Chapter 6

The Financial Consequences of High-Skill Emigration: Lessons from African Doctors Abroad

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Views of the Financial Effects of High-Skill Emigration

A common view in the social science literature is that the emigration of publicly trained professionals from developing countries causes the country of origin to lose the amount invested in their training. In this view, having a skilled diaspora can carry enormous public costs for the country of origin, and a variety of proposals have been advanced to offset those costs. These proposals include measures to limit skilled emigration, such as restrictions on international recruitment, taxes on highly trained emigrants, and systems of compensation from destination-country governments to origin-country governments.

Kirigia et al. (2006), for example, show that the Kenyan public invests the equivalent of US$48,169 in the medical training of each physician—an astronomical sum in a country where the average person earns about US$1.30 per day—and that the emigration of such a physician causes the country to lose this amount in medical training costs. This comports with other estimates of the cost of training a physician in several other African countries, typically US$5,000 to US$10,000 per year of medical schooling (Hagopian et al. 2005), normally taken to represent the public loss arising from the emigration of physicians thus trained. Clearly, the departure of a skilled worker is the proximate cause of a change in the amount and
distribution of the returns to that investment. It is also the proximate cause of a reduction in revenues from taxes that person would have paid at home.

Thus, many observers have concluded that the departure of a skilled person constitutes a massive loss of public finance to the country of origin. Desai et al. (2009) claim that the emigration of skilled Indians causes India to lose 2.5 percent of fiscal revenue. Some have gone further and suggest that the value of the loss should be set far above any direct cost of public training, such as the value of what that training cost would have earned if invested in a bank account instead (for example, Kirigia et al. 2006), or what the cost of training that person in the destination country would have been (Bhargava 2005). Bhagwati (1976) has advocated an emigration tax on high-skill workers who retain citizenship in the country of origin—though it is not limited to publicly trained workers—a proposal that has evolved somewhat since (Wilson 2008). Many policy makers have urged that developing countries that publicly train skilled professionals who emigrate be given a compensation payment of some kind by the destination countries. Advocates of this approach include former Irish president Mary Robinson (McColl 2008) and a committee convened by the U.K. parliament (Select Committee on Science and Technology 2004:para. 144).

**New Data on African Physicians in North America**

Before exploring these commonly held views, it would be useful to establish a series of facts about the behavior of one skilled emigrant population that has been of interest to policy makers—African physicians in North America. Those facts will then be used as a tool to question many of the common suppositions about the financial effects of high-skill worker emigration, using African physicians as a suitable group with which to test the assumptions underlying mainstream views of the financial impacts of these movements. This chapter discusses only the financial impacts of the emigration of African physicians. Impacts of their emigration on morbidity and mortality can be found elsewhere (Clemens 2007).

Clemens (2011) reports the results of a new mail survey asking African doctors abroad about their remittances, year of arrival, country of training, and other migration-related traits. The survey was sent to all 6,775
African-born members of the American Medical Association, and all 3,117 African-trained members of the Canadian Medical Association. “Africa” here is defined as all 54 countries of the African continent. This includes Sub-Saharan Africa (as defined by the World Bank, which includes Madagascar, Mauritius, and other nearby island nations) plus all of North Africa (Algeria, Djibouti, Egypt, Libya, Morocco, and Tunisia).

A total of 1,759 African physicians answered the survey, giving a response rate of 17.78 percent. This is strikingly high for a “one-off” mail survey with no participation incentive. But it is low enough that great care must be taken in assessing whether the respondent’s characteristics are representative of the population that was sampled. Clemens (2011) describes multiple methods used to correct the estimates described here for potential sources of bias due to nonresponse.

The first of these corrections is post-stratification. When the distribution of potential respondents’ traits in the whole population is known, the answers can be adjusted for any factors causing nonresponse that are correlated with those traits. In this survey, the American Medical Association and Canadian Medical Association records indicate the country of birth or training, age, gender, medical specialty, and state or province of residence. For example, if remittances by Ghanaian physicians are higher than those by South African physicians, and South Africans are more likely to respond than Ghanaians, the raw survey data would tend to underestimate remittances in the population. But if we know how many Ghanaians and South Africans are in the population that received the questionnaire, we can reweight the remittance estimates to account for different response rates by Ghanaians and South Africans. The post-stratified average remittance estimate in this example would assign greater weight to each Ghanaian because Ghanaians were less likely to respond. Post-stratification produces a moderate adjustment to the findings of the survey reported below.

A second correction is a randomized survey design. Perhaps the most important unknown trait of African physicians that might influence their response to a survey about remittances is the level of remittances themselves. People who send large remittances might fear reporting this fact; conversely, people who send no remittances might see a survey about remittances arrive in the mail and discard it as irrelevant to them. For this reason, a version of the mail survey questionnaire without any questions about remittances was sent to a randomly chosen subset of the population. Any difference between response rates for the different questionnaires
must be caused by the presence of a remittance question. This allows bounds to be placed, as reported below, on the degree to which remittance behavior itself could produce bias by directly causing nonresponse.

A third correction is response time analysis. People who have a greater degree of interest in answering the survey might plausibly be expected to return it quickly; people with less interest might return it with a greater delay. If nonresponders differ substantially from responders on a particular characteristic, then we might expect late responders to differ substantially from early responders on that characteristic. For example, it was found that reported remittances do not decline as the response time increases, as would be expected if nonresponders remit more than responders. Responders who took several months to return the survey form reported no lower remittances than those who responded within a week. This is suggestive evidence that reported remittances are not biased upward by nonresponse.

A fourth correction is conservative bounding. Many survey respondents, for example, returned the survey but left blank the answer to the question about remittances. Does this constitute a refusal to answer, or does it mean that the respondent sent no money? The most conservative approach, to establish a lower bound on remittances, is to assume that “item nonresponse” of this kind means that no remittances were sent.

Readers with interest in these and other methodological details of the survey are referred to Clemens (2011). For the present purpose, the estimates discussed below are adjusted for nonresponse bias by all of these methods, and in all cases they are assumed to represent conservative estimates of the traits of the underlying population.

**Country of Training**

The first useful fact from the survey is that about 51 percent of the African-born physicians residing in the United States received their doctor of medicine degrees in their country of birth. Thus, about half received their medical training in the United States or in a third country prior to arriving in the United States, not in the countries they come from.

Figure 6.1 shows the post-stratified estimates of the percentage of African-born physicians in the United States trained in the country of birth. The dark gray column shows this figure for all countries of birth. The light gray columns show it for selected countries of birth with a
There is great heterogeneity across countries of birth: less than a fifth of Kenyan-born physicians in the United States became doctors in Kenya, whereas about three-quarters of Egyptian doctors in the United States became doctors in Egypt.

**Timing of Departure**

The second useful fact from the survey is that the typical African-born, African-trained physician who is living and working in Canada and the United States spent at least five years working as a physician in his or her country of birth before emigrating, and probably substantially more.

The survey questionnaire asked each physician his or her country of birth, country of medical training, year of receiving their doctor of medicine degree, and year of arrival in Canada or the United States. This allows...
calculation, for those trained in their countries of birth, of the amount of
time that elapsed between receipt of their doctor of medicine degree and
arrival in Canada or the United States. Figure 6.2 shows a density plot of
this elapsed time for the African-trained physicians only. While the figure
makes clear that many arrived quickly after graduating, the average
elapsed time among survey respondents is 8.5 years. When post-stratified
to adjust for nonresponse bias, this average falls to 7.2 years.

It is not obvious that all of this time was spent in the country of birth for
all physicians, but there is strong evidence that most of these physicians
spent most of that time in their country of birth. Clemens (2011) shows that
around 75 percent of African-born physicians who received U.S. permanent
residency between 1980 and 2000 listed their previous country of residence
as their country of birth. Even those who did not state this might have spent
a substantial portion of their postgraduation time in their countries of birth,

FIGURE 6.2
Time Elapsed between Receipt of Doctor of Medicine Degree and
Arrival in Canada or the United States, for Those Who Received Their
Doctor of Medicine Degree in Their African Country of Birth

Source: Author’s calculations based on Clemens 2011.
Note: Kernel density plot with Epanechnikov kernel, bandwidth 1. Vertical axis shows fraction of total density. Sample of 1,149
African-born physicians who received a doctor of medicine degree in their countries of birth, who were residing in the United States
and Canada in 2006. Post-stratification is by all possible combinations of two gender strata; five age strata (quintiles); four medical
specialty strata (grouped by average income); and six strata combining country of residence and country of birth, country of train-
ing, or both (three categories for U.S. residents born in Northern Africa, South Africa, and all others; and three more categories for
Canada residents trained in Northern Africa, South Africa, and all others).
but to be conservative, let us assume that all of those who were African trained and did not list their country of birth as their country of previous residence left their country of birth immediately after graduation to depart to some third country from which they arrived in the United States.

Suppose we assume that (a) the tendency for African physicians arriving in the United States to remain for a time in their country of birth post-graduation is roughly similar to that of those who arrive in Canada; and that (b) the behavior of those with permanent residency is roughly similar to those in the sample, either because the sample largely includes those with permanent residency or because those without permanent residency in the United States did not have a greatly different tendency to remain in their country of birth postgraduation than those with permanent residency. Both of these assumptions are plausible. Under these assumptions, a conservative lower bound on the number of years spent postgraduation in their countries of birth by African-trained physicians is $0.75 \times 7.2$ years, or 5.4 years, which we conservatively round down to 5.

One reason this is quite conservative is that a large majority of medical students work in a patient-care capacity closely mimicking that of a graduated physician even while they are still in medical school. Thus, the number of years of patient care provided in the home country by these physicians prior to emigration is very likely to be higher than five.

**Remittances**

The third useful fact from the survey is that African physicians in Canada and the United States send an average of more than US$4,500 per year to their countries of birth, including nonremitters. Average remittances of the subset of those who received their medical degree in their African country of birth are more than US$6,500 per year.

Figure 6.3 shows these estimates. The light gray columns show averages for all African-born physicians; the dark gray columns show the average for those who are both African born and received a doctor of medicine degree in their country of birth. The black error bars show 95 percent confidence intervals for the mean remittance in each population. The leftmost pair of columns shows the average reported by those who answered the survey. The second pair of columns adjusts that mean, as described above, by simultaneously post-stratifying by country of birth or training, age, sex, medical specialty, and Canadian province or U.S. state of residence.
estimate for all physicians’ remittances modestly declines and that for African-trained physicians modestly rises, though neither of these changes is statistically significant.

The final pair of columns makes two very conservative assumptions about the relationship between nonresponse and remittances: first, that all respondents who left the remittance question unanswered sent zero remittances, and second, that all respondents who were caused not to return the survey by the presence of a remittance question (that is, 4 percent of nonresponders, as revealed by the aforementioned randomized survey design) also sent zero remittances. This final pair of columns, therefore, represent a conservative lower bound on remittances sent by the population sampled. It is plausible, for example, that many of those who chose not to answer the remittance question specifically, or chose not to answer the entire survey because of the remittance question, were sending large amounts and chose not to answer for that reason.

**FIGURE 6.3**

Annual Remittances to Country of Birth for Physicians Born in Africa, Residing in Canada and the United States in 2006, Including Nonremitters

Source: Author’s calculations based on Clemens 2011.

Note: Post-stratification is by all possible combinations of two gender strata, five age strata (quintiles), four medical specialty strata (grouped by average income), and six strata combining country of residence and country of birth or country of training (three categories for U.S. residents born in Northern Africa, South Africa, and all others; and three more categories for Canada residents trained in Northern Africa, South Africa, and all others).
Lessons of the Financial Cost of High-Skill Emigration

These facts shine light on how we might think about the financial consequences of high-skill emigration in the particular context of African doctors working in a rich country. All of them suggest, in different ways, that it is simply wrong to count up the number of African physicians abroad to calculate the financial loss to their countries in the amount of the full public cost of their training.

Lesson 1: Large percentages of skilled professionals from developing countries were trained outside of the countries they come from.

Most obviously, we must account for the fact that important percentages of emigrant skilled professionals from developing countries became skilled professionals abroad. Only about half of the African-born physicians in the United States became physicians in their countries of birth.

This suggests that very little public money from their countries of origin was spent on their medical training. Some countries do offer scholarships for overseas study and it is possible that a small number of those physicians were funded by their countries of birth to train as doctors abroad. The enormous costs of medical school in rich countries suggest that this number is likely to be very small, indeed.

It is true that even African doctors who received their medical training abroad are likely to have received public subsidies for lower-level education such as primary school. But the idea that all 200 million international migrants on earth owe money to their countries of primary education in the amount of their primary schooling costs has not been (nor should be) proposed in credible policy research. Few would argue that the expenditure of money by the French state on the primary education of French citizens creates a property right to those citizens’ brains that must be paid in full upon emigration to avoid charges of embezzling public funds. And, anyway, the other costs of education are much smaller than medical costs. Kirigia et al. (2006), for example, show that the cost of medical education is 73 percent of the total public cost of all education (including primary and secondary) typically received by physicians in Kenya.

The experience of African doctors abroad also suggests that it is simply not accurate or meaningful to count the number of tertiary-educated people born in a developing country who live abroad and describe this as a generalized measure of “brain drain.” Docquier and Marfouk (2006) provide groundbreaking counts of the number of tertiary-educated people
born in each developing country residing in a rich destination country and refer to this number as a measurement of “brain drain.” Docquier and Marfouk do not in any way claim that their numbers are directly informative about the financial effects of emigration, but common usage of the term “brain drain” does tend to include the presumption of negative financial effects. Yet, the stock of tertiary-educated people born in Cape Verde who live in the United States may be enormously different from the number of tertiary-educated people who left Cape Verde, if many of them acquired tertiary education in the United States, and it is not at all clear that many or even most of them would have acquired tertiary education had they been unable to leave Cape Verde. One lesson from African physicians is that the stock of skilled workers abroad can be very different from the number of skilled workers who left.

Lesson 2: A substantial portion of the public’s financial investment in training emigrants is recouped before they depart, even for those who never return.

Even those African physicians who were trained in their countries of birth—the vast majority with substantial public subsidy—spent an average of more than five years in their countries of birth prior to emigrating. Even those physicians who depart, never return, never send any money home, and never interact in any way with their country of birth are therefore typically giving their country of training a substantial return on its public investment. This bears directly on the financial cost of their departure: They are not taking the entire training investment with them, because the country has already typically realized a substantial return on that investment.

What portion of the public investment is recouped by receiving (conservatively) five years of service? Many states do permit limited contractual relationships that limit movement in exchange for public funding of higher education, but these limits rarely amount to five years of movement restrictions. Brazil’s National Council for Scientific and Technological Development, for example, awards scholarships for a few years of postgraduate study abroad that require the same number of years of residence in Brazil thereafter. The Turkish government’s Scientific and Technological Research Council also publicly sponsors doctoral research abroad in exchange for an obligation to live thereafter in Turkey, usually for no more than two years. The United States government pays for much of the training cost of physicians who agree to two years of work in certain facilities on Native American reservations.
The fact that in all of these cases the public debt is considered repaid with a few years of residence is suggestive. Where governments have explicitly spelled out the amount of time it takes for publicly trained professionals to repay their debt to society through service provision, the amount of time does not typically extend beyond five years; nowhere does it appear to be measured in decades. Because the typical experience of publicly trained African emigrant doctors is to remain longer than five years after graduation, it might be reasonable to think that the typical African-trained doctor who emigrates has already paid back most or all of their debt through service.

Lesson 3: The emigration of publicly trained doctors from Africa typically results in the transfer of money within the African countries they come from, not a transfer of money out of those countries.

The emigration of African-trained physicians in Canada and the United States produces financial flows that are tremendously at odds with conventional wisdom. Rather than representing a transfer of money out of the country of origin, the departure of a publicly trained African physician to Canada and the United States causes a transfer of money within the country of origin, from the state to private hands—with much more money entering private hands than leaves public coffers.

The reason for this is that the remittances typically sent by African-trained physicians in North America are substantially greater than the amount spent to train those physicians. As discussed above, the publicly borne medical training cost of a physician in Sub-Saharan Africa is typically about US$10,000 per year of school, usually for around six years. The average African physician in Canada or the United States who was trained in his or her country of birth—including those who send no money—sends upward of US$6,500 per year to family, friends, or charitable organizations in that country. In the same sample in Clemens (2011), the average number of years since arrival in Canada or the United States is 21.1 years, and remittances start out slightly higher than average in the first year since arrival, declining very slowly over time. All of this means that the typical African-trained physician in Canada or the United States has cumulatively sent home much more than the public cost of his or her medical training. A back-of-the-envelope estimate would suggest that this cost was about US$70,000 or less, and that the average cumulative amount sent home for those remaining long term in Canada or the United States is US$130,000 or more.
To be sure, the source and destination of these financial flows within the home country are very different: The cost of training might come from the budget of the Ministry of Education or Ministry of Health, and the immediate destination of remittances is most often the hands of the physicians’ family members. Of course, this does not rule out a substantial positive fiscal impact, since very little of remittances would tend to be spirited away to foreign bank accounts; the vast majority is spent in the African country to which it is sent. Indeed, spending is typically the purpose for which it is sent. Such spending would be expected to have a Keynesian multiplier effect: people building new houses pay construction workers, who buy food from farmers, and so on. To the extent that any such activity is taxed, there could well be positive fiscal effects.

But even setting aside any such knock-on positive fiscal effects, at the very least the evidence from African doctors abroad suggests that we adopt a fundamentally different conception of the nature of financial flows caused by the departure of publicly educated skilled professionals from developing countries. It is common to look upon a dollar spent on the public medical training of an African emigrant physician as a dollar lost to the country of origin. In rough terms, it is more like a one dollar net gain to the country of origin—with a dollar being thereby lost to public coffers, and two dollars being thereby gained by consumers in the country of origin. Again, this ignores the possibility of positive fiscal effects from taxed expenditure of the two dollars in private hands and its multiplier effects on other spending.

How Much Compensation Is Enough?

As discussed, there are various proposals for payments from migration destination countries to compensate countries for the financial loss occasioned by the emigration of publicly trained professionals. Let us assume for a moment that such payments are justified and inquire only about the amount. For publicly trained African physicians who have departed for North America, how much would be the proper compensation payment?

Many Sub-Saharan African countries typically spend about US$70,000 on the medical training of each emigrant physician, most of which typically
comes from public coffers. Assuming that this is the financial cost to be offset by a compensation payment, the following facts bear on the proper amount of the payment:

- Large fractions of the African doctors abroad were not publicly trained in their home countries, so any calculation of the payment must focus on those who are trained and leave, not simply the number who are abroad.
- Those who are publicly trained in their home countries typically serve in that country for at least five years before departing—not counting care they provide while in medical school. Certainly this diminishes the fiscal loss caused by their departure, since it represents the realization of a substantial portion of the public investment prior to their departure.
- The same doctor, if bound for a rich destination country like Canada or the United States, can be expected to send home roughly double his or her training cost in unrequited financial transfers—unless of course he or she returns home, in which case the question of compensation becomes moot.

The size of the compensation payment would depend on these and other factors. At the least, it would depend on the value placed on a year of service in the country of origin. The revealed preference of many governments, as discussed above, is that a few years of work constitutes full compensation for the public’s investment, and the typical publicly trained African emigrant physician is already doing this. Furthermore, it would depend on the relative social value of a dollar in public hands and two dollars in private hands—with the complication that some portion of the two dollars in private hands would eventually reach public coffers.

Whatever the social value of the cumulative US$130,000 sent home by the average, African-trained, long-term emigrant physician living in Canada or the United States, it is surely not zero, because its expenditure in the origin country must create some degree of employment and economic activity beyond any effects on the public coffers. Both of these suggest that whatever the proper compensation payment might be, even if we were strictly interested in offsetting the financial loss to the country, it is substantially less than the full training cost of the physician, and it is not obvious that the proper compensation payment is greater than zero.
Additional Questions About Policies to Remedy Financial Impacts

The preceding discussion has assumed that the policy goal is to offset the strictly financial loss of having a publicly subsidized mind depart the country. There are additional reasons to question the propriety and amount of compensation payments, presented in detail in Clemens (2011)—reasons that arise separately from the magnitude of the financial flows considered so far.

First, the question of compensation for training costs cannot be divorced from measurement of the social benefit provided by those workers. (An extreme example to make this point is that the proper compensation payment for the emigration of publicly trained astrologers is zero, because they have little social benefit, regardless of their training cost.) And it is unclear that the social benefit of each and every physician trained by an African country exceeds their training cost. The majority of publicly trained physicians in South Africa, for example, do not work in public clinics or hospitals and do not work in poor areas of the country. A donor that chooses to compensate the training cost of one of these physicians who departs South Africa is choosing to subsidize physician education—rather than, say, the education of community health workers or water sanitation workers, whose training expense might have a much higher social return. A donor whose objective is not simply to offset strictly financial costs of public training, but to generate improved health, might wish to target subsidies elsewhere than strictly physician training. The optimal payment by such a donor in compensation for publicly subsidized training of emigrant physicians would be something less than the full training cost of the physician.

Second, even if all African physicians were fully publicly educated at home, departed their countries of birth immediately upon graduation, never sent any money home, and would have enormous social benefits if they stayed in their home countries—even in this extreme counterfactual case—would it be correct to say that exactly 100 percent of their training cost has been wasted if they leave the country that trained them, requiring a payment of compensation in the amount of 100 percent of their training cost to pay the public debt they owe? That is, does absolutely all of the social value of educating a skilled professional arise from the provision of services in their country of training? To believe that, we would need to
believe that there is zero social value per se in creating a country where a person who wishes to become a doctor can become a doctor, regardless of their social background.

The constitutions of many African countries state that their citizens have a right to higher education if they are qualified for it, a statement that is meaningless if the only and exclusive social value of training skilled workers arises from the services those people provide. We would also need to believe that public subsidies for individuals’ education create an unlimited state property right to those people, valued at the full value of the training cost. As discussed, some states do consider public education subsidies to create a limited public property right to people who receive them—and therefore require a few years of residence or public service following graduation—but no state recognizes the creation of an unlimited public property right to the brains of those publicly educated, for example, by requiring permanent residence or lifelong public service after graduation. These states already accept, then, that the degree of public property right to publicly educated individuals does not extend to the full cost of training them.

Third, there are ethical complexities involved in requiring any amount of compensation from emigrants. Bhagwati and Dellalfar (1973) propose a tax on skilled émigré citizens of developing countries, to be collected under United Nations auspices in rich destination countries and sent back to the countries of origin. Part of the justification for this tax is that it would only be levied on those who choose to retain citizenship in the country of origin—a provision intended to lessen the degree of coercion embodied in the tax. But the decision to accept public training subsidies, the decision to depart one’s country of birth, and the decision to retain citizenship in the country of origin are not frequently free of coercion. If the tax were levied only on those publicly trained (which many support but Bhagwati and Dellalfar do not suggest), it would be ethically complex to require compensation payments from people who were born in countries that do not have quality private universities and were forced to rely on publicly subsidized education, but not to require such payments from those born in other countries with viable private options.

Beyond this, it may be unethical to require a Zimbabwean physician to pay money to a government that, by provoking economic collapse in Zimbabwe, obliged him or her to emigrate. And it is not clearly ethical to require people “choosing” to retain citizenship in their countries of birth to
pay a tax when many migrants who would prefer to be citizens of their destination cannot be; in 2008, the waiting list for legal permanent residency in the United States was 2.5 million people, many of whom have been waiting several years. Highly skilled emigrants among them would be forced to choose between paying a tax to their only country of citizenship or to become stateless. At the very least, such a tax involves ethical complexities that often go unaddressed.

**Conclusion**

This chapter is not an attempt to categorically state that the financial impacts of medical or any other high-skill emigration are positive or negative, that compensation payments for training costs are always or never justified, or what the precise amount of compensation should be in any particular case. Rather, the goal has been to argue that the assumptions we would need to make to believe that skilled emigrants should make compensation payments to their countries of origin for the full amount of their skilled training costs are clearly violated by the behavior of one important group of skilled emigrants: African physicians abroad.

Many of those physicians are trained abroad, and even those trained at home typically spend substantial periods in their country of training prior to departure and send amounts of money home that greatly exceed their training costs. Rather than caricature public training subsidies as “lost” to the country of origin when skilled emigrants leave, it would be better to recognize that they are often recouped to a substantial degree before the trained professionals leave, and that they generate enormous flows of money into the private sector of the origin countries that must also help to recoup the loss in some nonzero measure. Building on facts like these might lead to a more constructive discussion about the financial effects of high-skill migration and policies associated with it.

**Notes**

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2. The American Medical Association has no record on the country where its members received their degrees, and the Canadian Medical Association has no record of its members’ country of birth. The American sample thus includes African-born physicians, trained both in Africa and abroad, while the Canadian sample includes physicians trained exclusively in Africa (the large majority of whom are African born). African-born, Canadian-trained physicians were not sampled.

3. There are no corresponding estimates for those resident in Canada because the survey sample for Canada only included African-trained physicians.

4. There are two gender strata, five age strata (quintiles), four medical specialty strata (grouped by average income), and six strata combining country of residence and country of birth and country of training (three categories for U.S. residents born in Northern Africa, South Africa, and all others; and three more categories for Canada residents trained in Northern Africa, South Africa, and all others). Clemens (2011) reports estimates post-stratified by individual countries of birth or training, and other choices of strata.

References


