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DOI:10.1097/QAD.0b013e328357f72d

Human capital contracts for global health: a plan to increase the number of physicians in resource limited settings

Africa has 24% of the global disease burden, yet only 3% of the world's healthcare professionals [1]. The shortage of healthcare professionals in sub-Saharan Africa contributes to the weak domestic healthcare systems and impedes the achievement of the millennium development goals, such as reducing maternal and child mortality, treating noncommunicable chronic diseases or the eradication of pediatric HIV [2–4]. When using HIV prevalence as a proxy to signify burden of disease, it is blatant that there are an insufficient number of physicians trained per year to adequately meet the healthcare needs of the 10 sub-Saharan African countries afflicted most by HIV/AIDS (Table 1) [1].

One cause for this physician shortage is the emigration of well trained African physicians, a phenomenon popularly known as the healthcare 'brain drain' [5]. In a seminal economic analysis, Mills *et al.* [6] estimates that US\$ 2.17 billion was lost by nine African countries in training physicians who then emigrated to Australia, Canada, the UK, and the USA (Table 1). Notably, the UK benefitted from the emigration of African healthcare workers by an estimated US\$ 2.7 billion and the USA benefitted by US\$ 846 million [6].

In an attempt to minimize this sink-source phenomenon, the World Health Assembly in 2010 adopted the Global Code of Practice on the International Recruitment of Health Personnel [7]. The resolution is a multilateral, voluntary framework that addresses the shortage of global health personnel by focusing on the migration of

healthcare workers from resource-limited countries [7]. The code also calls on wealthy countries to provide financial assistance to source countries afflicted by the loss of qualified health workers [7].

We propose a solution to mitigate the healthcare brain drain by using a strategy known as human capital contracts (HCC) (first proposed by the Nobel Prize economist Milton Friedman) [8]. It works like this: an investor, such as a donor nation or global health initiative, covers the entire cost of a student's medical training [9]. In exchange, the student will work for the first 10 years of their medical career in a government or NGO sponsored health clinic in their respective country of medical education. Their medical license will be contingent on this obligatory national service. A multilateral 'binding' agreement between the African country and destination countries (i.e., Australia, Canada, the UK, and the USA) could prevent migration during the term period.

For example, in Malawi, the College of Medicine (COM) (the country's only medical school) has graduated 372 students since 1991 [10]. Currently, the school anticipates 60 graduates per year with the intention to scale-up to 100 graduates per year [10]. The Malawian government subsidizes nearly 100% of students' medical education, currently estimated to be US\$ 32 952 per year [6]. In the case of Malawi, assuming a donor aims to triple the number of COM graduates from 60 to 180 students per year, it would cost an estimated US\$ 6 million per year. Ironically, in order to tackle the physician shortage in

Table 1. Total physicians (per 100 000 population) and estimated lost investment in the 10 African Countries with the highest HIV/AIDS prevalence.

HIV/AIDS Rank	Country	Adult HIV prevalence (15–49 years) (%)	Total physicians (per 100 000 population)	Estimated lost investment (\$, millions) (95% CI)
1	Swaziland	25.9	16	N/A
2	Botswana	24.8	34	N/A
3	Lesotho	23.6	05	N/A
4	South Africa	17.8	80	1412.70 (1382.51–1435.95)
5	Zimbabwe	14.3	20	39.61 (35.87–43.27)
6	Zambia	13.5	10	12.14 (10.68–13.58)
7	Namibia	13.1	37	N/A
8	Mozambique	11.5	03	N/A
9	Malawi	11.0	02	2.16 (1.55–2.78)
10	Uganda	06.5	10	13.61 (12.31–14.85)

CI, confidence interval. Adapted from Mills *et al.* [6].

Malawi, the United Nations Development Program (UNDP) is paying US\$ 40 000 per year to attract foreign doctors [11]. It makes more sense for the UNDP to instead invest this aid into training Malawian physicians by way of a HCC. The benefits of training Malawian physicians, with stronger ties to their country, instead of importing foreign doctors are self-evident [12].

Our proposal has many advantages but we also acknowledge potential limitations. Without a concurrent increase in infrastructure capacity, African medical schools may not have the optimal environments for the increased class size. However, experience from Malawi and other African nations demonstrates that international partnerships with donors can improve medical school facilities by subsidizing construction of lecture halls, libraries, and computer labs [13]. In fact, The President Emergency Plan for AIDS Relief, through the creation of the Medical Education Partnership Initiative, committed US\$ 130 million with the goal to train and support the retention of at least 140 000 new healthcare workers in Africa and included grants for medical school infrastructure development [1].

Another important consideration is the need to address quality of education. We propose coupling HCC with a mechanism of accreditation to ensure academic standards. Finally, donors of HCC will need to consider mechanisms to prevent increases in tuition (that surpass inflation) as medical schools may see this as an opportunity to increase revenue.

Improving health equity vis-à-vis increasing access to healthcare is a well established intervention to achieve poverty reduction and attaining universal human rights [14]. Direct investment in medical education is an effective and well defined sector-wide approach to increase healthcare and public health capacity in Africa [15]. Financial support through the use of HCC could mitigate the ethical and economic consequences of emigration of African doctors, thereby stemming the healthcare brain drain.

Acknowledgements

Conflicts of interest

All authors approve this manuscript.

There are no conflicts of interest.

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Received: 2 July 2012; revised: 15 July 2012; accepted: 19 July 2012.

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DOI:10.1097/QAD.0b013e32835857d4