



Rebalancing brain drain: Exploring resource reallocation to address health worker migration and promote global health

Timothy Ken Mackey^{a,b,*}, Bryan Albert Liang^{a,c,d,1}

^a Institute of Health Law Studies, California Western School of Law, United States

^b Joint Doctoral Program on Global Health, University of California San Diego–San Diego State University, United States

^c Institute of Health Law Studies, California Western School of Law, San Diego Center for Patient Safety, University of California, San Diego School of Medicine, 350 Cedar Street, San Diego, CA 92101, United States

^d Department of Anesthesiology, University of California San Diego School of Medicine, United States

ARTICLE INFO

Article history:

Received 8 October 2011

Received in revised form 7 April 2012

Accepted 11 April 2012

Keywords:

Brain drain
Migration
Global health
Health equity
Justice
Health systems
Health infrastructure
Health policy
Health law
Health workers

ABSTRACT

Global public health is threatened by an imbalance in health worker migration from resource-poor countries to developed countries. This “brain drain” results in health workforce shortages, health system weakening, and economic loss and waste, threatening the well-being of vulnerable populations and effectiveness of global health interventions. Current structural imbalances in resource allocation and global incentive structures have resulted in 57 countries identified by WHO as having a “critical shortage” of health workers. Yet current efforts to strengthen domestic health systems have fallen short in addressing this issue. Instead, global solutions should focus on sustainable forms of equitable resource sharing. This can be accomplished by adoption of mandatory global resource and staff-sharing programs in conjunction with implementation of state-based health services corps.

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1. Introduction

Lack of a robust health workforce operating in stable delivery infrastructures undermines effective domestic health systems and global public health interventions. This is particularly true in resource-poor countries ravaged by disease and suffering from poor environmental and social determinants of health [1]. Strengthening and investing in

the global health workforce is important to achieve health equity in these countries as well as health related United Nations Millennium Development Goals (“MDGs”) [1–3].

Yet each year, the “brain drain” of health workers who migrate from resource-poor to developed countries perpetuates a maldistribution of financial and health resources away from populations already suffering from poor public health and weak delivery infrastructures. A global shortage of physicians, nurses, pharmacists, public and community health workers, health care administrators, and other health professionals is exacerbated through this disproportionate flow of emigration and immigration from poor to rich countries, threatening global health [4].

The consequences have been dire for resource-poor countries, including financial and human resource loss, health system weakening, and failure to provide essential public health interventions [4,5]. This is especially

* Corresponding author at: Senior Research Associate, Institute of Health Law Studies, California Western School of Law, Global Health Program, University of California, San Diego – San Diego State University, 350 Cedar Street, San Diego, CA 92101, United States. Tel.: +619 515 1568; fax: +619 515 1599.

E-mail addresses: tmackey@ucsd.edu (T.K. Mackey), baliang@alum.mit.edu (B.A. Liang).

¹ Tel.: +619 515 1568; fax: +619 515 1599.

troublesome in low-income countries with a high global burden of disease such as the devastating consequences of HIV/AIDS, malaria, tuberculosis, and others that require extensive financial outlays [5].

This health professional exodus from resource-poor countries is driven by developed world shortages [6]. Fuelling their need is a growing aging population, the increasing burden of chronic diseases, and high-tech and expensive healthcare that requires highly-trained health professionals in developed countries [5]. Developed country demand coupled with low investment and inadequate health system planning in resource-poor countries has resulted in fewer healthcare professionals domestically trained and retained to work in resource-poor nations [5]. The consequences of this one-way outflow has created imbalances in migration, resulting in health worker shortages of 1.5 million alone in Africa, and 2.4 million in world's 57 poorest nations [6,7].

However, it may not be ethical to limit the individual freedom of health workers who are considering emigrating from resource-poor countries. The myriad of possibilities for better working conditions, safety, income, and infrastructure as well as political freedom and liberty may drive individual decisions to immigrate to countries such as the USA, United Kingdom ("UK") and Canada [4,8].

Hence, migration of health workers has emerged as a serious global health challenge that extend to all aspects of society and governance, including structural, political, societal, and economic factors [8]. To address this complex issue, it is crucial that different solutions to this brain drain are assessed in terms of effectiveness, efficiency and feasibility, and are aligned with responsible global health governance. This requires understanding the inequitable distribution of health worker resources, economic imbalances and waste, and the limitations of current strategies in the existing system. We review these concerns below. We then turn to a policy proposal that may address concerns identified compared with previous efforts (Table 1).

2. Global health worker migration imbalance

Though issues posed by healthcare worker migration have been studied since the 1960s, a global imbalance in healthcare workforce capacity between resource-poor and developed countries continues to persist [3].

Developed countries in the Americas, dominated by USA and Canada, have the highest proportion of healthcare workers (37%), yet only have 10% of the global disease burden, [7] yielding a worker-disease index ("WDI") of 3.7 (a worker-index >1 represents an excessive proportion of workers for a region's global disease burden). Europe enjoys 28% of the health workforce with only 10% of the global disease burden: [7] i.e., WDI=2.8. Africa, however, shoulders ~1/4th of the world's disease burden (24%) but only has 3% of the global health workforce (and spends a mere 1% of global health expenditures), [7] with an exceedingly low WDI=0.125. These structural imbalances in health workforce capacity, health financing and spending, and corresponding disease burden mean the poorest countries, with the worst shortages and health outcomes,

contribute the greatest percentage of physicians and medical graduates to high-income countries [9].

Indeed, as a group, high-income countries including the USA, UK, Canada, and Australia use 23–28% of all international physician graduates, highlighting the dependence of developed countries on foreign medical training and education [10]. Indeed, lower-income countries contribute between 40–75% of their medical graduates to these countries, with the UK and USA representing the first and second largest recipients [10]. This is further evidenced by annual 5% increases of migrant healthcare workers in many European countries and the 20% of physicians in Organisation for Economic Co-operation and Development ("OECD") countries originating from abroad [7]. Yet not all high-income countries rely upon brain drain. Countries such as Switzerland and Norway source medical graduates primarily from Europe and in Japan only 1% of the physician workforce originates from abroad [10].

The net impact on individual resource-poor countries may be difficult to determine given differences in population sizes and number of physicians in country [4,10]. However, adjusted calculations indicate that sub-Saharan Africa, the Indian subcontinent, and the Caribbean have the highest healthcare worker emigration, despite many of these countries being the most resource-poor [10]. This data further illustrates the status of global migration imbalance that disproportionately affects resource-poor settings.

This imbalance will undoubtedly continue to grow with increasing capacity demands in high-income countries such as the USA and UK [7,11]. Regional developments such as European Union ("EU") enlargement has also reduced barriers and created new sources of healthcare worker migration often involving accession of less developed countries [12]. In addition, USA healthcare reform, which aims to provide broader health access for millions of uninsured persons, will undoubtedly attract international health worker emigration due to the increased demand for services. Though the USA healthcare reform enacts certain cost-control measures and is estimated to only have a negligible impact on health expenditures as a percentage of GDP, savings projected do not change the fact that additional healthcare workers will be needed for the millions of additional people that are targeted to gain access to the healthcare system [13,14]. Such demand will impose yet additional challenges on resource-poor countries.

3. Economic conditions: burden, balance, and policies

Resource-poor countries suffer financial injury from health worker migration, with ~\$500 million lost annually in health education expenditure and tax revenues [5]. For example, Ghana, since 1951, has incurred US \$60 million in losses from training investment while the UK has saved approximately £103 (US \$168) million from Ghanaian healthcare worker immigration [15]. Other studies have reported financial losses from physician brain drain in nine sub-Saharan African countries with high HIV/AIDS prevalence at ~\$2.17 billion while UK and USA have benefited by \$2.7 billion and \$846 million, respectively [16].

Table 1
Summary of implementation and institutional responsibility of policy proposals.

Proposal	Proposal phase	Implementation time frame	Institutional responsibility
Health exchange programs	Global agreement to advocate and formulate governance for HEPs	Short-term	International community and civil society
	State-based legislation to form and operationalize HEPs	Mid-term	State governments
	Development of HEPs by healthcare organisations in partnership with public sector and source countries	Long-term	Private and public Sector (Managerial level)
	Formation of global governance structure to monitor, audit, credential HEPs	Long-term	International community (WHO and ILO)
Global public health service corps.	Global agreement on the need for GPHSCs for health equity, capacity building, and security	Short-term	International community and civil society
	State-based legislation to form and fund GPHSCs	Mid-term	State governments
	Development of BRAIN network to coordinate and operationalize GPHSCs	Long-term	Public, private, civil society, international community

Source countries whose healthcare workers emigrate to high-income countries can potentially retrieve benefits. This can be from economic capital flow (mainly in the form of remittances from these health workers) and advanced healthcare skills and experience if these emigrating workers return [17].

While remittances of wages earned and sent back to home countries have varying impacts, the net benefit generally does not offset the massive financial and human resource loss [3,17]. More specifically, remittances are not earmarked for health systems infrastructures, are not spread equitably throughout society, [3] nor do they address underlining problems of lack of access to health professionals and clinical care. Further, additional costs of recruitment when poor countries are forced to themselves import health workers from outside of the country due to internal shortages are not addressed [3].

In addition, only a small percentage of emigrating workers return to source countries. Even if they do return, their skills may not be translatable given differences in medical technology and qualifications/experience obtained during migration [17]. In sum, the result is the ironic subsidization of wealthy nations by resource-poor countries for health worker education, training, and staffing.

Emigration of health workers from resource-poor countries can also result from strategic export of skilled health workers to wealthy nations as a crucial component of its export economy, fuelled by developed country demand [6]. The Philippines for example, exports ~60% of its nursing students to foreign countries and tripled the number of nursing schools to meet increasing high-income country demand [6]. This export market of healthcare workers is now a component of domestic economic policy, as the country has become dependent on remittances and other economic benefits accruing from such trade. Yet although resulting remittances from this export industry have the potential to reduce poverty in exporting countries, concerns regarding unfair labour practices, aggressive recruitment, risks of abuse and discrimination, and domestic health worker shortages bring into question the net benefits of this practice [18]. In fact, despite rapid proliferation of nursing schools in the Philippines, surveys show

that ~70% of Filipinos die without receiving medical care, and domestic healthcare resources are increasingly being diverted to medical tourism patients [18]. This disproportionately impacts availability of health care services for vulnerable patient populations, who may already lack sufficient access to necessary healthcare [6].

Compounding internal policy strategies are global economic policies that have liberalized markets through deregulation of trade, often to the detriment of resource-poor countries [3]. For example, macroeconomic policies of the International Monetary Fund and World Bank have created barriers for resource-poor countries to invest in public financing of healthcare and education due to outstanding debt obligations [9,19]. Structural adjustment programs that impose austerity measures on resource-poor countries and retraction of public sector development and investment have resulted in salaries for health workers that are stagnant, irregular, and uncompetitive [2].

These macroeconomic policies create an environment ripe to allow private entities, NGOs, and high-income governments to poach skilled health workers from resource-poor countries. Hence, current economic incentive structures encourage brain drain not only to developed countries, but also to entities within resource-poor countries that can outbid governments for skilled health workers. Consequently, solutions to brain drain should encompass the totality of these diverse actors to better balance healthcare resource allocation.

4. Economic impact: brain drain, brain waste and health resource competition

Faced with high burden of disease, poor delivery system support, and extremely low WDI, many resource-poor countries find themselves unable to provide basic health and disease-prevention services. Numerous countries including South Africa, Uganda, Zambia, Ghana, Nigeria, and Jamaica have suffered from massive brain drain losses [3,11,20].

The impact of heavy disease burden, poor infrastructure, and brain drain can be illustrated by the HIV/AIDS epidemic. HIV/AIDS has had disastrous effects on many

resource-poor countries, and has brought global attention to the negative influences of brain drain [1,21]. In communities that suffer from the scourge of the epidemic, health workers have resigned or migrated out of fear of occupational transmission within poor infrastructures, or may exit forcibly due to morbidity and mortality from the disease [2,21]. This leads to health workforce shortages and further increased demand, decreasing potential to prevent further spread and address inadequate treatment of patients and disease outbreaks [21]. In turn, this creates more difficult working conditions, feeding into a negative loop that creates greater incentives to migrate while public health continues to deteriorate.

Brain drain also has additional downsides impacting not only the resource-poor, originating country, but also the global health worker market. Macroeconomic inefficiencies from health worker migration have resulted in “brain waste”, where emigrating health workers become unemployed, underemployed or employed outside the healthcare setting and/or below their skill level [3]. In the USA alone, ~1.3 million (22%) of 6.1 million immigrants with bachelor’s degree or higher are either unemployed or work in unskilled labour that does not employ their full academic/professional credentials [22]. Further, population-based survey studies conclude the probability of an educated, foreign-born degree holder obtaining a skilled job is often very poor [23]. This includes 63% of Kenyan immigrants with professional degrees (such as physicians and PhDs) in the 1990s experiencing brain waste, and surveys showing ~80% of Filipino public sector physicians applying to work abroad as nurses [18,23]. In addition, language barriers, cost of credentialing/exams, and competition for post-graduate training also represent barriers faced by workers immigrating to the USA that lead to brain waste [24]. Other, less quantifiable but important societal factors such as discrimination, abusive labour practices, and unrealistic expectations for success and economic security may act as important factors leading to brain waste.

Importantly, assessing both brain drain and brain waste also requires a more nuanced examination of the differing motivations of types of healthcare workers, including what they are willing to accept to migrate. Different workers (e.g., physicians, nurses, community-based healthcare workers, and administrators) will have different rationales for potential emigration. These individuals will also have varying characteristics that influence their level of success/failure upon migration to developed markets.

Brain drain and brain waste from inefficient migration leads to increased transaction costs for both resource-poor and high-income countries. Yet the costs of recruiting for resource-poor countries represent a disproportionately larger fraction of available health resources compared with developed countries, which have greater capacity, placing the risk of brain drain and waste squarely on the developing world.

Brain drain and waste occur within resource-poor setting as well, as they must compete with foreign entrants for health workers. The proliferation of NGOs illustrates these challenges. Though NGOs may deliver health interventions seeking to improve health outcomes, they may

also negatively impact domestic and community-based health systems by siphoning off needed health workers by offering higher compensation than domestic health structures can bear. For example, NGOs may offer salaries 5–20 *times* higher than public sector employers while also offering them better working conditions and benefits [19]. Hence, through potentially unfair private-market practices, NGOs may divert resources both within and outside of resource-poor countries, leading to brain drain and potential waste. These resources may also be deployed to specific short-term projects focused on goals dictated by NGO and developed country funding mechanisms that may actually overlap or indeed compete with existing public health service efforts [19,25]. This system introduces redundancy and inefficient use of scarce health worker resources, prioritising NGO project support and operations over domestic public health needs.

5. Limitations of current efforts

5.1. Unrecognised health worker reform needs

Current imbalances of brain drain, waste, and health resource competition due to infrastructural challenges appear relatively unrecognised (Table 2 summarizes previous proposal pros and cons). Little discussion of health workforce reform has occurred during continued funding for global health interventions in resource-poor countries. Neither bilateral, multilateral, nor international disease-specific aid such as the president’s emergency program for AIDS relief (“PEPFAR,”) the global fund to fight AIDS, TB, and Malaria (“The Global Fund,”) nor programs underwritten by private donors and foundations such as the Bill and Melinda Gates Foundation have adequately addressed workforce concerns [19]. However, in the absence of a stable set of health workers coupled with an adequate domestic health systems infrastructure to support and deliver these multi-million dollar interventions, long-term success and sustainability of these programs are at risk [19].

Crucial to any response is the strengthening of domestic health systems of source countries to attract and retain health workers. This has been attempted using various strategies, including task shifting, rebalancing of incentives, and increased investment in health systems [2,6,8,21]. By improving working conditions, providing fair remuneration, and providing opportunities for education and career development, source countries can provide an environment where health workers can function effectively and bring long-term benefits to society and health [3].

Yet these strategies require substantial investment and coordinated efforts by local governments in resource-poor countries. However, these countries are already facing fiscal crisis and declining public health budgets that have been devastated by diseases such as HIV/AIDS and the global fiscal crisis [1,26]. Further, such investments and infrastructure building may not be possible without international or donor assistance that has ignored workforce issues, traditionally focused on discrete disease intervention [2]. These challenges become even more intractable in rural areas that lack adequate working conditions and

Table 2
Summary of pros and cons of policy proposals.

Proposal	Pros	Cons
Task shifting	Relative low investment compared to other proposals; uses existing healthcare workforce	Requires training and investment in healthcare workers/infrastructure; changes in clinical guidelines/licensure
WHO code	International soft law which has already been implemented; establishes model code for states/organisations to follow; relatively flexible instrument	Non-binding; does not include enforceable provisions; lacks incentives for participation by high-income countries
Health exchange programs	Creates framework for binding set of legislation to establish equitable health resource transfer; establishes governance measures to ensure compliance; eliminates barriers for re-entry; possibly enhances WHO Code compliance; encourages commitment to capacity building	Requires buy-in by state governments; higher institutional cost to implement
Global public health service corps	Utilizes current public health professionals to promote global health and equity; allows for longer term capacity building, promotes health diplomacy	Requires buy-in and funding by state governments; higher institutional cost to implement; requires coordination by central body

infrastructure, including access to medicines, equipment and, critically, trained health workers [3].

5.2. WHO code of conduct

In addition to internal resource-poor country efforts in realigning incentives for healthcare worker recruitment and employment, in May 2010, WHO adopted the WHO global code of practice on the international recruitment of health personnel (“Code”) [27]. The non-binding code aims to maximize benefits and minimize negative factors of healthcare worker migration, protect the rights of individual health worker migrants, and strengthen health systems [27]. The Code also encourages the development of bilateral and multilateral agreements to support these overall goals [2].

One goal of the Code is also to act as a roadmap for future regional or bilateral agreements to promote more equitable resource sharing between countries [5]. The Code attempts to address these issues by providing recommendations for increasing health workforce production, expansion of development assistance to aid in retention and training in source countries, and exchange and reporting of data to track implementation of the Code [27,28].

Code adoption is the culmination of previous efforts by NGOs and other professional organisations to develop standards and codes of practice for ethical recruitment of health workers, including the Kampala declaration adopted at the First Global Forum on Human Resources for Health that advocated for such action [5,27]. A number of international NGOs also recently signed a code of conduct agreeing to help strengthen health systems and the public sector [25]. The goal of these voluntary guidelines is to encourage collaboration and efficient use of domestic public health systems for delivery of services instead of competing with them [25].

However, limiting the Code’s effectiveness is its voluntary nature. It must be self-adopted and enforced by stakeholders, including individual member states, private sector actors, and others, who may have conflicting demands arising from self-interest. Further, while the

Code provides overarching principles, it fails to specifically address ongoing imbalances that are endemic to health human resource sharing with binding and effective enforcement mechanisms. Even if substantive concerns were addressed, it lacks a funding apparatus to support any potential ongoing promotion or participation.

It does not appear that the Code has had the desired impact upon key higher-income countries that benefit from health worker immigration from resource-poor countries. Some resource-poor countries are working to incorporate the Code into national legislation, while 69 countries have designated representatives to assess the Code provisions, only Norway (a country without a high proportion of foreign healthcare workers already developing its own health worker recruitment policy) has taken steps to implement the Code [29]. Hence, the effectiveness of this form of international soft law is being critically tested especially if outcomes remain relatively unchanged. Indeed, this appears to be at least the short-term reality: other preliminary empirical studies report the large majority of high-income countries including Australia, Canada, United Kingdom, and the USA have not made meaningful progress in changing or influencing policies as a result of the Code [30]. Measuring similar efforts such as those by the United Kingdom, which has its own code of practice for international recruitment, have been unclear with some evidence suggesting that such codes have an influence on recruitment practices and other data indicating that immigration rates persisted and that recruitment efforts may have circumvented requirements of the code [12].

With growing shortages in health workers continuing to persist and no tangible method to enforce the Code, its impact on current day-to-day operations of wealthy country entities draining health workers from resource-poor countries remains in question.

6. Reassessing solutions: a global policy proposal

Addressing brain drain from resource-poor countries is rooted in virtually insatiable demand for global migration of high-income countries and limited repatriation of

financial and human resources, stakeholders framing of interests and positions as a health equity or macroeconomic issues that result in reduced public health resources and negative worker incentives (from professional and personal standpoints and within and outside the resource-poor region), economic incentives that drive workers to non-resource-poor settings, and unsustainable and non-binding health worker resource standards. Consequently, this important and complex global health problem requires an integrated set of global policies that operate under a unified global health governance framework, recognizing the varying challenges and stakeholder interests of both source and importing countries.

A solution that attempts to formalize pathways of “reverse” resource sharing from developed to resource-poor countries should be explored to provide for reallocation of lost health and financial resources. To do so, we believe a new global policy proposal to address these challenges can be created based upon prior experiences and reports from the literature, clinical experience of the authors in a high-income country, and insights from global health technical experts in the field of healthcare worker migration. A multi-disciplinary and multi-sectorial perspective to address this problem is needed and can be framed through synthesis of public health, law, and global governance principles and experience.

We believe that adopting policy to promote mandatory global resource and staff sharing in conjunction with requirements to implement a state-based health services corps in developed countries can begin to alleviate the burdens of brain drain from resource-poor countries. These components are reviewed below. A table summarizing the implementation timelines and institutional responsibilities of the suggesting solutions detailed below is also provided (see Table 1).

6.1. Global resource/staff sharing in health exchange programs

Individual health care workers should have the right to emigrate. However, entities hiring from resource-poor countries should be subject to mandatory cost-sharing and reallocation of resources in an attempt to mitigate disproportionate losses borne by developing countries and subsidized gains by developed ones. These entities include private firms, state governments, and NGOs. This cost sharing can be accomplished by having high-income countries (such as OECD countries) enact domestic policy/legislation requiring employing states and firms to develop “Health Exchange Programs” (“HEPs”) for immigrating health workers.

HEPs would allow healthcare workers to return to their home country to provide services for extended periods of time as well as provide opportunities for sharing specialists from developed countries through joint capacity building projects, similar to other proposals designed to allow migrant health workers to temporarily return without risk to citizenship status [31]. HEPs could be implemented as a requirement for organisations that hire healthcare workers from abroad, and could employ sharing of either domestic health resources or immigrated healthcare workers back to

exporting countries for prescribed periods of time through a letter of intent between vetted partners and partnerships. This improves on prior proposals compared with previous efforts (see Table 2).

Importantly, specific measures to encourage compliance and enforcement should be included at both the individual state and global governance level. This could include individual state-based legislation implementing HEPs, published ethical standards for developed recruitment country efforts, as well as required mandatory credentialing by international organisations or by member states of HEP compliance. In addition, HEPs could strengthen existing proposals and standards, such as requiring organisations to adhere to the WHO Code as a precondition for credentialing. In exchange for high-income countries agreeing to engage in HEPs, sourcing countries could agree to preferential and streamlined immigration policies and creation of long-term partnerships for health worker exchanges.

Countries that do not participate in HEPs would be publicly listed with “non-preferential status.” In addition, as a practical matter, they will also be recognized as high-risk regions for health worker migration due to low regulation/protection of healthcare worker rights.

International organisations, such as the WHO and International Labor Organisation (“ILO”) could foster the HEP program and worker exchange partnerships by providing technical assistance in establishing model HEPs for different types of organisations and healthcare personnel aimed at training, capacity building and sharing of health resources. WHO and ILO could also actively engage in needed data collection of migration flows through fee-based auditing, monitoring, and participate or provide technical assistance to member states to implement in proposed mandatory credentialing of healthcare providers for adherence to requirements of HEPs, labour conditions, and compliance to the Code for recruiting practices.

This system would mitigate the impact of brain drain by reducing or eliminating barriers for re-entry, incentivizing equitable recruitment practices, and maintaining individual health worker rights to migrate. It would also expressly focus on both reducing barriers for health worker re-entry into their home country, and provide interim developing country health worker support while supporting future domestic capacity building. Importantly, such flexibilities and program conduits can be employed in disaster preparedness response or in the event of public health emergencies where relevant cultural competence and language expertise as well as valuable health resources are critically needed.

Such a proposal is analogous to the “brain mobility” concept, involving diaspora networks of health workers who engage in short-term and development assignments in their home countries, such as implemented in Africa and Thailand, [1,3] the Rockefeller Foundation-WHO-World Bank “Joint Learning Initiative” program supporting resource-poor regions, USA Fogarty International Center training grants, [32] and agreements between the UK and South Africa for healthcare worker exchanges as well as sharing of best practices between hospitals across these regions [5]. Norway and the Netherlands have also

developed programs to support the training and sharing of healthcare workers in source countries in response to current health worker shortages in the latter [2,5]. In addition, cross-border instruments such as twinning (e.g., links between healthcare organisations in source and destination countries using staff exchanges, staff support, and resource flow) can also be explored as potential models to use under HEPs [12].

Harmonizing these efforts using established HEPs can potentially provide opportunities for improved efficiency, enhanced capacity building, promotion of “equitable” migration, and long-term commitments to strengthening resource-poor health settings through continual exchanges compared with the current patchwork of ad hoc projects. These programmatic efforts can also be implemented as part of global health programs in professional schools.

Technology sharing and transfer to resource-poor countries can also be used to mitigate the impact of brain drain, as has been proposed for environmental settings [33]. For example, utilization and sharing of emerging and existing technology platforms such as telemedicine and online or mobile application training modules can increase the impact of capacity, exchange and infrastructure efforts at relatively lower costs. These will be dependent upon the region’s available resources, and implementation should engage public–private partnerships to accelerate integration into these venues as in other global health initiatives [34,35].

Though obstacles in the form of resistance from high-income countries and private entities that currently rely upon imbalances for individual gain will arise, it is nevertheless crucial that global governance solutions that address both equitable resource sharing and the individual rights of healthcare workers to migrate be created. Highlighting mutual benefits and incentivizing more balanced practices using HEPs represents a possible first step.

6.2. State-based public healthcare service corps

In exchange for gaining access to crucial healthcare professionals in resource-poor countries, beyond health exchanges, high-income nations should commit to exporting healthcare services and expertise to developing nations through development of national public health service entities, such as a Global Public Healthcare Service Corps (“GPHSC”). Such a strategy is similar to those suggested in a USA Institute of Medicine report advocating for the formation of a Global Health Service to mobilize USA health care professionals as well as proposals to establish a Public Health Service centralized in the USA Department of Human and Health Services aimed at building capacity and treating disease in low-income countries [36,37].

This system would provide a stable set of longer term, broader-based developed country professionals beyond shorter-term deployments under health exchanges that rely on immigrating professionals and volunteer providers. GPHSCs would allow for sustained efforts in capacity building and provide a consistent cadre of healthcare professionals specializing and focusing on global public health initiatives. Importantly, goals can be driven by developing country priorities instead of donor-led priorities. National

ministries of health can then gain access to these resources that are independent of funding specific mandates. In this manner, local domestic health agencies and efforts can be strengthened in a sustainable way, while sending countries benefit through global health security and essential medical field training and experience that may be unavailable otherwise.

Developed countries should create modes of participation for young healthcare professionals to provide aid and assistance in developing countries, similar to the USA Peace Corps model and efforts at exporting health workers by countries such as Cuba [36,38]. This should be incentivized by benefits for the participating providers, including tax offsets for participation costs (e.g., travel, lodging, etc.), student loan forgiveness in countries such as the USA that have private higher education systems, as well as other incentives specific to the relevant provider’s citizenship [36].

In addition, to formalize these GPHSC groups and efforts, an international society (e.g., Basic Resource Alliance for International Need Network, “BRAIN Network”) modelled after the World Medical Association or the World Health Professions Alliance, in combination with the International Alliance of Patients’ Organisations, should be created. The BRAIN Network can professionalize these global health participants, promote best practices, perform systems assessments, as well as create a programmatic memory to inform future efforts, research, and policy.

In order to ensure effective coordination of GPHSCs, the BRAIN Network can act as a forum for a diverse set of stakeholders including government entities, ministries of health, NGOs, civil society, and healthcare workers. This forum can assist in prioritising a global agenda for health system strengthening standards, identify countries of immediate need, develop and deploy teams of GPHSC members to more effectively deal with public health projects or emergencies. Such an approach would also bring benefits in foreign diplomacy circles and operationalize the provisioning of healthcare services as an integral aspect of diplomacy (i.e., health diplomacy) [36,39]. This advantage is one that improves on other efforts without such provision for continued, longstanding health worker supply (Table 2).

7. Conclusion

Brain drain from resource-poor countries continues unabated despite recent attempts to address it. More needs to be done and done soon to ensure the poorest and most vulnerable have needed access to health services and professionals. This requires a system that targets motivations of global health migration at both the system and individual level through reallocation of resources utilizing structured global resource sharing and active transfer of health personnel and expertise by the developed world. Mandatory Health Exchange Programs and engagement of state-based Global Public Health Service Corps can respond to both immediate and long-term needs of developing countries that have been adversely impacted by brain drain. Through these mechanisms, developed countries can begin to

compensate the resource-poor for the immense cost and harm caused by health care brain drain.

Conflict of interest

The authors report no existing conflicts of interest at the time of submission.

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