The migration of highly educated or skilled people is a critical, controversial, and difficult subject. It is critical because it involves the transfer of human capital, which is a key to economic growth and poverty reduction. It is controversial because, in many cases, the transfer takes place from countries suffering from scarcity of such resources to countries enjoying relative abundance. It is difficult to analyze because the general lack of data means that neither the causes nor the impacts of the phenomenon are well understood.

A high level of skilled migration is rarely the root problem but rather a symptom of myriad other development problems. Without properly addressing various policy challenges—in education, labor and financial markets, healthcare, and public finance—efforts to design mechanisms to harness the benefits and minimize the costs of skilled migration will not be fully effective. Indeed, they may be futile. The discussion yields the following main conclusions:

- Although the emigration rate for tertiary-educated workers is high in many African countries, rates vary considerably across countries. High-skilled migration rates are particularly high in small, low-income, and conflict-affected countries. The low levels of human capital in many African countries amplify the impact of high-skilled migration. Rather than trying to stem migration, African governments and policy makers should focus on increasing education and skill levels and establishing an environment in which high-skilled workers have productive opportunities at home.

- Tertiary-educated migrants from different African countries exhibit vast differences in terms of their performance in the destination countries’ labor markets. These differences reflect language ability, the quality of education in origin countries, and the speed of integration
in destination-country labor markets. The performance of tertiary-educated migrants is important for the overall development impact of skilled migration, because it affects their potential to send remittances and generate other positive diaspora externalities.

• The data and analysis have important implications for policies to limit the costs and maximize the benefits of tertiary-educated migration. Education should be a major focus. Shifting educational resources to less-sophisticated degree programs (for example, training physicians’ assistants rather than doctors) could increase the supply of workers trained to provide services that are in short supply in underserved areas while also reducing the ability of trainees to find employment in destination countries. However, such policies should be implemented based on the country’s need for the right mix of specialists and lower skilled workers, not the implications for high-skilled emigration. Requiring students to perform public service for a moderate period of time (since more onerous requirements are likely to encourage emigration and discourage return) and to pay for a portion of the cost of their education while providing performance-based subsidies to some students could increase the benefits of higher education while limiting the fiscal losses from high-skilled migration.

• Restrictions on the emigration of high-skilled professionals infringe on civil liberties; may not deter emigration, given the strength of incentives to emigrate; and discourage return. Incentives to return may be ineffective, may be provided to migrants who would have returned in any event, and may engender resentment from workers who never migrated. Removing restrictions on the recognition of foreign qualifications and experience could encourage return.

• Taxation of potential emigrants may prove difficult to enforce, as it would require the cooperation of destination-country governments that derive great benefits from high-skilled emigration. Destination countries might consider providing financial and technical assistance to origin countries’ educational programs, provided that such aid does not replace existing programs. An option worth considering involves getting hiring institutions (whether public or private) to open training facilities in Africa.

This chapter is organized as follows. The first section reviews available data on high-skilled migration from Africa and compares high-skilled migration patterns across African countries. The second section reviews the performance of tertiary-educated migrants in destination labor markets, focusing on the migration of healthcare professionals and the impact their migration has on Africa. The third section analyzes various policy options.
BENEFITS AND PATTERNS OF HIGH-SKILLED MIGRATION

Highly educated workers generate positive externalities that are critical to economic growth and development. These externalities are lost for high-skilled migrants’ home countries upon their departure. Among such externalities are productivity spillovers to both high- and low-skilled workers; public services—such as healthcare and education—that have both immediate and future social spillovers; innovative and creative activities that are at the core of long-term growth; and contributions to the health of social, political, and economic institutions. In addition, in most countries, tertiary education is publicly financed, and the highly educated are net fiscal contributors once they enter the labor force. Their migration therefore implies a fiscal loss for their countries.

On the positive side, the migration of highly skilled people generates numerous benefits for their home countries. Migrants send remittances to their families and forge economic and social linkages between their home countries and the rest of the world. A wide range of other positive diaspora externalities, such as the return of professionals with enhanced skills, are addressed in chapter 4 (see also Wahba 2007; Dustmann, Falzon, and Weiss 2010). An influential body of recent work claims that the migration of highly educated workers can have a net positive impact on the demand for education in a country (box 3.1).

Easterly and Nyarko (2009) argue that in Africa, the gains to migrants and their families are large enough to offset the general losses to the country associated with high-skilled migration and that migration increases overall human capital accumulation. They fail to find evidence of any negative growth effect of skilled migration, concluding that such migration is, on balance, good for Africa. They note that any loss to the origin country is minimal if the emigrating professionals are not able to use their skills efficiently in the origin country, because of a poor investment climate, inadequate complementary inputs (such as poor medical facilities), or lack of scale economies. The voluminous literature on this subject (see Docquier and Rapoport 2009) attests to the difficulty of measuring the costs and benefits and fails to reach a conclusion on the net benefits from high-skilled migration.

HIGH-SKILLED MIGRATION BY WORLD REGION

Migration levels from developing countries, especially from those in Africa, to OECD countries are low. This fact is surprising given the vast wage and income differentials between developing and developed coun-
Box 3.1 The Brain Gain

Individuals generally need to make their education decisions before migration opportunities materialize. In many instances, education increases the likelihood of emigration to a high-income country, since immigration policies in many countries favor highly educated people. Because of such policies, many people invest in more education than they otherwise would have in order to increase their chances of immigrating (Stark, Helmenstein, and Prskawetz 1997; Beine, Docquier, and Rapoport 2001). However, some individuals who acquire higher education, with the hope of immigration, may end up staying at home. This can result in an increase in the stock of human capital (“brain gain”) if the number of people who acquire extra education but stay at home exceeds the number of people who migrate. A reduction in the stock of human capital (“brain drain”) occurs otherwise (Mountford 1997; Stark 2004; World Bank 2006). In one of the few country-level analyses, Chand and Clemens (2008) argue that high rates of emigration by tertiary-educated Fiji Islanders raised investment in tertiary education in Fiji as well as the stock of tertiary-educated people, net of departures.

The empirical evidence is mixed for the relative importance of brain drain versus brain gain effects. Beine, Docquier, and Rapoport (2001) find that for a subgroup of developing countries whose per capita gross domestic product (GDP) is less than 15 percent that of G-7 countries, the stock of human capital has a positive relationship with the migration rate, indicating brain gain. For the entire sample (which also includes upper-middle-income countries such as Brazil, Mexico, and South Africa), they find no evidence of a loss of human capital accumulation as a result of migration.\(^a\) In a more recent study, Angel-Urdinola, Takeno, and Wodon (2008) find a negative relationship between emigration of students from Latin American countries to the United States and tertiary enrollment rates in the countries of origin, indicating an absence of any brain gain.\(^b\) There are some positive experiences of brain gain in the health and information technology (IT) sectors. The expectation of emigrating may have increased the incentive to invest in higher education and specialized training such as IT (in India and Taiwan, China) and nursing (in Ghana and the Philippines) (Solimano 2008).

\(^a\) The authors used a cross-section of 37 developing countries in 1998 to examine the relationship between an indicator for the level of educational attainment and the rate of migration to the United States, controlling for other variables, such as public education expenditure, wage differentials, and population of the home country.

\(^b\) It is difficult to conclude that these results—based on annual data—are evidence of brain drain and not merely the absence of brain gain. Even if there were some brain gain effect, there would typically be a considerable lag between the migration of high-skilled individuals and the incentive for those remaining behind to acquire higher education.

tries. With the exception of the Caribbean and Central America regions, all developing regions had migration rates of 3 percent or less of their total labor force in 2000 (Global Skilled Migration database, described in Docquier and others 2010). Sub-Saharan Africa had the third-lowest migration rate among developing regions, with only 1 percent of its labor force residing in OECD countries or South Africa in 2000 (figure 3.1). Only South and East Asia had migration rates lower than Africa, at less than 1 percent of the labor force. Still, all developing regions saw their overall migration levels increase by about 20 percent between 1990 and
Highly educated workers are more likely to emigrate than less educated workers. In all developing regions, in both 1990 and 2000, the migration rate for tertiary-educated workers (the number of tertiary-educated migrants divided by the total number of tertiary-educated workers) far exceeded the migration rate for less educated workers. In 2000, the migration rates of the tertiary educated ranged from about 5 percent in South America, South Asia, and Eastern Europe to more than 41 percent in the Caribbean (figure 3.2). Africa had the third-highest migration rate of tertiary-educated workers, after the Caribbean and Central America and Mexico. South Asia had the lowest and East Asia the second-lowest migration rates among the tertiary educated.

Another important statistic is the share of tertiary-educated workers in the total stock of migrants, which exceeds the share of tertiary-educated workers in the domestic labor force in every developing region of the world (figure 3.3). In South Asia, for example, tertiary-educated workers accounted for 5 percent of the labor force and 51 percent of all migrants. In Sub-Saharan Africa, the tertiary educated accounted for less than 3 percent of the labor force but more than 35 percent of all migrants.

There are numerous economic and policy-induced reasons why tertiary-educated workers in developing regions are more likely than less
educated workers to emigrate. First, wage gaps (in absolute terms) increase with education, which implies that the overall income gains from emigration are higher (Clemens, Montenegro, and Pritchett 2008). Second, tertiary-educated workers are more likely to possess skills (such as languages) that enable them to adapt to the destination countries’ labor markets and social environments relatively easily and rapidly. Third, educated workers are better able to overcome the financial costs
and legal barriers of immigration. Fourth, selective migration policies in many OECD countries strongly favor tertiary-educated migrants.

Migration rates for tertiary-educated workers are particularly high in Africa. In 2000, one out of every eight tertiary-educated Africans lived in an OECD country, the highest rate among developing regions except the Caribbean and Central America and Mexico. These relatively high skilled immigration rates reflect the fact that Africa has the lowest rate of tertiary education of any developing region (figure 3.4). In 2000, only 3 percent of Africa’s labor force had tertiary education—a far lower figure than in the Caribbean (11 percent) or Central America and Mexico (9 percent), the other two regions with high migration rates among tertiary-educated workers. Despite significant increases in tertiary education in many African countries since 2000, Sub-Saharan Africa still lags other regions.

The small share of the labor force with tertiary education and the relative inability of the unskilled to migrate make skilled migration rates in Africa look especially high relative to other regions. A comparison of Africa and South America provides a useful illustration. In 2000, South America’s labor force of 170 million was much smaller than Sub-Saharan Africa’s of 240 million. However, South America had more than 21.5 million tertiary-educated workers (12.6 percent of the labor force) compared with only 6.6 million (2.8 percent of the labor force) in Africa. About 1.2 million tertiary-educated migrants from South America and a little more
than 1 million from Africa were living in OECD countries in 2000. The migration rate among the tertiary educated in South America (5.5 percent) was about one-third of Africa’s (15.2 percent), because of the much larger number of tertiary-educated workers in South America. The migration rate to OECD countries of less educated workers was much higher in South America than in Africa, a reflection of the lower transportation costs to the United States and the availability of social networks that reduce assimilation costs and legal barriers (Beine, Docquier, and Ozden 2011). At the same time, superior business climates and stable social/political environments in Latin American countries increase the incentives to stay at home for tertiary-educated workers (Fajnzylber and Lopez 2007; Grogger and Hanson forthcoming). Both of these factors led to a lower ratio of migrants with tertiary education among all migrants.

HIGH-SKILLED MIGRATION ACROSS AFRICA

Most African countries resemble the regional average, with low levels of human capital and high rates of tertiary-educated migration. Tertiary-educated workers accounted for less than 10 percent of the labor force in the vast majority of African countries in 2000 (figure 3.5, panel a). They represented at least 10 percent of migrants in almost every country, however, and more than 30 percent in more than half of the countries.

One of the mistakes often made in discussions of skilled migration is to treat Africa as a single homogenous entity. Aggregate migration rates mask wide disparities among country groups and individual countries. The share of migrants among tertiary-educated workers in Africa ranged from a very low rate of 3 percent in Burkina Faso to a staggering 82 percent in Cape Verde. By contrast, overall migration rates range from 1 to 35 percent, with the vast majority of countries below 7 percent (figure 3.5, panel b). The wide divergence between tertiary-educated and other workers stems from the fact that most workers are unable to leave Africa, mainly because of financial and physical barriers.

On average, small countries in Africa have higher migration rates than large countries. In 2000, the share of migrants in the labor force in small countries (populations of less than 3 million) was four times the share in large countries. The average migration rate among the tertiary educated in small countries (30 percent) was three times that of large countries and 1.5 times the skilled migration rate in medium-size countries (figure 3.6). This pattern of higher overall migration and higher-skilled migration in smaller countries is not limited to Africa but is found in many small countries in the Caribbean and the Pacific (Docquier and Marfouk 2007).
Low-income African countries tend to have higher migration rates than middle-income countries. The migration rate among the tertiary educated in low-income African countries is twice that of middle-income countries (figure 3.7). Although the tertiary educated accounted for less than 2 percent of the labor force in low-income countries in 2000, they made up almost one-third of total migrants.
The high rates of tertiary-educated migration from small and low-income countries reflect their small pools of tertiary-educated workers. In 2000, less than 900,000 of the 64 million workers in low-income African countries were tertiary educated. The migration of 200,000 tertiary-educated workers from these countries—a relatively small number considering that in 2000 there were 173,000 tertiary-educated migrants in the OECD countries from South Africa alone—results in a very high level of skilled migration rate for this group. The return on human capital in these countries tends to be relatively low, given the limited opportunities for specialization. The scope for highly skilled workers to generate economic spillovers in more developed countries leads to higher economic gains and strong incentives to migrate.

Ten medium-size countries and nine middle-income countries also had high tertiary-educated migration rates in 2000. Three small countries and three low-income countries had low tertiary-educated migration rates (table 3.1).

At the individual country level, South Africa boasts some of the highest living standards on the continent and has a relatively skilled labor force. Yet in 2000, the migration rate among tertiary-educated workers in South Africa was only twice that of Burkina Faso, one of the world’s poorest nations. Meanwhile, Mauritius—often touted as an African success story—had more than 60 percent of its tertiary-educated labor force residing in OECD countries in 2000. This rate is more than seven times the

**Figure 3.6** Migration Rates in Africa, by Country Size, 1990 and 2000

Source: Authors, based on data from the Global Skilled Migration database (described in Docquier and others 2010).
migration rate of similar workers in Madagascar, another francophone island nation with a per capita GDP one-tenth that of Mauritius. High tertiary-educated migration rates from middle-income African countries are likely to reflect the greater ability to overcome financial and legal barriers to migration.

Political conflict can affect the migration of tertiary-educated workers, but it does not always result in the massive migration of the tertiary educated. Migration rates in 2000 among the tertiary educated in seven African countries that suffered from civil conflicts during the 1990s ranged from a mere 4 percent (in Angola) to 42 percent in (Liberia). Various country-specific factors account for this variation. For example, Portuguese-speaking Angolans are less likely to migrate than English-speaking Liberians, because most destinations for skilled migrants are also English speaking. The presence of an established diaspora in the destination is another key determinant of migration flows, even for skilled workers (Beine, Docquier, and Ozden 2011).

DESTINATIONS OF HIGH-SKILLED MIGRANTS

Tertiary-educated migrants from Africa go predominantly to English-speaking countries such as the United States, Australia, and Canada. In 2000, 53 percent of all tertiary-educated emigrants from African countries to OECD countries went to these three countries, down slightly from 57 percent in 1990 (figure 3.8). These countries, on the other hand, account for only 28 percent of total African emigrants to the OECD countries.
Table 3.1: High-Skilled Migration Rates in Sub-Saharan African Countries of Different Sizes and Income Levels, 2000

<table>
<thead>
<tr>
<th>Country</th>
<th>Size</th>
<th>Income</th>
<th>Country</th>
<th>Size</th>
<th>Income</th>
<th>Country</th>
<th>Size</th>
<th>Income</th>
</tr>
</thead>
<tbody>
<tr>
<td>Angola&lt;sup&gt;a&lt;/sup&gt;</td>
<td>Medium</td>
<td>Middle</td>
<td>Cameroon</td>
<td>Medium</td>
<td>Middle</td>
<td>Cape Verde</td>
<td>Small</td>
<td>Middle</td>
</tr>
<tr>
<td>Benin</td>
<td>Medium</td>
<td>Middle</td>
<td>Comoros</td>
<td>Small</td>
<td>Middle</td>
<td>Congo, Rep.&lt;sup&gt;a&lt;/sup&gt;</td>
<td>Medium</td>
<td>Middle</td>
</tr>
<tr>
<td>Botswana</td>
<td>Small</td>
<td>High-middle</td>
<td>Congo, Dem. Rep.</td>
<td>Large</td>
<td>Middle</td>
<td>Eritrea</td>
<td>Medium</td>
<td>Middle</td>
</tr>
<tr>
<td>Burkina Faso</td>
<td>Medium</td>
<td>Middle</td>
<td>Equatorial Guinea</td>
<td>Small</td>
<td>Middle</td>
<td>Gambia, The</td>
<td>Small</td>
<td>Middle</td>
</tr>
<tr>
<td>Burundi&lt;sup&gt;a&lt;/sup&gt;</td>
<td>Medium</td>
<td>Middle</td>
<td>Gabon</td>
<td>Small</td>
<td>High-middle</td>
<td>Ghana</td>
<td>Medium</td>
<td>Middle</td>
</tr>
<tr>
<td>Central African Republic</td>
<td>Medium</td>
<td>Middle</td>
<td>Lesotho</td>
<td>Small</td>
<td>Middle</td>
<td>Guinea-Bissau</td>
<td>Small</td>
<td>Low</td>
</tr>
<tr>
<td>Chad</td>
<td>Small</td>
<td>Middle</td>
<td>Mali</td>
<td>Medium</td>
<td>Middle</td>
<td>Kenya</td>
<td>Large</td>
<td>Low</td>
</tr>
<tr>
<td>Côte d'Ivoire</td>
<td>Medium</td>
<td>Middle</td>
<td>Nigeria</td>
<td>Large</td>
<td>Middle</td>
<td>Liberia&lt;sup&gt;a&lt;/sup&gt;</td>
<td>Medium</td>
<td>Low</td>
</tr>
<tr>
<td>Djibouti</td>
<td>Small</td>
<td>Middle</td>
<td>Senegal</td>
<td>Medium</td>
<td>Middle</td>
<td>Malawi</td>
<td>Medium</td>
<td>Low</td>
</tr>
<tr>
<td>Ethiopia</td>
<td>Large</td>
<td>Middle</td>
<td>Swaziland</td>
<td>Small</td>
<td>Middle</td>
<td>Mauritius</td>
<td>Small</td>
<td>High-middle</td>
</tr>
<tr>
<td>Guinea</td>
<td>Medium</td>
<td>Middle</td>
<td>Tanzania</td>
<td>Large</td>
<td>Low</td>
<td>Mozambique&lt;sup&gt;a&lt;/sup&gt;</td>
<td>Medium</td>
<td>Low</td>
</tr>
<tr>
<td>Madagascar</td>
<td>Medium</td>
<td>Low</td>
<td>Togo</td>
<td>Medium</td>
<td>Low</td>
<td>Namibia</td>
<td>Small</td>
<td>High-middle</td>
</tr>
<tr>
<td>Mauritania</td>
<td>Medium</td>
<td>Low</td>
<td>Zambia</td>
<td>Medium</td>
<td>Low</td>
<td>Rwanda&lt;sup&gt;a&lt;/sup&gt;</td>
<td>Medium</td>
<td>Low</td>
</tr>
<tr>
<td>Niger</td>
<td>Medium</td>
<td>Low</td>
<td>Zimbabwe</td>
<td>Medium</td>
<td>Low</td>
<td>São Tomé and Príncipe</td>
<td>Small</td>
<td>Middle</td>
</tr>
<tr>
<td>South Africa</td>
<td>Large</td>
<td>High-middle</td>
<td>Seychelles</td>
<td>Small</td>
<td>High-middle</td>
<td>Sierra Leone</td>
<td>Medium</td>
<td>Low</td>
</tr>
<tr>
<td>Sudan&lt;sup&gt;a&lt;/sup&gt;</td>
<td>Large</td>
<td>Middle</td>
<td></td>
<td></td>
<td></td>
<td>Somalia&lt;sup&gt;a&lt;/sup&gt;</td>
<td>Medium</td>
<td>Low</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Uganda</td>
<td>Medium</td>
<td>Low</td>
</tr>
</tbody>
</table>

Source: Authors, based on data from the Global Skilled Migration database (described in Docquier and others 2010).

<sup>a</sup> Experienced civil conflict during the 1990s.
The importance of the United States, Australia, and Canada for tertiary-educated African migrants is the outcome of several factors. First, migration policies in these countries tend to favor educated migrants in general. Second, these destinations have more flexible labor markets than other OECD countries. Third, these countries are widely perceived to offer better career and assimilation prospects than other OECD destinations. Fourth, these countries are farther from Africa than European destinations, which implies higher costs of migration and, hence, works against unskilled workers, who are generally unable to overcome these costs.

A closer look at 10 diverse African countries reveals more detailed information about emigrants’ destination countries. Colonial links feature prominently as a determinant of destinations. For example, France accounts for the largest shares of migrants from Côte d’Ivoire, Madagascar, and Senegal, and the United Kingdom receives the largest shares of migrants from Kenya and Zambia (outer circles in figure 3.9).

Colonial links appear less important for tertiary-educated migrants. In 2000, the United States accounted for the largest shares of tertiary-educated migrants from Ghana and Nigeria. The dominance of the United States, Canada, and Australia as destinations for tertiary-educated migrants is evident even among some francophone countries: in 2000 the United States received 37 percent of tertiary-educated migrants from Côte d’Ivoire, just slightly less than France’s share of 40 percent (inner circles in figure 3.10).

**Figure 3.8** Distribution of Total Migrants and Skilled Migrants from Africa by Destination, 1990 and 2000

Source: Authors, based on data from the Global Skilled Migration database (described in Docquier and others 2010).
Note: Outer circle shows total migrants. Inner circle shows tertiary-educated migrants.
Figure 3.9  Distribution of Migrants and Skilled Migrants from Selected Anglophone Countries in Africa, 2000

Ghana

South Africa

Nigeria

Kenya

Namibia

Zambia

Source: Authors, based on data from the Global Skilled Migration database (described in Docquier and others 2010).
Note: Outer circle shows total migrants. Inner circle shows tertiary-educated migrants.
Figure 3.10  Distribution of Total Migrants and Skilled Migrants from Selected Francophone Countries in Africa, 2000

Côte d'Ivoire

Senegal


Madagascar

Source: Authors, based on data from the Global Skilled Migration database (described in Docquier and others 2010).
Note: Outer circle shows total migrants. Inner circle shows tertiary-educated migrants.
EARNINGS OF TERTIARY-EDUCATED MIGRANTS IN DESTINATION LABOR MARKETS

The professional placement and performance of tertiary-educated migrants in their destination labor markets have important implications for the policy debate on skilled migration. The type of job a migrant has influences his or her performance in the destination country and, thus, the overall welfare gains from migration.

One concern is “brain waste,” which occurs when highly educated migrants accept positions that require little training or education (or do not find employment at all), eroding the benefits of migration to them and their home country. Mattoo, Neagu, and Ozden (2008) argue that this issue is more important for people whose quality of education and skills do not match the standards expected in the destination countries’ labor markets. They estimate the probability that a foreign-born bachelor’s degree holder will obtain a skilled job (a job that on average requires tertiary education) and the probability that a foreign-born professional-degree holder (for example, law, medicine, pharmacy) will obtain a science-oriented or professional job in the United States. They find evidence of significant variation across origin countries and especially low rates of professional placement among educated migrants from several African countries (figure 3.11). Migrants with bachelor’s degrees from 7 of 15 African countries have less than a 40 percent chance of ending up in a skilled job. The pilot project in Ghana (box 3.2) indicates that brain waste is not a problem for top students.

In most cases, the probability of obtaining a skilled job is higher for an African-born migrant with a professional degree than one with a bachelor’s degree. For example, the probability of obtaining a skilled job for an Eritrean- or Ethiopian-born migrant with a professional degree is three times that of a bachelor-degree holder. Among the 15 countries listed in figure 3.11, only bachelor’s degree holders from Senegal and Sierra Leone had higher probabilities of landing a skilled job than holders of professional degrees.

The factors that influence the probability that a tertiary-educated migrant obtains a skilled job or a professional job in the United States vary significantly by country of origin. Factors such as expenditure on tertiary education and the use of English as a medium of instruction have a tremendous impact on the quality of education. Mattoo, Neagu, and Ozden (2008) show that they strongly influence whether a migrant obtains a professional or other high-skilled job. In a related study, Coulombe and Tremblay (2009) compare the skill intensity and schooling levels of Canadian immigrants and natives who were submitted to the same standardized tests.
in literacy, math, and problem solving. They estimate a skill-schooling gap for each origin country, defined as the difference between the mean years of schooling of the immigrant subgroup and the typical Canadian native with the same skill proficiency level. The larger the skill-schooling gap, the lower the quality of education in the country of origin. In simple regressions, they show that the skill-schooling gap is a decreasing function of per capita income of the origin country. The estimate of the slope coefficient indicates that the skill-schooling gap declines by one year for every $10,000 increase in annual per capita income in the origin country.

Migrants with bachelor’s degrees from the three francophone countries studied (Cameroon, Senegal, and Sierra Leone) face lower probabilities of obtaining professional jobs than other skilled jobs in the United States. The probabilities that migrants from these countries obtain professional jobs are lower than those for their counterparts from anglophone countries. But the probabilities of obtaining either a skilled or a professional
job vary among the three francophone countries as well. The probability that a Sierra Leone–born migrant with a bachelor’s degree will obtain a skilled job is 42 percent compared with only 24 percent for a Senegalese migrant with the same qualifications and 29 percent for a Cameroonian (Mattoo, Neagu, and Ozden 2008).

Country differences reflect more than just language. The probability that a migrant from Ethiopia (where Amharic is the official language but
Migrant students earned more than five times as much as top students who never migrated (box figure 3.2.3). After controlling for age, parental education, and family wealth status at the end of high school, a migrant who was abroad earned about $74,000 a year more than a non-migrant. There was no significant difference between the incomes of nonmigrants and return migrants, after controlling for various personal attributes. Assuming a discount rate of 5 percent, the net present value of the lifetime earnings gained from working abroad rather than in Ghana exceeded $1 million per migrant.

(Box continues on next page)
Another key observation emerging from these data is the difference between women and men. Labor market data from many different countries indicate that on average women earn more than men (although the difference is not statistically significant) for identical levels of education and other qualifications. The data on this elite group point show that women, especially elite migrants, earn significantly more than men. There are many possible reasons for this gap, including potential selection biases in migration and education decisions. Examination of these issues was beyond the scope of this research but worth noting for future rounds of analysis.

Migrants abroad are working in broadly similar occupations as those in Ghana. Typical occupations include management consultants, engineers, information technology specialists, academics, doctors, lawyers, and bankers. Elite migrants do not appear to be working in occupations far beneath their qualification levels.

Almost all of these top professionals have bachelor’s degrees (box table 3.2.1). Among current migrants 41 percent obtained their bachelor’s degree abroad. In contrast, only 9 percent of return migrants had foreign degrees. Current migrants are significantly more likely to have obtained an advanced degree than nonmigrants, and in the majority of cases these advanced qualifications were obtained abroad. Among all former top students currently living in Ghana, 32 percent with an advanced degree obtained it abroad.

What are the effects of high-skilled migration on Ghana? Among current migrants surveyed who were not students, 93 percent were sending remittances, and most were sending about $5,000 a year. There was little involvement in trade: only 3 percent of migrants helped a Ghanaian firm make a trade deal or exported goods from their home country in the past year. About 19 percent made investments in Ghanaian businesses, with a mean investment of $3,700 per migrant. The most common knowledge transfer that current migrants engaged in was providing advice on study and work options abroad to other Ghanaians, which about half of migrants reported doing. There were also some limited interactions with companies and businesses: 16 percent of current

**Box table 3.2.1 Educational Achievements of Former Top Ghanaian Students Currently 25–45 (percent)**

<table>
<thead>
<tr>
<th>Migration status</th>
<th>Bachelor's degree</th>
<th>Masters degree, law degree, medical degree, or doctorate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Proportion of degree holders who earned it abroad</td>
<td>Proportion of degree holders who earned it abroad</td>
</tr>
<tr>
<td>Migrant</td>
<td>85</td>
<td>68</td>
</tr>
<tr>
<td>Return migrant</td>
<td>78</td>
<td>70</td>
</tr>
<tr>
<td>Nonmigrant</td>
<td>92</td>
<td>32</td>
</tr>
<tr>
<td>Nonmigrant and return migrant</td>
<td>86</td>
<td>49</td>
</tr>
</tbody>
</table>

Source: Authors.
Note: n = 293. n.a. = not applicable.
English is the medium of instruction in secondary schools) with a bachelor’s degree will obtain a skilled job in the United States is about 20 percent. The same probability for a migrant from South Africa or Zimbabwe is more than 65 percent. Variations for holders of professional degrees are also wide. For example, the probability that a Tanzanian holder of bachelor’s degree obtains a professional job is less than 40 percent, compared with 60 percent for a migrant born in Kenya and more than 80 percent for a migrant born in Eritrea (Mattoo, Neagu, and Ozden 2008).

**Migration of Healthcare Professionals**

Among the highly educated people who leave Africa each year, none has triggered more widespread emotion and, at times, controversy than healthcare professionals. Some argue that the exodus of healthcare professionals, especially physicians, has contributed to a decline in healthcare outcomes in many African countries (Bundred and Levitt 2000). There is no question that many African countries with large numbers of emigrant healthcare professionals face severe shortages of healthcare workers. For example, the vacancy rate in Ghana’s public sector health was 47 percent for doctors and 57 percent for nurses in 2002 (Dovlo 2003). Moreover, given the technological and institutional constraints on substitution among medical personnel, the departure of doctors may result in the underemployment of nurses and other auxiliary staff (Commander, Kangasniemi, and Winters 2004). The number of physicians per hundred
thousand people is less than 5 in many African countries, compared with more than 250 in many OECD countries (the destination for the majority of African physician emigrants) (Bhargava and Docquier 2008). In 2004, there were about 25,000 Africa-trained physicians in OECD countries (Bhargava and Docquier 2008), almost one-fourth the total number of physicians practicing medicine in Sub-Saharan Africa—three times the rate in the next-highest region (figure 3.12).

Emigration of African physicians has risen significantly since the early 1990s. The number of physicians in Africa increased 61 percent while the number of migrant physicians rose 91 percent. This increase reflects the increased capacity and improved quality of medical education in Africa, mainly as a result of the intensive focus by domestic governments and the international community on healthcare problems in Africa (figure 3.13).

Factors causing African physicians to leave their home countries are similar to those driving other skilled workers from developing countries to migrate to OECD countries. Some issues are more important for healthcare delivery, however, such as the lack of professional development prospects, insufficient postgraduate training opportunities, and poor practice conditions at home, especially regarding facilities, equipment, medical supplies, and support staff (Clemens 2007; Bhargava and Docquier 2008). Ghanaian doctors who live abroad cite income and career development as their main reasons for emigrating (box 3.3).
The destination choices of African physicians are similar to those of other African professionals but even more biased in favor of English-speaking countries. The United Kingdom, the United States, Canada, and Australia account for more than 85 percent of African physicians in OECD countries, with the United Kingdom alone accounting for 55 percent (figure 3.14). Ireland is the fifth-largest destination for African physicians among OECD countries. A larger number of physicians in developing countries are trained in or fluent in English when compared to other languages. The practice of medicine requires interaction with other professionals and patients. As a result, English-speaking countries become natural destinations for physicians from developing countries. The principal language still has some influence: France and Belgium, for example, are the dominant destinations for physicians from francophone countries. The fact that the United States receives a significant share of physicians from francophone countries suggests that, in some cases, economic prospects and selective immigration policies can supersede language and colonial links as determining factors.

Policies also play an important role in influencing destination choices. Destination countries that emphasize the attraction of high-skilled labor tend to receive more emigrant physicians. Profession-specific laws and regulations regarding foreign-trained doctors are also important; regulatory criteria that discriminate against foreign-trained doctors impede
Box 3.3 Ghana: A Case Study of Emigrant Physicians

The exodus of Ghanaian doctors is not new. Its roots go back to the 1930s, when a scholarship scheme that was established to train African medical doctors in the United Kingdom planted the seeds for the first physician migration from Ghana. For at least 20 years, medical schools in Ghana included study in the United Kingdom as an official component of the medical program. As a result, in 2004 nearly one of every three Ghanaian doctors worked in an OECD country, mostly in the United States and the United Kingdom. A 1999 study estimates that of the 489 physicians who graduated from the University of Ghana between 1985 and 1994, less than 40 percent remained in the country; more than half went to the United Kingdom and about a third to the United States (Dovlo and Nyonator 1999). The number of migrant physicians grew steadily from 1991 to 2004, albeit at a slower pace than that of domestic physicians (box figure 3.3.1).

Box figure 3.3.1 Number of Ghanaian Physicians at Home and Abroad, 1991–2004

The United States is the largest destination, accounting for 41 percent of all Ghanaian doctors abroad, followed by the United Kingdom, with 39 percent (box figure 3.3.2). The large share of the United States and the United Kingdom is to be expected given the language factor and the colonial links to the United Kingdom. Data on Ghanaian doctors in Australia and South Africa, other likely destination countries, were not available and are not included in these figures.

Migration. For example, in the United States, foreign-trained doctors need to complete their residency there, regardless of their prior specializations. Despite this requirement the United States is the most important destination for foreign-trained doctors; without it, the number of foreign-trained doctors would be even greater.
A World Bank survey of Ghanaian physicians in the United Kingdom and the United States offers important insights not only into the demographic attributes of the migrant doctors but also about factors that influenced their decision to migrate. The top reasons cited by Ghanaian doctors for leaving their home country were related to income and career development. More than 90 percent of respondents said they left the country to pursue their specialization. More than 40 percent of respondents cited concerns about instability in Ghana as one of the top five reasons for leaving the country.

Sub-Saharan Africa experienced high emigration rates by health professional between 1991 and 2004. But rates varied widely across countries. In absolute numbers, a small group of countries—generally the largest in terms of population—are the source of the vast majority of migrant physicians in OECD countries. The main reason is that these countries also have the largest supply of physicians. Five countries—South Africa, Nigeria, Sudan, Ghana, and Ethiopia—accounted for more than 87 percent of all African physicians in OECD countries; South Africa alone accounted for 60 percent of the total stock of migrant physicians in 2004 (Docquier and Marfouk 2007).

These countries are not necessarily the ones facing the highest rates of migration as a share of the existing physician stock. Most countries with high emigration rates for physicians (rates of more than 10 percent) experienced an increase in migration rates between 1991 and 2004 (figure 3.15). Small countries were most affected. Cape Verde had the highest rate...
Figure 3.14  Number of African Physicians Working in Selected OECD Countries, 1991 and 2004

Source: Authors, based on data in Bhargava and Docquier 2008 and the Medical Skilled Migration database (described in Bhargava, Docquier, and Moullan 2010).

Figure 3.15  African Countries with Highest Rates of Physician Emigration, 1991 and 2004

Source: Authors, based on data in Bhargava and Docquier 2008 and the Medical Skilled Migration database (described in Bhargava, Docquier, and Moullan 2010).
of physician migration (55 percent), followed by São Tomé and Príncipe (45 percent).

The reasons behind these variations are similar to those for overall tertiary-educated flows. Smaller and poorer countries provide fewer professional and financial opportunities; in many cases, they do not even have medical schools and thus have to send their students abroad for medical training, at a great fiscal expense in many cases.

Data on the migration behavior of nurses are more limited, but studies indicate that their migration rates are also very high. In 2004, 17 Sub-Saharan African countries saw emigration rates of 20 percent or higher among locally trained nurses (figure 3.16). Many of the countries with high physician emigration rates also have high nurse emigration rates, suggesting that the same factors may influence the migration decisions of all healthcare professionals. For example, emigration rates of nurses from Cape Verde and São Tomé, which have the two highest rates of migration among physicians, were about 40 percent. In Liberia, 40 percent of doctors and 80 percent of nurses emigrated.

**IMPACT OF MIGRATION OF HEALTHCARE PROFESSIONALS**

Consensus is slowly emerging on the extent of migration of physicians and other healthcare professionals from Africa. There is much less agreement on the overall impact on Africa’s health outcomes. Anand and Bärnighausen (2004) performed a cross-country analysis of maternal mortality, infant mortality, and under-five mortality rates. Their results suggest that the density of human resources for healthcare is significant in accounting for the three mortality rates tested, with elasticities ranging from –0.39 to –0.17. A later study by the same authors using a similar method suggests that healthcare worker density is correlated with the coverage of three vaccinations (MCV, DTP3, and polio3).4 When the impact of doctors and nurses is assessed separately, Anand and Bärnighausen find that only nurse density is positively associated with the three vaccinations.

Clemens (2007) tests the hypothesis that decreases in emigration raise the number of domestic healthcare professionals, increases the mass availability of basic primary care, and improves a range of public health outcomes. His results suggest that Africa’s generally low staffing levels and poor public health conditions are the result of factors—such as the segmentation of labor markets for healthcare workers—entirely unrelated to international movements of health professionals. He argues that emigration has increased the production of healthcare workers in
Figure 3.16
Migration Rates among Nurses, by Country, 2000

Source: Clemens and Pettersson 2006.
Africa. He highlights the various benefits associated with migration, such as remittances.

Bhargava, Docquier, and Moullan (2010) analyze the effect of physician migration on child mortality and vaccination levels, using a random effects model. Their more nuanced results indicate that many health indicators improve with physician levels when adult literacy levels exceed 55 percent. They demonstrate the importance of the complex linkages among migration, development, and the overall social and economic environment of the country in question and show that the number of physicians in a country is only one of the inputs into the provision of health services. Stopping their migration, they conclude, would have a positive but small impact on the overall human development indicators they analyze.

POLICY OPTIONS

One of the main developmental challenges African countries face—more critical than high-skilled emigration—is low levels of human capital. How to increase human capital, given limited resources, is a complex problem, well beyond the scope of this book. The main focus in this section is on policy choices governing tertiary-educated migration. These choices can be divided along two main dimensions: What stage of a migrant’s professional career should be targeted by the policies—before or after education is obtained? Who implements the policies—sending countries or destination countries, mostly in the OECD?

Two educational issues are most relevant for international migration: tuition policies and the type of education offered. In regard to policies governing tuition, a dilemma exists. Careers in medicine, engineering, and other technical subjects are fast becoming global, and professionals in these fields are in high demand in destination countries. Training in these fields also tends to be the most costly. Requiring students to pay for a portion of the cost of their training seems only fair, especially if the students will migrate soon after graduation. This option is frequently recommended, especially on economic efficiency grounds (Clemens 2009). Tuition levels that reflect the actual cost of education would sharply restrict the number of graduates and limit eligibility to the rich, however, because most of the origin countries lack credit markets to finance education. Limited access to finance, which is especially acute in African countries (Gurgand, Lorenceau, and Melonio 2011), would result in many highly qualified African students being unable to obtain professional education. Furthermore, as professionals in science, technology, and medicine are
the ones generating positive externalities, it would make sense to subsidize their education from public funds.

One potential solution is a two-tiered tuition system, similar to the one currently implemented in medical schools in Ghana. It involves partial (or full) cost recovery for a portion of students and free tuition for the rest, where eligibility depends on academic merit, public service requirements, or both. This system may generate extra revenue, which, in turn, would raise the supply of students, reduce the reliance on government funding, or both. Because a large portion of the financial gain from migration accrues to migrants and their social networks, a partial ex ante recovery of the cost of the education is also economically efficient.

Another alternative is for governments to offer merit-based scholarships for students who otherwise could not afford education. Scholarships could substitute for direct public funding; if structured to include certain conditions, they could help stem emigration.

The potential for migration may also influence the type of education provided. A frequently suggested policy is to change the education mix—for example, by training physicians’ assistants rather than physicians or health aides rather than nurses. One example concerns “health surveillance assistants” in Malawi, who require limited training. The first effect of such change is to increase the overall number of healthcare workers, as the training costs per student are significantly lower than the costs of training higher-level healthcare workers. Because many critical services, such as the immunization of children, can be provided by nurses or other healthcare workers, an increase in the number of healthcare professionals may increase the delivery of such services and improve certain outcomes. The second effect is that migration rates may decline, because the demand for such professionals is likely to be lower in the destination OECD countries. Such policy suggestions can be controversial and may have serious negative welfare implications, however, such as prompting an explicit trade-off between quantity and quality (Soucat and Scheffler forthcoming). Such a trade-off is found in many countries where services are of high quality only in rich and urban areas, at the cost of poor and rural areas.

Another group of policies takes effect after the education of potential migrants is completed. South Africa requires several years’ service in rural areas after graduation from medical schools. Ghana has experimented with bonding schemes to require some medical professionals to pay back a part of the government-funded tuition if they fail to serve for a number of years after graduation. Except for nursing, however, payment levels were set so low that they did not cover the cost of the education and did not discourage doctors from immigrating—most doctors working abroad
simply paid off the bond instead of completing the service requirements (Awumbila 2010). Such bond requirements, if imposed at all, should be structured so that they do not significantly reduce the demand for education or encourage immediate migration to escape from the requirement.

An alternative is to impose additional taxes/payments on migrants (generally referred to as the Bhagwati tax). Although such a practice sounds efficient and fair, in practice it may be difficult to impose and enforce, because the cooperation of destination countries’ government or courts may be needed (see Wilson 2009 for a detailed analysis).

Ghana has sought to curb the emigration of medical professionals by offering higher salaries and professional opportunities (box 3.4). But there is no convincing evidence of the cost-effectiveness of such policies, given the vast wage gaps between the destination and origin countries.

Another alternative that has been suggested is to restrict travel, by refusing to issue passports or diplomas to students and recent graduates. These policies are not likely to be effective; they also violate basic principles of human rights.

Other policies that repeatedly appear in policy discussions aim to encourage the return of professionals. Among the incentives provided

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**Box 3.4  Incentives to Retain Health Professionals in Ghana**

The Ghanaian Ministry of Health established incentive schemes to keep medical professionals in the country. The program consisted of several components. First, it reduced the need for specialized training outside the country by establishing the Ghana College of Physicians and Surgeons. The college has increased the supply of labor in remote districts, as part of the training is conducted in hospitals outside of Accra.

Second, since 1999 a program called the Additional Duty Hours Allowance (ADHA) has, for the first time, compensated doctors and nurses for hours worked beyond their normal schedules. The program was initially successful among doctors, but it was considered demotivating for nurses, whose salaries were low, in particular in comparison with what doctors earned (Buchan and Dovlo 2004). Moreover, the program became too expensive: by 2005, ADHA payments and salaries accounted for 97 percent of total government health expenditures and 67 percent of total government and donor health expenditures. As a result, in 2006 ADHA was replaced by a comprehensive salary regime (the health sector salary scheme) that removed the health sector from the general Ghanaian salary structure and raised overall salaries.

Third, the government provided health professionals in deprived districts an additional allowance equal to 20–35 percent of their monthly salaries. Each district’s level of deprivation was based on the lack of electricity, potable water, all-weather roads, and adequate basic education. The policy did not succeed in attracting more health professionals to the targeted districts, largely because healthcare workers in urban areas could supplement their government salaries by taking highly paid, part-time jobs at private health clinics.

Source: Awumbila 2010.
are efforts to help returnees find jobs and to subsidize housing or return expenses. To stem the loss of its healthcare workers, Kenya provided incentives including paid leave, overtime pay, housing support, car loans, transport allowances, life insurance, shortened working hours, and better healthcare coverage (Ndetei, Khasakhala, and Omolo 2008). In Zambia, more training opportunities may have led to higher retention rates (Mathauer and Imhoff 2006).

Migration policies to provide subsidies or other incentives to return migrants are popular, but there is no systematic evidence of their effectiveness. Thorn and Holm-Nielson (2008) find that although adequate pay is necessary, the primary determinants of decisions to return include the quality of the research environment, professional reward structures, and access to state-of-the-art equipment. Financial incentives are also likely to create distortions, such as penalizing professionals who never migrated or subsidizing returnees who were planning to return even in the absence of the incentives. In addition, such policies may result in adverse selection, with the least skilled returning and the more skilled remaining abroad. One simple policy that can provide significant benefits at low fiscal cost would be to remove certain biases against returning professionals that exist in professional regulations or government employment, by, for example, adequately recognizing qualifications and experience obtained abroad.

Destination-country policies are also important in determining the size and composition of migrant flows. Many OECD countries implement selective policies that target highly skilled and educated migrants, making their entry and assimilation as easy as possible. Such policies range from providing special visas for the highly educated to citizenship laws, recognition of professional qualifications, and provision of access to public services such as education and healthcare. The increase in demand for high-skilled workers in the United States has been filled through permanent employer-based resident permits (“green cards”) for individuals with advanced degrees in science and technology, temporary H-1B visas for high-skilled workers, and intracompany transfer (L1) visas. Australia, Canada, and New Zealand award higher points for highly educated applicants for work permits. And the European Union (EU) is considering creating a “blue card,” which would grant high-skilled professionals selected through a points-based system unrestricted access to EU labor markets after an initial period in the host country.

Because OECD countries are the main beneficiaries of the migration of professionals trained by public funds in African countries, there is some justice in asking them to subsidize the education expenses in the origin countries. Provision of such assistance must be additional to other forms
of assistance if it is to compensate countries of origin for the fiscal loss associated with high-skilled emigration. A similar scheme might involve the provision of scholarships for students from developing countries to study at universities in destination countries. Most students, however, use such programs as entry points into the labor markets of the destination countries, as current experience shows.

Among the most popular postgraduation policies debated are the ones centered on the recruitment policies of destination countries. As a result of public pressure, many OECD governments (such as that of the United Kingdom) impose “ethical” recruitment policies, especially for medical professionals. Such policies have had limited effectiveness (Bach 2008). Inflows of nurses from some of the poorest countries in Sub-Saharan Africa (such as Malawi and Swaziland), which are prohibited by the U.K. code of practice, have continued.

A potential policy measure is a cooperation arrangement under which OECD governments would agree to help African governments enforce their service or taxation requirements or impose their own additional taxes to be remitted to African governments. No destination country would want to impose such taxes unilaterally, however, for fear of diverting migrant professionals to other destination countries that do not implement them. Furthermore, enforcement in many countries might face institutional and legal obstacles.

The debate on policies regarding skilled migration takes place in the absence of detailed and systematic empirical analysis. Not only is it unclear what the policy parameters need to be, in many cases it is not obvious whether any migration-related policy should be implemented at all. For example, if the main constraints in the delivery of healthcare are equipment and facilities, then any policy aiming to limit migration of physicians or other professionals is unlikely to generate an improvement in welfare. In this case, the remittances sent home by migrants or the professional links they establish may benefit their country of origin.

Policies restricting mobility directly or through educational restrictions are extremely distortionary and violate simple human freedoms. Moreover, anecdotal evidence suggests that they are unlikely to work. In cases where limited mandatory service requirements are imposed, the terms and duration need to be carefully chosen in order not to create the perverse effect of encouraging migration to avoid such burdens. Where the goal is cost recovery, such policies should probably be implemented ex ante rather than ex post through additional taxation, which is difficult to enforce.

Policies set by destination countries are even less likely to be effective, but additional subsidies to educational institutions in origin countries
are likely to be the least distortionary. The feasibility of hiring institutions (for example, public or private hospitals) in receiving countries opening training facilities in Africa should be examined to increase the supply of professionals.

The multitude of constraints facing Africa’s health sector as a whole need to be addressed. Poor working conditions, limited opportunities for professional progress, and shortages of equipment and support staff are some of the main reasons driving African physicians to migrate to wealthier countries in the North. A forthcoming World Bank publication (Soucat and Scheffler) tackles various human resource challenges faced in the health sector in Africa and provides detailed analysis.

The problems facing the healthcare sector in Africa are complex. Addressing them requires country-specific, detailed, multifaceted approaches that incorporate policies on education, compensation, private sector participation, and financing of healthcare expenditures. Analysis and debate, based on much better data collection, will be needed before sustainable solutions can be found.

NOTES

1. The terms highly skilled, highly educated, and tertiary educated are used interchangeably in the academic and policy literature.

2. The term brain drain is often used to refer to high-skilled migration, especially when the goal is to highlight the negative effects of skilled migration. This chapter refrains from using this term, as a more neutral expression probably leads to more objective discussion.

3. Exceptions exist: the dominant destination for migrants from Mozambique—a former colony of Portugal—was South Africa, mainly because of proximity.

4. It is important to keep in mind that correlation does not imply causation. Healthcare worker density may be correlated with limited vaccine coverage but not cause it. Indeed, a plethora of other factors could be responsible for both the scarcity of healthcare workers and poor health outcomes.


6. Melonio (2008) proposes the concept of migration balances between countries adjusted for education level and expenditure. He suggests making transfers directly from destination countries to origin countries without involving individuals in the process, thus minimizing the administrative burden.

7. Training financed directly by OECD governments for courses geared toward OECD licensing requirements or OECD–focused job search assistance may encourage migration.

8. The code of practice of the U.K. National Health Service (NHS) applies only to the active recruitment of health professionals from developing countries by the NHS in the absence of a bilateral agreement.
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