The rest of the paper is organized as follows. Section 2 examines existing

literature. Data and methodology are presented and outlined respectively in Section 3. Empirical analysis and discussion are covered in Section 4. Section 5 concludes.

2. Existing literature

2.1 Health human resource crisis in Africa

Health Human Resource (hence HHR) migration is severely infringing on the African health care system (Asongu, 2014a). Physicians and nurses based in rural and poor areas move to cities for appealing working conditions and environments. Urban-based physicians and nurses move from the critically under-funded and under-equipped public sector to the private sector (Gerein et al., 2006). More so, these professionals and their colleagues in the public sector leave to work in more developed countries in a bid to obtain greater pay, better working conditions, improved quality of life and better opportunities for their families.

Borrowing from Dovlo (2005a), the need for medical professionals is arguably greatest in sub-Saharan Africa (SSA). Yet a significant number of African-trained health workers are migrating to developed countries to work on a yearly basis. Mullan (2005) establishes that 6 of the 20 countries with the highest physician emigration factors (arrived at by measuring the loss of physicians from countries as a proportion of the physicians remaining to offer their services in health care) are in SSA. It is estimated that at least 11 000 SSAfrican-trained health workers are licensed and practicing in the United Kingdom (UK), United States (US) and Canada alone (Hagopian et al., 2005). In Africa, the public health sector is arguably the most seriously affected by inadequate HHRs and it is this sector that serves majority of the population. The greatest burden of disease globally is endured by the poorer strata in African countries which constitute a

great bulk of the population[2]. These health professionals leave behind severely crippled health systems in a region where life expectancy is only in the horizon of 50 years. In the continent, 16% of children die before their fifth birthday and the HIV/AIDS crisis continues to burgeon. The population of SSA is around the region of 660 million with a ratio of fewer than 13 physicians per 100 000 (Packer et al., 2007). Understaffing results in stress and increased workload (Dovlo, 2005b) and poses a significant threat to the Millennium Development Goals (Bueno de Mesquita & Gordon, 2005). A great chunk of the remaining health professionals are ill motivated, not only because of their workload and poor-pay but also because of poor equipment and limited career opportunities. These conditions in turn lead to a downward spiral in which workers migrate, further crippling the system and placing greater strain on the remaining workers who also start entertaining ambitions of migrating-out from poor working conditions (Dovlo, 2005b). Ultimately, this cycle leads to a catastrophic crisis in HHRs.

A slightly different position by Singh (2007) after an extensive literature survey suggests that, there is as yet very little consensus on if the degree of emigration in HHRs to developed from developing countries constitute a health worker crisis for the latter countries. This stance is broadly shared by Mwaniki & Dulo (2008, p.53) on the costs and benefits of the phenomenon. Nonetheless, the debate is no longer centered on the concern with numbers but has moved to the imperative of promoting health care in the source countries. According to the narrative, more emphasis is being tilted towards the promotion of strategies that prevent workers from emigrating. Protecting the rights of HHRs in destination countries and strengthening the capacity of health systems in source countries constitute some of the measures. Consistent with the author, the primary measures of responsibility should be borne by the governments of

[2] See Figure 2 page 18 of Packer et al. (2007). Africa has a 25% in the global disease burden with a share in population of 13.76% but has only a 1.3% share in health workers. This is consistent with Singh (2007, p.10).

developing or source countries. However, a holistic approach is also needed in which the responsibilities and obligations of the global community and destination countries are clearly articulated. The principal challenge however remains ethical: the freedom of individuals to migrate in search for better employment opportunities and the need for health care in source countries. Technical and financial support to source countries is needed, though non-financial factors have also been documented to be responsible for the health issues in Africa (Njoh, 2012) and there is growing emphasis that the debate on health policy ought to be refocused on social inequality (Obeng-Odoom, 2012). Moreover, the decision to move is not always positively associated with lower salaries, it could be the result of other factors like the degree of stress experienced, age, level of work-place satisfaction…etc (George et al., 2013).

2.2 Determinants of health professionals' migration

2.2.1 Framing the drivers

Borrowing from Packer et al. (2007), there are various ways of framing and understanding how openness affects migration and ultimately health-service. Firstly, HHR migration is inherently a defining characteristic of globalization (i.e., increased movement of people). Therefore, border barriers in rich countries for professional, skilled and technical immigrants are being lifted, contrary to a dwindling acceptance rate of semi or less skilled migrants (UNFPA, 2005). Globalization (in the forms of trade and investment liberalizations) is expected to lead to increased GDP per capita and could also improve the general health of a population (Packer et al., 2007). This is through reductions in poverty and commodity prices, while providing improved taxable income that could be invested in public health systems for the general good. These effects should diminish a source country's push factors. With respect to Bundred et al. (2004), most low-income economies from which a significant number of health

workers are emigrating still lack the capital investment to improve their health systems. Evidence of per capita GDP trickling-down to mitigate poverty is mixed at best.

On a second note, HHR migration can also be conceived as a problem requiring global policy intervention (that is, increased health inequities arising from lack of workers in poorer countries with high disease burdens). Within this perspective, the empirical relationship between globalization drivers and HHR migration is less a concern than the obligation or duty of all nations to manage migration flows in a way that does not compromise their legal or normative commitments under human right treaties (for example the right to health) or development goals (notably the MDGs).

On a third count, HHR migration is the result of other characteristics of globalization (that is, increase in factors that push workers out of their countries). Therefore, while framing this concern, it is imperative to examine the extent to which different aspects of globalization lead to increase in HHR migration. These could be categorized into the following strands:

-specific policies to overproduce and export in order to achieve a better balance of payments via remittances in part to create domestic conditions more favorable to foreign investors or lenders;

-deteriorating socio-economic and environmental conditions at least partly and substantively attributable, inter alia, to liberalization and other forms of global market convergence;

-conditions linked to grants, debt relief and loans from international financial institutions (IMF, World Bank and regional development banks) that could limit governments' ability to provide incentives to retain HHRs or pay adequate salaries;

-eased migration restrictions on the flows of HHRs from lower to higher-income nations with perceived HHR deficits; especially emigration of those with internationally recognized qualifications such as physicians and nurses (Bundred et al., 2004).

2.2.2 Post-colonial and linguistic ties

In line with Packer et al. (2007), post-colonial ties (through which countries continue to share customs, curricula and languages) are crucial factors in the choice of a destination-country. For this reason, Southern African and Caribbean nurses emigrate to Canada, the UK and Australia.

A survey on preferred destination-countries of professionals in five Southern African countries found 31.6% desired to immigrate to North America, 27.5% to the UK and 8.0% to Australia/ New Zealand. Also, 28.8% preferred to emigrate to their neighbor South Africa (Crush et al., 2005). A great many medical establishments in Southern Africa prepare students to work with diseases and facilities that are compatible with Western medical settings (English language of instruction and Western medical texts books). It follows that, medical degrees from Southern Africa, especially those from English-speaking countries have standards similar to Western degrees enabling them to practice abroad or in some degree encouraging them to do so.

2.2.3 Push and pull factors

In accordance with the literature (Crush, 2002; Bundred et al., 2004), different individuals are motivated to move for different reasons; typically, they are pushed-out of their countries or pulled-in to recruiting countries by differences in working conditions. Borrowing from Packer et al. (2007), because the motivations are very country-specific, we shall limit the main determinants of migration to push and pull factors as summarized in Table 1. In addition to these factors, an unappealing by-product of decades of growing HHR migration is the well-developed culture of medical migration. As pointed-out by Hagopian et al. (2005), this culture has become firmly buttressed in many source and receiving countries. The phenomenon is

increasingly encouraged as medical school faculties are becoming role models of migration; as they boast of their students who emigrate successfully. Thus, it is interesting to break down factors behind HHR migration in order to understand specific trends of the global HHR crisis.

Policy-makers are usually faced with the fundamental question of whether push or pull factors are more responsible for HHR emigration. Dealing with both types of factors is necessary to control the spiraling of the crisis; however informed opinion suggests that push factors weigh-in more heavily (Packer et al., 2007). There are a number of premises for this thesis:

-individuals characteristically cite push factors over pull factors as primary reasons for their intention or decision to migrate - for example a survey on migration factors cited by university students of six Southern African countries reveals cost of living, inability to find relevant jobs, low income and lack of prospects for professional advancement; with personal and family security being the most important (Crush et al., 2005);

-even with the absence of jobs in developed countries for health professionals, migration will still take place at a reduced rate, in view of other security reasons cited above;

-considerable differences in pay within and between countries represent significant push and pull factors (Thomas et al., 2005; Hagopian et al., 2005)[3].

-for the most part, source developing countries experience severe HHR shortages themselves accompanied by lack of supplies, stress and a common prospect of practicing effectively;

-there is little evidence to support the return of a significant numbers of doctors and nurses to their source countries (for practice), ostensibly because conditions that pushed them away have remained unchanged.

Ultimately, much emphasis must be placed on diminishing the push factors that force health workers out of source countries in large numbers in the first place. Retention efforts will

[3] It is important to note high pay in certain countries may be accompanied with high living cost.

be void of success unless fundamental labor, economic and social conditions that push workers out in the first place are improved.

Table 1: Summary on push and pull factors of HHR migration

Push Factors	Pull Factors
Job Security	
* No jobs available * Lack of promotions * Risk of losing jobs due to lack of funds	* Jobs available * Information from colleagues, friends and recruiters about opportunities * Fairness in granting promotions
Working Conditions	
* Deteriorating working environment/facilities * Inadequate medicine and equipment * Inability to treat patients appropriately * Unhappiness with prevalent social attitudes towards the nurse profession * Significant stress, overtime and generally poor conditions of service resulting to fatigue * Deplorable patient-health care service ratios, which decrease quality care	* Job satisfaction in the nursing and medicine practices * Reasonable workload and better working conditions
Economic Considerations	
* Disarray in several economically depressed countries * Low salaries * Inability to accrue savings * Non-payment of salaries, housing allowance and pensions	* Higher pay (and opportunities for remittances) * Reasonable remuneration–with savings opportunities * Recruiters actively searching workers internationally with the promise of high income
Political Considerations	
* Political, racial and ethnic upheavals * Gender discrimination * Government training of workers for international export	* OECD countries are wealthy, stable and democratic * Absence of corruption
Physical Security	
* Criminality * Gender-based violence * Exposure risk to HIV	* Safe country * Safe working environment * Appropriate medical equipment to prevent HIV infection
Quality of Life	
* Poor accommodation * Lack of transport means to work * Inability to live a decent life	* Multi-ethnicity and tolerance of diversity * Good quality of life
Education	
* Diminishing quality of education for children	* Greater opportunities, good education and improved living standards for children

Source: Packer et al. (2007)

2.3 Statement of the problem and testable hypotheses

Borrowing from Awases et al. (2004), the International Organization for Migration (IOM) estimates that approximately 20 000 Africans in various professional occupations leave each year for western industrialized countries. This global exodus most commonly stems from

the desire to achieve personally and professionally. This aspiration results from the combination of country-specific political, economic and general living conditions (WHO, 1997). The quality, efficiency and equity of services are contingent on the availability of skilled and competent health professionals. Migration of health professionals from one geographic area to another seriously affects the ability of health systems to maintain adequate coverage and quality services. The available literature consistently reports that, many African health professionals are not satisfied with their working conditions; quality of life and employment guarantee prospects (Mutizwa-Mangiza, 1998). The reasons advanced for such dissatisfaction are among others: delayed salaries, slow promotions, lack of recognition and unaffordable basic needs of life. This has led to a large scale of outward migration of professionals in the health sector.

According to Packer et al. (2007), the imperative of policies and strategies designed to help fight HHR emigration is increasingly a prime concern for the WHO. In response to this issue, the WHO commission on the determinants of health worker crisis has recently reported some theoretical postulations (Packer et al., 2007). This paper aims to assess the empirical relevance of these theoretical determinants for Africa in a context where existing emigration levels matter. Thus, the following hypotheses will be tested:

Hypothesis 1: Unfavorable working conditions increase the tendency for HHRs to emigrate;

Hypothesis 2: An adverse economic outlook pushes health workers out of their countries;

Hypothesis 3: Poor political institutions and government ineffectiveness increase HHR emigration;

Hypothesis 4: Depreciating quality of life increase HHR emigration;

Hypothesis 5: Globalization is a driver of HHR emigration;

Hypothesis 6: Continuing education increases tertiary emigration which positively affects HHR migration prospects.

In assessing above hypotheses, this paper contributes to the literature in the following dimensions. (1) Despite the acute concern of health-worker crisis in Africa owing to emigration, lack of relevant data has made the subject matter empirically void (theoretically valid though) over the last decades. Our use of a relatively novel data source provides a practical dimension to the African HHR literature. (2) Assessing the empirical validity of theoretical postulations from the WHO commission report (Packer et al., 2007) could capture specific African determinants of HHR emigration and hence provide relevant policies and strategies on how to fight the surge in health sector brain-drain. (3) Contrary to conventional HHR literature (Anarfi et al., 2010), investigating the determinants of health worker crisis throughout the distribution of HHR emigration could provide very robust findings if the worst and best fighters of HHR emigration respond differently to the hypothetical WHO determinants. It follows that if existing emigration levels matter, determinants could respond differently to countries with very high emigration rates in comparison to those with low emigration levels. Thus, a methodology that takes existing emigration levels (heterogeneity) into account could provide findings with more focused policy implications.

3. Data and Methodology

3.1 Data

We assess a sample of 24 countries with data from African Development Indicators (ADI) of the World Bank (WB), Freedom House and Clemens & Pettersson (2006). While determinants (exogenous variables) are obtained from the first two sources, physician and nurse emigration dependent variables are extracted from the new database on health professional

emigration from Africa (Clemens & Pettersson, 2006)[4]. Table 2 below depicts selected HHR determinants with respect to push factors outlined in Table 1 from the WHO report. The data is cross-sectional and based on the year 2000 because HHR migration data is only available for this period. HHR dependent variables entail both physician and nurse emigrations while their determinants involve aspects of job security (GDP per capita growth and health expenditure), economic considerations (savings, inflation and population growth), physical security (freedom and government effectiveness), political considerations (democracy and corruption-control), quality of life (human development index, development assistance and HIV infection rate), education (tertiary emigration rate) and globalization (trade openness and capital liberalization). Summary statistics and correlation analysis (with presentation countries) are detailed in Appendix 1 and Appendix 2 respectively. The descriptive statistics of the variables used in the quantile regressions show that, there is quite a degree of variation in the data utilized so that one should be confident that reasonable estimated relationships should emerge. The purpose of the correlation matrix is to mitigate issues resulting from overparametization and multicollinearity. Based on the correlation coefficients, there do not appear to be any serious problems in terms of the relationships to be estimated.

Table 2: Selected HHR variables

Factors	Variables	Definitions	Sources
Panel A: Outcome variables (Health Human Resource Emigration)			
Health Worker Emigration	Physicians	Physician emigration rate (% of total physicians)	Clemens & Pettersson (2006)
	Nurses	Nurse emigration rate (% of total nurses)	Clemens & Pettersson (2006)
Panel B: Independent and control variables			
Job Security	GDP per capita growth	GDP per capita growth (annual %). It measures the GDP (Output) divided by the total population	WDI (2011)

[4] Migration from poorer to richer African countries is neglected. "*Counting each as an additional loss would ignore the fact that for intra-Africa movements, one country's loss is another's gain. And this discrepancy, to the extent that it is small and largely independent of country characteristics, contributes primarily white noise to the data here rather than any bias that would affect the analysis*" (Clemens & Pettersson, 2006). 'Medical profession' refers to 'physicians' and 'professional nurses'.

		in a country on a yearly basis.	
	Health Expenditure	Health Expenditure (% of GDP). It refers to the sum of public and private annual health expenditure.	WDI (2011)
Economic Considerations	Savings	Gross Savings (% of GDP). It is calculated as gross national income less total consumption plus net transfers.	WDI (2011)
	Inflation	Consumer Price Index (annual %). This refers to changes in the price of a market basket of consumer commodities purchased by households.	WDI (2011)
	Population growth	Population growth rate (annual %)	WDI (2011)
Political Considerations	Democracy	Level of Institutionalized Democracy. It ranges from -10.0 to + 10.0	WDI (2011)
	Control of Corruption	Control of Corruption (Estimate). Captures perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as 'capture' of the state by elites and private interests. It ranges from -2.5 to + 2.5.	WDI (2011)
Physical Security	Freedom	Press Freedom. It reflects the rate of freedom news organizations, citizens and journalist enjoy as well as efforts made by authorities to respect and ensure respect of this freedom.	WDI (2011)
	Government Effectiveness	Government Effectiveness (Estimate). Measures the quality of public services, the quality and degree of independence from political pressures of the civil service, the quality of policy formulation and implementation, and the credibility of governments' commitments to such policies. It ranges from -2.5 to + 2.5.	WDI (2011)
Quality of life	IHDI	Inequality adjusted Human Development Index (HDI). It accounts for inequality in the HDI by adjusting for the degree of inequality as measured by the Atkinson index.	WDI (2011)
	Development Assistance	Net Official Development Assistance (% of GDP). These are disbursements of loans made on concessional terms (net of repayments of principal) and grants by official agencies of the members of Development Assistance Committee (DAC), by multilateral institutions and by non-DAC countries to promote economic development and welfare in countries and territories in the DAC list of aid recipients.	WDI (2011)
	HIV Infection rate	Prevalence of HIV (% of population ages 15-49)	WDI (2011)
Education	Tertiary emigration	Emigration rate of tertiary educated (% of total tertiary educated population)	WDI (2011)
Globalization	Foreign Investment	Foreign Direct Investment (% of GDP). The net inflows of inward direct investment made by non-resident investors in the reporting economy.	WDI (2011)
	Trade Openness	Exports plus Imports of Commodities (% of GDP)	WDI (2011)

WDI: World Bank Development Indicators. IHDI: Inequality adjusted Human Development Index. HIV: The human immunodeficiency virus (HIV).

Based on postulated hypotheses and the literature (Packer et al., 2007), we expect ameliorations in job security, economic considerations, political institutions, physical security and quality of life to infringe on emigration prospects in the health sector. Globalization determinants could either mitigate or fuel HHR crisis depending on circumstances. On the one hand, globalization by definition implies border barriers are being lifted in rich countries for professional, technical and skilled immigrants (UNFPA, 2005). On the other hand, the phenomenon (in terms of trade and investment liberalizations) increases GDP per capita and foreign-patients (medical-tourism), thus deterring push factors (Packer et al., 2007).

3.2 Methodology

To assess if existing HHR emigration levels matter in the fight against health work brain-drain, we borrow from Billger & Goel (2009) and recent Africa development literature in using quantile regression (Asongu, 2013ab). This estimation approach enables us to investigate whether the relationship between HHR emigration and the independent variables differ through-out the distribution of the dependent variable (Koenker & Hallock, 2001). Studies on the determinants of HHR migration based on Ordinary Least Squares (OLS) estimation report parameter estimates at the conditional mean of HHR emigration. Whereas, mean effects are certainly important, this study expands such findings by using Quantile Regression (QR). In addition, one of the underlying assumptions of OLS regression is that the error term and the endogenous variable are normally distributed. However, QR does not require a normally distributed error term. Therefore, based on this approach we are able to carefully assess the determinants of HHR emigration throughout the conditional distribution with particular emphasis on the best and worst fighters of HHR emigration. QR yields parameters estimated at multiple points in the conditional distribution of the dependent variable (Koenker & Bassett,

1978) and has gained emphasis in recent development literature (Billger & Goel, 2009; Okada & Samreth, 2012; Asongu, 2014bc).

The θth quantile estimator of the dependent variable is obtained by solving for the following optimization problem.

$$\min_{\beta \in R^k}\left[\sum_{i\in\{i:\, y_i \geq x_i'\beta\ \}}\theta\left|y_i - x_i'\beta\right| + \sum_{i\in\{i:\, y_i \geq x_i'\beta\ \}}(1-\theta)\left|y_i - x_i'\beta\right|\right] \qquad (1)$$

Where $\theta \in (0,1)$. In contrast to OLS which is based on minimizing the sum of squared residuals, with QR we minimize the weighted sum of absolute deviations. For instance the 25th or 90th quantiles (with θ=0.25 or 0.90 respectively) by approximately weighing the residuals. The conditional quantile of y_i given x_i is :

$$Q_y(\theta / x_i) = x_i'\beta_\theta \qquad (2)$$

where unique slope parameters are estimated for each θth quantile of interest. This formulation is analogous to $E(y / x) = x_i'\beta$ in the OLS slope, albeit parameters are estimated only at the mean of the conditional distribution of the endogenous variable. For the model in Eq. (2), the dependent variable y_i is the HHR emigration indicator while x_i contains a constant term, human development, trade, inflation, development assistance, tertiary emigration, economic prosperity, democracy, freedom, savings, health expenditure, population growth, corruption-control, government effectiveness and HIV infection rate . The quantile estimation technique is more robust than the OLS approach in the presence of outliers when the distribution of the dependent variable is a highly non-normal pattern (Okada & Samreth, 2012; Asongu, 2013a). We also report estimates for Least Absolute Deviations (LAD) which theoretically correspond to those of the 0.5th quantile.

4. Empirical analysis

4.1 Summary of results

The results presented in Tables 4-5 include OLS, LAD and QR estimates. OLS estimates provide a baseline of mean effects and we compare these to estimates of LAD and separate quantiles in the conditional distributions of health worker emigration. In interpreting the signs of estimated coefficients, note should be taken of the fact that the smaller quantiles (in conditional distributions) of the endogenous variable denote low-levels of HHR outward migration.

Table 3: Summary of results

		Physician emigration		**Nurse emigration**	
		Low Quantiles	Top Quantiles	Low Quantiles	Top Quantiles
Job Security	Economic Prosperity	-	-	-	na
	Health Expenditure	+	-	+	-
Economic Considerations	Savings	-	+	+	-
	Inflation	+	-	-	+
	Population	-	na	-	-
Political Considerations	Democracy	-	+	+	+
	Corruption control	-	na	-	+
Physical Security	Freedom	-	+	-	+
	Government Effectiveness	+	na	+	-
Quality of life	Human Development	+	-	+	-
	Development Assistance	+	+	+	+
	HIV Infection rate	+	na	-	-
Globalization	Financial openness	-	+	+	+
	Trade openness	+	na	+	-
Education	Tertiary emigration	+	+	+	+

na: not applicable due to insignificance of estimated coefficient.

Table 3 presents a summary of the findings, with particular emphasis on the best and worst fighters of HHR emigration. Low Quantiles (LQ) denote the part of the emigration distribution where existing brain-drain is less while, Top Quantiles (TQ) represent the side of the distribution where existing brain-drain is high. The heterogeneous nature of findings across the distribution of the dependent variable points to the relevance of an estimation technique that is conditional on existing levels of HHR emigration. The choice of the estimation approach is

further justified by the insignificance of OLS estimates across specifications (see Tables 4-5). The positive signs (+) indicate an increase in HHR emigration whereas negative signs (-) suggests the contrary. The 'n.a' signs denote the insignificant estimates either in the TQ or LQ of the distributions. Looking at the third line describing the 'economic prosperity' component of 'job security', it could be inferred that, for both TQ and LQ of the 'physician emigration' distribution, 'economic prosperity' decreases emigration incentives. As for 'nurse emigration' along the same line, 'economic prosperity' mitigates incentives to emigrate only when existing 'nurse emigration' levels are low, whereas, the effect is not significantly negative when existing 'nurse emigration' levels are high.

Table 4: Determinants of Physician Migration : OLS, LAD and Quantile Regressions

	OLS	**LAD**	**Q 0.1**	**Q 0.25**	**Q 0.50**	**Q 0.75**	**Q 0.90**
			Specification 1				
Constant	0.308	0.352	**0.213*** **	**0.227***	**0.352*** **	**0.409*** **	**0.245****
	(0.198)	(0.444)	**(0.000)**	**(0.090)**	**(0.008)**	**(0.008)**	**(0.042)**
Human Development	-0.003	-0.004	**0.002*** **	0.0001	**-0.004***	**-0.006****	**-0.010*** **
	(0.409)	(0.994)	**(0.000)**	(0.945)	**(0.066)**	**(0.029)**	**(0.000)**
Foreign Direct Investment	0.008	-0.026	**-0.006*** **	0.0009	**-0.026***	-0.017	**0.043*** **
	(0.733)	(0.672)	**(0.000)**	(0.946)	**(0.058)**	(0.268)	**(0.002)**
Trade	-0.000	0.002	**0.001*** **	0.001	**0.002*** **	0.001	-0.001
	(0.953)	(0.459)	**(0.000)**	(0.244)	**(0.005)**	(0.172)	(0.119)
Democracy	0.007	-0.005	**-0.016*** **	-0.004	-0.005	0.002	**0.046*** **
	(0.719)	(0.885)	**(0.000)**	(0.678)	(0.573)	(0.830)	**(0.000)**
Freedom	0.0006	-0.000	**-0.001*** **	-0.001	-0.000	0.0006	**0.002***
	(0.824)	(0.996)	**(0.000)**	(0.332)	(0.985)	(0.719)	**(0.052)**
Observations	1-24	1-24	1-24	1-24	1-24	1-24	1-24
			Specification 2				
Constant	0.186	0.394	0.007	0.072	**0.394*** **	**0.314*** **	0.164
	(0.149)	(0.104)	(0.453)	(0.109)	**(0.000)**	**(0.000)**	(0.131)
Savings	0.0003	-0.003	**-0.001*** **	**-0.001****	**-0.003*** **	**0.001*** **	0.002
	(0.866)	(0.375)	**(0.000)**	**(0.045)**	**(0.006)**	**(0.000)**	(0.171)
Health Expenditure	-0.006	-0.034	**0.017*** **	**0.004**	**-0.034****	**-0.003*** **	0.021
	(0.755)	(0.411)	**(0.000)**	**(0.592)**	**(0.010)**	**(0.000)**	(0.238)
Inflation	0.003	0.005	**0.003*** **	**0.005*** **	**0.005****	**-0.004*** **	**-0.005*** **
	(0.421)	(0.420)	**(0.000)**	**(0.000)**	**(0.028)**	**(0.000)**	**(0.116)**
Development Assistance	**0.009***	0.006	**0.001*** **	**0.005*** **	**0.006****	**0.012*** **	**0.017*** **
	(0.053)	(0.427)	**(0.000)**	**(0.000)**	**(0.022)**	**(0.000)**	**(0.000)**
Tertiary Emigration	**0.006*** **	0.005	**0.007*** **	**0.006*** **	**0.005*** **	**0.005*** **	**0.005*** **
	(0.003)	(0.148)	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.002)**
Observations	1-24	1-24	1-24	1-24	1-24	1-24	1-24
			Specification 3				
Constant	**0.374****	0.388	**0.583*** **	**0.105*** **	**0.388***	**0.573*** **	**0.673*** **
	(0.015)	(0.207)	**(0.000)**	**(0.000)**	**(0.099)**	**(0.005)**	**(0.000)**
Economic Prosperity	0.004	0.014	**-0.007***	**0.015*** **	0.014	-0.007	**-0.021*** **
	(0.732)	(0.556)	**(0.055)**	**(0.000)**	(0.466)	(0.638)	**(0.000)**
Population growth	0.006	0.002	**-0.149*** **	**0.033*** **	0.002	-0.022	-0.035
	(0.872)	(0.977)	**(0.000)**	**(0.000)**	(0.970)	(0.673)	(0.171)
Corruption Control	-0.166	-0.123	**-0.538*** **	**-0.258*** **	-0.123	-0.029	0.013
	(0.243)	(0.421)	**(0.000)**	**(0.000)**	(0.581)	(0.869)	(0.873)
Government Effectiveness	0.139	0.052	**0.494*** **	**0.136*** **	0.052	-0.029	-0.039
	(0.293)	(0.761)	**(0.000)**	**(0.000)**	(0.800)	(0.862)	(0.626)
HIV	-0.002	-0.009	-0.002	**0.001*** **	-0.009	-0.007	-0.001

	(0.699)	(0.373)	(0.125)	**(0.000)**	(0.282)	(0.287)	(0.747)
Observations	1-24	1-24	1-24	1-24	1-24	1-24	1-24

Notes. Dependent variable is the Physician Emigration rate. *,**,***, denote significance levels of 10%, 5% and 1% respectively. Lower quantiles (e.g., Q 0.1) signify nations where the Physician Emigration rate is least. OLS: Ordinary Least Squares. LAD: Least Absolute Deviation.

Table 5: Determinants of Nurse Migration : OLS, LAD and Quantile Regressions

	OLS	**LAD**	**Q 0.1**	**Q 0.25**	**Q 0.50**	**Q 0.75**	**Q 0.90**
			Specification 1				
Constant	-0.063	0.067	**0.024*** **	**0.039*** **	0.067	-0.004	**-0.351*** **
	(0.786)	(0.796)	**(0.000)**	**(0.000)**	(0.553)	(0.981)	**(0.000)**
Human Development	-0.004	-0.002	**0.0003*** **	**-0.002*** **	-0.002	-0.005	**-0.013*** **
	(0.384)	(0.994)	**(0.000)**	**(0.000)**	(0.215)	(0.131)	**(0.000)**
Foreign Direct Investment	0.027	0.001	**0.0004*** **	**0.008*** **	0.001	0.012	**0.086*** **
	(0.281)	(0.960)	**(0.000)**	**(0.000)**	(0.885)	(0.546)	**(0.000)**
Trade	-0.001	-0.0001	**0.0001*** **	**-0.000*** **	-0.0001	-0.0002	**-0.006*** **
	(0.438)	(0.934)	**(0.000)**	**(0.000)**	(0.815)	(0.857)	**(0.000)**
Democracy	0.032	0.011	**0.0007*** **	**0.013*** **	0.011	**0.030***	**0.105*** **
	(0.114)	(0.613)	**(0.000)**	**(0.000)**	(0.250)	**(0.063)**	**(0.000)**
Freedom	0.002	0.0008	**-0.0002*** **	**-0.0006*** **	0.0008	0.002	**0.012*** **
	(0.389)	(0.819)	**(0.000)**	**(0.000)**	(0.541)	(0.376)	**(0.000)**
Observations	1-24	1-24	1-24	1-24	1-24	1-24	1-24
			Specification 2				
Constant	0.139	0.014	-0.037	**-0.041*** **	0.014	0.155	**0.217*** **
	(0.452)	(0.938)	(0.388)	**(0.000)**	(0.664)	(0.150)	**(0.000)**
Savings	-0.001	-0.0003	0.0001	**0.0003*** **	-0.0003	-0.002	**-0.004*** **
	(0.559)	(0.925)	(0.842)	**(0.000)**	(0.554)	(0.130)	**(0.000)**
Health Expenditure	-0.012	0.001	0.007	**0.007*** **	0.001	-0.015	**-0.032*** **
	(0.684)	(0.962)	(0.300)	**(0.000)**	(0.764)	(0.382)	**(0.000)**
Inflation	0.006	-0.001	0.0005	**-0.0008*** **	**-0.001***	0.000	**0.023*** **
	(0.218)	(0.823)	(0.644)	**(0.000)**	**(0.076)**	(0.982)	**(0.000)**
Development Assistance	-0.004	0.003	0.001	**0.002*** **	**0.003*** **	-0.004	**0.005*** **
	(0.521)	(0.607)	(0.298)	**(0.000)**	**(0.003)**	(0.271)	**(0.000)**
Tertiary Emigration	**0.005***	0.004	**0.001** **	**0.003*** **	**0.004*** **	**0.010*** **	**0.010*** **
	(0.089)	(0.352)	**(0.019)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**
Observations	1-24	1-24	1-24	1-24	1-24	1-24	1-24
			Specification 3				
Constant	**0.447*** **	0.278	**0.265*** **	**0.252** **	**0.278*** **	**0.359*** **	**0.749*** **
	(0.003)	(0.418)	**(0.000)**	**(0.033)**	**(0.000)**	**(0.000)**	**(0.000)**
Economic Prosperity	-0.002	-0.001	**-0.007*** **	0.002	-0.001	-0.002	-0.004
	(0.801)	(0.954)	**(0.000)**	(0.824)	(0.863)	(0.716)	(0.695)
Population growth	**-0.066***	-0.003	**-0.069*** **	-0.042	-0.003	-0.019	**-0.091** **
	(0.099)	(0.973)	**(0.000)**	(0.194)	(0.853)	(0.405)	**(0.017)**
Corruption Control	0.045	0.084	**-0.086*** **	-0.028	0.084	0.035	**0.430*** **
	(0.734)	(0.459)	**(0.000)**	(0.792)	(0.257)	(0.652)	**(0.001)**
Government Effectiveness	-0.003	0.022	**0.112*** **	0.042	0.022	0.022	**-0.514*** **
	(0.978)	(0.856)	**(0.000)**	(0.682)	(0.749)	(0.761)	**(0.000)**
HIV	**-0.011** **	-0.009	**-0.003*** **	-0.006	**-0.009*** **	**-0.011*** **	**-0.022*** **
	(0.042)	(0.168)	**(0.000)**	(0.145)	**(0.005)**	**(0.001)**	**(0.000)**
Observations	1-24	1-24	1-24	1-24	1-24	1-24	1-24

Notes. Dependent variable is the Nurse Emigration rate. *,**,***, denote significance levels of 10%, 5% and 1% respectively. Lower quantiles (e.g., Q 0.1) signify nations where the Nurse Emigration rate is least. OLS: Ordinary Least Squares. LAD: Least Absolute Deviation.

4.2 Retrospect to tested hypotheses

Hypothesis 1: Unfavorable working conditions (job insecurity) increase the tendency for HHRs to emigrate.

-But for the insignificance of estimates in the TQ of the nurse emigration distribution, economic prosperity reduces HHR emigration. It follows that, economic prosperity is a relevant tool in the fight against the crisis.

-Health expenditure is a relevant tool in combating health worker emigration only when existing emigration levels are high. Where existing levels are low, an increase in the health budget will only fuel health worker crisis.

Hypothesis 2: An adverse economic outlook pushes health workers out of their countries.

-Population growth significantly reduces HHR emigration.

-Savings and price-stability or absence of inflation are important tools in curbing physician (nurse) emigration when existing emigration levels are low (high).

Hypothesis 3: Poor political institutions and government ineffectiveness increase HHR emigration.

-But for estimates in the LQ of the physician emigration distribution, the democratization process in the African continent only fuels HHR brain-drain.

-Corruption control and press-freedom are strong tools against the phenomenon only when existing emigration levels are low.

-Government effectiveness is a viable option in the fight only for nurse emigration in the top quantiles of their distribution.

Hypothesis 4: Depreciating quality of life increases HHR emigration.

-Human development combats emigration when existing levels are high.

-Foreign aid only accelerates the problem.

Hypothesis 5: Globalization is a driver of HHR emigration.

-But for estimates in the LQ (TQ) of the physician (nurse) emigration distribution for financial (trade) liberalization, globalization fuels health worker crisis.

Hypothesis 6: Continuing education increases tertiary emigration which positively affects HHR migration prospects.

-This control hypothesis is overwhelmingly validated (see Table 3).

4.3 Discussion and policy implications

We have found that *economic prosperity attenuates the emigration of HHRs*. Thus, there's hope that with the current trends of economic growth in the African continent, if the wealth is equitably distributed and the health sector improved, the tendency of Africa remaining a net export of HHRs may begin to shift in favor of an inward-flow of foreign patients by virtue of medical tourism. If African countries undertake policies to reform their economic structures and adapt health-training to Western standard curriculum, in the near future Africa could become an important destination of medical tourists. By definition this policy recommendation presupposes health-expenditure is instrumental in curbing the HHR emigration crisis.

We have also found that *health expenditure is a relevant tool in the fight against HHR brain-drain when existing emigration levels are high*. Thus, given the acute nature of the crisis in the African continent, investing substantially in the health sector could help retain health workers and improve human development.

We have observed from the findings that *savings and price-stability or absence of inflation are important tools in curbing physician (nurse) emigration when existing emigration levels are low (high)*. Thus, these policy recommendations are valid only when existing

emigration levels of physicians and nurses are low and high respectively. Price-stability maintains purchasing power and thus mitigates perceptions of a negative economic outlook and uncertainty in the living standards of health professionals. Price-stability also encourages domestic savings. The prospect of savings acting as a deterrent to emigration in our analysis may denote a sense of employment security and the feeling that on average, workers (including health professionals) are earning enough from their jobs and saving excess unspent income.

But for estimates in lower quantiles of the physician emigration distribution, the democratization process in the African continent fuels brain-drain. This result is not unexpected because democracy and globalization go hand in glove; suggesting the absence of restrictions in international transactions and labor mobility that come with democracy confers health-workers with the liberty to migrate for greener pastures. With the exception of lower quantiles in the nurse emigration distribution, the effect of press-freedom is similar to that of democracy. This implies that, politically free societies are likely to have minimal restrictions on the mobility of goods and services as well as factors of production: capital and labor (health workers). It is worth pointing-out that; press-freedom could be used as a weapon against emigration only when existing emigration levels are low.

The effect of government effectiveness requires some emphasis on its conception and definition before its effect on HHR migration can be fully grasped. *But for nurse migration in the top quantiles of the distribution, government effectiveness is found to fuel heath-worker crisis*. This indicates that government is ineffective at curbing HHR crisis. The logic for this interpretation is the fact that, when the 'government-effectiveness' indicator does not achieve the required objective (expected negative sign), it means the degree effectiveness is marginal; in other words, governance is ineffective. It follows that, based on the definition of government

effectiveness[5], African governments are not effective enough at curbing HHR emigration. The 'control of corruption' dimension of governance however is a strong tool against the phenomenon when existing emigration levels are low.

Overall, we may state that government quality dynamics of democracy, press-freedom and corruption-control are effective at battling the crisis only in low quantiles of the conditional distributions. What does this tendency tell us? It points to the validity of governance measures in stemming the emigration tide when existing levels are still low. Once the phenomenon surges to a certain threshold (Top Quantiles), government quality indicators become ineffective policy measures. This is a call for African governments in sampled countries to start acting now before the phenomenon takes heights that are unresponsive to good-governance policies. Thus in substance, the fight against corruption and improvements in political stability, voice and accountability, rule of law and regulation quality could curb the crisis before emigration levels reach uncontrollable proportions.

When good-governance policy measures cannot curb the crisis when existing emigration levels are high, we have found human development to be instrumental for the purpose. As our findings reveal, human development is a tool against HHR crisis only in top quantiles. Thus policy measures focused on improving human development will ultimately mitigate the problem. It follows that good-governance and human-development oriented policies should be short-term and long-term focused respectively.

Foreign-aid (development assistance) has been found in recent empirical literature to be perilous to human development (Asongu, 2013c, 2014d) and government quality dynamics (Asongu, 2012, 2013d). *This implies, reliance on foreign-aid only reduces the effectiveness of*

[5] Government effectiveness measures the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies (The World Bank Governance Indicators).

the short-term (government quality) and long-term (human development) policy measures highlighted in the preceding paragraph. More so, a country's reliance on foreign-aid increases the negative perception citizens may harbor on employment guarantee and a secured future. This tendency only encourages the search for greener pastures by HHRs. Another way of understanding the peril of foreign-aid is that, conditions associated with loans or debt relief from international financial institutions limits governments' abilities to pay adequate salaries or to provide incentives for health workers to remain. As a result, physicians and nurses are being pushed out and governments are hard-pressed to implement effective remedies to curtail (or stop) the exodus (Packer et al., 2007).

But for low quantiles (top quantiles) in physician (nurse) emigration for financial (trade) liberalization, globalization fuels health-worker crisis. This results is not unexpected because globalization is partially responsible in various ways for causing the "push" conditions which have contributed to the chronic problems in HHRs. Deteriorating socio-economic and environmental conditions (at least partly attributable to liberalization or other forms of global market convergence) are pushing health workers out of their countries.

The sensitivity of the effects to the conditional points of the HHRs distributions is broadly consistent with recent literature of similar scope (Asongu, 2014a, e). The varying signs across the distributions also confirm the position of Singh (2007) on the postulation that there is as yet very little consensus as to whether the rate of emigration in HHRs in source countries constitute a health worker crisis. Accordingly, in line with Mwaniki & Dulo (2008, p. 53) the costs and benefits vary depending on a plethora of factors as well as the existing levels of emigration.

5. Conclusion

Despite the acute concern of health-worker crisis in Africa owing to emigration, lack of relevant data has made the subject matter empirically void over the last decades. How do economic prosperity, health expenditure, savings, price-stability, demographic change, democracy, corruption-control, press-freedom, government effectiveness, human development, foreign-aid, physical security, trade openness and financial liberalization play-out in the fight against health worker crisis when existing emigration levels matter? To investigate these concerns we have examined the determinants of health worker emigration throughout the conditional distributions of health human resource emigration. Thus, this paper has assessed the theoretical postulations of the WHO report on determinants of health-worker emigration. Findings could be summed up in the following. (1) But for the insignificance of estimates in the top quantiles of the nurse emigration distributions, economic prosperity reduces HHR emigration. It follows that economic prosperity could be a valuable tool in the brain-drain fight. (2) Health expenditure is a relevant tool in combating health worker emigration only when existing emigration levels are high. Where existing levels are low, increasing health budget will only fuel health worker crisis. (3) Savings and price-stability or absence of inflation is important tools in curbing physician (nurse) emigration when existing emigration levels are low (high). (4) But for estimates of low quantiles in the physician emigration distribution, the democratization process in the African continent only fuels brain-drain. (5) Corruption-control and press-freedom are strong tools against the phenomenon only when emigration levels are low. (6) Government effectiveness is a viable option only for nurse emigration at the top quantiles of the distributions. (7) Human development combats emigration when exiting levels are high. (8) Foreign-aid only accelerates the problem. (9) But for low (top) quantiles in physician (nurse) emigration for

financial (trade) liberalization, globalization fuels health worker crisis. (10) Continuing education increases tertiary emigration which positively affects HHR migration prospects.

As a policy implication, blanket emigration-control policies are unlikely to succeed equally across countries with different levels of emigration. Thus to be effective, immigration policies should be contingent on the prevailing levels of the crisis. It follows that emigration-control initiatives should be tailored differently across the best and worst brain-drain fighting countries.

Appendices

Appendix 1: Summary statistics

	Variables	Mean	S.D	Min.	Max.	Observations
Dependent Variables	Physician Emigration	0.376	0.174	0.090	0.750	24
	Nurse Emigration	0.166	0.185	0.010	0.780	24
Independent & Control Variables	Human Development	2.270	9.055	0.219	44.783	24
	Foreign Direct Investment	2.951	3.102	0.479	15.792	24
	Trade	70.732	37.665	27.688	166.14	24
	Democracy	3.291	4.069	-8.000	10.000	24
	Freedom	54.208	21.419	17.000	85.000	24
	Savings	10.518	16.309	-25.00	59.310	24
	Health Expenditure	5.111	1.439	2.111	8.465	24
	Tertiary education emigration	17.897	14.437	2.557	55.965	24
	Inflation	8.458	9.090	-0.881	29.581	24
	Development Assistance	8.905	7.655	0.366	25.587	24
	GDP per capita growth	1.037	3.701	-6.097	8.290	24
	Population growth	2.610	1.070	0.982	6.686	24
	Corruption-Control	-0.440	0.546	-1.127	0.737	24
	Government Effectiveness	-0.550	0.573	-1.491	0.578	24
	HIV Infection Rate	7.558	7.922	0.200	26.000	24

S.D: Standard Deviation. Min: Minimum. Max: Maximum.

Appendix 2: Correlation analysis and presentation of countries

Panel A: Correlation analysis

Dep. Variables		Independent and control variables														
Physic	Nurses	IHDI	FDI	Trade	Demo	Free	Savings	HExp.	TerEmi	Infl.	NODA	GDPpcg	Popg	CofC	GE	HIV	
1.000	0.332	-0.203	0.087	0.075	-0.031	0.044	-0.043	0.053	0.611	0.409	0.530	-0.002	0.085	-0.145	0.003	-0.098	Physic
	1.000	-0.131	-0.037	-0.030	0.231	-0.063	-0.054	0.026	0.382	0.285	0.100	0.016	-0.267	0.033	-0.025	-0.352	Nurses
		1.000	-0.163	-0.093	0.300	-0.292	0.114	0.493	-0.150	-0.073	-0.244	0.040	-0.031	0.347	0.424	0.233	IHDI
			1.000	0.635	-0.561	0.047	-0.293	0.135	-0.016	-0.016	-0.161	0.410	-0.409	0.104	0.065	0.377	FDI
				1.000	-0.139	-0.000	0.148	0.006	0.145	0.054	-0.385	0.557	-0.494	0.444	0.240	0.443	Trade
					1.000	-0.623	0.415	-0.052	0.117	0.027	0.031	-0.080	-0.072	0.471	0.480	-0.217	Demo
						1.000	-0.129	-0.207	-0.083	0.193	-0.000	-0.171	0.126	-0.670	-0.742	-0.001	Free
							1.000	-0.441	0.197	-0.284	-0.399	0.327	-0.234	0.177	0.114	-0.064	Savings
								1.000	-0.071	0.391	0.249	-0.154	-0.136	0.220	0.382	0.440	HExp.
									1.000	0.110	0.130	0.153	0.061	-0.007	0.192	-0.295	TerEmi.
										1.000	0.561	-0.067	-0.104	0.010	0.010	0.275	Infl.
											1.000	-0.406	0.465	-0.290	-0.166	-0.082	NODA
												1.000	-0.370	0.354	0.286	0.234	GDPpcg
													1.000	-0.251	-0.173	-0.266	Popg
														1.000	0.842	0.346	CoC
															1.000	0.367	GE
																1.000	HIV

Panel B: Presentation of countries(24)

Benin, Botswana, Burkina Faso, Burundi, Cameroon, Congo Republic, Ivory Coast, Ghana, Kenya, Lesotho, Madagascar, Malawi , Mali, Mauritius, Mozambique, Niger, Rwanda, Senegal, South Africa, Sudan, Swaziland, Togo, Uganda, Zambia.

Dep: Dependent. Physic: Physicians. IHDI: Inequality adjusted Human Development Index. FDI: Foreign Direct Investment. Demo: Democracy. Free: Press Freedom. HExp: Health Expenditure. TerEmi: Tertiary Emigration. Infl: Inflation. NODA: Net Official Development Assistance. GDPpcg: GDP per capita growth. Popg: Population growth. CofC: Control of Corruption. GE: Government Effectiveness. HIV: Human Immunodeficiency Virus.

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