

AUGUST 2007

IIDE
discussion paper:
200708-03

IIDE institute for international and development economics

DISCUSSION PAPER

The Economic Impact of Medical Migration: an Overview of the Literature

August 2007

IIDE discussion paper 200708-03

Martine Rutten

*ERASMUS UNIVERSITY ROTTERDAM &
NETHERLANDS MINISTRY OF FINANCE*
mmrutten@gmail.com

JEL codes: F22, I1

Key words: medical migration, brain drain, doctor migration, nurse
migration

The Economic Impact of Medical Migration: an Overview of the Literature

Martine Rutten¹

Abstract: This paper provides an overview of the evidence and applied literature on medical migration. Since migration of health workers influences the provision of health services, or put differently since an expansion of health provision in the short-run is often only possible via the importation of health workers, and impacts upon the well-being of the population, the paper includes a survey of applied macroeconomic models on changes in health and/or health care provision. The general equilibrium economic impacts of endogenous changes in health provision on the health of the population, well-being and effective labour supplies are relatively little researched in the literature. Receiving even less attention is *medical brain drain*, a process likely to have associated adverse (positive) health and welfare consequences for developing source (developed destination) countries.

Structure

1. Introduction	2
2. Macro-economic models of changes in health (provision)	4
3. Macro-economic models of international labour migration	8
4. Patterns of international migration of health workers	14
5. The international policy agenda: from medical brain drain to brain gain	31
6. Conclusions	41

¹ Policy Advisor of the Dutch Ministry of Finance and External Research Fellow of the School of Economics at the Erasmus University Rotterdam. Email address for correspondence: mrutten@few.eur.nl. The paper is based on the author's Ph.D. thesis at the University of Nottingham and benefited greatly from valuable comments and suggestions from Geoff Reed and Joe Franco. The responsibility for any remaining errors or infelicities remains with the author.

1. Introduction

Health workers migrate from developing to developed countries to better their economic or social situation immediately or for the purpose of career development. The incentives to migrate typically involve a combination of “push factors” (unsatisfactory working or living conditions in the country of origin) and “pull factors” (attractive working or living conditions, availability of positions and active recruitment in the country of destination).² While individual motives underlie the observed migration flows – and in this sense are neither new³ nor unique to the health sector as such – the so-called medical “brain drain” causes the unique problem of severe workforce shortages in developing country health systems that are already under stress.⁴ Exceptions are countries like India and the Philippines, which have collaborative health-worker migration schemes and are reported to over-produce physicians and nurses intended for an international market.⁵ A notable difference with the past is that migration and the accompanying shortage of health personnel for developing countries is now usually permanent.⁶ Faced with a dwindling work force, the task facing developing countries in building up their health care systems is particularly daunting. This is the more so for Sub-Saharan African countries which suffer the HIV/AIDS pandemic, which uses up most of health and medical services and claims the lives of many health workers.⁷

This paper provides an overview of the evidence and applied literature on medical migration. Since migration of health workers influences the provision of health services, or put differently since an expansion of health provision *in the short-run* is often only possible via the importation of health workers, and impacts upon the well-being of the population, the paper includes a survey of applied macroeconomic models on changes in health and/or health care provision. The paper is part of a

² Ahmad (2005), Alkire and Chen (2004), Awases et al. (2004), Bach (2003), Buchan and Dovlo (2004), Buchan and Perfilieva (2006), Dovlo and Martineau (2004), Eastwood et al. (2005), GCIM (2005), Hagopian et al. (2004), Forcier et al. (2004), Padarath et al. (2004), Pang et al. (2002), Stilwell et al. (2004), Vujicic et al. (2004), WHO (2006).

³ See Bundred and Levitt (2000), Martineau et al. (2002) and Bach (2004) for a historical perspective.

⁴ Stilwell et al. (2004).

⁵ Hagopian et al. (2004), Buchan et al. (2003), Forcier et al. (2004).

⁶ In countries with better opportunities, such as India, some health workers do return (Eastwood et al. 2005).

⁷ Dixon et al. (2002) for example report a HIV/AIDS prevalence rate of 20% for South African nurses.

broader research project examining the economic effects of the medical brain drain on both receiving countries and sending countries.⁸

The remainder of the paper is organised as follows. Section 2 reviews empirical literature applied to the economic effects of health and health care provision, focusing on Computable General Equilibrium (CGE) models. We find that the economic impacts of endogenous changes in health provision on the health of the population, well-being and effective labour supplies are relatively little researched. Section 3 zooms in on the applied international migration literature. Global welfare gains are a well-established result of this literature, with developing countries gaining especially from (temporary) out-migration of unskilled labour in which they are relatively abundant. The impact of liberalising the movement of skilled workers on global (and developing country) welfare is a lot less clear due to the more likely to be permanent loss of scarce human capital, i.e. the brain drain from developing to developed countries. On top of that the *medical* brain drain is likely to have associated adverse (positive) health and welfare consequences for developing source (developed destination) countries, an aspect which has not been explicitly quantified so far. Section 4 presents an overview of the evidence on migration flows and associated remittance behaviour of medical personnel from developing to developed countries, underlying causes and associated health and welfare impacts. The evidence suggests that, while medical migration flows are multi-directional both within and across countries, particularly English-speaking countries in Sub-Saharan Africa and the Caribbean with a relatively small base of health workers and high burden of disease are likely to lose from the medical brain drain to the benefit of English-speaking countries in the North, most notably the UK and the USA. Section 5 documents current policies on international (medical) migration and their influence on observed and expected future migration flows, and discusses the agenda for the future. The suggested way forward is concerted action by all relevant stakeholders, which is country-led and accords to a commonly agreed international framework to manage medical migration flows so that brain drains are turned into gains. The final section concludes.

⁸ A first paper tackles the receiving countries' perspective, taking the UK as an archetype OECD economy which imports medical services, whereas a second paper tackles the sending countries' perspective.

2. Macro-economic models of changes in health (provision)

The interactions between health care, health and the remainder of the economy are multiple and complex. On the one hand, changes in income impact upon the consumption and/or provision of health care and other goods, which affects the health of populations in terms of mortality and morbidity (illness). On the other hand, changes in health impact upon the well-being of populations, with associated consequences for labour market participation, productivity and income. While the interdependencies between health care, health and the rest of the economy are now widely acknowledged, economic models which are used to assess these generally do not incorporate the main channels through which interactions take place.

The majority of empirical studies employ econometric analysis and usually conceal or ignore the general equilibrium effects of changes in health and health care across sectors, factors, households and their implications for the government budget.⁹ The applied literature focusing on general equilibrium effects of changes in health and health care on the economy is small but diverse in terms of application area, the majority having a developing country context.¹⁰ The majority of CGE studies that exist can be arranged into three groups to show the diversity in research themes; they are, in chronological order, models of health or health care as a basic need (Basic Needs models), CGE analyses of health care as having an external effect (Externality models) and studies of epidemics (HIV/AIDS models). Each strand will be shortly discussed below.

A related strand of Health Sector models¹¹ claims to be of the general equilibrium type, but since the model domain spans health care markets only and abstracts from the “rest of the world” they are truly partial in nature. These models are typically applied to developed countries and feature the behaviour of patients, general

⁹ Econometric models focusing on multiple linkages between health, health expenditures and economic growth include Bhargava et al. (2001), Bloom and Canning (2000), Bloom, Canning and Jamison (2004), Bloom et al. (2001, 2004), Crémieux et al. (1999), Ettner (1996), Hamoudi and Sachs (1999), Hitiris and Posnett (1992), Jamison et al. (2003), Knowles and Owen (1997), Mayer (2001a,b), Pritchett and Summers (1996), Strauss and Thomas (1998), Stronks et al. (1997) and Thomas (2001).

¹⁰ The exceptions are Lee and McKibbin's (2003) study of the global economic effects of SARS based on the G-Cubed (Asia Pacific) model and Smith et al.'s (2005) static UK model of the macroeconomic impact of antimicrobial resistance.

¹¹ Chatterji and Paelinck (1991) develop a purely theoretical general equilibrium model. Canton and Westerhout (1999a, b) and Folmer et al. (1997) construct a model applied to the Dutch pharmaceutical and health care market respectively, which are employed to analyse financial reform measures.

practitioners, medical specialists, pharmacists, drug producers (brand name and generic), parallel importers, insurance companies and hospitals and the various interrelationships between them. Special attention is devoted to the presence of market failures such as information asymmetries between patients, physicians and pharmacists (principal-agency problems) and imperfect competition in the market for pharmaceuticals caused by patenting. Although the detailed level of analysis of medical care represents a constructive addition to the CGE literature applied to changes in health and health care, their partial character precludes general equilibrium analyses such as resource claims of health care (i.e. competition for scarce factors of production such as capital and labour), government budget implications and the impact on effective labour supply of improved health, which are crucial for our understanding of the economic impact of health provision.

Basic Needs models

The earliest type of models that acknowledge the economy-wide effects of improved health, Basic Needs models,¹² were designed to implement the basic needs approach to development of the 1970s into a comprehensive framework, with its overarching goal of basic needs satisfaction. Improved health features in terms of demographic variables, working time and labour productivity effects. However, health and health policy fulfil only a minor role and it is virtually impossible to disentangle the effect of improved health within counterfactual simulations. Furthermore, Basic Needs models typically are recursive dynamic, applied to developing countries and by virtue of the latter, suffer from lack of data, a rather *ad hoc* approach to modelling of economic behaviour (not based on micro-economic optimisation behaviour) and abstraction from several general equilibrium elements (such as endogenous prices and a government budget).

Externality models

Externality models account for the presence of external effects, such as health, education and environmental effects, in a CGE framework. To our knowledge only

¹² Vianen and Waardenburg (1975) focus entirely on health care (in Tanzania) and model the working time effect of improved health by postulating that the number of people recovering or dying is a function of the number of treatments, next to those who recover spontaneously. In van der Hoeven's (1987, 1988) Kenyan model health is restricted primarily to affect demographic variables. Kouwenaar's (1987) model for Ecuador also includes a labour productivity effect via labour augmenting technological progress.

one CGE model of health externalities exists, that by Savard and Adjovi (1997).¹³ Health improvements appear endogenously in the form of improved labour productivity by implementing labour-augmenting technological progress in production (as a function of government expenditures on health relative to the base year) which influences the optimal combination of inputs in production and relative wages.

The main aim of the model, and indeed of most externality models, is to verify whether the standard CGE result of (small) economic benefits from trade liberalisation holds in the presence of positive health and education externalities. The conclusion is negative as cuts in government expenditure on health and education, aimed at maintaining the government deficit, have negative spill-over effects on domestic product and public sector employment, household income and welfare.

In contrast to Basic Needs models, this model is firmly grounded in microeconomic optimisation behaviour and accounts for various inter-sectoral linkages. However, it too is applied to developing country issues in which health is only of secondary importance. Further caveats are a lack of dynamic effects, no distinction between working and non-working or age groups, and absence of endogenous labour supply effects (i.e. the impact of better health on working time) and utility gains from improved health.

HIV/AIDS models

The most recent class of models of HIV/AIDS¹⁴ assess the economic impact of HIV (Human Immunodeficiency Virus) and AIDS (Acquired Immune Deficiency Syndrome) using (recursive) dynamic CGE analysis. Generally, with the exception of Dixon et al. (2004), this literature models the negative health consequences of the pandemic by imposing exogenous demographic and behavioural scenario's on the

¹³ A selection of environmental CGE models featuring side effects on health care is: Vennemo (1997), Beghin et al. (1999), Bruvoll et al. (1999), Garbaccio et al. (2000) and Li (2002).

¹⁴ Kambou, Devarajan and Over (1992) implement the impact of HIV/AIDS on the Cameroonian economy by reducing growth rates for labour supply by skill type. Arndt and Lewis's (2000, 2001) South African model incorporates a variety of demographic and behavioural effects (household and government responses to palliate the negative consequences of the pandemic). The impact of the HIV/AIDS pandemic on the rate of skill accumulation via reductions in education spending is assessed by Arndt and Wobst's (2002) Tanzanian model and Arndt's (2003) model for Mozambique. Finally, Dixon et al. (2004) models the impact of the HIV/AIDS pandemic and health interventions on the Botswana economy. Whereas the pandemic and the mitigating effects of two health policies are endogenously modelled, other health expenditures are assumed not to affect the health of the population, the labour force and (this is true for all policies) population well-being.

economy.¹⁵ Typical features of the pandemic are that it reduces labour supply by skill type, factor productivity, and increases household and government expenditures on health care at a cost of expenditures on other goods and savings. Under these assumptions the literature's main finding is that the slow-down in physical capital accumulation (due to lower savings and investments), productivity growth, population growth and human capital accumulation (due to a fall in supply and demand for education) reduces economic growth and results in a fall in per capita income in the long term compared to a fictional "No-AIDS" scenario.

HIV/AIDS models share with the foregoing strands of literature the application to developing countries and associated data problems. Relative to Basic Needs and Externality models, HIV/AIDS models are however more sophisticated in the sense that they model the various channels through which changes in health, albeit negative, affect the economy in greatest detail. Most likely due to the incurable nature of the disease, the HIV/AIDS studies abstract from any positive feedback effect from health (and other) expenditures to population health, well-being and labour supply.

From the foregoing analysis we can conclude that, while each of these strands of literature has its own merits, the existing models do not comprehensively assess the endogenous impact of changes in health care provision on the health of the population, the labour force and its impact on production, income and welfare (i.e. well-being or utility) over time in a (developed country) CGE setting. This caveat is addressed in the remaining two papers of this research project, in which we model the economic impacts of medical migration in a (albeit static) CGE context both from a sending and a receiving country's perspective, whilst recognising the simultaneous effects of consequent changes in health on effective labour supplies, population welfare and the resource claims made by the health care sector.

¹⁵ This is also the method used by Smith et al.'s (2005) static UK model of the macroeconomic impact of antimicrobial resistance, where antimicrobial resistance impacts upon labour supply, inputs productivity and health care delivery costs. Hence, while modelling a different health problem, this model bears the same characteristics as HIV/AIDS models and suffers from the same caveats.

3. Macro-economic models of international labour migration

Economic literature unequivocally finds considerable global welfare gains from removing barriers to international migration. These gains arise as workers flow from low productivity areas (developing countries) to high productivity areas (developed countries) yielding a rise in world output.¹⁶ Given the lack of applied models which focus specifically on the movement of medical personnel, this section reviews the applied economic models that have been developed to study the effects of increased worldwide labour migration, with an emphasis on Computable General Equilibrium (CGE) models.

Hamilton and Whalley (1984)

The first (partial equilibrium) study by Hamilton and Whalley (1984) estimates that, by removing restrictions on international labour mobility, annual world income could easily rise by 100% or more, most of the gains being realised in the initial phases of migration. The latter suggests that even a small liberalisation of the international labour market brings about substantial welfare gains. The authors find that, while not all gains accrue to developing countries, the size of the gains indicates that liberalisation of migration may be the most important issue from which developing countries stand to gain.

Hamilton and Whalley (1984) point out several shortcomings with respect to the costs and benefits for source and destination countries that could be improved. Firstly, neither the loss of human capital due to out-migration (i.e. the cost of education), nor gains in human capital (for example upon return, or those generated by a rise in the expected return on education for those staying behind) are modelled.¹⁷ Secondly, compensating financial flows, i.e. remittances, are not modelled. Finally, Hamilton and Whalley do not incorporate selective (i.e. skilled) migration, as opposed to general (skilled and unskilled) migration, which could drive down wages of unskilled and worsen worldwide income distribution.

¹⁶ Bhatnagar (2004). Note that this presumes a definition of productivity directly related to pay, thereby ignoring the impact upon the health and well-being of the population.

¹⁷ Schiff (2005) shows that claims about the size and impact of the brain gain stemming from the increased expected return on education in the country of origin on welfare and growth are greatly exaggerated and that brain drain is likely to just entail a loss for developing source countries. See also the World Bank (2005b, p. 208-210).

Moses and Letnes (2003, 2004)

In an attempt to update the analysis of Hamilton and Whalley, Moses and Letnes (2003) provide estimates of the actual number of migrants and per-migrant cost/benefits associated with various levels of migration and compare these with contemporary migration flows and associated economic gains.

For the migration scenarios the authors rely on an updated model and data for three world regions, documented in Moses and Letnes (2004), with which they estimate the worldwide welfare gains of a full relaxation of migration controls to be US\$3.4 trillion, 9.6% of real world GDP in 1998, much higher than the US\$0.58 trillion they predict for 1977.¹⁸ These are, as in Hamilton and Whalley (1984), generated mostly in the initial phases of migration.

The migration flows associated with the various migration scenarios are found to be very large; in the conservative scenario of a 1% relaxation of migration controls, the model generates 44 million migrants (5% of the population in the developed world). The same is true for per-migrant gains (estimates are almost nine times larger than those from other studies), with total welfare gains of US\$84 billion by large out-competing the gains of alternative development strategies. These accrue primarily to the developed region (per-migrant gain of \$3600), whereas the developing regions lose out (per-migrant losses of \$1000 for middle-income and \$2700 for poorest countries).¹⁹

Whilst having updated the study by Hamilton and Whalley (1984), Moses and Letnes's (2003, 2004) analysis still suffers from the same shortcomings mentioned previously. Notably the absence of remittances might, as mentioned by the authors, explain why the developing regions are worse off with increased international labour mobility.

¹⁸ Moses and Letnes (2004) give lowest and highest estimates of US\$1.97 trillion and US\$ 55.04 trillion respectively.

¹⁹ In an attempt to produce more realistic model outcomes, the authors subsequently increase the efficiency difference separating rich and poor countries to rather unrealistic levels (unrealistic in the sense that at some point migration flows reverse). This adjustment results in a migration flow in the 1% scenario of 12 million people (1.3% of the developed world population), generating a lower but still significant overall welfare gain of \$5 billion. However, since these outcomes are based on unrealistic migration assumptions, Moses and Letnes argue that the original model is probably producing better estimates of the potential gains of international labour migration.

Iregui (2003)

Iregui (2003) is one of the first to distinguish between different types of labour, the skilled and the unskilled. Using a multi-regional CGE model, she finds that a removal of the restrictions on labour generates considerable global welfare gains, of in between 15% to 67% of world GDP. These gains are reduced in the presence of a segmented labour market to a level of 13% to 59% of world GDP, since there are less opportunities for skilled and unskilled labour to reallocate, and fall to a level of 3% to 11% of world GDP if only skilled labour is allowed to migrate, explained by the fact that the skilled form only a small proportion of the developing world's work force. In the latter case, a relatively large number of skilled workers migrate (59%-73% of skilled labour endowments of developing regions, compared to 35%-50% for skilled and unskilled labour migration) so that migration costs (calculated as the transport costs of migrating people) outweigh welfare gains, producing an overall welfare loss.

In line with the previous studies, Iregui (2003) shows that when skilled and unskilled workers migrate, wages in the regions of origin (destination) rise (fall) and capital rents fall (rise) since labour (capital) has become relatively scarce. Skilled labour benefits relatively more compared to unskilled labour since they are relatively scarce in the developing regions, and more so after migration. When only the skilled migrate, skilled workers in the regions of origin gain, whereas unskilled workers and capital owners are worse off in spite of increases in their remuneration. In destination regions, skilled wages fall, whereas unskilled wages and capital rents rise.

The author adjusts her analysis for three factors that are likely to affect the results: transaction costs, international capital mobility and selective labour mobility between particular developing and developed regions. The introduction of transaction costs associated with migration is shown to reduce welfare gains and migration costs fall due to reduced migration flows. Adjusting the model for capital mobility (where the unskilled remains fixed) improves aggregate welfare gains, though the effect on the remuneration of capital is smaller due to relatively small size of capital flows compared to migration flows (7% of world capital endowments, as opposed to 56% of world labour endowments). With selective labour mobility the aggregate welfare improvement depends on the size of the region of origin's labour endowment. An

obvious factor missing from this analysis is the impact of remittances which will flow back from regions of destination to regions of origin.

Walmsley and Winters (2003), Winters (2003b), Winters et al. (2003)

In a series of papers, Winters and others analyse the economic impact of liberalising GATS Mode 4, i.e. the temporary movement of natural persons (TMNP) from developing to developed countries. Using a static version of the Global Trade Analysis Project (GTAP) model, the authors find that increasing the inward mobility of skilled and unskilled labour by only 3% of the developed countries' work forces, just a fraction of the flow possible from a WTO arrangement on Mode 4, yields welfare gains of \$156 billion a year (approximately 0.6% of world income in 1997), shared over all countries. Most of these gains stem from increased unskilled rather than skilled labour mobility, stemming from the relative abundance of the unskilled in developing countries and the relatively large size of the productivity gap between host and home countries for this type of workers.

Whilst TMNP has the benefit of avoiding political costs associated with permanent migration (i.e. threat to culture or integration and benefit claims), the authors also expect gains from migration to increase in time due to the ageing and skill-upgrading of populations in developed countries.²⁰ The only challenge posed by TMNP is to ensure that local unskilled workers in developed countries are not worse off by the inflow of migrant workers, which could be done via some form of compensation in the short run and education/training and attention to asset distribution in the long run.

The distributional analysis of this study is the most sophisticated of all studies discussed so far; it accounts for remittance flows and distinguishes between home and host country residents, defined as the set of people in a country respectively before and after migration occurs, and temporary migrants/workers. The results indicate that the original residents of developing source countries benefit most due to temporary migrants earning a higher wage abroad. While migrants send remittances back home, the permanent residents of developing countries lose out due to a fall in remunerations

²⁰ As Hollingsworth et al. (2005) rightfully points out, this is only true if one is willing to assume that absorption of TMNP is frictionless, i.e. there is full employment and wages fall so as to preserve the equilibrium in the labour market following migration.

to other factors, including capital. The original residents of developed countries are also better off due to higher capital rents and tax revenues.

Global Economic Prospects 2006

The Global Economic Prospects 2006 (GEP) focuses on the economic implications of remittances and migration from developing to high-income countries and is the latest study presenting estimates of the size of the welfare gains of migration.²¹ The GEP's main finding is that migration of 3% of the labour force of high-income countries over the period 1970-2000 yields a global welfare gain of \$356 billion (an 0.6% increase in global income). This welfare gain exceeds that of global trade reform and primarily accrues to the poorest developing regions, though developed countries gain as well.²²

Compared to the previous studies, the analysis is novel in mainly two respects. Firstly, it takes into account differences in purchasing power between high-income and developing countries, which deflates the welfare gains for migrants. Secondly, it distinguishes between natives in high-income and developing countries, new migrants and old migrants in high-income countries. The latter two are considered to be closer substitutes compared to new migrants and natives so that earlier migrants experience a fall in wages and a fall in income of 6% following migration. Natives in high-income countries experience income gains of 0.4% since the return to capital increases which offsets the marginal decline in wages. In contrast to Walmsley and Winters' work, natives in developing countries gain as well (by 0.9%), which is primarily explained from the remittances from new migrants and increased wages of remaining labourers. The main beneficiaries, however, are new migrants who see their incomes rise by 200%.

In conclusion, economic models suggest that the migration of workers leads to considerable global welfare gains. A relatively large part of the welfare gains accrue to developing countries and can be attributed primarily to (temporary) increased unskilled labour migration. The impact of liberalising the movement of skilled workers on global welfare, and more specifically developing country welfare, is a lot

²¹ World Bank (2005c). The study uses the (dynamic) LINKAGE model, which is based on GTAP release version 6.0.

²² The findings of GEP are comparable to that of Walmsley and Winters when adjusting the assumed productivity catch up of new migrants from 50% of the wage differential between developing and high-income countries to 75% as used in GEP. This assumption seems more realistic since much of the observed migration is permanent rather than temporary.

less clear due to the effect of the (more likely to be permanent) loss of scarce human capital to source countries, i.e. the brain drain. The remaining two papers of this research project attempt to address this caveat, by modelling in greater detail the migration of skilled health workers, i.e. the “medical brain drain” from developing countries to developed countries.

The focus on medical migration also allows us to address another caveat of the existing literature on migration, which is to analyse the associated adverse health (and welfare) consequences for many developing countries, particularly in Sub-Saharan Africa, that already suffer from severe medical workforce shortages and, their mirror image, the associated positive health (and welfare) consequences for developed countries, such as the UK, whose health care systems are rationed by limited public funding. Accounting for population health effects associated with the international movement of health workers may well lower global welfare gains and increase inequalities across regions. This is because the health and welfare gains of an influx of health workers into developed countries with relatively well-functioning health care systems are likely to be insufficient to compensate for the adverse health and welfare consequences of the loss of scarce health workers for developing countries where (well-) functioning health care systems are usually lacking and where the burden of disease is high.

4. Patterns of international migration of health workers

This section describes the international flows of medical personnel, their causes and consequences for sending and receiving countries. Although there is a vast amount of empirical literature on medical migration (vide the extensive list of references), the available data on international medical migration flows is rather weak and patchy.²³ We thus focus on the two types of medical personnel for which international migration statistics are more reliable and more readily available and which are pivotal to the delivery of key health services in developing countries, doctors (physicians) and nurses. We further restrict ourselves to survey studies, where needed supplemented with anecdotal evidence, so as to extract the general patterns of international medical migration.

General patterns: carousels and conveyer belts

Exports of medical personnel are mostly from Southern hemisphere countries in Africa, the Caribbean, Southeast Asia and South Asia, whereas imports are mostly from Northern countries, including Australia, Canada, France, Belgium, the UK and the USA.²⁴ The former can be subdivided into surplus countries which voluntarily send health workers abroad, including Cuba, India, Egypt and the Philippines, and shortage countries where out-migration of health personnel is involuntarily, mostly in Africa, the Caribbean and Asia.²⁵ The latter are generally shortage countries, though some argue that there are also problems with incentives, productivity, skill-mix, geographical imbalances and supplier-induced demand.²⁶

Migration flows between these Southern and Northern countries are multi-directional. Medical migration can be described as a “carousel”, in which doctors and nurses migrate from one country to another that offers better working and/or living conditions.²⁷ In the past for example, doctors from Tanzania, Kenya or Nigeria would

²³ Diallo (2004) elaborates on sources, uses and challenges for migration data.

²⁴ Alkire and Chen (2004), Bach (2003, 2006).

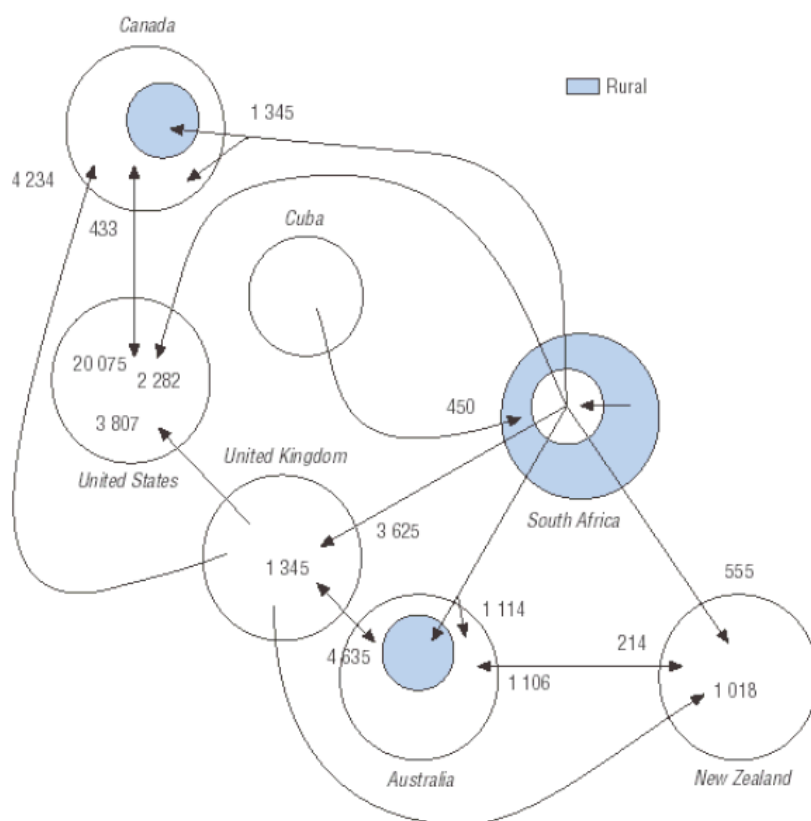
²⁵ Alkire and Chen (2004), Dovlo (2004), Buchan et al. (2003), Forcier et al. (2004), Hagopian et al. (2004), Schrecker and Labonte (2004). Some of these countries do report internal shortages of physicians (India) and nurses (Philippines), notably in rural areas. See for example Nullis-Kapp (2005).

²⁶ Bloor et al. (2006).

²⁷ Alkire and Chen (2004), Bundred and Levitt (2000), Eastwood et al. (2005), Martineau et al. (2002), Joint Learning Initiative (2004).

move to South Africa²⁸, South African doctors would move to the UK, British doctors to Canada and the USA and Canadian doctors to the USA. The obvious losers are the poorest Sub-Saharan African nations at the start of the carousel who experience a net brain drain since the carousel does not, as in the past, turn a full circle anymore.²⁹ Figure 1 illustrates the carousel for a selection of countries.³⁰ It shows that there's a considerable amount of "cycling" between English-speaking developed nations.³¹

Figure 1: A carousel of health workers - external migration



Source: Alkire and Chen (2004), Figure 9

Other studies use the term “conveyor belt” to describe medical migration flows. This term captures the internal medical migration flows that are prompted by external medical migration flows and vice versa.³² For example, a vacancy left behind by an emigrant health worker in a large city forms a good career opportunity for a health

²⁸ This is not the case anymore as, since 1995, South Africa has stopped recruiting doctors from other Organisation of African Unity countries (Bundred and Levitt, 2000).

²⁹ Eastwood et al. (2005).

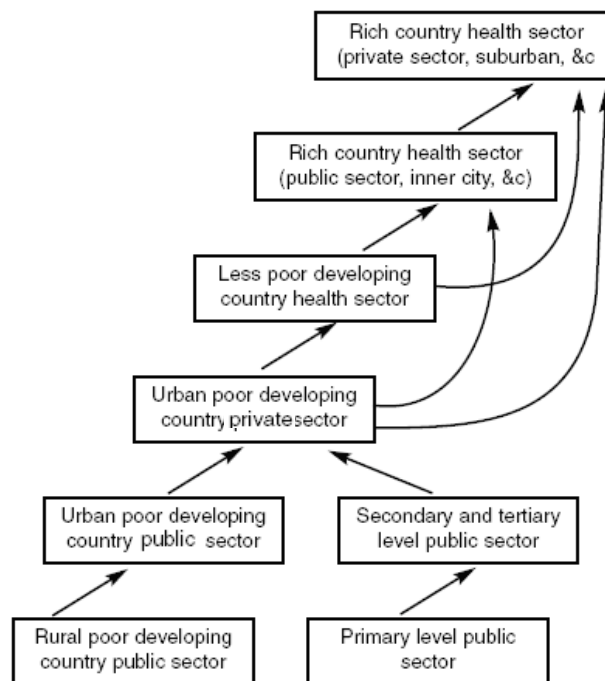
³⁰ Note that some health workers in the north also temporarily move south to gain work experience, but these amounts are relatively small.

³¹ Mullan (2005).

³² Padarath et al. (2004), Schrecker and Labonte (2004).

worker in a rural area, where working and living conditions are worse.³³ Also, internal mal-distribution of health workers attracts health workers from surplus countries, as is illustrated by Cuban doctors filling in vacancies in Southern Africa.³⁴ Within countries health workers tend to move from the public to the private sector and from rural to urban areas with better working and/or living conditions.³⁵ Figure 2 illustrates.

Figure 2: The conveyor belt of health workers - internal-external migration linkages



Source: adapted from Schrecker and Labonte (2004), Figure 1

International migration flows of doctors

The most recent comprehensive study on the international physician migration is Mullan (2005). He investigates the international composition of physicians in the United States, the United Kingdom, Canada and Australia and computes an emigration factor for the source countries of the immigrant physicians, which represents a relative measure of the physician brain drain. Mullan finds that in between 23 and 28 percent of physicians in these countries are international medical graduates, with in between 40 and 75 percent of these coming from lower-income countries (using the World Bank classification of countries). The major source

³³ Eastwood et al. (2005).

³⁴ Bach (2003, 2006), Chikanda (2004), Padarath et al. (2004), Skeldon (2005), Schrecker and Labonte (2004).

³⁵ Awases et al. (2004), Dovlo and Martineau (2004).

countries are India (59,523 physicians), the Philippines (18,303) and Pakistan (12,813). However, using the physician emigration factor, the drain is relatively high for countries in sub-Saharan Africa and the Caribbean. The UK, Canada and Australia draw substantially from South Africa, whereas the USA draws relatively heavily from the Philippines. Table 1, 2 and 3 display the main results.

The four recipient countries account for the bulk of migrants from lower-income countries, so that the patterns discerned by Mullan (2005) are indicative of the extent of the brain drain of physicians. Nevertheless, the study does not tell the whole story. Firstly, it excludes recipient countries other than the USA, UK, Canada and Australia. This includes countries with fewer than 1000 physicians for which the extent of the brain drain is likely to be relatively high. Furthermore, the study cannot discern trends over time, since it uses World Health Organization (WHO) data from the most recent year. Finally, it conceals the fact that many foreign-trained physicians migrate to attend post-graduate training.³⁶ Mullan (2005) does include some data for other OECD countries to draw comparisons: only three other OECD countries report shares of international medical graduates in the physician work force of more than 10 percent. These countries are New Zealand (34.5%), Switzerland (17.8%) and Norway (12.7%). For France and Japan these figures are 3% and 1% respectively. Germany is the major source country of physicians for Switzerland and Norway, providing 60% and 33% of physician supply respectively, whereas New Zealand's physician source countries are similar to that of Australia (being the UK, India and South Africa).

Mullan's (2005) findings are in line with an earlier survey study of Hagopian et al. (2004) on the migration of physicians trained in Sub-Saharan Africa into the world's largest "consumer" of health workers, the USA. This study finds that more than 23% of physicians in the USA received their medical training abroad, mostly (64%) in low-income or lower-middle-income countries. A total of 5,334 of these come from Sub-Saharan Africa, representing more than 6% of the stock of physicians in Sub-Saharan Africa. Furthermore, most of these Africans come from three countries, Nigeria, South Africa and Ghana, and 79% of these are trained at only 10 medical schools.

³⁶ Simoens and Hurst (2006).

Table 1: International Medical Graduates (IMGs) in the USA, UK, Canada & Australia

Country	No. of Physicians per 100,000 Population	Total No. of IMGs	% of IMGs in Workforce	% of IMGs from Lower-Income Countries	% of IMGs from the Three Other Developed Countries
United States	293	208,733	25.0	60.2	6.5
United Kingdom	231	39,266	28.3	75.2	2.5
Canada	220	15,701	23.1	43.4	22.3
Australia	271	14,346	26.5	40.0	33.5

Source: Mullan (2005), Table 1

Table 2: Top 5 source countries of IMGs in the USA, UK, Canada and Australia

United States		United Kingdom	
Source Country	No. of IMGs from Source Country (% of Workforce)	Source Country	No. of IMGs from Source Country (% of Workforce)
India	40,838 (4.9)	India	15,093 (10.9)
United States (U.S. IMGs)*	25,380 (3.0)	Ireland	2,845 (2.1)
Philippines	17,873 (2.1)	Pakistan	2,693 (1.9)
Pakistan	9,667 (1.2)	South Africa	1,980 (1.4)
Canada	8,990 (1.1)	Egypt	1,592 (1.1)

Canada		Australia	
Source Country	No. of IMGs from Source Country (% of Workforce)	Source Country	No. of IMGs from Source Country (% of Workforce)
United Kingdom	2,735 (4.0)	United Kingdom	4,664 (8.6)
South Africa	1,754 (2.6)	India	2,143 (4.0)
India	1,449 (2.1)	New Zealand	1,742 (3.2)
Ireland	1,164 (1.7)	South Africa	1,253 (2.3)
Saudi Arabia	658 (1.0)	Sri Lanka	627 (1.2)

Source: adapted from Mullan (2005), Table 2

Table 3: Emigration factors by region

Region	Location of Physician's Practice		Emigration Factor [†]
	Recipient Countries [†]	Source Countries	
	<i>no. of physicians</i>		
Sub-Saharan Africa	13,272	82,100	13.9
Indian Subcontinent	78,680	656,876	10.7
Caribbean	8,010	87,443	8.4
Middle East and North Africa	27,010	489,464	5.2
Central and South America	12,103	707,416	1.7
Europe and Central Asia	44,988	2,741,717	1.6
East Asia and Pacific	39,910	2,808,400	1.4
North America	14,519	1,076,398	1.3

* The emigration factor for a region is computed as $[A \div (A + B)] \times 100$, where A is the number of physicians from countries in the region who have emigrated to work in one of the four recipient countries (either in their own or in another region), and B is the total number of physicians practicing in countries of the region.

† The recipient countries are the United States, the United Kingdom, Canada, and Australia.

Source: Mullan (2005), Table 4

International migration flows of nurses

Due to the nursing shortages in many developed countries, there appears to be an upward trend in inflow of nurses from developing countries. There are several survey papers on the international migration of nurses, including Buchan et al. (2003, 2005), Buchan and Sochalski (2004) which corroborate this observation. The papers make use of the same study, supported by the WHO, the International Council of Nurses, and the Royal College of Nursing (UK), which compiled registration data from five destination countries, Australia, Ireland, Norway, the UK and the USA. The main results are described below.

The authors find a noteworthy increase in the flow of nurses into these destination countries, both in terms of absolute numbers and in proportion to new nurses becoming eligible to practice. Especially Ireland and the UK experienced a steep rise in the inflow of international nurses. The principle source countries of nurses for Ireland were Australia, India, The Philippines, South Africa and the UK. The principle source countries for the UK were (in decreasing order using the latest available data³⁷) India, Philippines, Australia, and South Africa. Since the second half of the nineties, the ratio of foreign-trained to newly licensed nurses in the USA is also on the rise. The main source countries for the USA were (in decreasing order) the Philippines, Canada and Africa (mainly Nigeria and South Africa).

The extent to which different destination countries rely on recruiting from developing or developed source countries varies significantly. Figure 3 shows that the UK, the USA and to a lesser extent Ireland are relying significantly on the recruitment of international nurses from countries that are lower-middle income and low income. In contrast Australia (Victoria) and Norway are relying mainly on nurse supply from other high-income or high-middle income countries (respectively the UK and New Zealand; other Scandinavian countries and Germany).

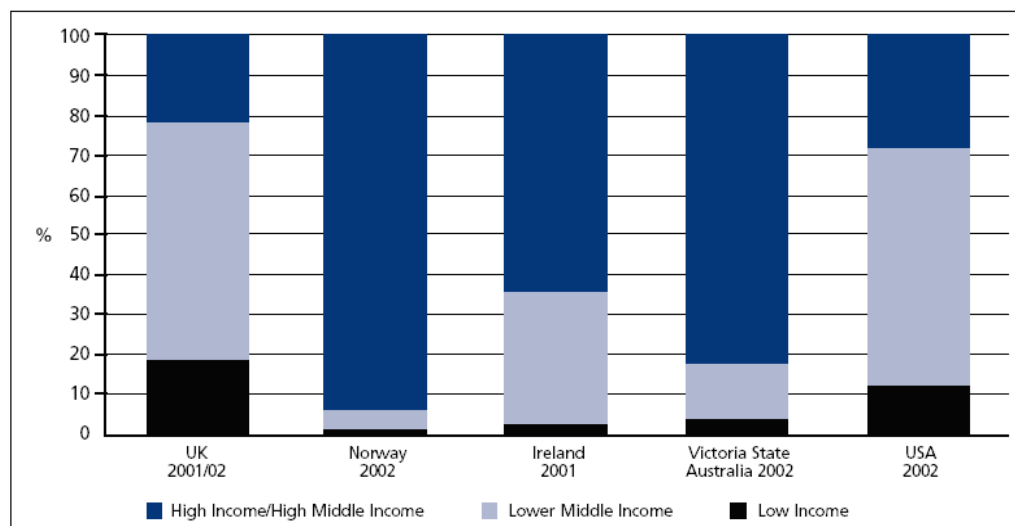
A comprehensive survey of nurse migration from the perspective of source countries in order to be able to measure the extent of the nurse brain drain to date does not exist. Buchan et al. (2003, 2005) does report data for a selection of source countries, but

³⁷ See UK paper.

these are difficult to compare due to differences in definition, reliability and reference period. The data do seem to suggest that especially English speaking Sub-Saharan African countries and countries from the Caribbean experience significant losses of the already few domestically trained nurses. This is corroborated by data on nurses and midwives working in seven OECD recipient countries reported by the WHO in the *World Health Report 2006* (Table 4, next page).³⁸

How do migration flows for doctors and nurses compare? Anecdotal evidence suggests that in absolute numbers the loss of nurses is more severe compared to the loss of physicians due to the sheer volume of nurse migration (e.g. more than 150,000 Filipino nurses and 18,000 Zimbabwean nurses work abroad).³⁹ But compared to an average of 23% of physicians trained in Sub-Saharan Africa working in the selection of OECD countries⁴⁰ - of which 14% in the UK, the USA, Canada and Australia (see Table 3) - the average of 5% reported for nurses and midwives (Table 4) is relatively small. Moreover, as Table 4 shows, figures vary widely from country to country, so that the extent of the brain drain (and gain for developed destination countries) should be assessed on a case-by-case basis relative to the stock of health workers.

Figure 3: Composition of inflow of nurses into the UK, Norway, Ireland, Australia (Victoria State) and the USA by type of source country (World Bank classification)



Source: Buchan et al. (2005), Figure 4

³⁸ WHO (2006).

³⁹ Pang et al. (2002).

⁴⁰ From WHO (2006), Table 5.2.

Table 4: Nurses and midwives trained in Sub-Saharan Africa working in the OECD

Source country	Total nurses and midwives working in home country	Nurses and midwives working in seven OECD recipient countries ^a	
		Number	Percentage of home country workforce
Angola	13 627	105	0
Botswana	7 747	572	7
Cameroon	26 032	84	0
Ethiopia	20 763	195	0
Ghana	17 322	2 267	13
Guinea-Bissau	3 203	30	0
Kenya	37 113	1 213	3
Lesotho	1 123	200	18
Malawi	11 022	453	4
Mauritius	4 438	781	18
Mozambique	6 183	34	0
Namibia	6 145	54	0
Nigeria	210 306	5 375	3
South Africa	184 459	13 496	7
Swaziland	4 590	299	7
Uganda	17 472	21	0
United Republic of Tanzania	13 292	37	0
Zambia	22 010	1 198	5
Zimbabwe	9 357	3 183	34
Total	616 204	29 597	Average 5

^a Recipient countries: Canada, Denmark, Finland, Ireland, Portugal, United Kingdom, United States of America.

Note: Data compiled by WHO from various sources.

Source: World Health Report 2006, Table 5.3

Causes

The underlying causes for medical migration are well documented in the literature (see Table 5).⁴¹ Incentives to migrate typically involve a combination of “push factors” (unsatisfactory working or living conditions in the country of origin) and “pull factors” (attractive working or living conditions, availability of positions and active recruitment in the country of destination). In general, pull factors tend to dominate as migration is only beneficial if there are vacancies in the destination country.⁴² Regarding the relative importance of financial versus non-financial factors, research by Vujicic et al. (2004) finds little correlation between the supply of medical migrants and the size of the wage differential.⁴³ This finding suggests that non-financial factors play a crucial role in the decision to migrate.

⁴¹ Ahmad (2005), Alkire and Chen (2004), Awases et al. (2004), Bach (2003), Buchan and Dovlo (2004), Buchan and Perfilieva (2006), Dovlo and Martineau (2004), Eastwood et al. (2005), Hagopian et al. (2004), Forcier et al. (2004), Pang et al. (2002), Stilwell et al. (2004), Vujicic et al. (2004), WHO (2006). The Global Commission on International Migration (GCIM, 2005) groups them under the “3Ds”; differences in development, demography and democracy. Padarath et al. (2004) also distinguishes stick and stay factors mitigating the push out of source and destination countries.

⁴² Stilwell et al. (2004), Bach (2004). Other authors, including Dovlo and Martineau (2004) claim that the opposite is true and the push out of source countries is the dominating factor.

⁴³ This counterintuitive result is explained from the relatively large size of the wage differential between source and destination countries, so that small wage increases in source countries have little impact on migration flows.

Table 5: Causes of medical migration

Push Factors

Lack of opportunities for postgraduate training

Underfunding of health service and research facilities: lack of basic medical supplies and equipment, contributing to an insecure work environment

Absence of established posts and career opportunities

Poor remuneration and conditions of service, including retirement provision

Governance and health-service management shortcomings (inefficient and unfair)

Civil unrest and personal security: human rights violations, ethnic, religious and political tensions, wars, economic collapse

Pull Factors

Opportunities for further training and career advancement

The presence of centres of medical and educational excellence

Greater financial and non-financial rewards, improved working conditions (safer and more satisfying), opportunities for remittances

Availability of posts, often combined with active recruitment by prospective employing countries

Political and economic stability, aid work, travel opportunities

Source: adapted from Eastwood et al. (2005)

A factor operating in the background of Table 5 is that the similarity of language between source and destination countries largely determines the observed pairings of source and destination countries.⁴⁴ This, for example, explains the cyclical pattern of medical migration between Australia, Canada, Ireland, the UK and the USA; between Austria, Germany and Switzerland; between Belgium and France; and between Denmark, Finland, Norway and Sweden. For some of these countries, geographical proximity clearly plays an important role.

For developing source countries, similarity of language with popular destination countries usually stems from former historic (colonial) ties. This explains the migration flows from India towards Australia, Canada, the UK and the USA; from countries in North Africa and the Middle-East to France; from Mozambique to Portugal and from Suriname (and other Dutch-speaking countries such as South

⁴⁴ Eastwood et al. (2005), Forcier et al. (2004).

Africa) to the Netherlands. In an increasingly globalising world such historic patterns are gradually fading. With the English language becoming increasingly an international language it is not surprising that the effects of medical migration on source countries are worst felt in English-speaking Sub-Saharan African countries, stemming from the “pull” of English speaking countries, especially the UK and North America.⁴⁵

Countries in the EU are also likely to benefit from increased liberalisation of labour markets and mutual recognition of qualifications. In contrast to expectations this has so far not resulted in increased movement of health personnel due to linguistic and cultural barriers. However, since the enlargement of the EU in April 2004 with ten (much poorer) countries from Central and Eastern Europe there are signs that medical migration from countries including Poland, the Czech Republic and Hungary will gain in importance.⁴⁶

Finally, the push and pull factors operate in a dynamic context. Once people have migrated from one area or country to another area or country, more people, family, friends or people from the same community, are likely to follow.⁴⁷ This is explained by the phenomenon that first-round migrants establish social networks which reduce the costs and risks of migration for those who follow.

Consequences

Consequences of medical migration can be subdivided into costs and benefits for source and destination countries. The overall welfare effects will depend on the interplay of several factors, which next to the change in the stock of human capital of source and destination countries, includes the amount of remittances flowing back from destination to source countries, the impact on labour markets in source and destination countries and the consequences for health service provision and the health status of the population in source and destination countries.

⁴⁵ Eastwood et al. (2005).

⁴⁶ Bach (2006). See Buchan and Perfilieva (2006) for a survey of health worker migration in the EU.

⁴⁷ Bach (2003), Dovlo (2005), Stilwell et al. (2004), Padarath et al. (2004).

Costs and benefits of medical migration for destination countries

The benefits of inflows of health professionals for destination countries such as the UK are obvious; rather than having to train a doctor for 5 or 6 years at a cost of approximately £220,000 or a nurse at a cost of about £12,500 to fill up staff shortages, a migrant doctor or nurse is immediately available at zero cost.⁴⁸ In this way the UK has saved £65 million in training costs for the doctors and £38 million for the nurses it has taken from Ghana since 1998, while being able to maintain or increase health provision at the benefit of population welfare.⁴⁹

Empirical evidence does not substantiate offsetting negative effects of migration on unemployment rates in destination countries: effects on wages are found to have been negative but small, and migrants seem to contribute more in taxes than they receive in social security, thereby contributing to the fiscal system and economic growth in general in industrial countries.⁵⁰

Costs and benefits of medical migration for source countries

The costs of outflows of medical personnel to developing countries are also evident. Firstly, there is a human capital loss of educated and experienced personnel, with negative spill-over effects on those who remain.⁵¹ UNCTAD estimates that each migrating health professional represents a loss of US\$184,000 to Africa, while at the same time it has unfilled vacancies and is forced to spend \$4 billion on salaries of 100,000 foreign experts which could be used to train and retain health professionals.⁵² The cost of training investment in health professionals has been estimated at US\$60 million for Ghana alone.⁵³ For South Africa, the estimated cost of training a doctor is approximately \$97,000. For a nurse this amounts to \$42,000, so that the overall loss of the investment in medical education may be estimated at approximately US\$1

⁴⁸ Eastwood et al. (2005). Note that some migrant workers need additional language/professional training (Glover et al. 2001, Forcier et al. 2004).

⁴⁹ Mensah et al. (2005). Martineau et al. (2002) state that this may hinder the development of domestic health worker supply and speaks of the perverse incentive arising from the potential cost savings to underestimate the need of workers as the gap can be filled from overseas. Whereas migrant workers are willing to work in less popular areas, they do tend to go home for public holidays and are often being lured to other countries with competitive salaries complicating work force planning.

⁵⁰ Buchan et al. (2003), World Bank (2005a). Glover et al. (2001) estimate a net fiscal gain in 1998/99 for the UK of £2.6 billion. The challenge of migration to local workers is equivalent to that imposed by imports of labour-intensive goods from developing countries, which could easily be compensated out of the overall welfare gain of migration (Winters, 2003b).

⁵¹ These will be limited in case of temporary migration and in surplus countries such as India and the Philippines.

⁵² Eastwood et al. (2005), Pang et al. (2002), Padarath et al. (2004). See World Bank (2005c) for an overview of the costs and benefits of migration for countries of origin.

⁵³ Martineau et al. (2002).

billion, equivalent to a third of official development aid to South Africa over the period 1994-2000.⁵⁴ The loss of public subsidies for medical education is estimated at \$500 million for all emigrating skilled workers from Africa.⁵⁵ These are just few of the many examples cited in the literature. Apart from these direct losses, there are second-round effects of reductions in quality and output of health care, achievement of health outcomes, tax revenues and economic growth.⁵⁶

The benefits of migration for the source countries include long term professional networks, improved training and skills of migrant workers which benefit the source country in terms of higher productivity upon return (absent when migration is permanent), a rise in real wages for those staying behind and financial remittances from expatriates.⁵⁷ These benefits may be reduced if “brain waste” occurs and migrant health workers end up working outside the health sector or in lower skilled jobs in the country to which they move to.⁵⁸ Evidence of “brain gain” to those who stay behind in the form of an increased incentive to enter education (in view of the migration opportunity and higher wages) suggests that this gain is limited.⁵⁹ The literature also suggests that migration may operate as a “safety valve” by reducing pressures for national governments to provide employment opportunities and benefits.⁶⁰

The evidence on remittances by medical migrants

The evidence on the magnitude of world-wide remittance flows by migrant workers is mixed and difficult to establish since large proportions are transferred informally, and is therefore not recorded in official statistics. The World Bank estimates that in 2005 total remittances world-wide exceeded US\$232 billion, of which developing countries received US\$167 billion, less than FDI inflows but larger (and more stable) than capital market flows and official development assistance.⁶¹ There is little information

⁵⁴ Example drawn from Alkire and Chen (2004).

⁵⁵ Chen and Boufford (2005).

⁵⁶ Awases et al. (2004), Forcier et al. (2004), Stilwell et al. (2003), World Bank (2005a).

⁵⁷ Pang et al. (2002), Stilwell et al. (2003), Forcier et al. (2004).

⁵⁸ Bundred and Levitt (2000), Dovlo (2005), Pang et al. (2002), Martineau et al. (2002), World Bank (2005b, p. 208-210).

⁵⁹ World Bank (2005b, p. 208-210), Schiff (2005).

⁶⁰ Martineau et al. (2002) cites a Ghanaian official who pointed out that if all 1500 doctors abroad returned, the government would only be able to provide employment for 200 of them. Moreover, Bach (2003, 2006) suggests that many health professionals would not have stayed in the public health sector anyway. In this respect, Alkire and Chen (2004) and Skeldon (2005) point to the importance of wider policy failures.

⁶¹ World Bank (2005c). Unrecorded flows are conservatively estimated to add at least 50% of official remittance flows.

on how much can be attributed to health workers, but the general patterns are described below.

Health workers, who generally come from higher income households that are in lesser need of remittances and, in particular, those who migrate permanently seem to remit less than lower skilled short-term migrants.⁶² Evidence suggests that doctors generally migrate permanently and so remit insignificant amounts, while nurses tend to migrate temporarily and remit a lot more.⁶³ Other studies point out that, while fewer high skilled migrants remit, when they do they may well remit more, especially when lucrative investment opportunities are involved.⁶⁴ More importantly however, the magnitude of outward remittances largely depends on where migrants come from; countries such as China, India, Philippines, Egypt and Cuba, with a surplus of health professionals, actively send them abroad since remittances are considered an important source of revenues. For the Pacific Islands of Tonga and Samoa the income from remittances is estimated to equal total GDP, and remittances by migrant nurses not only exceed those made by other migrants but also outweigh the cost of additional human capital in nurse training.⁶⁵ Similarly, remittances by Philippine physicians were found to outweigh economic losses of emigration.⁶⁶ In contrast, recorded remittances to Sub-Saharan Africa are highly volatile and comprise the lowest dollar amounts of any other poor world region (less than US\$5 billion), primarily due to a high level of informal flows stemming from strong intraregional migration and an underdeveloped financial sector.⁶⁷ There are some exceptions, such as Nigeria which is said to receive remittances from Nigerians abroad in multiples of the amount of official development assistance to this country.⁶⁸ This suggests that remittance flows vary by country, as will the development impact.

The evidence on the impact of medical migration on health service provision and health status

It is all too easy to blame the health status crisis in many developing countries, in particular in Sub Saharan Africa, on the exodus of health workers. Some argue that it

⁶² Martineau et al. (2002), World Bank (2005a).

⁶³ Dovlo and Martineau (2004), Padarath et al. (2004).

⁶⁴ Lowell and Findlay (2002).

⁶⁵ Connell and Brown (2004).

⁶⁶ Forcier et al. (2004), Diallo (2004).

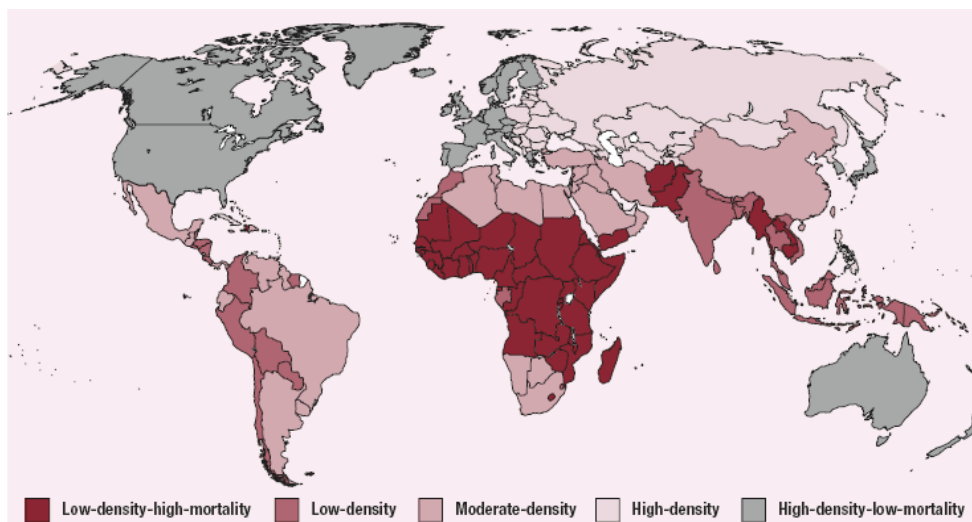
⁶⁷ Hagopian et al. (2004), Stilwell et al (2003), World Bank (2005a).

⁶⁸ Dovlo and Martineau (2004).

is the lack of employment opportunities which generates out-migration in the first place.⁶⁹ As shown previously, low pay and lack of employment prospects are important push factors of medical migration. Out-migration could therefore well be a symptom of deeper economic and political failures.

The international migration of health workers from developing source countries to developed destination countries does pose challenges for human resource management and health service delivery, in particular for the former countries. The loss from migration generally outstrips production of medical personnel in these countries, which can be explained by a lack of medical schools.⁷⁰ In fact, human resources are often cited as the biggest constraint to health service expansion in both Northern developed and Southern developing countries.⁷¹ As shown before, within the diverse group of developing countries, the extent of the brain drain is particularly felt by countries with relatively limited medical skill base, i.e. Sub-Saharan Africa and small island economies of the Caribbean.⁷² This is the so called “inverse care law”, that countries most in need of health care resources are getting the least (Figure 5).⁷³

Figure 5 Global variation in the density of doctors, nurses and midwives



Source: Joint Learning Initiative (JLI, 2004), Figure 1. Low density and high density clusters are divide into high and low under-five mortality. Among low-density countries, 45 are in the low-density-high mortality category. These are predominantly countries from Sub-Saharan Africa.

⁶⁹ Alkire and Chen (2004), Skeldon (2005).

⁷⁰ Hagopian et al. (2004). Awasas et al. (2004) shows that in some countries, including Cameroon, Ghana, Senegal, South Africa, Uganda and Zimbabwe, the numbers of registered health professionals, apart from nurses, actually increased.

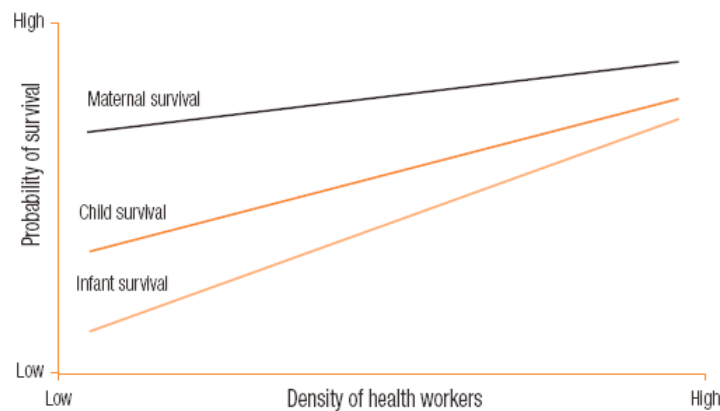
⁷¹ Martineau and Dovlo (2004), Narasimhan et al. (2004).

⁷² Eastwood et al. (2005), Mullan (2005), Skeldon (2005).

⁷³ Dovlo (2005).

The inverse care law is a matter of concern since the workforce is crucial for advancing health. Recent reports by the WHO and the Joint Learning Initiative (JLI; a network of more than 100 global health leaders) show that health worker density is positively associated with immunization coverage, primary care service provision and infant, child and, most notably, maternal survival (Figure 6).⁷⁴

Figure 6: Association between worker density and survival rates



Source: World Health Report 2006, Figure 1

Consequently, for many countries the health-related Millennium Development Goals are likely to get even further out of reach. The WHO estimates that there are currently 57 countries with critical health worker shortages. These countries are unable to meet the health-related Millennium Development Goals in 2015. The deficit for these countries is estimated at 2.4 million doctors, nurses and midwives, compared to a global shortage of more than 4.3 million workers.⁷⁵ The burden falls relatively heavily on Sub-Saharan Africa, which has to triple its current numbers of health workers (equivalent to 1 million more health workers – including more than 600,000 nurses), whereas the absolute burden is greatest in South-East Asia.⁷⁶ The shortfall for doctors in Sub-Saharan Africa is estimated by some to equal approximately 700,000 showing that the data, while giving an indication of the scale of the problem, are rather imprecise.⁷⁷

⁷⁴ WHO (2006), JLI (2004).

⁷⁵ WHO (2006).

⁷⁶ Data are drawn from JLI (2004) and are slightly higher than those provided by the WHO: the WHO (2006) estimates that Sub-Saharan Africa needs approximately 800,000 more health workers to reach the MDGs, an increase of 140%. The figure for nurses needed in Sub-Saharan Africa is drawn from Buchan and Calman (2004).

⁷⁷ Munjanja et al. (2005).

With health service provision in source countries deteriorating due to the outflow of medical personnel, a self-sustaining vicious circle results in which medical migration increases the gap between working and living conditions between source and destination countries, thereby encouraging further migration.

Overall welfare effects – the need for better data and quantitative studies

The overall welfare effects of medical migration on source countries, destination countries and for the world as a whole depend on how the previously discussed factors add up. The debate currently is polarised between the critics and proponents of medical migration.⁷⁸ The former accuse the developed countries of the North of “silent theft”, or “acting like a vacuum cleaner” of or “poaching” labour from developing countries of the South that can ill afford to lose health personnel. They stress the negative health externalities caused by the out-migration of individual health workers for which developing countries are not compensated. The latter are proponents of increased globalisation, including free trade and the international movement of labour. They stress the right of individuals in enhancing their career and earnings’ opportunities, the benefits from remittances and the benefits from knowledge spill-over effects.

Remittances, although benefiting the economy as a whole, are generally not thought of as making up for the human capital loss of medical professionals since the repatriated income will not find its way into investments in health care given the lack of health professionals to do so.⁷⁹ Nevertheless, empirical studies to take into account such broader and long-term outcomes into consideration are lacking, so that the overall welfare effects remain unclear. This prompts further quantitative research on the causes and consequences of medical migration and appropriate policy responses.⁸⁰ It is evident that in order to carry out such research properly, data availability and monitoring in this field should drastically be improved. Since the causes and

⁷⁸ Alkire and Chen (2004), Bach (2006), Chen and Boufford (2005).

⁷⁹ Eastwood et al. (2005), Hagopian et al. (2004), Martineau et al. (2002), Schrecker and Labonte (2004), Stilwell et al. (2003).

⁸⁰ Two forthcoming papers attempt to do this; the first from the receiving countries’ perspective, taking the UK as an archetype OECD economy which imports medical services, the second from the sending countries’ perspective.

consequences of medical migration are highly country-specific, outcomes are likely to differ per country.⁸¹

Trends and expectations for the future

It was not feasible so far to comprehensively assess overall trends in the movement of health workers, since data for many countries was limited, incomplete or non-existent. Nevertheless, since the earliest study on flow and stocks of physician and nurse labour force in 40 countries carried out by the WHO in 1979⁸², the mobility of health professionals is said to have increased, especially amongst nurses.⁸³ The (anecdotal) evidence presented in this section supports this observation.

Whether this trend will continue in the near future depends on whether or not governments will interfere, unilaterally or via multilateral agreements, so as to mitigate the negative effects of medical migration. Even so, medical migration is likely to remain important given the continuing globalisation (facilitated by GATS mode IV), and given that push factors and pull factors are likely to grow in strength.⁸⁴

A large “pull” is expected from richer countries due to forces such as the ageing of the population, including the health work force, new technologies and management of chronic diseases. For example, the WHO estimates that by 2008 Great Britain will need 25,000 more doctors and 250,000 more nurses than it did in 1997. Similarly the USA will need more than one million additional nurses by 2020. Canada and Australia need 78,000 and 40,000 more nurses over the coming four to five years.⁸⁵

Also the “push” out of developing countries is unlikely to diminish. While Sub-Saharan African countries are doing much better in terms of economic growth,⁸⁶ prospects for economic development and indeed health service provision need to improve much more so as to weaken the push. Indeed, a recent synthesis report on migration of health professionals in six countries carried out by the WHO finds that a high proportion of health workers intends to emigrate, ranging from 26% in Uganda

⁸¹ UNFPA (2006), Dovlo (2005).

⁸² Mejia et al. (1979).

⁸³ Alkire and Chen (2004), Bach (2006).

⁸⁴ Martineau et al. (2002).

⁸⁵ Data are taken from UNFPA (2006).

⁸⁶ Sub-Saharan Africa recorded a GDP growth of 4.6% in 2005, explained by very strong growth amongst resource-rich countries. Source: World Bank (2005c).

to 68% in Zimbabwe.⁸⁷ While intention is not a solid predictor of future trends, it does form a cause for concern.

5. The international policy agenda: from medical brain drain to brain gain

Flows of workers from (developing) source to (developed) destination countries depend not only on the push and pull factors encouraging health workers to migrate, but also on national and international migration policies. Political interference in the area of medical migration is motivated by the adverse impacts on resource-strapped African (and other poor) countries documented in the previous section. Policy makers need to carefully balance such policies with the universal right of individuals to move abroad to for personal gain, a right which should not be denied.⁸⁸ Given that in the future both push and pull factors are likely to remain important, it has been argued to take a positive stance towards medical migration and actively “manage” the migration flows such that they benefit both destination and source countries.⁸⁹ Policies to manage migration of health workers are directed towards push and pull factors so as to indirectly influence the extent of migration, strengthen its positive impacts and mitigate its negative impacts. This section documents national and international policy options, including bilateral and multilateral agreements, that are currently in place or which are called for in the literature.⁹⁰

Actions at the country level

Since both push and pull factors are involved, ensuring that medical migration benefits destination and source countries requires action from both developed and developing countries. Policies typically aim at increasing the training of medical personnel, retaining health professionals, especially in underserved areas, and promoting the return of migrant workers. We also briefly touch upon the role of codes of conduct, the contentious issue of compensation and how to increase (the impact of) remittance flows. Negative measures such as taxing migrants (a so-called ‘brain drain

⁸⁷ Awases et al. (2004).

⁸⁸ See for example Skeldon (2005).

⁸⁹ See for example Glover et al. (2001), Buchan and Dovlo (2004).

⁹⁰ All of the previously cited literature touches upon the policy implications. A good overview is given by Ahmad (2005), Bach (2006), Bundred and Levitt (2000), Buchan and Sochalski (2004), Buchan et al. (2003, 2005), Dovlo (2005), Eastwood et al. (2005), JLI (2004), Muula (2005), Nullis-Kapp (2005), Schrecker and Labonte (2004), Stilwell et al. (2003, 2004), WHO (2006, 2006a). See Lowell and Findlay (2002) and GCIM (2005) for an overview of policy responses to (high skilled) migration.

tax' proposed in the 1970s) or setting limits to the number of people that are allowed migrate are also mentioned in the literature but they are considered to be undesirable and ineffective for various reasons.⁹¹ Firstly migrant income has already been taxed in the destination country such that taxing that income being remitted to the country of origin would 'punish' migrants twice. Secondly, such measures are unethical in that they impair individuals' rights to move in search for better living and/or working conditions, offer no long-term solution in that they are unlikely to address the underlying causes (i.e. the push and pull factors), and may even induce illegal migration with its associated problems for both source and destination countries.

Education and training of medical personnel

A policy of educating and training medical personnel is required to reduce the number of unfilled vacancies in developing source countries and stem the pull from developed destination countries, in particular in the USA and the UK.⁹² This policy takes time, but in the long term it is the only viable solution to resolving the human resource crisis in the health sector.⁹³ Moreover, Hagopian et al. (2004) found that most of the foreign trained physicians in the USA come from only a few Sub-Saharan Africa countries and are trained at a few medical schools, suggesting that policy interventions in these few locations could be effective in stemming the brain drain. Some argue that developed countries which benefit from an implicit education subsidy have a role in funding of medical education of health personnel for developing countries (see also below).⁹⁴

The literature suggests that the type of education and training also matters, since the current medical curriculum focuses too much on the needs of developed countries, thereby indirectly contributing to migration.⁹⁵ Developing source countries need to introduce much more basic training in order to train personnel with a skill mix that is appropriate for developing country needs. In this respect, Skeldon (2005) proposes some sort of "two-tier" education system in which doctors and nurses in developing

⁹¹ GCIM (2005), Lowell and Findlay (2002), Mensah et al. (2005), Padarath et al. (2004).

⁹² Mullan (2005).

⁹³ According to the WHO, the ultimate aim of countries should be self-sufficiency, i.e. production of adequate numbers of health workers to meet national needs. See WHO (2006a).

⁹⁴ See for example Skeldon (2005).

⁹⁵ Muula (2005), Mullan (2005), Skeldon (2005).

countries are trained to international standards - which may be lost to the international labour market - but with many others trained to much more basic levels to suit the needs of rural areas. Next to the question of whether a “two-tier” health system is desirable, it is likely not to solve the problem, since such half-trained would still form attractive recruits for developed countries.⁹⁶

Improving retention and encouraging return

Efforts to improve retention and encourage return apply not only at the national level but also at the regional level given that much of migration is from rural to urban areas and from the public to the private sector. Moreover they are equally relevant for developed country health care systems.⁹⁷

Retention and return policies typically focus on financial (wages, pensions) and non-financial rewards to make living and working in the home country more attractive. The latter includes provision of adequate housing, means of transport, schooling for children, adequate equipment and medical supplies, safe work environments and opportunities for further training. Furthermore, countries may create rules or enter into bilateral agreements which encourage temporary migration for a fixed period.⁹⁸ These are sometimes linked to training (e.g. via “bonding”) and staff exchanges (e.g. via “twinning” between hospitals) and all serve the purpose of career, personal and organisational development.⁹⁹ Other initiatives try to make use of diaspora networks by encouraging emigrant workers to engage in temporary service in their home countries whilst keeping their jobs abroad.¹⁰⁰

Whereas the pay differential between migrant source and destination countries is an important reason for migration, the literature suggests that increasing wages alone will be ineffective in stemming the drain. According to Vujicic et al. (2004) nurse (doctor) pay differentials are highest for Zambia, Sierra Leone and Ghana (Zambia, Ghana and Cote d’Ivoire) and lowest for South Africa, Trinidad and Tobago and Cote

⁹⁶ Eastwood et al. (2005).

⁹⁷ See also Simoens and Hurst (2006).

⁹⁸ For example, both India and the Philippines entered into bilateral agreements with the UK. See Eastwood et al. (2005). The Department of Health in the UK also signed bilateral recruitment agreements with Egypt, Spain and South Africa. See Bach (2006), WHO (2006).

⁹⁹ Buchan and Dovlo (2004), Dovlo and Martineau (2004), Simoens and Hurst (2006).

¹⁰⁰ Dovlo and Martineau (2004). The IOM programme on Migration and Development for Africa (MIDA) is such an example. See also Nullis-Kapp (2005).

d'Ivoire (Mozambique, South Africa and Lesotho). Vujicic et al. (2004) nonetheless find little correlation between the supply of health care migrants and the size of the wage differential. This suggests that non-wage instruments (i.e. improving working and living conditions in source countries) might be more effective in improving retention or encouraging return.¹⁰¹ It is clear that these include policies that reach beyond the health sector and address broader issues of creating a stable political and macroeconomic environment conducive to economic growth.¹⁰²

Ethical recruitment and codes of conduct

Concerns about ethical recruitment led the UK to develop in 2001 a Code of Practice for International Recruitment by which it limits recruitment to the two countries with which it has signed a health worker-migration agreement (India and the Philippines) which allows for controlled migration of health personnel.¹⁰³ All other developing countries are on the so-called “proscribed list”, which will not be targeted for active recruitment by the NHS.¹⁰⁴ A major drawback of the original Code of Practice was that it did not cover private employers and recruitment agencies, which led the Department of Health to change the Code in 2004. The impact of such codes of conduct is unclear. There have been continuing inflows of nurses from many countries that are on the proscribed list in the UK.¹⁰⁵ However, the recent decline in both nurse and doctor inflows into the UK from overseas may indicate that it is starting to take effect.¹⁰⁶ Developments in medical migration flows into the UK over the longer term will signify whether this is a one-off event or a sustained effect resulting from a more ethical recruitment process as governed by the Code of Practice.

Lump-sum financial compensation for the loss of human capital and the role of bilateral aid

At first sight, a compelling case exists for direct financial compensation of medical migrants who benefit developed countries' health care systems, but have been trained

¹⁰¹ This counterintuitive result is explained from the relatively large size of the wage differentials, so that small wage increases in source countries have little impact on migration flows.

¹⁰² Alkire and Chen (2004), Awasas et al. (2004), Buchan (2005), Narasimhan et al. (2004).

¹⁰³ Department of Health (2004). The original Code from 2001 does not cover non-NHS employers, individual initiatives by health workers themselves and inflows related to education purposes. The revised 2004 Code does cover non-NHS employers.

¹⁰⁴ Department of Health (2005). The list is based on the OECD/DAC list of aid recipients. Underlying criteria: economic status and relative position with regards to numbers of health personnel.

¹⁰⁵ The Code of Conduct applies to active not passive recruitment, so that its scope is rather limited. See also Bach (2006).

¹⁰⁶ See UK paper.

in their countries of origin at considerable public expense. However, such financial compensation (known as restitution) does not address the underlying push and pull factors governing migration, nor is it politically feasible in the short run.¹⁰⁷ Furthermore, it is difficult to determine whom should be paid and by how much. The appropriate level of compensation would, among others, have to cover the cost of education and the loss of health services, lowered by increases in scientific knowledge and remittances, and would have to take into account the potential return of the migrant, i.e. the length of stay.¹⁰⁸ However, such compensation, if properly managed, would create fiscal space for improved human resource management in developing country health care systems (i.e. investing in training of health personnel and improved working and living conditions of medical personnel - including pay provided it doesn't destabilise the rest of the economy).¹⁰⁹

The aforementioned disadvantages of direct financial compensation can be overcome if it takes the form of bilateral aid, the amount being determined by developed country aid budgets.¹¹⁰ In countries with good governance aid can be given in the form of budget support and allocated over sectors according to the country's priorities, whereas in countries with poor governance aid can be targeted directly to the health sector. An additional advantage of increasing aid for health system development is that it is also likely to be relatively cheap compared to training doctors and nurses at home (though the latter is required in the long-run to address the problem of medical workforce shortages).¹¹¹

There are concrete proposals for funding of education and training of the health workforce in developing countries. The Joint Learning Initiative (JLI, 2004) calls for the creation of a global educational reinvestment fund in Southern countries. Moreover, it recommends donors to harmonize their investments with a minimum of 10% (\$400 million) of the \$4 billion spent worldwide on human resources for health

¹⁰⁷ Eastwood et al. (2005), GCIM (2005).

¹⁰⁸ Dovlo and Martineau (2004), Forcier et al. (2004), GCIM (2005), Martineau et al. (2002), Muula (2005), Skeldon (2005), Stilwell et al. (2003), WHO (2006a).

¹⁰⁹ Awasas et al. (2004), Mensah et al. (2005).

¹¹⁰ See for example WHO (2006a), JLI (2004). The World Bank and IMF have been accused in the past of enforcing public expenditure cuts on the health sector as a condition of their assistance, which they say rather reflect a country's perverse prioritisation. One way or the other, additional and predictable donor money, if properly managed, would alleviate these constraints.

¹¹¹ Eastwood et al. (2005).

to strengthen strategic human capacities at the country level, and 10% of this (\$40 million) for regional and global resources. The World Health Organization (WHO, 2006) recommends a 50:50 guideline, whereby 50% of all development assistance is devoted to health systems, with half of this geared towards strengthening the national health workforce.

Increasing the quantity and development impact of remittances

Although remittances provide some compensation for the loss of human capital by sending countries, they are often used for private consumption and usually do not benefit the health care system, such that, at least in the short-run, sending countries are generally considered to be worse off from medical migration. Also, evidence suggests that the amount of remittances varies by skill type and duration of migration (higher skilled tend to migrate permanently and consequently remit less). Moreover, remittances vary by the migrant's country of origin: particularly in Sub-Saharan Africa remittance levels are relatively low due to, among others, underdeveloped financial markets. While the decision to remit is one of individual choice which should not be distorted by government policy, governments do have a role in developing financial markets, in reducing remittance costs by encouraging competition and tackling overregulation, and in improving the overall investment climate.¹¹²

The international institutional architecture related to medical migration

At the international level, a number of institutions are active in the area of health worker migration. The World Bank, as a proponent of increased globalisation for the purpose of long-term economic growth, has in the past proposed that “health services are another area in which developing countries could become major exporters,...., by temporarily sending their health personnel abroad.”¹¹³ The International Labor Organization (ILO), the World Health Organization (WHO), the International Organization for Migration (IOM) and the independent Global Commission on International Migration (GCIM) also acknowledge the importance of labour migration in general for the world economy, but have expressed their concern about the impact

¹¹² See World Bank (2005a, 2005c) for more on policies to improve the developmental impact of remittances.

¹¹³ Hilary (2002). The World Bank and IMF have also been accused of enforcing public expenditure cuts on the health sector as a condition of their assistance, which they say rather reflect a country's perverse prioritisation.

of medical labour migration in undermining the performance of health systems and the achievement of the health-related Millennium Development Goals.¹¹⁴

The role of GATS Mode 4

International migration of health personnel is expected to gain momentum in future through progress within the negotiations on Mode 4 of the General Agreement on Trade in Services (GATS) of the World Trade Organisation (WTO). GATS Mode 4, by which services can be traded via the movement of natural persons, relates to the provision of health services by individuals in another country on a temporary basis.¹¹⁵

There are, however, several problems with the current formulation of Mode 4.¹¹⁶ Firstly, the term “temporary” has been defined only negatively as excluding permanent migration and there is no international consensus on the definition. This could be to the benefit of source countries by limiting the time for which health workers can go abroad and so reducing the possibility of permanently losing costly human capital. However, the term “temporary” may not entail much significance since it is difficult to enforce in practice: temporary workers, once they have migrated, may be unwilling to move back to their home country after their contracts have finished and may become permanent residents (to the point where they disappear into illegality).

Secondly, persons are seen as service providers, not as entrants to the labour market. This distinction is difficult to maintain in practice since a temporary residency often implies that the service provider will have entered the local labour market. This, and the modest commitments made on Mode 4 so far (currently accounting for only 1.4% of the value of services trade), can be explained by the fear of (developed) countries that they may lose their ability to regulate immigration and the fear of potential negative impacts on the national economy.

¹¹⁴ GCIM (2005).

¹¹⁵ See Benavides (2002), Hilary (2001), WHO (2001, 2002), WTO-WHO (2002) for more on trade in health services and GATS. GATS does not cover public services, i.e. services provided in the exercise of government authority (defined as being provided neither on a commercial basis, nor in competition). Commitments under Mode 4 take the shape of access conditions granted by potential host countries and so do not cover commitments by countries of origin.

¹¹⁶ Bach (2003), Forcier et al. (2004), Stilwell et al. (2003), Lowell and Findlay (2002), Hilary (2001), WHO (2001, 2002), Winters (2003a), Winters et al. (2003), Bhatnagar (2004), Schrecker and Labonte (2004).

Thirdly, the GATS framework allows for domestic regulations regarding the requirements to practice of health professionals in order to safeguard the quality and safety of health service provision. These act as a barrier to entry by health professionals to developed host countries so as to protect the income of domestic health professionals. In some cases requirements regarding qualification and licences are said to have led to discrimination against foreign physicians.¹¹⁷ More generally, GATS service liberalisation is typically biased towards liberalising the movement of highly skilled personnel, rather than creating new employment opportunities worldwide for the unskilled, an area of comparative advantage for developing countries. This may however benefit the health sector, since it is relatively skill-intensive.

Despite these problems and the limited progress so far, expectations are high for future progress in the area of international medical migration since there is a continuing momentum towards the enlargement of regional trade blocks and the harmonisation of medical qualifications worldwide. The WTO recognises that in this process there will be benefits from surplus countries filling up gaps in shortage countries and more generally benefits of lower health care prices worldwide, but also risks of brain drains exacerbating health personnel shortages and problems of access to and the quality of health services in developing countries.¹¹⁸ The WTO thus recommends that countries impose appropriate regulations so that national health policy goals are not undermined by trade in health services.¹¹⁹

International codes of conduct for ethical recruitment

International organisations other than the WTO have attempted to draw up and strengthen codes of practice.¹²⁰ Ratification by all members, however, often does not materialise since the priorities of destination and source countries, cost-effective international recruitment and a more equitable terms of trade respectively, are found to be incompatible. The Commonwealth has for example adopted a Code of Practice

¹¹⁷ Forcier et al. (2004).

¹¹⁸ WTO-WHO (2002).

¹¹⁹ GATS for example allows sending countries to discourage medical migration via negative measures, such as taxing emigrating personnel or demanding financial compensation from recruiting countries/organisations, and positive measures, such as better employment/living conditions at home. Since most developing countries have insufficient regulatory and enforcement capacity to do so, strengthening their regulatory capacity is a major challenge for the coming years.

¹²⁰ See also Willetts and Martineau (2004).

in 2003, though Canada, Australia and the UK have not signed the agreement, seemingly due to the addition of clauses related to compensation for countries of origin.¹²¹ All in all, while voluntary codes of practice, such as that of the UK and the Commonwealth, allow governments to display ethical international recruitment behaviour, they are relatively weak regulatory mechanisms because they have no legal standing.¹²² Many see it as a starting point, a benchmark by which international recruitment behaviour can be monitored.¹²³

The way forward: calls for a global framework for the management of skills migration

As a long-term solution, there are calls for an overhaul of the institutional migration architecture by creating an international framework consisting of all relevant stakeholders which is to govern international skills migration.¹²⁴ GCIM for example proposes the establishment, in 2006, one Inter-agency Global Migration Facility responsible for all migration policies to create a more effective and coherent response to the opportunities and challenges posed by international migration. As a short-term solution a high-level inter-institutional group could pave the way for such a facility.¹²⁵ Similarly, the 2006 World Health Assembly announces the creation of the Global Health Workforce Alliance in 2006, which is to support countries in building an effective health workforce during the coming decade. Specific targets include the formulation of a strategic national workforce plan by all countries within five years, substantial increases in education and training of the work force and the improvement of workforce strategies.¹²⁶

How such proposals will affect international medical migration remains as yet unknown. However, the increased collaborative work on migration of health workers between a number of international agencies, including the IOM, WHO, ILO, the Commonwealth, OECD, World Bank, and UN institutions, but also with non-governmental organisations, private initiatives and national governments, within structures such as the Joint Learning Initiative and the Global Health Workforce

¹²¹ Bach (2006), Buchan and Dovlo (2004), Eastwood et al. (2005), Nullis-Kapp (2005). See Bach (2003) for more on international standards and trade agreements.

¹²² Bach (2006).

¹²³ Ahmad (2005), WHO (2006a).

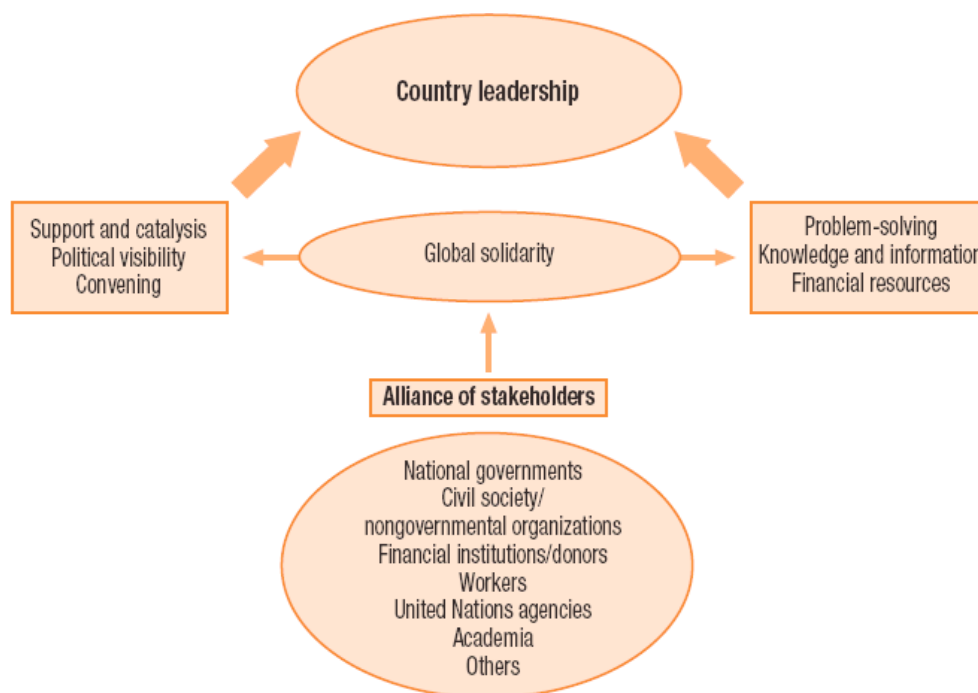
¹²⁴ See for example Ahmad (2005), Dovlo (2005), JLI (2004), Pang et al. (2002).

¹²⁵ GCIM (2005).

¹²⁶ WHO (2006, 2006a).

Alliance, is commendable since it harmonises the collection of data, improves the knowledge base and ensures better management and alignment of policies at the country level compared to separate approaches. Figure 7 summarises how increased international cooperation can accelerate progress in managing medical migration. It shows that effective international cooperation should be country-led for the purpose of increasing country ownership, but also since country-specific problems require country-specific solutions.

Figure 7: An international framework for managing medical migration



Source: World Health Report 2006, Figure 5

6. Conclusions

This paper presented an overview of the evidence and applied literature on medical migration.

The applied literature overwhelmingly finds global welfare gains from international migration, with developing countries gaining especially from (temporary) out-migration of unskilled labour in which they are relatively abundant. The impact of liberalising the movement of skilled workers on global (and developing country) welfare is a lot less clear due to the more likely to be permanent loss of scarce human capital, i.e. the brain drain from developing to developed countries. On top of that the *medical* brain drain is likely to have associated adverse (positive) health provision, health and welfare consequences for developing source (developed destination) countries, an aspect which has not been explicitly quantified so far.

The evidence suggests that, while medical migration flows are multi-directional both within and across countries, particularly English-speaking countries in Sub-Saharan Africa and the Caribbean with a relatively small base of health workers and high burden of disease suffer from the medical brain drain to the benefit of a few English-speaking countries in the North, most notably the UK and the USA. This is worrying since the workforce is crucial for advancing health, so that for many of these countries the health-related Millennium Development Goals get further out of reach.

The overall welfare effects for source and destination countries depend on the interplay of several factors. These include changes in the stock of human capital, the amount of remittances, the labour market impacts and changes in health care provision and the health status of the population. While remittances are generally not thought of as making up for the human capital loss of medical professionals, empirical studies to take into account all short-term and long-term impacts are lacking so that the overall welfare effects for source and destination countries remain unclear. This prompts further quantitative research on the causes and consequences of medical migration and appropriate policy responses. In order to carry out such research properly, data availability and monitoring of medical migration flows needs to be

drastically improved. Since the causes and consequences of medical migration are highly country-specific, results and policy implications are likely to differ per country.

The global welfare gains from migration may well fall and inequalities across regions may rise when accounting for population health effects associated with the international movement of health workers. This is because the health and welfare gains of an influx of health workers into developed countries with relatively well-functioning health care systems are likely to be insufficient to compensate for the adverse health and welfare consequences of the loss of scarce health workers for developing countries where (well-) functioning health care systems are usually lacking and where the burden of disease is high. Again this presumption needs to be tested by further quantitative research.

Political interference in the area of medical migration is motivated by the negative external effects on resource-strapped African (and other poor) countries. Since it is the individual's right to move and since the underlying push and pull factors are likely to remain important, the policy approach has been one that aims to manage rather than restrict medical migration flows so that they benefit destination and source countries. The policy agenda for destination and source countries includes measures to:

- increase the education and training of medical personnel and change the medical curriculum in developing countries so that it suits their needs;
- improve the retention of health professionals, especially in underserved areas and promote the return of migrant workers;
- and increase (impact of) remittances.

Retention and return will require a mix of financial and non-financial rewards to make living and working in the home country or region more attractive. Policies in developing countries often need to reach beyond the health sector due to wider policy failures of poor country governance and economic collapse. Countries may also create rules or enter into bilateral agreements which encourage temporary migration for a limited period. These could be linked to training or staff exchanges and include

initiatives of diaspora networks to involve emigrant workers in capacity building in their home countries.

While direct financial compensation of medical migrants to compensate for the implicit education subsidy of medical migration from developing source to developed destination countries is generally not recommended, there is a valid and strong moral argument for increased financial and non-financial support for strengthening human resource management in developing country health care systems. The WHO recommends a 50:50 guideline, whereby 50% of all development assistance is devoted to health systems, with half of this geared towards strengthening the national health workforce.

At the international level, voluntary codes of conduct, such as that of the UK and the Commonwealth, have provided a benchmark by which international recruitment behaviour can be monitored. Since they have no legal standing they provide only a starting point for improved ethical recruitment behaviour. International institutions, including the UN, WB, IMF, WTO, WHO, ILO, IOM and GCIM, have the leverage to do so. However, while health worker migration is expected to gain momentum in the future through progress with negotiations within the WTO on GATS Mode 4, little progress has been made so far. Also, cooperation with and between the other institutions needs improving.

The way forward is generally seen as one of concerted action by all relevant stakeholders, which is country-led and accords to a commonly agreed international framework to manage medical migration flows so that brain drains are turned into gains. Proposals include the creation of an Inter-agency Global Migration Facility. A recent step forward is the creation of the Global Health Workforce Alliance in 2006 which aims to support countries in building an effective health work force. How such initiatives will affect medical migration flows remains as yet unknown. However, increased collaborative work on migration of health workers is needed to harmonise the collection of data, improve the knowledge base and ensure better management and alignment of policies at the country-level so that brain drains are turned into gains.

References

- Ahmad, Omar. B. (2005), "Managing medical migration from poor countries", *British Medical Journal* 331: 43-45.
- Alkire, Sabina and Lincoln Chen (2004), "Medical Exceptionalism in International Migration: Should Doctors and Nurses Be Treated Differently?", *Draft Paper for the Workshop "Global Migration Regimes"*. Available from: <http://www.fas.harvard.edu/~acegi/Publications/Akire/Migration%2010-25.pdf>.
- Arndt, C. (2003), "HIV/AIDS, Human Capital, and Economic Growth Prospects for Mozambique", *Africa Region Working Paper Series*, No. 48. Washington D.C.: The World Bank.
- Arndt, C. and J.D. Lewis (2000), "The Macro Implications of HIV/AIDS in South Africa: A Preliminary Assessment", *South African Journal of Economics* 68(5): 856-887.
- Arndt, C. and J.D. Lewis (2001), "The HIV/AIDS Pandemic in South Africa: Sectoral Impacts and Unemployment", *Journal of International Development* 13(4): 427-449.
- Arndt, C. and P. Wobst (2002), "HIV/AIDS and Labor Markets in Tanzania", *Trade and Macroeconomics Division Discussion Paper*, No. 102. Washington D.C.: International Food Policy Research Institute.
- Awases, M., A. Gbary, J. Nyoni and R. Chatora (2004), "Migration of Health Professionals in Six Countries: A Synthesis Report", WHO Regional Office for Africa.
- Bach, Stephen (2003), "International migration of health workers: Labour and social issues", *Sectoral Activities Programme Working Paper*, No. 209. Geneva: International Labour Office. Available from: <http://www.ilo.org/public/english/dialogue/sector/papers/health/wp209.pdf>.
- Bach, Stephen (2004), "Migration patterns of physicians and nurses: still the same story?", *Bulletin of the World Health Organization* 82(8): 624-625.
- Bach, Stephen (2006), "International Mobility of Health Professionals: Brain Drain or Brain Exchange?", *UNU-WIDER Research Paper*, No. 2006/82. Available from: <http://www.wider.unu.edu/publications/rps/rps2006/rp2006-82.pdf>.
- Batata, Amber S. (2005), "International nurse recruitment and NHS vacancies: a cross-sectional analysis", *Globalization and Health* 1(7).
- Beghin J., B. Bowland, S. Dessus, D. Roland-Holst, and D. van der Mensbrugghe (1999) "Trade, Environment, and Public Health in Chile. Evidence from an Economywide Model", in P. Fredriksson (ed.), *Trade, Global Policy and the Environment*. Washington D.C.: The World Bank, World Bank Discussion Paper, No. 402, pp. 35-54.
- Benavides, David Díaz (2002), "Trade policies and export of health services: a development perspective", Part II, Chapter 5 in *Trade in Health Services: global, regional and country perspectives*, Vieira, Cesar (ed.). Washington DC: Pan-American Health Organization, Program on Public Policy and Health, Division of Health and Human Development: 53-69. Available from: www.who.int/entity/trade/en/THpart2chap5.pdf.
- Bhargava, A., D.T. Jamison, L.J. Lau and C.J.L. Murray (2001), "Modeling the Effects of Health on Economic Growth", *Journal of Health Economics* 20(3): 423-440.
- Bhatnagar, Pradip (2004), "Liberalising the Movement of Natural Persons: A Lost Decade", *The World Economy* 27(3): 459-472.
- Bloom, D.E. and D. Canning (2000), "The Health and Wealth of Nations", *Science* 287(5456): 1207-1209.

- Bloom, D.E., Canning, D. and D.T. Jamison (2004), "Health, Wealth and Welfare", *Finance and Development*, March 2004, pp. 10-15.
- Bloom, D.E., D. Canning and J. Sevilla (2001), "The Effect of Health on Economic Growth: Theory and Evidence", *NBER Working Paper Series*, No. 8587. Cambridge, Massachusetts: NBER.
- Bloom, D.E., D. Canning and J. Sevilla (2004), "The Effect of Health on Economic Growth: A Production Function Approach", *World Development* 32(1): 1-13.
- Bloor, Karen, Vivien Hendry and Alan Maynard, "Do we need more doctors?", *Journal of the Royal Society of Medicine* 99: 281-287.
- Bruvold, A., S. Glomsrod, H. Vennemo (1999), "Environmental Drag: Evidence from Norway", *Ecological Economics* 30(2): 235-249.
- Buchan, James and Lynn Calman (2004), *The Global Shortage of Registered Nurses: An Overview of Issues and Actions*. Geneva: International Council of Nurses. Available from: <http://www.icn.ch/global/shortage.pdf>.
- Buchan, James and Delanyo Dovlo (2004), *International Recruitment of Health Workers to the UK: A Report for DFID*. London: DFID Health Systems Resource Centre. Available from: http://www.dfidhealthrc.org/shared/know_the/publications.html#dfidrep.
- Buchan, James, Mireille Kingma and F. Marilyn Lorenzo (2005), "International migration of nurses: trends and policy implications", *Issue paper*, No. 5. Geneva: International Council of Nurses. Available from: <http://www.icn.ch/global/Issue5migration.pdf>.
- Buchan, James, Tina Parkin and Julie Sochalski (2003), *International nurse mobility: Trends and policy implications*. Geneva: World Health Organization. Available from: http://www.icn.ch/Int_Nurse_mobility%20final.pdf.
- Buchan, James and Galina Perfilieva (2006), "Health Worker Migration in the European Union: Country Case Studies and Policy Implications", Division of Country Support, WHO Regional Office for Europe, Copenhagen. Available from: <http://www.euro.who.int/document/e88366.pdf>.
- Buchan, James and Julie Sochalski (2004), "The migration of nurses: trends and policies", *Bulletin of the World Health Organization* 82 (8): 587-594.
- Bundred, Peter E. and Cheryl Levitt (2000), "Medical migration: who are the real losers?", *Lancet* 356: 245-46.
- Canton, E. and E. Westerhout (1999a), "A Model for the Dutch Pharmaceutical Market", *Health Economics* 8(5): 391-402.
- Canton, E. and E. Westerhout (1999b), "Modelling the Dutch Pharmaceutical Market", *CPB Report*, No. 99/2, pp. 30-35. The Hague: Centraal Plan Bureau.
- Chatterji, M. and J.H.P. Paelinck (1991), "A General Equilibrium Model of Health Care", in G. Duru and J.H.P. Paelinck (eds.), *Econometrics of Health Care*. Dordrecht: Kluwer Academic Publishers, pp. 237-248.
- Chen, Lincoln C. and Jo Ivey Boufford (2005), "Fatal Flows – Doctors on the Move", *New England Journal of Medicine* 353(17):1850-1852.
- Chikanda, Abel (2004), "Skilled health professionals' migration and its impact on health delivery in Zimbabwe", *Policy and Society Working Paper*, No. 4. Centre on Migration, University of Oxford. Available from: <http://www.compas.ox.ac.uk/publications/wp-04-04.shtml>.

- Connell, John and Richard P.C. Brown (2004), “The remittances of migrant Tongan and Samoan nurses from Australia”, *Human Resources for Health* 2(2).
- Crémieux, P-Y, Ouellette, P. and C. Pilon (1999), “Health Care Spending as Determinants of Health Outcomes”, *Health Economics* 8(7): 627-639.
- Dixon, S., S. McDonald and J. Roberts (2004), AIDS in Botswana: Evaluating the General Equilibrium Implications of Healthcare Interventions, Paper prepared for the conference *Growth, Poverty Reduction and Human Development in Africa*, hosted by the Centre for the Study of African Economies, University of Oxford, 21st to 22nd of March, 2004, Preliminary Version.
- Department of Health (2004), *Code of Practice for the international recruitment of health care professionals*. London. Available from: <http://www.dh.gov.uk/assetRoot/04/09/77/34/04097734.pdf>.
- Department of Health (2005). Proscribed list of developing countries which “should not be targeted for the recruitment of healthcare professionals”. Available from: <http://www.dh.gov.uk/assetRoot/04/03/46/79/04034679.pdf>.
- Diallo, Khassoum (2004), “Data on the migration of health-care workers: sources, uses and challenges”, *Bulletin of the World Health Organization* 82(8): 601-607.
- Dixon, S., S. McDonald and J. Roberts (2002), “The impact of HIV and AIDS on Africa’s economic development”, *British Medical Journal* 324: 232-234.
- Dovlo, Dela and Tim Martineau (2004), “Human Resources for Health and Development: A Review of the Migration of Africa’s Health Professionals”, *Joint Learning Initiative Working Paper*, No. 4-4. Available from: <http://www.globalhealthtrust.org/doc/abstracts/WG4/DovloMartineauFINAL.pdf>.
- Dovlo (2005), “Taking More Than a Fair Share? The Migration of Health Professionals from Poor to Rich Countries”, *PLoS Med* 2(5): e109.
- Eastwood, J.B., R.E.Conroy, S. Naicker, P.A. West, R.C. Tutt and J. Plange-Rhule (2005), “Loss of health professionals from sub-Saharan Africa: the pivotal role of the UK”, *Lancet* 365: 1893-900.
- Ettner, S.L. (1996), “New Evidence on the Relationship between Income and Health”, *Journal of Health Economics* 15(1): 67-85.
- Folmer, K., J. Stevens, F. Van Tulder and E. Westerhout (1997), “Towards an Economic Model of the Dutch Health Care Sector”, *Health Economics* 6(4): 351-363.
- Forcier, Mélanie Bourassa, Steven Simoens and Antonio Giuffrida (2004), “Impact, regulation and health policy implications of physician migration in OECD countries”, *Human Resources for Health* 2(12).
- Garbaccio, R.F., M.S. Ho and D.W. Jorgenson (2000), *The Health Benefits of Controlling Carbon Emissions in China*. Kennedy School of Government, Harvard University, Cambridge, MA. Available at: <http://www.ksg.harvard.edu/cbg/ptep/recpap.htm>.
- Global Commission on International Migration (2005), *Migration in an interconnected world: New directions for action*. Available from: <http://www.gcim.org>.
- Glover, Stephen, Ceri Gott, Anaïs Loizillon, Jonathan Portes, Richard Price, Sarah Spencer, Vasanthi Srinivasan and Carole Willis (2001), “Migration: an economic and social analysis”, *RDS Occasional Paper*, No 67. London: Home Office. Available from: <http://www.homeoffice.gov.uk/rds/pdfs/occ67-migration.pdf>.

- Hagopian, Amy, Matthew J. Thompson, Meredith Fordyce, Karin E. Johnson, and L. Gary Hart (2004), "The migration of physicians from sub-Saharan Africa to the United States of America: measures of the African brain drain", *Human Resources for Health* 2(17).
- Hamilton, Bob and John Whalley (1984), "Efficiency and Distributional Implications of Global Restrictions on Labour Mobility: Calculations and Policy Implications", *Journal of Development Economics* 14 (1-2): 61-75.
- Hamoudi, A.A. and J.D. Sachs (1999), "Economic Consequences of Health Status: A Review of the Evidence", *CID Working Paper*, No. 30. Center for International Development, Harvard University.
- Hilary, John (2001), *The Wrong Model: GATS, trade liberalisation and children's right to health*, London: Save the Children. Available from: http://www.savethechildren.org.uk/scuk_cache/scuk/cache/cmsattach/986_wrongmodel.pdf.
- Hilary, John (2002), "Developed countries must say no to trade in medical staff", *British Medical Journal* 325: 219.
- Hitiris, T. and J. Posnett (1992), "The Determinants and Effects of Health Expenditure in Developed Countries", *Journal of Health Economics* 11(2): 173-181.
- Hollingsworth, Bruce., Chandra Shah, Michael Long and Jeff Richardson (2005), "Modelling the economic impact of international movements in the health labour force", *Centre for Health Economics Working Paper*, No. 152, Monash University. Available from: <http://www.buseco.monash.edu.au/centres/che/pubs/wp152.pdf>.
- Iregui, Ana María (2003), "Efficiency Gains from the Elimination of Global Restrictions on Labour Mobility: An Analysis using a Multiregional CGE Model", *UNU/WIDER Discussion Paper*, No. 2003/27. Available from: <http://www.wider.unu.edu/publications/dps/dps2003/dp2003-27.pdf>.
- Jamison, D.T., L.J. Lau and J. Wang (2003), "Health's Contribution to Economic Growth in an Environment of Partially Endogenous Technical Progress". Forthcoming in G. Lopez-Casasnovas, B. Rivera and L. Currais (eds.), *Health and Economic Growth: Findings and Policy Implications*. Cambridge, MA: MIT Press.
- Joint Learning Initiative (2004), "Human resources for health: overcoming the crisis". Available from: <http://www.globalhealthtrust.org/report.html>. Associated article in *Lancet* 364: 1984-90.
- Kambou, G., S. Devarajan and M. Over (1992), "The Economic Impact of AIDS in an African Country: Simulations with a General Equilibrium Model of Cameroon." *Journal of African Economies* 1(1): 103-130.
- Knowles, S. and P.D. Owen (1997), "Education and Health in an Effective-Labour Empirical Growth Model", *Economic Record* 73(223): 314-328.
- Kouwenaar, A. (1986), *A Basic Needs Policy Model: A General Equilibrium Analysis with Special Reference to Ecuador*, Ph.D. thesis, Erasmus Universiteit Rotterdam.
- Lee, J-W and W.J. McKibbin (2003), "Globalization and Disease: The Case of SARS", *Working Papers in Trade and Development*, No. 2003/16. Division of Economics, Research School of Pacific and Asian Studies.
- Li, J. C-I. (2002), "Including the Feedback of Local Health Improvement in Assessing Costs and Benefits of GHG Reduction", *Review of Urban and Regional Development Studies* 14(3): 282-304.
- Lowell, B. Lindsay and Allan Findlay (2002), "Migration of highly skilled persons from developing countries: impact and policy responses", Synthesis Report, *International Migration Papers*, No. 44, International Migration Branch. Geneva: International Labour Office. Available from: <http://www.ilo.org/public/english/protection/migrant/download/imp/imp44.pdf>.

- Martineau, Tim, Karola Decker and Peter Bundred (2002), *Briefing note on international migration of health professionals: levelling the playing field for developing country health systems*. Liverpool School of Tropical Medicine. Available from: <http://www.liv.ac.uk/lstm/research/documents/InternationalMigrationBriefNote.pdf>.
- Mayer, D. (2001a), "The Long-Term Impact of Health on Economic Growth in Latin America", *World Development* 29(6): 1025-1033.
- Mayer, D. (2001b), "The Long-Term Impact of Health on Economic Growth in Mexico, 1950-1995", *Journal of International Development* 13(1): 123-126.
- Mensah, Kwadwo, Maureen Mackintosh and Leroi Henry (2005), *The 'Skills Drain' of Health Professionals from the Developing World: a Framework for Policy Formulation*. London: Medact. Available from: <http://www.medact.org/content/Skills%20drain/Mensah%20et%20al.%202005.pdf>.
- Mejia, A. (1978), "Migration of Physicians and Nurses: A Worldwide Picture", *International Journal of Epidemiology* 7(3): 207-15.
- Moses, Jonathon W. and Bjørn Letnes (2003), "If People were Money: Estimating the Potential Gains from Increased International Migration", *UNU/WIDER Discussion Paper*, No. 2003/41. Available from: <http://www.wider.unu.edu/publications/dps/dps2003/dp2003-41.pdf>.
- Moses, Jonathon W. and Bjørn Letnes (2004), "The Economic Costs to International Labor Restrictions: Revisiting the Empirical Discussion", *World Development* 32(10): 1609-1626.
- Mullan, Fitzhugh (2005), "The Metrics of the Physician Brain Drain", *New England Journal of Medicine* 35(17): 1810-8.
- Munjanja, Olive Kopolo, Sarah Kibuka and Delanyo Dovlo (2005), "The nursing workforce in sub-Saharan Africa", *Issue paper*, No. 7. Geneva: International Council of Nurses. Available from: <http://www.icn.ch/global/Issue7SSA.pdf>.
- Narasimhan, Vasant, Hilary Brown, Ariel Pablos-Mendez, Orvill Adams, Gilles Dussault, Gijs Elzinga, Anders Nordstrom, Demissie Habte, Marian Jacobs, Giorgio Solimano, Nelson Sewankambo, Suwit Wibulpolprasert, Timothy Evans and Lincoln Chen, "Responding to the global human resources crisis", *Lancet* 363:1469-72.
- Nullis-Kapp, Clare (2005), "Efforts under way to stem 'brain drain' of doctors and nurses", *Bulletin of the World Health Organization* 83(2): 84-85.
- Padarath, Ashnie, Charlotte Chamberlain, David McCoy, Antoinette Ntuli, Mike Rowson and Rene Loewenson (2004), "Health Personnel in Southern Africa: Confronting maldistribution and brain drain", *Equinet Discussion Paper*, No. 3. Available from: http://www.medact.org/content/health/documents/brain_drain/Padarath%20et%20al.%20-%20Medact-HST-Equient.pdf.
- Pang, Tikki, Mary Ann Lansang and Andy Haines (2002), "Brain drain and health professionals", *British Medical Journal* 324: 499-500.
- Pritchett, L. and L. Summers (1996), "Wealthier is Healthier", *Journal of Human Resources* 31(4): 841-68.
- Rutten, Martine (2004), *The Economic Impact of Health Care Provision: A CGE Assessment for the UK*. Ph.D. Thesis, 2004.
- Savard, L. and É. Adjovi (1997), "Adjustment, Liberalization and Welfare in Presence of Health and Education Externalities: a CGE applied to Benin", *Cahier 97-07 du Centre de Recherche en Economie et Finance Appliquées*. CREFA, Département d'Economie, Faculté des Sciences Sociales.

- Schiff, Maurice (2005), "Brain Gain: Claims about its Size and Impact on Welfare and Growth Are Greatly Exaggerated", *World Bank Policy Research Working Paper*, No. 3708. Washington DC. Available from: http://wdsbeta.worldbank.org/external/default/WDSContentServer/TW3P/IB/2005/09/01/000016406_20050901171456/Rendered/PDF/wps3708.pdf. Published as Chapter 6 in *International Migration, Remittances & the Brain Drain*, Özden, Ç. and Schiff, M. (Eds.), World Bank and Palgrave Macmillan, 2006.
- Schrecker, Ted and Ronald Labonte (2004), "Taming the Brain Drain: A Challenge for Public Health Systems in Southern Africa", *Int J Occup Environ Health* 10(4): 409-415.
- Simoens, Steven and Jeremy Hurst, "The Supply of Physicians in OECD Countries", *OECD Health Working Papers*, No. 21, OECD. Available from: <http://www.oecd.org/dataoecd/27/22/35987490.pdf>.
- Skeldon, Ron (2005), "Globalization, Skilled Migration and Poverty Alleviation: Brain Drains in Context", *Working Paper*, No. T15. Issued by the Development Research Centre on Migration, Globalisation and Poverty. Available from: http://www.sarpn.org.za/documents/d0001767/Migration_brain-drain_Nov2005.pdf.
- Smith, Richard D., Milton Yago, Michael Millar and Jo Coast (2005), "Assessing the macroeconomic impact of a health care problem: The application of computable general equilibrium analysis to antimicrobial resistance", *Journal of Health Economics* 24(6): 1055 – 1075.
- Stilwell, Barbara, Khassoum Diallo, Pascal Zurn, Mario R. Dal Poz, Orvill Adams and James Buchan (2003), "Developing evidence-based ethical policies on the migration of health workers: conceptual and practical challenges", *Human Resources for Health* 1(8).
- Stilwell, Barbara, Khassoum Diallo, Pascal Zurn, Marko Vujcic, Orvill Adams and Mario Dal Poz (2004), "Migration of health-care workers from developing countries: strategic approaches to its management", *Bulletin of the World Health Organization* 82(8): 595-600.
- Strauss, J. and D. Thomas (1998), "Health, Nutrition and Economic Development", *Journal of Economic Literature* 36(2): 766-817.
- Stronks, K., van de Mheen, H., van den Bos, J. and J.P. Mackenbach (1997), "The Interrelationship between Income, Health and Employment Status", *International Journal of Epidemiology* 26(3): 592-600.
- Thomas, D. (2001), "Health, Nutrition and Economic Prosperity: A Microeconomic Perspective", *CMH Working Paper Series*, No. WG1:7, WHO Commission on Macro Economics and Health.
- United Nations Population Fund (2006), *The State of the World Population 2006: A Passage to Hope – Women and International Migration*.
- Van der Hoeven, R. (1987), *Planning for Basic Needs: A Basic Needs Simulation Model applied to Kenya*, Ph.D. thesis. Vrije Universiteit Amsterdam, Amsterdam: Free University Press.
- Van der Hoeven, R. (1988), *Planning for Basic Needs: A Soft Option or a Solid Policy? A Basic Needs Simulation Model Applied to Kenya*. Aldershot: Gower.
- Vennemo, H. (1997), "A Dynamic Applied General Equilibrium Model with Environmental Feedbacks", *Economic Modelling* 14(1): 99-154.
- Vianen, J.G. and J.G. Waardenburg (1975), "Integration of Health Care into a Multi-Sector Model: With a Quantification for Tanzania", *Discussion Paper*, No.29. Centre for Development Planning, Erasmus University Rotterdam.

- Vujicic, Marko, Pascal Zurn, Khassoum Diallo, Orvill Adams and Mario R Dal Poz (2004, “The role of wages in the migration of health care professionals from developing countries”, *Human Resources for Health* 2(3).
- Walmsley, Terrie L. and L. Alan Winters (2003), “Relaxing the Restrictions on the Temporary Movement of Natural Persons: A Simulation Analysis”, *CEPR Discussion Paper*, No. 3719. London: CEPR.
- Willets, Annie and Tim Martineau (2004), *Ethical international recruitment of health professionals: Will codes of practice protect developing country health systems?*, Liverpool School of Tropical Medicine, UK. Available from: <http://www.liv.ac.uk/lstm/research/documents/codesofpracticereport.pdf>.
- Winters, L. Alan (2003a), “GATS Mode 4: The Temporary Movement of Natural Persons”, *Background Paper Prepared for UN Millennium Project International Task Force on Trade*, April 2003. Available from: <http://www.ycsg.yale.edu/documents/papers/Winters.doc>.
- Winters, L. Alan (2003b), “The Economic Implications of Liberalizing Mode 4 Trade”, Chapter 4 in *Moving People to Deliver Service*, Mattoo, A. and Carzaniga A. (eds.). Oxford: Oxford University Press: 59-92.
- Winters, L. Alan, Terrie L. Walmsley, Zhen Kun Wang and Roman Grynberg (2003a), “Liberalising Temporary Movement of Natural Persons: An Agenda for the Development Round”, *The World Economy* 26(8): 1137-1161.
- Winters, L. Alan, Terrie L. Walmsley, Zhen Kun Wang and Roman Grynberg (2003b), “Liberalising Labour Mobility under the GATS”, *Economic Paper No. 53*, Commonwealth Secretariat.
- World Bank (2005a), *Remittances: development impact and future prospects*, eds. Samuel Munzele Maimbo and Dilip Ratha. Washington DC.
- World Bank (2005b), *World Development Report 2006: Equity and Development*. Washington DC.
- World Bank (2005c), *Global Economic Prospects 2006: Economic Implications of Remittances and Migration*. Washington DC.
- World Health Organization (2001), *Assessment of Trade in Health Services and GATS: Background Note*. Available from: <http://www.who.int/health-services-trade/Background-Briefing-Note.20Dec.doc>.
- World Health Organization (2002), *Assessment of GATS and trade in health services: an international consultation on monitoring and research priorities*. 9-11 January, Geneva.
- World Health Organization (2006), *World Health Report 2006: Working Together for Health*. Geneva.
- World Health Organization (2006a), “International Migration of health personnel: a challenge for health systems in developing countries”, *Provisional agenda item 11.12, Fifty-ninth World Health Assembly*.
- World Trade Organization – World Health Organization (2002), *WTO Agreements and Public Health: A joint study by the WHO and the WTO Secretariat*. Available from: http://www.wto.org/english/news_e/pres02_e/pr310_e.htm.