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# Globalization and health worker crisis: what do wealth-effects tell us?

Simplice A, Asongu

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Simplice A. Asongu

E-mail: asongusimplice@yahoo.com

Tel: 0032 473613172

*HEC-Management School, University of Liège.*

*Rue Louvrex 14, Bldg. N1, B-4000 Liège, Belgium*

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## Abstract

Owing to lack of relevant data on health human resource migration, the empirical dimension of the health-worker crisis debate has remained void despite abundant theoretical literature. A health worker crisis is overwhelming the world. Shortages in health professionals are reaching staggering levels in many parts of the globe. This paper complements existing literature by empirically investigating the WHO hypothetical determinants of health-worker migration in the context of globalization when income-levels matter. In plainer terms, the work explores how the wealth of exporting countries play-out in the determinants of HHR emigration. We assess the determinants of  emigration in the health sector through-out the conditional distribution of health human resource emigration. Findings provide very targeted policy implications based on income-levels and existing emigration levels for both physician and nurse worker crises. Beside specific policy recommendations, we also outlined broad policy measures for source-countries, recipient-states and regional(international) institutions.

## 1. Introduction

Globalization is to some extent responsible in various ways for causing the 'push' and 'pull' conditions which have contributed to chronic problems in Health Human Resources(hence HHRs). Deteriorating socio-economic and environmental conditions(partly attributable to liberalization and other forms of global market integration) are pushing health workers out of their countries. Conditions linked to loans or debt relief from international financial institutions have limited governments' ability to pay adequate salaries or provide incentives for health workers to remain. As a results, physicians and nurses are being pushed-out and governments are hard-pressed to implement effectives remedies to curb the exodus. The movement of HHRs is asymmetrical and tilted towards developed(rich) countries, with the poorest countries unable to attract replacement workers. For countries unable to draw-in new health workers to replace those who have left for greener pastures, the inevitable effect is diminished health care access and service.

Globalization is making it easier for rich countries to 'pull-in' HHRs. Border barriers in rich countries are being actively lowered for technical, professional and skilled workers. The principal destination-countries of HHRs are five, predominantly English speaking OECD countries: the UK, the US, Canada, Australia and New Zealand. These countries deficient of HHRs are increasingly relying on the immigration of foreign-trained health workers to relieve them in exchange for higher pay, better working conditions and greater opportunities. More so beside these push and pull factors are a number of other features associated with globalization which further foster HHR migration, notably the internationalization of professional credentials, citizenship and remittances. Thus professional credentials in health and other fields are increasingly recognized across borders particularly where free trade zones have been established.

Professional credentials are now serving as passports and other factors that ease migration(multilingualism, post-colonial ties, common academic curricula…etc) and mobility (cheaper, faster and easier travel) have contributed to a veritable sense of global belonging (citizenship). The opportunity to accumulate savings and remit portions to family and communities back home is a significant pull for HHR migration. Thus remittances represent important private welfare gains and seriously influence the HHR migration decision(Packer et al.,2007).

In this paper we examine how the wealth of exporting countries play-out in the determinants of HHR emigration. In plainer terms, the work explores whether factors affecting HHR migration play-out differently in low-income countries in comparison to their middle-income counterparts. The choice of the African continent is most relevant because it is facing serious HHR crisis in the health sector. While medical tourism in Asia and Latin America is seriously deterring HHR emigration(as patients from developed countries move there for more readily and affordable treatments), African health system infrastructures are not solid enough to attract foreign-patients. Over the past two decades the African population has increased substantially, with a significant surge in disease burden due to HIV/AIDS and recurrent communicable diseases as well as an increased incidence in noncommunicable diseases. This increased demand for health services has been met with a rather low supply of health workers. According to Packer et al.(2007), Africa has a 25% share in the global diseases burden, a share in population of 13.76% but only a 1.3% share in health service. Therefore findings of the paper could provide very relevant policies implications if the determinants of HHR migration are different across income and emigration levels.

The paper's contribution to the literature is threefold. (1) Despite the abundant theoretical literature on the subject matter, lack of relevant data on health professional migration has rendered it empirically void over the last decades. Thus we complement existing theoretical literature by providing a pioneering empirical dimension to the migration-development nexus of the health sector. (2) The WHO report on globalization and health worker crisis presents to the best of our knowledge the most exhaustive and detailed theoretical globalization-underpinnings of the health-worker crisis(Packer et al.,2007). Empirically investigating hypothetical determinants postulated in the report when income-levels matter in the context of globalization could have relevant policy implications. (3) Examining determinants of health professional migration through-out the conditional distribution of health-worker migration could also provide results with more focused policy measures. The logic behind this dynamic analysis is that, countries with the best and worst health-worker emigration fighting records may respond differently to the determinants outlined in the WHO report. Therefore 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, to be 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.

The rest of the paper is organized as follows. Section 2 examines existing literature. Data is presented and methodology outlined in Section 3. Empirical analysis, discussion and policy implications are covered in Section 4. Section 5 concludes.

**2. Existing literature**

**2.1 Globalization and cross-border care of patients**

Cross-border importing(exporting) of health workers and exporting(importing) of patients is becoming a veritable industry and booming worldwide. A decade past, the medical tourism industry was hardly noticeable. A great bulk of literature has emphasized the substantial nature of this industry: in 2002, while the number of  foreign patients travelling to India for medical care was 150 000, it increased  in 2005 to approximately half a million (Hutchinson,2005; Rosenmoller et al.,2006); by 2007,  250 000 patients were visiting Singapore alone on a yearly basis, with half of them from the Middle East(Packer et al.,2007)…etc. A number of reasons explain the boom of this medical industry. Patients faced with significant waiting lists for medical care or high costs of treatment seek care in other countries where treatment is readily available and/or affordably priced[1].

India is the leading country promoting medical tourism and it is estimated that tourism of this kind is growing by 20% each year(Packer et al., 2007). In a declaration by India's National Health Policy, the treatment of foreign patients is legally an "export" and "eligible for all fiscal incentives extended to export earning". Government and private sector studies in the country estimate that medical-tourism could bring as much as between US$1 billion and $2 billion into the country by 2012.  The country is also moving into a new area of medical outsourcing where subcontractors provide services to overburdened medical care systems in developed countries (Macintosh, 2004).

Thailand has also espoused this industry, with the Thai Consulate General in Canada for example advertising medical tourism in Thailand for Canadians by listing prices in US dollars for

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[1] With respect to Packer et al.(2007), in one study waiting-time for a heart bypass in the UK could last up to 6 months and cost the NHS between 15,000 and 19,000 pounds, whereas a large pool of well qualified doctors in India will readily perform the surgery at a cost of 4,800 pounds. For hospitals and clinics in developing countries receiving these patients, their treatment brings-in important revenue and desirable foreign exchange.

various surgeries on its website. In line with Packer et al.(2007), 600 000 foreign patients in 2005 sought treatment in Thailand. This figure was expected to grow by 66% by the end of 2006 and projections (by the country's ambitious national health plan of action) hold that the country will become a medical hub of excellence by 2020 with an estimated number of foreign patients increasing to 10 million that year. This ambitious plan also entails negative consequences for Thai citizens as the Ministry of Health is noting a substantial shift in HHRs (to the private sector) from the public sector on which about 90% of the Thai population depends. Though steps to curb the within-country HHR migration are yet unclear, it is nonetheless anticipated that fewer health workers will seek to leave the country to work abroad.

While some analysts believe this cross-border treatment of patients could be an answer to unethical waiting lists for patients and structural(temporal) shortages in domestic HHRs(Tjadens, 2002), critics of cross-border care point to a number of major flaws. Firstly, patients receiving treatment abroad may be awarded lower quality care, thus putting their health at risk. Patients may also be treated by foreign HHRs in a language they do not understand. Secondly, cross-border health-care discriminates in favor of wealthy patients (able to pay for the services), thus rendering access to health-care increasingly unequal. Thirdly, in countries with insufficient HHRs, promoting medical tourism discriminates in favor of rich foreigners. Finally, income accruing from health tourism typically(but not always) enter into the coffers of private clinics; implying the revenues end up in private pockets(accounts) and are not ploughed back into the public health system.

A position in favor of or against cross-border care is not very clear-cut, as there are shifting costs and benefits to the countries involved. Cross-border health care supply is for the most part organized as a private system(with private providers, private insurance or co-payments and private facilities) and benefits only those who can afford it. Nay, from a heath equity standpoint, public systems allow access to services(though they may be imperfect on the basis of need rather than

ability to pay) with costs being met through cross-subsidization. Borrowing from Packer et al.(2007), policy measures governments are facing are whether to value equity in health care access or simply to increase aggregate access without regard to who benefits. Thus for effective management with insurance of equitable access and HHR flows, the prevailing system in the European Union(EU) could provide a global model. Nonetheless a large number of countries must agree to some form of supranational regulatory framework for such flows, premised on equity in health service access. In the meantime the inevitable cross-border care as a backup to domestic health care systems will continue(Rai, 2006), with insurance companies in particular increasingly gauging out-of-country treatments as low-cost solutions.

## 2.2 Globalization's drivers of migration

### 2.2.1 Framing the drivers

There are various ways of framing and understanding how globalization influences migration and ultimately health service. Firstly, HHR migration is inherently a defining characteristic of globalization(i.e., increased movement of people). Thus border barriers in rich countries for professional, technical and skilled immigrants are being lifted, in contrast to a dwindling acceptance rate of semi or less skilled migrants(UNFPA,2005). Globalization(in the forms of trade and investment liberalizations) leads to increased per capita GDP 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 increased taxable income that could be invested in public health systems. These effects should mitigate a source country's push factors. According to Bundred et al.(2004), most low-income economies from which a significant number of health workers are migrating still lack the capital investment to develop their health systems. Evidence of per capita GDP trickling-down to mitigate poverty is mixed at best.

Secondly, 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 framework, the empirical relationship of globalization's drivers and HHR migration is less of a concern than is the obligation or duty of all nations to manage HHR 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).

Thirdly, HHR migration is the result of other characteristics of globalization(increase in other factors that push workers out of their countries). In this framing of the concern, it is imperative to examine the extent to which  different aspects of globalization lead to increased HHR migration. These could be clubbed into the following strands:

-specific policies to overproduce and export in order to achieve a better balance of payments through 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 integration;

-conditions associated with 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 accredited qualifications such as physicians and nurses(Bundred et al.,2004).

*2.2.2 Post-colonial and linguistic ties*

According to Packer et al.(2007), post-colonial ties which enable countries to continue to share customs, languages and curricula are important factors in the choice of the country of destination. For this reason, Southern African or Caribbean nurses emigrate to the UK, Canada and Australia. A survey on preferred countries of professionals' destination in 5 Southern African countries found 31.6% desired to emigrate to North America, 27.5% to the UK and 8.0% to Australia/ New Zealand. Also, 28.8% preferred emigrating to their neighbor South Africa(Crush et al., 2005). A great many medical institutions 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, particularly those from English-speaking countries have standards similar to Western degrees, hence enabling them to practice abroad or indirectly encouraging them to do so.

*2.2.3 Push and pull factors*

In line 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), owing to the country-specific nature of the motivations, we shall restrict the main determinants of emigration into push and pull factors as summarized in Table 1. In addition to these factors, an unappealing by-product from decades of increasing HHR migration is the well-developed culture of medical-migration. As pointed-out by Hagopian et al.(2005), this culture has become firmly rooted in many source and receiving countries. The phenomenon is

increasingly encouraged with   medical school faculties   often   serving as role models of emigration; as they are proud of their students who successfully emigrate. Thus it is interesting to break-down factors behind HHR migration in order to understand how global HHR crisis may be solved.

Policy-makers are often confronted with the fundamental question of whether push or pull factors are more responsible for HHR emigration. It is necessary to deal with both types of factors in controlling for the spiraling of the crisis, however informed opinion argues that push factors weigh-in more(Packer et al.,2007). There are a number of reasons for this position:

-individuals  characteristically cite push factors over pull factors as primary reasons for their intention or decision to migrate. For example, a survey of the factors cited by university students in six Southern African countries for wanting to migrate reveals cost of living, inability to find relevant jobs, low income, lack of prospects for professional advancement and inability to find relevant jobs; 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;

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

-for the most part, source developing countries experience severe HHR shortages themselves accompanied by stress, lack of supplies and a generalized ability to practice effectively;

-there is little evidence that a significant number of doctors(nurses) return to their source countries to practice, ostensibly because conditions that led to their departure have remained unchanged.

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

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

Ultimately greater emphasis must be placed on diminishing the push factors that force doctors(nurses) out of source countries in large numbers in the first place. Retention efforts will be void of success unless fundamental socio-economic and labor conditions that push workers to leave in the first place are improved.

**3. Data and Methodology**

**3.1 Data**

Table 2 below summarizes HHR determinants with respect to push factors outlined in Table 1. The data is cross-sectional because HHR migration data is only available for the year 2000. HHR variables entail both physician and nurse emigration rates while their determinants entail 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). While the dependent variables are from Clemens & Pettersson(2006), the independent and control variables are obtained from Freedom House and African Development Indicators(ADI) of the World Bank(WB). Summary statistics and correlation analysis(with presentation of countries) are detailed in Appendix 1 and Appendix 2 respectively.

From intuition and the literature(Packer et al., 2007), we expect improvements in job security, economic growth, political morality, physical security and 'quality of life' to deter HHR emigration. Globalization determinants could either fuel or mitigate the HHR crisis depending on circumstances. On the hand, globalization by definition implies border-barriers in rich countries for professionals, technical and skilled immigrants are being lifted(UNFPA,2005). On the other hand, the phenomenon(in terms of trade and investment liberalizations) may lead to increased per capita GDP and rate of foreign patients(medical tourism), thus mitigating push factors(Packer et al.,2007).

**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 %) | World Bank(WDI) |
| | Health Expenditure | Health Expenditure(% of GDP) | World Bank(WDI) |
| Economic Considerations | Savings | Gross Savings(% of GDP) | World Bank(WDI) |
| | Inflation | Consumer Price Index | World Bank(WDI) |
| | Population growth | Population growth rate(annual %) | World Bank(WDI) |
| Political Considerations | Democracy | Level of Institutionalized Democracy | World Bank(WDI) |
| | Control of Corruption | Control of Corruption(Estimate) | World Bank(WDI) |
| Physical Security | Freedom | Press Freedom | Freedom House |
| | Government Effectiveness | Government Effectiveness(Estimate) | World Bank(WDI) |
| Quality of life | IHDI | Inequality adjusted Human Development Index | World Bank(WDI) |
| | Development  Assistance | Net Official Development Assistance(% of GDP) | World Bank(WDI) |
| | HIV  Infection rate | Prevalence of HIV(% of  population ages 15-49) | World Bank(WDI) |
| Education | Tertiary emigration | Emigration rate of tertiary educated (% of total tertiary educated population) | World Bank(WDI) |
| Globalization | Foreign Investment | Foreign Direct Investment(% of GDP) | World Bank(WDI) |
| | Trade Openness | Exports plus Imports(% of GDP) | World Bank(WDI) |

WDI: World Bank Development Indicators.  IHDI: Inequality adjusted Human Development Index.

## 3.2 Methodology

To determine if existing HHR emigration levels matter in the fight against health-worker brain-drain we borrow from Billger & Goel(2009) and recent Africa development literature in using quantile regression(Asongu, 2012abc). This technique enables us to investigate if the relationship between HHR emigration and the exogenous variables differ throughout 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 migration. While 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 dependent variable are normally distributed. However QR does not require a normally distributed error term. Therefore, based on

this technique we are able to carefully assess the determinants of HHR emigration throughout the conditional distribution with particular emphasis on countries with the best and worst fighting records of HHR emigration. QR yields parameters estimated at multiple points in the conditional distribution of the dependent variable(Koenker & Bassett, 1978) and has gained attention in recent development literature(Billger & Goel, 2009; Okada & Samreth,2012; Asongu, 2012abc). The $\theta$ th 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 $\theta \in (0,1)$. Contrary 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 75th or 90th quantiles(with $\theta$ =0.75 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 $\theta$ th 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 dependent 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, democracy, press-freedom, savings, health expenditure, inflation, development assistance, tertiary emigration, economic prosperity, 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, 2012a).

We also report estimates for Least Absolute Deviations(LAD) which should correspond to those of the 0.5[th] quantile.

## 4. Empirical analysis

### 4.1 Summary of results

The results presented in Tables 3-7 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 HHR emigration.

**Table 3: Summary of results**

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

BQ:Bottom Quantiles. TQ: Top Quantiles. LICs : Low Income Countries. MICs: Middle Income Countries.  na: not applicable due to insignificance of estimated coefficient.

Table 3 above presents a summary of overall findings. In the interpretation of the findings note should be taken of the fact that Low Quantiles(LQ) denote  the part of the emigration distribution where existing levels of brain-drain are less, while Top Quantiles(TQ) represent the side of the distribution where existing levels of brain-drain are high. The

heterogeneous nature of findings across the distribution of the dependent variable points to the relevance of an estimation approach that is conditional on existing levels of HHR emigration. Our estimation technique is further justified by the insignificance of OLS estimates across specifications(see Tables 4-7). The positive signs(+) denote increase in HHR emigration while negative signs(-) indicate the contrary.

### 4.1.1 Wealth effects for Physician migration

Income-level effects for physician migration are captured by cross-examining Table 4 and Table 5. With respect to the first specification, the following could be established. (1) LAD and OLS estimates are not significant and only the top quantile results are mostly significant for both income groups. (2) While human development, democracy and press-freedom increase HHR emigration in Low Income Countries(LICs), the opposite effect is witnessed in Middle Income Countries(MICs). (3) For LICs, while trade openness is a tool for fighting HHR emigration, financial liberalization is not.

With regard to the second specification. (1) Health expenditure decreases incentives to HHR emigration for both income-levels, but while the negative effect is consistent across the distribution in LICs, it is only relevant in the top quantiles of their MICs counterparts. (2) Brian-drain is deterred by domestic savings only in MICs(in top quantiles). (3) With the exception of health expenditure for LICs, savings, inflation and development assistance are incentives to HHR emigration; with the relevance across the distribution for LICs and only in lower quantiles for MICs.

Looking at the third specification, the following could be established. (1) While the HIV infection rate increases emigration in LICs, it deters the phenomenon in their MIC counterparts. (2) Economic prosperity is not a tool in the fight against emigration for both income-levels. (3)

Whereas population growth is a tool at bottom quantiles of MICs, it is relevant only in the highest quantile of LICs as a deterrent to emigration. (4) While Government effectiveness fights emigration in top quantiles of LICs, it only helps to increase the crisis in MICs. (5) Corruption-control is a tool against emigration only in lower quantiles of both income groups.

**Table 4: Determinants of Physician Migration in LICs : OLS, LAD and QR**

| | OLS | LAD | Q 0.1 | Q 0.25 | Q 0.50 | Q 0.75 | Q 0.90 |
|---|---|---|---|---|---|---|---|
| | | | | **Specification 1** | | | |
| Constant | -0.284 | -0.349 | -0.139 | **-0.322** | -0.349 | -0.382 | -0.162 |
| | (0.381) | (0.633) | (0.421) | **(0.013)** | (0.274) | (0.151) | (0.472) |
| Human Development | 1.166 | 1.304 | **1.120** | **1.635*** | **1.304*** | **1.413** | 0.129 |
| | (0.116) | (0.578) | **(0.012)** | **(0.000)** | **(0.077)** | **(0.025)** | (0.789) |
| Foreign Direct Investment | 0.074 | 0.048 | 0.029 | 0.025 | 0.048 | 0.040 | **0.122*** |
| | (0.158) | (0.735) | (0.292) | (0.163) | (0.328) | (0.320) | **(0.005)** |
| Trade | -0.003 | -0.0002 | -0.0006 | **-0.002** | -0.0002 | -0.001 | **-0.003*** |
| | (0.285) | (0.982) | (0.680) | **(0.011)** | (0.919) | (0.393) | **(0.096)** |
| Democracy | 0.019 | -0.005 | -0.002 | -0.004 | -0.005 | **0.030*** | **0.050*** |
| | (0.363) | (0.938) | (0.796) | (0.572) | (0.801) | **(0.096)** | **(0.006)** |
| Freedom | 0.004 | 0.003 | 0.0002 | 0.003 | 0.003 | **0.005*** | **0.008*** |
| | (0.217) | (0.833) | (0.895) | (0.014) | (0.283) | **(0.067)** | **(0.003)** |
| Observations | 1-15 | 1-15 | 1-15 | 1-15 | 1-15 | 1-15 | 1-15 |
| | | | | **Specification 2** | | | |
| Constant | 0.177 | 0.362 | **-0.200*** | **0.280*** | **0.362*** | **0.368*** | **0.281*** |
| | (0.299) | (0.315) | **(0.000)** | **(0.001)** | **(0.000)** | **(0.000)** | **(0.000)** |
| Savings | 0.003 | 0.001 | **0.007*** | **0.003** | **0.001** | **0.001*** | **0.001** |
| | (0.235) | (0.895) | **(0.000)** | **(0.018)** | **(0.012)** | **(0.000)** | **(0.044)** |
| Health Expenditure | -0.010 | -0.043 | 0.002 | **-0.034** | **-0.043*** | **-0.042*** | **-0.023*** |
| | (0.761) | (0.570) | (0.394) | **(0.021)** | **(0.000)** | **(0.000)** | **(0.002)** |
| Inflation | 0.006 | 0.006 | **0.004*** | **0.008*** | **0.006*** | **0.004*** | **-0.005*** |
| | (0.135) | (0.462) | **(0.000)** | **(0.000)** | **(0.000)** | **(0.000)** | **(0.000)** |
| Development Assistance | 0.007 | 0.006 | **0.016*** | **0.005** | **0.006*** | **0.008*** | **0.023*** |
| | (0.276) | (0.647) | **(0.000)** | **(0.041)** | **(0.000)** | **(0.000)** | **(0.000)** |
| Tertiary Emigration | **0.005*** | 0.005 | **0.008*** | **0.005*** | **0.005*** | **0.005*** | **0.007*** |
| | **(0.077)** | (0.567) | **(0.000)** | **(0.001)** | **(0.000)** | **(0.000)** | **(0.000)** |
| Observations | 1-15 | 1-15 | 1-15 | 1-15 | 1-15 | 1-15 | 1-15 |
| | | | | **Specification 3** | | | |
| Constant | **0.397** | 0.313 | 0.142 | **0.195*** | **0.313*** | **0.479*** | **0.460*** |
| | **(0.021)** | (0.542) | (0.225) | **(0.000)** | **(0.000)** | **(0.000)** | **(0.000)** |
| Economic Prosperity | 0.020 | 0.021 | **0.026** | **0.022*** | **0.021*** | **0.018*** | **0.019*** |
| | (0.174) | (0.581) | **(0.037)** | **(0.000)** | **(0.000)** | **(0.000)** | **(0.000)** |
| Population growth | -0.008 | 0.003 | 0.029 | **0.029*** | 0.003 | -0.007 | **-0.007*** |
| | (0.787) | (0.976) | (0.257) | **(0.000)** | (0.694) | (0.300) | **(0.000)** |
| Corruption Control | 0.029 | 0.064 | -0.054 | **-0.009*** | 0.064 | **0.333*** | **0.396*** |
| | (0.814) | (0.786) | (0.581) | **(0.000)** | (0.100) | **(0.000)** | **(0.000)** |
| Government Effectiveness | 0.072 | -0.044 | 0.097 | **0.123*** | -0.044 | **-0.066** | **-0.072*** |
| | (0.543) | (0.881) | (0.295) | **(0.000)** | (0.203) | **(0.018)** | **(0.000)** |
| HIV | **0.025** | 0.020 | **0.025*** | **0.026*** | **0.020*** | **0.042*** | **0.058*** |
| | **(0.016)** | (0.464) | **(0.003)** | **(0.000)** | **(0.000)** | **(0.000)** | **(0.000)** |
| Observations | 1-15 | 1-15 | 1-15 | 1-15 | 1-15 | 1-15 | 1-15 |

Notes. Dependent variable is the emigration physician rate. *,**,***, denote significance levels of 10%, 5% and 1% respectively. Lower quantiles (e.g., Q 0.10) signify nations where emigration is least. OLS:Ordinary Least Squares. LAD: Least Absolute Deviation. LICs: Low Income Countries.

## Table 5: Determinants of Physician Migration in MICs : OLS, LAD and QR

| | OLS | LAD | Q 0.1 | Q 0.25 | Q 0.50 | Q 0.75 | Q 0.90 |
|---|---|---|---|---|---|---|---|
| **Specification 1** | | | | | | | |
| Constant | 0.513 | 1.233 | 0.013 | 0.013 | **1.233*** | 0.594 | **0.594** |
| | (0.549) | (0.898) | (0.951) | (0.951) | **(0.000)** | (0.103) | **(0.044)** |
| Human Development | -0.003 | -0.008 | 0.003 | 0.003 | **-0.008*** | **-0.007** | **-0.007** |
| | (0.609) | (0.999) | (0.139) | (0.137) | **(0.000)** | **(0.044)** | **(0.017)** |
| Foreign Direct Investment | 0.001 | -0.046 | 0.005 | 0.005 | **-0.046*** | 0.002 | 0.002 |
| | (0.977) | (0.865) | (0.710) | (0.708) | **(0.000)** | (0.883) | (0.833) |
| Trade | -0.0003 | 0.000 | 0.001 | 0.001 | **0.0009*** | -0.001 | **-0.001*** |
| | (0.886) | (0.990) | (0.191) | (0.189) | **(0.003)** | (0.169) | **(0.080)** |
| Democracy | -0.004 | -0.043 | -0.004 | -0.004 | **-0.043*** | 0.005 | 0.005 |
| | (0.934) | (0.955) | (0.773) | (0.771) | **(0.000)** | (0.766) | (0.670) |
| Freedom | -0.003 | -0.011 | 0.0007 | 0.0007 | **-0.011*** | -0.0009 | -0.0009 |
| | (0.723) | (0.900) | (0.748) | (0.747) | **(0.000)** | (0.727) | (0.619) |
| Observations | 1-9 | 1-9 | 1-9 | 1-9 | 1-9 | 1-9 | 1-9 |
| **Specification 2** | | | | | | | |
| Constant | -0.108 | -0.440 | **-0.423*** | **-0.423*** | **-0.440*** | **0.849** | **0.849*** |
| | (0.793) | (0.966) | **(0.002)** | **(0.001)** | **(0.000)** | **(0.0113)** | **(0.009)** |
| Savings | -0.0003 | 0.001 | 0.0009 | **0.0009** | **0.001** | **-0.007** | **-0.007*** |
| | (0.918) | (0.985) | (0.100) | **(0.045)** | **(0.010)** | **(0.010)** | **(0.008)** |
| Health Expenditure | 0.026 | 0.045 | **0.048*** | **0.048*** | **0.045*** | **-0.044** | **-0.044** |
| | (0.511) | (0.979) | **(0.001)** | **(0.000)** | **(0.000)** | **(0.049)** | **(0.041)** |
| Inflation | 0.007 | 0.027 | **0.021*** | **0.021*** | **0.027*** | **-0.023*** | **-0.023** |
| | (0.718) | (0.841) | **(0.003)** | **(0.001)** | **(0.000)** | **(0.053)** | **(0.044)** |
| Development Assistance | 0.041 | 0.060 | **0.057*** | **0.057*** | **0.060*** | -0.007 | -0.007 |
| | (0.238) | (0.815) | **(0.000)** | **(0.000)** | **(0.000)** | (0.556) | (0.527) |
| Tertiary Emigration | **0.008*** | 0.009 | **0.010*** | **0.010*** | **0.009*** | 0.001 | 0.001 |
| | **(0.092)** | (0.850) | **(0.000)** | **(0.000)** | **(0.000)** | (0.404) | (0.373) |
| Observations | 1-9 | 1-9 | 1-9 | 1-9 | 1-9 | 1-9 | 1-9 |
| **Specification 3** | | | | | | | |
| Constant | 0.552 | 0.548 | **0.886*** | **0.886** | **0.548** | -0.006 | -0.006 |
| | (0.329) | (0.916) | **(0.004)** | **(0.012)** | **(0.010)** | (0.975) | (0.964) |
| Economic Prosperity | 0.004 | 0.013 | -0.011 | -0.011 | **0.013*** | **0.029*** | **0.029** |
| | (0.846) | (0.928) | (0.133) | (0.251) | **(0.056)** | **(0.059)** | **(0.023)** |
| Population growth | -0.088 | -0.115 | **-0.253** | **-0.253** | **-0.115*** | 0.198 | **0.198** |
| | (0.691) | (0.957) | **(0.013)** | **(0.035)** | **(0.064)** | (0.105) | **(0.045)** |
| Corruption Control | -0.295 | -0.328 | **-0.634*** | **-0.634** | **-0.328** | -0.217 | -0.217 |
| | (0.445) | (0.852) | **(0.004)** | **(0.012)** | **(0.016)** | (0.229) | (0.118) |
| Government Effectiveness | 0.294 | 0.231 | **0.607*** | **0.607** | **0.231** | **0.359*** | **0.359** |
| | (0.403) | (0.901) | **(0.003)** | **(0.010)** | **(0.031)** | **(0.070)** | **(0.028)** |
| HIV | -0.006 | -0.004 | **-0.006** | **-0.006*** | **-0.004*** | -0.002 | -0.002 |
| | (0.451) | (0.946) | **(0.028)** | **(0.071)** | **(0.059)** | (0.418) | (0.269) |
| Observations | 1-9 | 1-9 | 1-9 | 1-9 | 1-9 | 1-9 | 1-9 |

Notes. Dependent variable is the physician emigration rate. *,**,***, denote significance levels of 10%, 5% and 1% respectively. Lower quantiles (e.g., Q 0.10) signify nations where emigration is least. OLS:Ordinary Least Squares. LAD: Least Absolute Deviation. MICs: Middle Income Countries.

### 4.1.2 Wealth effects for Nurse migration

Income-level effects for nurse-emigration are captured by cross-examining Table 6 and Table 7. The following broad findings could be established. (1) Economic prosperity is(not) a tool in the fight against emigration in top(low) quantiles of LICs and in low(top) quantiles of MICs. (2) Health expenditure and savings only favor brain-drain in both income-groups in

bottom quantiles. (3) But for top quantiles of MICs, soaring consumer prices(inflation) increase(s) the likelihood of emigration in both income groups. (4) With the exception of low quantiles of LICs, population growth appears to deter emigration of health workers. (5) Democracy and press-freedom only encourage the phenomenon with much relevance in top quantiles.

**Table 6: Determinants of Nurse Migration in LICs : OLS, LAD and QR**

| | OLS | LAD | Q 0.1 | Q 0.25 | Q 0.50 | Q 0.75 | Q 0.90 |
|---|---|---|---|---|---|---|---|
| | | | | Specification 1 | | | |
| Constant | -0.178 | -0.001 | -0.074 | **-0.074*** | -0.001 | -0.238 | **-0.471*** |
| | (0.653) | (0.998) | (0.229) | **(0.074)** | (0.979) | (0.284) | **(0.055)** |
| Human Development | 0.057 | -0.077 | **0.346**** | **0.346**** | -0.077 | 0.596 | 0.137 |
| | (0.946) | (0.956) | **(0.021)** | **(0.001)** | (0.549) | (0.222) | (0.775) |
| Foreign Direct Investment | 0.063 | 0.017 | 0.012 | **0.012*** | **0.017*** | 0.003 | 0.033 |
| | (0.322) | (0.874) | (0.200) | **(0.059)** | **(0.085)** | (0.924) | (0.348) |
| Trade | -0.003 | -0.0001 | -0.0002 | -0.0002 | -0.0001 | -0.0002 | **-0.004**** |
| | (0.292) | (0.987) | (0.632) | (0.459) | (0.837) | (0.905) | **(0.030)** |
| Democracy | 0.021 | 0.010 | 0.006 | **0.006**** | **0.010**** | **0.025*** | **0.068***** |
| | (0.411) | (0.823) | (0.140) | **(0.032)** | **(0.018)** | **(0.096)** | **(0.000)** |
| Freedom | 0.006 | 0.002 | -0.0002 | -0.0002 | **0.002***** | 0.002 | **0.014***** |
| | (0.128) | (0.774) | (0.693) | (0.540) | **(0.003)** | (0.272) | **(0.000)** |
| Observations | 1-15 | 1-15 | 1-15 | 1-15 | 1-15 | 1-15 | 1-15 |
| | | | | Specification 2 | | | |
| Constant | 0.082 | 0.037 | -0.038 | **-0.062***** | **0.037***** | 0.247 | **0.271*** |
| | (0.724) | (0.908) | (0.451) | **(0.000)** | **(0.000)** | (0.215) | **(0.060)** |
| Savings | 0.0004 | 0.001 | **0.001*** | **0.002***** | **0.001***** | -0.0003 | 0.001 |
| | (0.905) | (0.912) | **(0.087)** | **(0.000)** | **(0.000)** | (0.918) | (0.625) |
| Health Expenditure | 0.044 | 0.038 | 0.009 | **0.014***** | **0.038***** | 0.0005 | -0.002 |
| | (0.370) | (0.936) | (0.372) | **(0.000)** | **(0.000)** | (0.988) | (0.923) |
| Inflation | **0.011*** | 0.005 | 0.001 | **0.003***** | **0.005***** | 0.007 | **0.024***** |
| | **(0.083)** | (0.948) | (0.382) | **(0.000)** | **(0.000)** | (0.149) | **(0.000)** |
| Development Assistance | -0.012 | -0.008 | 0.0006 | **0.0008***** | **-0.008***** | -0.003 | -0.000 |
| | (0.168) | (0.870) | (0.714) | **(0.000)** | **(0.000)** | (0.636) | (0.991) |
| Tertiary Emigration | -0.004 | -0.002 | 0.001 | **0.0007***** | **-0.002***** | -0.003 | **-0.006**** |
| | (0.318) | (0.896) | (0.168) | **(0.000)** | **(0.000)** | (0.324) | **(0.014)** |
| Observations | 1-15 | 1-15 | 1-15 | 1-15 | 1-15 | 1-15 | 1-15 |
| | | | | Specification 3 | | | |
| Constant | 0.256 | 0.276 | 0.001 | 0.034 | **0.276***** | **0.304*** | **0.510***** |
| | (0.260) | (0.575) | (0.812) | (0.621) | **(0.000)** | **(0.064)** | **(0.001)** |
| Economic Prosperity | -0.007 | -0.004 | **0.013***** | 0.012* | -0.004 | -0.012 | **-0.064***** |
| | (0.727) | (0.929) | **(0.000)** | (0.080) | (0.391) | (0.393) | **(0.000)** |
| Population growth | -0.047 | -0.004 | **0.015***** | 0.013 | -0.004 | -0.009 | **-0.051*** |
| | (0.351) | (0.976) | **(0.000)** | (0.400) | (0.704) | (0.768) | **(0.064)** |
| Corruption Control | 0.037 | 0.125 | **-0.055***** | -0.034 | **0.125**** | 0.141 | **0.242**** |
| | (0.844) | (0.627) | **(0.000)** | (0.567) | **(0.022)** | (0.291) | **(0.030)** |
| Government Effectiveness | -0.123 | -0.006 | **0.024***** | 0.029 | -0.006 | -0.054 | **-0.415***** |
| | (0.489) | (0.984) | **(0.001)** | (0.596) | (0.884) | (0.651) | **(0.001)** |
| HIV | -0.001 | -0.004 | 0.0006 | 0.0003 | -0.004 | -0.006 | **-0.027***** |
| | (0.906) | (0.850) | (0.113) | (0.923) | (0.195) | (0.445) | **(0.002)** |
| Observations | 1-15 | 1-15 | 1-15 | 1-15 | 1-15 | 1-15 | 1-15 |

Notes. Dependent variable is the nurse emigration rate. *,**,***, denote significance levels of 10%, 5% and 1% respectively. Lower quantiles (e.g., Q 0.10) signify nations where emigration is least. OLS: Ordinary Least Squares. LAD: Least Absolute Deviation. LICs: Low Income Countries.

(6) But for top quantiles in LICs, corruption-control(government effectiveness) is(not) a strong tool against emigration. (7) Human development only serves as a(an) deterrent(incentive) in top(bottom) quantiles of MICs(LICs). (8) Development assistance and financial openness only serve to make matters worse. (9) The HIV infection rate and trade openness decrease emigration prospects.

**Table 7: Determinants of Nurse Migration in MICs : OLS, LAD and QR**

| | OLS | LAD | Q 0.1 | Q 0.25 | Q 0.50 | Q 0.75 | Q 0.90 |
|---|---|---|---|---|---|---|---|
| | | | | **Specification 1** | | | |
| Constant | -0.300 | -0.658 | -0.205 | -0.205 | **-0.658*** | **-1.509*** | **-1.509*** |
| | (0.679) | (0.952) | (0.239) | (0.231) | **(0.099)** | **(0.000)** | **(0.000)** |
| Human Development | -0.004 | -0.004 | 0.0005 | 0.0005 | -0.004 | **-0.003*** | -0.003 |
| | (0.470) | (0.999) | (0.666) | (0.659) | (0.144) | **(0.000)** | (0.176) |
| Foreign Direct Investment | 0.052 | 0.072 | 0.017 | 0.017 | **0.072*** | **0.140*** | **0.140*** |
| | (0.331) | (0.679) | (0.166) | (0.159) | **(0.033)** | **(0.000)** | **(0.000)** |
| Trade | -0.001 | -0.0004 | 0.000 | 0.000 | -0.0004 | **-0.003*** | **-0.003*** |
| | (0.662) | (0.995) | (0.958) | (0.957) | (0.625) | **(0.000)** | **(0.015)** |
| Democracy | 0.058 | 0.086 | 0.019 | 0.019 | **0.086*** | **0.152*** | **0.152*** |
| | (0.279) | (0.928) | (0.134) | (0.128) | **(0.019)** | **(0.000)** | **(0.002)** |
| Freedom | 0.002 | 0.005 | 0.001 | 0.001 | 0.005 | **0.019*** | **0.019*** |
| | (0.726) | (0.958) | (0.282) | (0.273) | (0.153) | **(0.000)** | **(0.004)** |
| Observations | 1-9 | 1-9 | 1-9 | 1-9 | 1-9 | 1-9 | 1-9 |
| | | | | **Specification 2** | | | |
| Constant | **-0.157*** | -0.158 | **-0.246*** | **-0.246*** | **-0.158*** | -0.041 | **-0.041*** |
| | **(0.088)** | (0.836) | **(0.000)** | **(0.000)** | **(0.000)** | (0.259) | **(-0.041)** |
| Savings | 0.0009 | 0.0009 | **0.001*** | **0.001*** | **0.0009*** | -0.0001 | -0.0001 |
| | (0.191) | (0.904) | **(0.000)** | **(0.000)** | **(0.000)** | (0.696) | (0.384) |
| Health Expenditure | 0.010 | 0.009 | **0.015*** | **0.015*** | **0.009*** | 0.0003 | 0.0003 |
| | (0.182) | (0.938) | **(0.000)** | **(0.000)** | **(0.000)** | (0.917) | (0.806) |
| Inflation | 0.002 | 0.002 | **0.006*** | **0.006*** | **0.002*** | -0.0003 | -0.000 |
| | (0.526) | (0.894) | **(0.000)** | **(0.000)** | **(0.000)** | (0.816) | (0.592) |
| Development Assistance | **0.016*** | 0.017 | **0.022*** | **0.022*** | **0.017*** | **0.011*** | **0.011*** |
| | **(0.036)** | (0.658) | **(0.000)** | **(0.000)** | **(0.000)** | **(0.013)** | **(0.001)** |
| Tertiary Emigration | **0.012*** | 0.012 | **0.013*** | **0.013*** | **0.012*** | **0.011*** | **0.011*** |
| | **(0.000)** | (0.423) | **(0.000)** | **(0.000)** | **(0.000)** | **(0.000)** | **(0.000)** |
| Observations | 1-9 | 1-9 | 1-9 | 1-9 | 1-9 | 1-9 | 1-9 |
| | | | | **Specification 3** | | | |
| Constant | **0.892*** | 0.745 | **1.046*** | **1.046*** | **0.745*** | **0.696*** | **0.696*** |
| | **(0.034)** | (0.855) | **(0.000)** | **(0.000)** | **(0.000)** | **(0.000)** | **(0.000)** |
| Economic Prosperity | -0.006 | 0.005 | **-0.016*** | **-0.016*** | **0.005*** | **0.006*** | **0.006*** |
| | (0.597) | (0.982) | **(0.011)** | **(0.004)** | **(0.002)** | **(0.024)** | **(0.001)** |
| Population growth | **-0.253*** | -0.183 | **-0.324*** | **-0.324*** | **-0.183*** | **-0.155*** | **-0.155*** |
| | **(0.090)** | (0.932) | **(0.001)** | **(0.000)** | **(0.000)** | **(0.001)** | **(0.000)** |
| Corruption Control | -0.083 | -0.041 | **-0.207*** | **-0.207*** | **-0.041*** | -0.031 | **-0.031*** |
| | (0.661) | (0.983) | **(0.016)** | **(0.006)** | **(0.014)** | (0.283) | **(0.027)** |
| Government Effectiveness | 0.193 | 0.105 | **0.331*** | **0.331*** | **0.105*** | **0.117*** | **0.117*** |
| | (0.301) | (0.961) | **(0.003)** | **(0.001)** | **(0.000)** | **(0.012)** | **(0.000)** |
| HIV | **-0.015*** | -0.017 | **-0.016*** | **-0.016*** | **-0.017*** | **-0.017*** | **-0.017*** |
| | **(0.021)** | (0.564) | **(0.000)** | **(0.000)** | **(0.000)** | **(0.000)** | **(0.000)** |
| Observations | 1-9 | 1-9 | 1-9 | 1-9 | 1-9 | 1-9 | 1-9 |

Notes. Dependent variable is the nurse emigration rate. *,**,***, denote significance levels of 10%, 5% and 1% respectively. Lower quantiles (e.g., Q 0.10) signify nations where emigration is least. OLS: Ordinary Least Squares. LAD: Least Absolute Deviation. MICs: Middle Income Countries.

**4.2 Discussion, policy implications and limitations**

*4.2.1 What do wealth-effects tell us?*

As summarized in Table 3, when existing emigration levels are low, wealth-effects have the following broad implications. (1) Economic prosperity(health expenditure) is a good tool against nurse(physician) brain-drain in MICs(LICs). (2) Positive demographic change fuels(mitigates) the problem in LICs(MICs). (3) Savings, government-effectiveness, foreign-aid and inflationary pressures only accentuate the problem for both income groups. (4)Corruption-control becomes a vital tool for emigration-control in both income-brackets. (5)Trade(financial) openness mitigates(fuels) physician(nurse) emigration in LICs.

On the other hand when existing emigration levels are high the following establishments could be made. (1) Economic prosperity(savings) fight nurse(physician) emigration only in LICs(MICs). (2)Health expenditure and inflationary pressures are relevant tools in the battle against physician resource flight. (3)Government effectiveness(human development) is an important policy measure for mitigating emigration in LICs(MICs). (4)Democracy, press-freedom, foreign-aid and financial openness fuel emigration in either income strata. (5) Population growth and trade openness are important tools in the fight against brain-drain. (6) The HIV infection rate is a deterrent only to nurse emigration.

*4.2.2 Further discussion on wealth-effects and policy recommendations*

Before delving into further discussing the significance of our results, it is important to emphasize the intuition motivating the paper. The wealth-effect dimension is critical in the understanding of the increasing flow of skilled professionals from low-income to high-income countries. The baseline push-factor is poverty(income disparity). After assessing how wealth-effects play-out when emigration levels matter, it is imperative to outline general

recommendations in the fight against this phenomenon of brain-drain. These broad policy measures integrate both the push and pull factors of HHR migration(albeit our analysis this far has been limited only to push-factors). In substance broad policy recommendations are important because globalization is partially responsible in various ways for the chronic problems in HHRs. Deteriorating socio-economic and broader environmental conditions(at least partly attributable to liberalization or other forms of global market convergence) are pushing health workers out their countries.

With the increasing flow of skilled professionals from low-income to high-income countries, there are often costs borne by poorer nations that are greater than the gains they may receive through remittances or reductions in domestic labor market inefficiencies and failures. These costs are particularly high when the skilled professionals are health workers coming from countries facing critical shortages in health workers. A broad policy solution must find a fine balance between the private welfare gains of remittance and the public cost of lost training-revenues; between the aggregate GDP gains of remittance and the(often engendered) individual or local losses to families or communities left behind; and between the individual's right to migrate to greener pastures and the loss of access to health care for communities. Maximizing equity in health outcomes(between and within countries) in the context of such flows requires strategies that simultaneously address push and pull factors. These strategies in-turn will require net capital transfers(wealth flows) from richer to poorer countries(and from healthier to unhealthier populations). For organizational purposes we shall classify the recommendations with respect to source-countries , receiving-states and regional(international) institutions.

*a) Recommendations for source-countries*

-Improve job security and HHR planning by easing re-entry for HHRs seeking temporary employment abroad, giving priority to training and not committing to free trade of health services in trade treaties without prior experience in regulating such trade.

-Improve registration, examination and deployment procedures for foreign-trained HHRs. These include confining new foreign HHRs to employment in the public sector with priority given to rural or underserved areas.

-Ensure the training curricula meet local needs(rather than export-market needs) and develop mid-level professionals capable of meeting local needs and less likely to migrate.

-Improve retention incentives in health services by providing benefits(extra pay for instance) in rural/underserved areas, better management and career paths, supportive supervision and greater priority in public health expenditure.

-Decrease economic and political push factors, with donor aid(assistance) and other capital flows from rich to poor nations.

-Increase public-good contribution from the Diaspora through novel matching and tax incentives, including bilateral tax agreements permitting taxes by emigrants to be paid directly to governments of their home countries.

*b) Recommendations for receiving countries*

-Creation of bilateral agreements to regulate the recruiting process, ensure that the costs of migration are borne by the receiving and not the source country. Measures should also be taken to improve country of origin development-contributions of the Diaspora.

-Adoption and enforcement of ethical codes of conduct in the recruitment of imported HHRs.

-Improved self-sufficiency in HHR production through increased training, better use of existing unlicensed foreign-trained HHRs and ensuring that poor working conditions do not push some domestic HHRs(especially nurses) away from the health sector.

-Increased contributions to health systems of source countries through guaranteed salaries for remaining health professionals and sustained targeting of health-aid. Bilateral agreements creating new tax measures through which public-good remittances can improve financing of health and training systems.

-Improved 'return' or two-way HHR flows through time-limited visas or guaranteed return privileges for emigrants returning home after service-leaves. Equality in the two-way staff flow will ensure the source countries does not experience a loss of staff and at the same time would benefit from new knowledge brought by health practitioners from recipient countries. This will minimize the negative externalities of HHR flows from source to receiving countries.

*c) Recommendations for regional and international institutions(mechanisms)*

-Ensure human rights monitoring, through, inter alia, the office of the Special Rapporteur on Health in which countries report and recommend measures they are implementing in a bid to reduce factors pushing health workers to emigrate.

-Support for the Global Health Workforce Alliance which seeks to identify and resolve the problems surrounding health worker migration.

-Re-examine macroeconomic conditions that may impede health care expansion in least developed(low-income) source countries, particularly budgetary ceilings associated with IMF/World Bank Medium Term Expenditure Frameworks that indirectly prevent expansion of health care spending in many of the worst affected countries.

-Develop cross-border public health care agreements based on arrangements now evolving in the European Union. This will mitigate the drain created by private health care owing to "medical tourism".


## 5.Conclusion

Owing to lack of relevant data on health human resource migration, the empirical dimension of the health-worker crisis debate has remained void despite abundant theoretical literature. A health worker crisis is overwhelming the world. Shortages in health professionals are reaching staggering levels in many parts of the globe. This paper has complemented existing literature by empirically investigating the WHO hypothetical determinants of health-worker migration in the context of globalization when income-levels matter. Thus we have assessed the determinants of emigration in the health sector through-out the conditional distributions of emigration rates(physicians and nurses). Findings have provided very targeted policy implications based on income-levels and existing emigration levels for both physician and nurse worker crises. Apart from specific policy recommendations, we have also outlined broad policy measures for source-countries, recipient-states and regional(international) institutions.

# 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 Ratio | 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)

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

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.

**References**

Asongu, S. A., (2012a), "Fighting corruption in Africa: do existing corruption-control levels matter", *MPRA Paper* No. 36900.

Asongu, S. A., (2012b), "Fighting corruption when existing corruption-control levels count: what do wealth effects tell us", *MPRA Paper* No. 36901.

Asongu, S. A., (2012c), "Fighting corruption with cultural dynamics: when legal-origins, religious-influences and existing corruption-control levels matter", *MPRA Paper* No. 36893.

Billger, S. M., & Goel, R. K., (2009),"Do existing corruption levels matter in controlling corruption? Cross-country quantile regression estimates", *Journal of Development Economics*, 90, pp.299-305.

Bundred, P., Martineau, T., & Kitchiner, D.,(2004), "Factors affecting the global migration of health professional", *Harvard Health Policy Review*, 5, pp.77-87.

Clemens, M., & Pettersson, G.,(2006), "Medical Leave: A new database of health professional emigration from Africa", *Center for Global Development*, Washington D.C.

Crush, J.(2002), "The Global Raiders: Nationalism, globalization and the South African Brian Drain", *Journal of International Affairs*, 56, pp.148-172.

Crush, J., Pendleton, W., & Tevera, D. S.,(2005), "Degrees of Uncertainty: Students and the Brain Drain in Southern Africa", *African Institute of South Africa*.

Hagopian, A., Ofosu, A., Fatusi, A., Biritwum, R., Essel, A., Gary, H. L, & Watts, C., (2005), "The flight of physicians from West Africa: Views of African physicians and implications for polity", *Social Science & Medicine*, 61, pp.1750-1760.

Hutchinson, B.,(2005), "Medical Tourism growing worldwide", University of Delaware.

Koenker, R., & Bassett, Jr. G.,(1978),"Regression quantiles", *Econometrica*, 46, pp.33-50.

Koenker, R., & Hallock, F.K.,(2001), "Quantile regression", *Journal of Economic Perspectives*, 15, pp.143-156.

Macintosh, C., (2004), "Medical tourism: Need surgery, will travel", CBC News(accessed on 9th of March 2012: http://www.cbc.ca/news/background/healthcare/medicaltourism2.html).

Okada, K., & Samreth, S.,(2012), "The effect of foreign aid on corruption: A quantile regression approach", *Economic Letters*, 11, pp.240-243.

Packer, C., Labonté, R., & Spitzer, D.,(2007, August),"Globalization and Health Worker Crisis", *Globalization and Health Knowledge Network Research Paper*.

Rai, S.,(2006), "Hitches in globalization of heath care", New York Times(accessed 9th March 2012: http://www.nytimes.com/2006/10/10/business/worldbusiness/10iht-health.3103776.html).

Rosenmoller, M., McKee, M., & Beaten, R.,(2006), "Patient Mobility in the European Union. Learning from Experience", *European Observatory on Health Systems and Policies*.

Thomas, C., Hosein, R., & Yan, J.,(2005), Assessing the Export of Nursing Services as a Diversification Option for CARICOM Economies. Washington DC: Pan American Health Organization and Caribbean Commission on Health and Development.

Tjadens, F., (2002), "Health care shortages: where globalization nurses and migration meet", *Eurohealth,* 8, pp.33-35.

United Nations Population Fund :UNFPA, (2005), "International Migration and the Millennium Development  Goals". Selected Papers of the UNFPA Expert Group Meeting New York.