

Brain Drain: A Threat to Africa's Collective Security and Development

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Abstract

Our study is organised in two sections: first, an overview of African migration sets the scene; second, we focus on the experiences of Algeria and Nigeria, highlighting particularly medical brain drain (MBD). From these two views (macro and micro), we suggest pathways to reverse brain drain into brain circulation on African level, building scientific networks within Africa while at local level, attraction of expatriated talents and valorisation of the country graduate, while enhancing the domestic science and technology.

Key Words: Brain Drain, Collective Security and Development, Migration, Brain Gain.

ملخص

تنقسم الدراسة إلى قسمين، القسم الأول يشمل لمحة شاملة عن الهجرة الإفريقية التي تمثل المشهد العام، أما القسم الثاني يركز على تجارب كل من الجزائر ونيجيريا مع تسليط الضوء على هجرة الأدمغة الطبية بشكل خاص (MBD). من هاتين النظرتين (الكلية والجزئية) نقترح مسارات لعكس الاتجاه من استنزاف القدرات نحو الخارج إلى نقلها على المستوى الإفريقي مع بناء شبكات علمية داخل إفريقيا لجذب المواهب المغتربة على المستوى المحلي مع تثمين خريجي الجامعات، وفي نفس الوقت رفع مستوى العلوم والتكنولوجيا.

الكلمات المفتاحية: هجرة الأدمغة، الأمن الجماعي والتنمية، الهجرة، كسب الأدمغة.

Introduction

The issue of brain drain (BD) remains a hot topic for developing countries. Theoretical debates are combined with the geopolitical positions of all the regions of the world. The African position at transforming the brain drain by brain gain (2018), while that of the European Union, develops an option of talent partnerships, released in the new EU Pact on Migration and Asylum (2020).

The main question of our study is based on the Africa's management of international migration. How to minimize the negative effects of brain drain and maximize the positive impacts of high skilled labour force (HSLF) established abroad? Two specific questions emerge: what are the policies to be implemented to organize the mobility of high skilled labour force? What are the ways and means to develop a common vision for an intra-African mobility of students and circulation of skilled workers, as enacted by the African Union (AU)? Three outcomes are discussed in this paper: BD is supposed to be compensated by inflows of remittances, by the international mobility of students (for the transfer of knowledge) and by the return of high skilled labour migrants.

For this essay, we run a desk research by analysing recent literatures and statistics published by international, regional and national institutions: UNDESA, WHO, UNESCO, OECD. Surveys' data from Arab and Africa Barometers and from studies either in Algeria (DZA) or Nigeria (NGA), have been examined.

Migration is not new social phenomenon. People have always migrated in human history from one place to another looking for greener grasses. It is difficult to imagine the global economic growth without migration. The process of globalisation has now reached its cruising speed. This process, as well as human migration through open borders, is not worldwide and has not the same impacts. Economic literatures are rather abundant, but data has been available, only during this millennium, on migrations and brain drain.

The world stock of migrants is quite low comparing to world population. In 2020, the stock measured by UNDESA rose up to 281 million of persons, that represents 3.6 percent of world population, compared to 173 million, that is 2.8 percent in the year 2000. The growth rate during these two last decades is under one percent (UNDESA, 2021).

By region, in 2020, Europe hosted the largest number of international migrants, at 82 million; followed by North America, at 59 million; with 51 million in the United States alone - the largest number in a single nation. Africa provides some 40 million of international migrants, more than a half within the continent.

Our main focus is on brain drain from Africa. The notion of brain drain has been coined in the 1960s by UK Royal Academy. Since then, there has been a hot debate mainly among analysts on how to capture brain drain. This paper on brain drain from Africa is viewed also under the triple lenses of Migration, Development and Security (MDS).

The MDS nexus is rather recent in literature. This nexus is generally a dual combination and changes from the South and North perspectives (Sørensen, 2012). For southern developing countries, migration is supposed to be highly connected to development and for northern developed countries, migration narratives change as a threat in order to legitimize strict border control. The triple nexuses are revised recently from Sahel perspective. The Sahel was selected to revise these links as a “part of an emerging European foreign policy approach that externalizes the bloc’s security” (Venturi, 2017, p. 7).

When it comes to high skilled labour force (HSLF), the triple nexuses stand on the altar of scientific migration for the sake of global human security and development. The mobility of HSLF is organized also under the screen of Global Talent Competitiveness. There are many talent indexes - (WEF, 2011) (INSEAD, 2021) (IMD, 2021) - ranking world countries under selected indicators. Global Talent is understood as a group constituted by three profiles: Employers, High Skilled Workers, and International Student Mobility (OCDE, 2019). Northern developed countries have designed active migration policies to attract global talent, for example by issuing the Green Card for the USA or the Blue Card for EU countries.

The shift from HSLF to Global Talent has been raised, some fifteen years ago, by the ILO. One issue that arose from the discussion was “the asymmetric effects of the growing global talent flow on sending and receiving countries” (ILO, 2006). The talent competition is not a zero-sum game. There are losers and winners. Losers are mainly from developing countries, translated by brain drain. At the same time, the World Bank published a report on Remittances and Brain Drain (Özden & Schiff, 2006). A new concept is coined: Brain Waste highlights the differences between

HSLF, not as usual on income, “but in the occupational attainment of immigrants who have similar education backgrounds (...) from different countries”.

Brain drain deals with workers. All migrants are not workers. ILO has recently produced some data on migrant labour force (ILO, 2021). We can discard all literatures on brain drain that are not evidence-based. Some data, collected just recently by analysts of OECD countries, on labour force by level of education provide an evolution of brain drain.

After the pioneering study of three analysts (Beine, Docquier, & Rapoport, 2001), a wide range of empirical literature has tried to address this issue. Those studies explored the issue of how brain drain affects economic growth of welfare (Schiff, 2005) and the overall impact of brain drain on developing countries (Docquier F., 2007). Gender dimension of brain drain also has been revealed (Dumont, Martin, & Spielvogel, 2007).

For these authors, brain drain does not concern all talents, but simply, the emigration of a fraction of the population that is relatively highly educated as compared to the average: “The brain drain is defined as the migration of high-skill workers”, age over 25 years old, excluding students (Docquier, Lohest, & Marfouk, 2007). These empirical literatures show that high-skill emigration need not deplete a country’s human capital stock but can generate positive network externalities, hence in line with the migration theory drafted by the new political economy of migration (Stark, Helmenstein, & Prskawetz, 1997).

For this study, we consider that brain drain occurred when high skilled qualified workers, graduated from universities or High School, trained in the country of origin, and having some experience, migrate to another country. The notion of human capital flight is also generally used by social analysts to qualify brain drain (Haque & Kim, 1995).

On average, emigration rate towards OECD countries has increased from 5.5 percent in 2000/01 to 6.5 percent in 2015/16 (OECD, 2020). How many are from Africa?

1. Brain Drain from Africa

Most African migrations take place on the continent. Outflows of migrants come from a handful of African countries to other world’s re-

gions. The global volume of migrants has been doubled between 2000 and 2020. However, in relative terms, the rate of African migrants in relation to the global volume has only known an increase of one per cent since the beginning of this millennium. Africa's loss of high skilled labour force is a threat to its economic and social development, thereby undermining its security.

1.1. Overview of African's migration

This brief overview recalls the stock of migration from Africa from 1990 to 2020. Within this stock, the international mobility of student is provided. Two supposed outcomes are also reviewed: inflows of remittances and return migrations.

Stock of Migration from Africa

Migration has risen steadily over the last three decades. The stock of international migrants from Africa increased from 20.6 million in 1990 to 40.6 million in 2020 (UNDESA, 2020). But in terms of ratio of African compared to world migration, the rise is only 0.01 point - i.e. from 0.13 in 1990 compared to 0.14 in 2020.

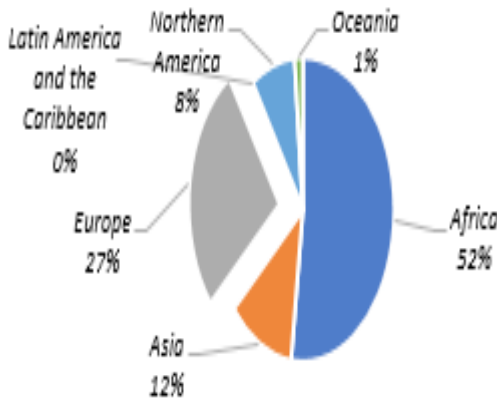
Table 1. Evolution stock of Africa's migration (1990-2020)

Year	1990	1995	2000	2005	2010	2015	2020
World	153,0	161,3	173,2	191,4	221,0	248,0	280,6
Africa	20,6	22,3	22,1	25,2	29,2	35,1	40,6
Ratio Africa/ World	0,13	0,14	0,13	0,13	0,13	0,14	0,14

Source: extracted from UNDESA (2020)

The fear of massive migration from Africa to Europe seems to be quite far from the statistics disclosed by the United Nations. Such narratives have no scientific grounds but are just used for the politicising migration, from Africa, as a threat for western countries' security.

Figure 1. African migrants across world regions in 2020.



African migrants are more prominent (52%) within Africa than in other regions. The second largest stock is in Europe, with 27% of African migrants, barely 8 million out of 40 million as stated in Table No 1.

Source: extracted from UNDESA (2021)

Within this stock of migrants, international students from Africa to other world's regions, needs also a brief overview

International Student Mobility from Africa

Student mobility has also grown rapidly in the world these last years. Data release by UNESCO records 4,7 million in 2015 steps up to 6 million 2019, just before the COVID pandemic.

Table 2. Evolution stock of International Mobility of Student (2015-2019)

Year	2015	2016	2017	2018	2019
Africa	510	543	556	567	577
World	4 779,6	5 086,0	5 375,4	5 681,6	6 063,6
Ratio Africa/World	0,11	0,11	0,10	0,10	0,10

Source: extracted from UNESCO (2021)

The ratio of African student abroad stands quite low and remains constant these last years at 0,1% from 2015 to 2019.

1.2. Brain Drain is on a rising trend in Africa

Several studies suggest an increase of the brain drain from Africa. African countries seem to be powerless against talent hunters operating in the global labour market. One can easily refer to the data published by the OECD to have a broad overview of the intensity of the human capital flight to northern developed countries.

It is estimated a volume of 3.6 million skilled Africans lived and worked in OECD countries in 2015 compared to 0.7 million in 1990 - i.e. an increase of 90.3% on average each decade. The size of brain drain is relatively stable at the world level (on average 4.8%). Africa has been characterized not only by its “greater brain drain but also by its growing trend (from 11.3% in 1990 to 13.2% in 2015)” (Cha'ngom, 2020).

The intensity of migration is different between the African sub-regions. Two main observations are derived from the data collected by the OECD.

- The five largest source countries for African skilled emigrants in 2015 were Morocco (470,593), Algeria (369,518), Nigeria (367,233), Egypt (256,393) and Kenya (137,745). Hence, the main suppliers of skilled Africans to OECD are high populous countries dominated by Northern Africa. The same countries were on the top five in 2000. The only change is observed in Nigeria's rank: a rise from 5th in 2000 to 3rd in 2015;
- In terms of emigration rate, the five highest rate of BD in Africa are observed as follows: Seychelles (77.2%), Zimbabwe (68%) Sao Tome and Principe (61.9%), Cape Verde (60.6%) and Mauritius (51.2%).

This first capture of migration and brain drain is important but has some limits. African's skills have also moved towards the Gulf countries. These countries have developed an attractive skills policy. No information is available on African skills in non-OECD countries (World Bank, 2014). South Africa also is becoming a talent magnet country.

Some analysts do consider BD as a solution to unemployment (East-erly & Nyarko, 2007). It is argued that BD is not so large to impact on the growth of Africa: migrant's families have a better life standard with remittances and a positive effect on skill accumulation offset the loss of skills to the brain drain. The gap in such analysis is that BD is not homogenous in regard to talent losses. In our context, it is witnessed a deficit in the STEM specialities during this 4th industrial revolution led by digitalisation of world economy. One of the most dangerous loss is that of doctors, the more so, during the running COVID pandemic.

Focus on the human capital flight in health sector – zoom on foreign trained doctors (FTD)

The intensity of migration of skills depends in particular on the re-

lationship not only with the volume of migrants but also with the training capacities (specialities) of the countries of departure. All skills and talents are now on the global market. Skills in the health sector are a very hot issue between Africa and northern developed countries. This race has accelerated during the COVID 19 pandemic. The migrations of health personnel have been scantily documented and many aspects still remain unclear. The stock rises of nearly two million since this millennium.

“The number of doctors in OECD countries increased from about 2.8 million in 2000 to 3.4 million in 2010 and 4.1 million in 2019. In most OECD countries, the number of doctors increased more rapidly than population size, so that, on average, the number of doctors rose from 2.7 per 1 000 population in 2000 to 3.6 in 2019”. (OECD, 2021, p. 212).

A stock of around 500 000 foreign trained doctors (FTD) were working in OECD countries from 2000-2018 (Socha-Dietrich & Dumont, 2021). Nearly 80% of the FTD are concentrated in six OECD countries: USA, GBR, GER, AUS, FRA, CAN. How many doctors are from Africa?

In 2019, the OECD data records nearly 45 000 thousand of FTD (as home-trained), quite distinct from native-born trained overseas. These FTD represent around 10% of doctors from Africa working in OECD countries. The bulk of the doctors (75 percent) came from 5 countries (EGY, RSA, NGA, DZA, SUD). The most affected African countries, with highest rate of emigration of doctors, are ZWE, TGO, LBR, COD and SLE, with a range from 20 to 32 percent of home-trained working abroad.

The medical brain drain (MBD) phenomenon is not exclusively from Africa. It affects many countries in the world: Caribbean and Pacific islands, Ireland and sub-Saharan African countries register the highest emigration rate of doctors: 48 African countries are severely affected by the MBD, hence penalizing their weak health systems. For sure, MBD is not the sole reason of this situation. They have the lowest medical densities in the world, less than one doctor per thousand inhabitants in 2020 or the latest available data derived for the World Development Indicators (World Bank, 2022). This MBD has contributed to the weakening of the health systems of these countries in the face of major pandemics. Developed countries have even eased the migration of physicians during the COVID crisis (OECD, 2020).

Of course, MBD is just one of the myriad facets of HSLF African migration. It is well known that most developed countries have a dire defi-

cit of STEM graduates, which are cardinal to gain the transition to digital economy. Within the core of this economy, cyber security experts are also missing on the world labour market. The Agenda aspires that, by 2063, Africa shall be a continent where “well educated and skilled citizens, underpinned by science, technology, and innovation for a knowledgeable society is the norm and no child misses school due to poverty...”.

According to the African Development Bank, less than 25% of African higher education students are in STEM fields, with the majority of students studying social sciences and humanities.

1.3. Outcomes of Brain Drain

Two concerns need to be captured when dealing with positive gain from overseas: remittances inflows and return migrations, along with the increasing demand for high school enrolment.

- *Remittances inflows to Africa*

Remittances inflows to Africa, as recorded by World Bank, grew up from 52 billion US\$ in 2010 to 83 billion US\$ in 2020. Table 3 highlight the evolution of inflows to Africa during the last decade.

Table 3. Remittances to Africa from 2010 to 2020

Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Africa	52,3	60,0	64,4	63,8	70,6	70,0	66,2	76,7	85,0	86,2	83,3
World	472, 9	529, 9	549,3	582,1	610,0	601,9	597,1	639,7	694,0	719,4	701,9
Africa / World %	11,1	11,3	11,7	11,0	11,6	11,6	11,1	12,0	12,3	12,0	11,9

Source: extracted from World Bank (2021)

The growth rate of the volume of remittances for Africa, during this period, is 59 percent, slightly above the world's rate which is 48 percent. The Africa/World ratio change is quite barely 0,8% during this decade (from 11.1 in 2010 to 11.9 in 2020).

- *African's return migrants: myths and preparedness*

With a growing literature on return migration, the positive externalities of the migration-education nexus began to emerge. It is argued by many analysts that human capital accumulation is a push factor for return

migration due to higher returns to education in the home country. Return migration is supposed to reduce brain drain. Up to now, to our knowledge, there are mainly global or regional studies on high skilled returnees.

In the contemporary policy discourse, returnees are often portrayed as agents of development who will bring back economic capital, knowledge and skills as well as social capital, values and attitudes gained from the developed North. Such narratives are produced by many international institutions. The recent global outlook published on Migration in Africa (OIM, 2022) outlines that the debate on BD can be reversed to BG... by returnees and by the Diaspora.

Very few data exist on returnees. Experiences from some countries deserve our attention. This silence is problematic as great expectations are put on these returnees in political discourses. These excerpts give a glimpse of the need of African scientists and the low rate of returnees in some countries.

“Africa’s future lies in the hands of its scientists. From urbanisation to agriculture, climate change to pandemics, Africa needs science, technology and innovation (STI) to secure a prosperous and sustainable future. The continent must urgently reverse the brain drain of its talented researchers and ramp up its education and expertise, so that Africa’s problems can be solved by Africa’s people” (WEF, 2017).

Some fifteen years ago, we contributed to fill the gap by a study of returnees to Maghreb countries from Europe (MIREM, 2007). Other essays on return migration have been published (Åkesson & Baaz, 2015) on Egypt, Senegal, Somali, Burkina Faso. However, HSLF returnees to Africa have not been targeted up to now for Africa. Our hope is that in the wake of developments in Africa and in Europe, it is possible that the impetus to return might increase in the coming years, else the myths of return will continue.

1.4. Developing Scientific and Technical networks within Africa: Brain Circulation

The globalisation process is leaving most African countries on the edge of development. The gap between African and northern countries is widening in economic, technological and social spheres. African leaders’ position, with African Union (AU) to reverse brain drain in brain gain remains one of the results expected by 2027 (AU, 2018). The objectives, fixed in the common African position (AU, 2006), are just slightly revised.

This first achievement is important to reach the objectives fixed by AU Agenda 2063 (AU, 2015). The protocol for free movements of persons in Africa is not yet approved by all countries (AU, 2018). At the same time, the United Nations adopted the global compact for safe, orderly and regular migrations (UN, 2019). From this sociological macro overview of brain drain from Africa, with a focus on MBD, two main pathways can be derived:

- There are many narratives on BD from Africa but evidence-based studies are lacking. Narratives are produced both by African leaders and also by scholars on the benefit of high skilled return migrants. Here again, there is no data to support the brain gain, excepts for some countries. Last year, an Africa Data Migration Network has been launched by IOM and this Network was preceded by the creation of an Africa Observatory of Migration;
- Alongside of this network and the Observatory, there is also a need for the creation of an African Academia on Migration within another research institution on migration founded last year by AU in Mali. This research centre will be a think tank for Africa by the involvement of the most prominent African scholars for high and intense debate on data collected by the AU Observatory. Within the Academy, skilled migrants can diffuse the know-how they acquire in their respective host countries to the home country.

This overview of world migration and the rising trends of brain drain from Africa, with a focus of foreign trained doctors, provide a macro level picture. The following section goes further on a micro level, comparing two African contrasted countries, Algeria and Nigeria.

2. High Skilled Migrants from Algeria and Nigeria

This section explores a micro level of brain drain from Africa on three subsections. First, to set up the scene, a brief overview of their profiles is sketched; second, the consequences of brain drain are derived from literature and, third, medical brain drain (MBD) from these two countries are compared.

2.1. *Global distinctions between Algeria and Nigeria*

These countries present two distinct profiles on many grounds: colonial history, demographic model, trajectories of migratory move-

ments, volume of remittances and student mobility. These countries also present similarities in economic management and in geostrategic migration issues relating to development and security.

- The colonisation feature is quite important. Algeria has been colonised by France from 1830 to 1962, obtained its independence after a seven years' war, while Nigeria was under the British protectorate since 1886, gained colony status in 1914 and acquired its independence in 1960. The official colonial language (French or English) is a key driver for migration;
- The demographic trend is a cardinal feature. NGA is the most populous country in Africa, with more than 200 million inhabitants in 2020, while DZA is the largest country in Africa, and its population is nearly 45 million in 2020. But a long-term ratio shows no difference, NGA has the same multiplier from 1960 to 2020. The density of population per square mile, relies on the global size of each country;
- The economic features are also interesting. NGA is the richest country in Africa with a GDP stands at 514 billion of US\$. But due to its demographic size, its GDP/per capita is just 5.186\$ and for DZA, its value is 11.324\$ in 2020. Both economies are highly dependent on energy market and fluctuations are observed when energies prices decline and rise on the world market;
- On migration governance, the two countries show some distinctions. Nigeria has produced a national migration policy while Algeria is governed on sectoral policies. The stock of foreign population (immigration), as a share of population, is quite the same with 0,7% for both countries. The trends of emigration, as well as the top countries of destination are different. The salient difference between the two countries, is the share of emigration to the population: for NGA the percentage is 0,7 while it is more than 4 percent for DZA;
- International Student Mobility is a common feature distinguished particularly for the countries of destination, former colonisation and language driven. The share of mobile student is quite different for the two countries: the percentage is 0,5 for DZA and 1,2 percent for NGA according to UNESCO most recent data (2020);
- Finally, inflows of remittances from overseas are quite contrasted for the two countries. Nigeria is the second-best African countries, after

Egypt, in capturing migrant remittances: an amount of 17 billion of US dollars in 2020 while the amount for DZA is under 2 billion US dollars. The share of remittances to GDP is 1,2 percent for DZA and 4 percent for NGA in 2020.

2.2. Effects of Brain Drain on Development and Security

The impact analysis of BD, viewed under the MDS nexuses, covers firstly its prelude led by the retention of mobile students, second the remittances received from migrants and third, return migrations. The combination of high retention of graduates abroad, low remittances and low rate of returnees are considered a threat for Development and Security of the country of origin. If the three indicators are positive, brain gain hypothesis is thus confirmed. To begin with, the main characteristics of migrant profile from DZA and NGA in OECD countries are outlined.

- *Migrants profile from DZA and NGA*

Table 4. Trends of the stock of migrants by sex from DZA and NGA (1990 - 2020)

Year	1990	1995	2000	2005	2010	2015	2020
DZA	921 665	979 641	1 037 985	1 599 647	1 655 264	1 836 502	2 022 337
Male	521 302	550 210	580 303	835 802	913 853	985 595	1 085 651
Female	400 363	429 431	457 682	763 845	741 411	850 907	936 686
Ratio F/M	0,8	0,8	0,8	0,9	0,8	0,9	0,9
NGA	446 753	524 535	610 130	817 392	996 914	1 306 526	1 670 455
Male	255 357	302 154	352 560	440 569	535 088	682 707	877 687
Female	191 396	222 381	257 570	376 823	461 826	623 819	792 768
Ratio F/M	0,7	0,7	0,7	0,9	0,9	0,9	0,9

Source: extracted from UNDESA (2021)

These figures illustrated the evolution during the three last decades. The stock from DZA has more than doubled while for NGA, the growth is higher, during the time lapse. For DZA, the stock was less than one million in 1990 to more than 2 million thirty years later. For NGA, the stock was nearly half million in 1990, it has a three-fold multiplier effect in 2020. The gender ratio is quite identical: 0,9 for both countries in 2020.

Table 5. Top 15 Destination countries for NGA and DZA in 2019

Rank	Destination for NGA	Number	%	Destination for DZA	Number	%
1	United States of America	309 699	21,0	France	1 575 528	81,0
2	United Kingdom	205 698	14,0	Canada	68 822	3,5
3	Cameroon	148 076	10,1	Spain	57 140	2,9
4	Niger	130 982	8,9	Palestine	44 422	2,3
5	Benin	86 226	5,9	Belgium	27 633	1,4
6	Italy	80 235	5,4	United Kingdom	25 134	1,3
7	Ghana	79 023	5,4	Italy	22 877	1,2
8	Canada	45 188	3,1	Germany	21 519	1,1
9	Côte d'Ivoire	44 791	3,0	United States of America	21 201	1,1
10	Germany	44 015	3,0	Morocco	14 164	0,7
11	Togo	32 176	2,2	Tunisia	10 580	0,5
12	Spain	29 204	2,0	Switzerland	10 122	0,5
13	South Africa	28 965	2,0	Guinea	6 723	0,3
14	Ireland	24 036	1,6	Senegal	4 342	0,2
15	Gabon	23 730	1,6	Netherlands	4 267	0,2
	S/total	1 312 044	89,1	S/total	1 914 474	98,4

Source: UNDESA World Migration Stock, 2019

Most Algerians migrate to France while for Nigerians, the three first countries of destination are USA, UK and Cameroon in 2019.

The UN agency does not provide data by level of education. We can have a broad idea of migrants by level produced by OECD last data in 2015⁽¹⁾.

Table 6. Evolution of the rate High Skilled (HS migrants from DZA and NGA (1990-2015)

Unit: thousands

<i>Year</i>	1990		2000		2010		2015	
Level of Education	HS	Total	HS	Total	HS	Total	HS	Total
DZA	28083	510238	210323	1252825	311216	1438677	369518	1483898
Rate	5,50		16,79		21,63		24,90	
NGA	62483	104323	133760	219186	275737	455772	367233	632629
Rate	59,89		61,03		60,50		58,05	

Source: OECD Data calculated (Cha'ngom, 2020).

This illustration clearly distinguishes the two countries. Though the stock of migrants is lower for NGA, this country has a highest rate for brain drain in OECD countries. But at the same time, we can note the rate of HS is rather constant from 1990 to 2015. For DZA, the growth is high with a five-fold multiplier during this same period.

Brain waste can also be examined by the underemployment of high skilled worker: nearly 40 percent of Nigerians and 33 percent of Algerians HSLF are overqualified. Some 20 percent of Algerians are in the STEM sector whereas 15 percent of Nigerians are in the health sector.

2.2.1. International student mobility

International mobility of student (ISM) is not necessary problematic for the countries of origin. It becomes dramatic when these students change their status of mobility to migration and are retained by the host country. Mobile students from DZA and NGA are quite low as noted earlier. Their destinations are quite opposed:

Table 7. Top Ten countries of destination for ISM from DZA and NGA in 2019

DZA		NGA	
Host countries	Number	Host countries	Number
France	24 612	USA	13 199
Canada	693	UK	10 796
Turkey	588	Canada	6 708
UK	551	Malaysia	4 661
Russia	547	Ukraine	3 302
Ukraine	522	South Africa	2 990
Malaysia	519	Ghana	2 960
KSA	366	Benin	2 959
Germany	249	Germany	2 290
S/total	28 647	S/total	49 865
Total	31 288	Total	71 133
% of Top 10	91,6	% of Top 10	70,1

UNESCO data provide a distinction of mobile student by destination countries. Three out of four Algerians ISM are in France, while one in three Nigerians ISM are either in USA or Canada.

There are at least four common destination countries (UK, Ukraine, Malaysia and Germany).

Particular destination countries are Turkey and KSA for DZA and three African countries for NGA – i.e. South Africa, Ghana and Benin.

Source: UNESCO (2019)

On the issue of ISM, as former colonized countries and differences in official languages (French/English), the destination countries can be explained namely during the early years of independence. NGA seems to have a more diversification destination country than DZA. A turning point is expected in coming years due to the change of English as second language, instead of French, adopted these last years.

The dark side of ISM is the cost of training abroad – i.e. the investment on human capital is a loss for the countries of origin and a gain for countries of destination. The global cost cover both national and overseas investment in education. Information on the cost of ISM is quite scarce. For example, an author states that the total cost of Nigerian ISM in UK would represent nearly 90 percent of education budget of the country in 2016. For DZA, the cost varies from one analyst to another without evidence-based data.

The second side effect is the retention of ISM by countries of destinations. The investment in human capital is, in this view, a net loss for countries of origin. For DZA or NGA, official data are not released on ISM returnees. In 2021, in a radio talk, an official from the Minister of Higher Education in Algeria claimed that around 50% of scholars returned after their studies abroad⁽²⁾.

A recent study running in student migration (Musette M. S., 2021), mainly to France, conclude that 22 percent of outbound Algerians in France, have the intention to return to the country of origin, after graduation. The latest data on returnees to NGA was published in 2011 (IOM, 2022). There are other narratives on return migration (Eborka, 2014) without data.

2.2.2. Remittance inflows to DZA and NGA

The global remittances inflows to Africa (Table3) is known. In this section, the trends of remittances are examined, at least for the last decade for these two countries.

Table 8. Remittance inflows to DZA and NGA from 2014 to 2020

Country/Year	2014	2 015	2016	2 017	2018	2 019	2020
DZA	2 452	1 997	1 989	1 792	1 985	1 786	1 682
NGA	20 999	20 626	19 698	22 037	24 311	23 809	17 208

Source. World Bank Data, 2022

For DZA, we can observe a drop of remittances' flows during this period. It runs from 2014 to 2017, then a slight increase in 2018, and finally the flow falls again at 1.6 million US\$ in 2020. For NGA, the same trend is revealed: there is a slowdown from 2014 to 2016, then a rise in 2017 until 2018, a slight decrease between 2018 and 2019 and it falls deeply in 2020. In 2020, the personal remittance was estimated at 17,2 million US dollars. The sharp decline, observed these two last years, is due to the world COVID crisis. What are the factors behind these trends? Possible causes are as follows:

- Personal remittance is a net positive outcome of international migrations for both countries. It contributes to 2 percent to the GDP for DZA and 4 percent for NGA.
- The distinction between the two countries relies on the state policy towards personal remittances: NGA has a volume of migrants less than DZA and collect a volume of 8 times more than DZA in 2020, and ten times in 2014.
- The use of remittances is mainly for consumption and the welfare of migrants' families left behind: health, education, food, housing...in both countries. For DZA, remittances' behaviour are discussed (Musette M. S., 2011), some years after remitters' behaviour is revealed

(Djelti, 2015). For NGA, in an ACP Report (Olatuyi, Awoyinka, & Adeniyi, 2013) many facets of remittances are explored. It is also admitted that remittances contribute to the reduction of poverty in developing country (Margolis, 2013).

- Remittance is quite different to Diaspora Investment. Diaspora Bonds issued by NGA is just one of “its policies to the involvement of migrants and diaspora in the economic development” (Rustomjee, 2018). For DZA, some recent academic studies have focussed on Diaspora’s investment in a survey (Nafa, 2015), qualitative researches have covered diaspora from France particularly (Madoui, 2010); (Santelli, 1999).

2.2.3. Return of high skilled migrants

The spectrum of return migrant is complex. It concerns various groups of migrants: labour, student, high skilled, entrepreneur, asylum seekers, refugees and illegal migrants. Common narratives are produced on the return of migrants in irregular situation nowadays. There is a paucity of literature on HSLF return to the country of origin.

Such scarcity is evident when OIM publication on Migration in Africa in 2022 mentions the rate of return in 2011: “It was 3% for Nigeria” observed ten years back (IOM, 2022, p. 137).

The same observation can be said for DZA, the only field study was produced more than fifteen years ago (MIREM, 2008). The findings revealed that the return rate of HSLF from Europe is 34%, half of whom have completed acquired new diploma in the host countries (Gubert & Nordman, 2008).

The most significant result is their professional status on return... most of these returnees were retired. A fraction under 10% are engaged in an economic activity and others intend to return back to the host countries, having still their families abroad.

2.3. Medical Brain Drain (MBD) from DZA and NGA

As the global trends of BD for Africa is on the rise, medical brain drain seems to be rather critical for these two countries. DZA has a positive density of doctor per thousands, with 1,72 and NGA with a rate of 0,38 in 2019. The world average rate is 1,75 (WHO, 2021). This picture, while critical and contrasted, needs further comparison on the stock and the trends of medical brain drain following our paper drafted some five years ago for the Maghreb countries (Musette M. S., Brain drain from Southern Mediterranean Countries, 2016).

Trends of Medical Brain Drain (MBD) over the last decade

To set up the scene, a first glance of MBD is given by recent stock and flows of foreign trained doctors (FTD) in OECD countries. The following tables recall the stock and flows for Nigeria in the USA and for Algeria in France.

Table 9. Stock of African trained doctors to the USA from 2007-2016

Year	2007	2008	2010	2011	2012	2013	2014	2015	2016
NGA	2408	2526	2816	3087	3370	3463	3510	3568	3634
Africa	10313	10559	11172	11898	12568	12914	12652	12636	12635
Stock USA	167647	171537	181145	195196	207691	214438	211771	213485	215630
%NGA/ Africa	23,3	23,9	25,2	25,9	26,8	26,8	27,7	28,2	28,8
% Africa /USA	6,2	6,2	6,2	6,1	6,1	6	6	5,9	5,9

Source: extracted from <https://stats.oecd.org/> - 26th January 2022

Table 10. Flows of African trained doctors to the USA from 2011-2019

Year	2011	2012	2013	2014	2015	2016	2017	2018	2019
Africa	383	377	350	335	317	372	390	448	429
NGA	104	116	110	94	94	95	109	115	114
Total flow USA	7211	7325	6475	6564	6594	6745	7033	7344	7483
/Ratio NGA Africa	0,27	0,31	0,31	0,28	0,3	0,26	0,28	0,26	0,27
Ratio Africa/USA	0,05	0,05	0,05	0,05	0,05	0,06	0,06	0,06	0,06

Source: extracted from <https://stats.oecd.org/> - 26th January 2022#

Data from Table No 9 shows that the stock of doctors from Africa in the USA, from 2007 to 2016, is nearly 6%; but the percentage of doctors from Nigeria is around 30, i.e. a multiplier of 5 compared to Africa. Data from Table No 10 provide the flows of Nigerian doctors to USA from 2011 to 2019 which represent a ratio of 0,27 in 2019. For DZA, the stock of FTD in France is nearly 3882 in 2019 compared to 2646 in 2011. The stock

of FTD in France is 26 355 in 2019, rising from 17625 in 2011. The ratio DZA/Africa is more than half (53 percent) as illustrated by the following Table 11.

Table 11. Stock of African trained doctors to France from 2011-2019

Years	2011	2012	2013	2014	2015	2016	2017	2018	2019
DZA	2646	2749	2866	3073	3301	3490	3703	3803	3882
Africa	4580	4808	5064	5572	6097	6454	6841	7068	7242
Stock France	17625	18842	20082	21569	22920	24096	25039	25675	26355
%DZA/ Africa	57,8	57,2	56,6	55,2	54,1	54,1	54,1	53,8	53,6
Africa/ % France	26	25,5	25,2	25,8	26,6	26,8	27,3	27,5	27,5

Source: extracted from <https://stats.oecd.org/> - 26th January 2022

The annual flows of Algerian FTD to France is an average of 177 doctors per year from 2011 to 2019, An in-depth analysis of MBD from DZA records for 2016 some medical specializations are more affected than others (Musette M. S., Brain drain from Southern Mediterranean Countries, 2016). Such data are not available for Nigeria.

Table 12. Flows of African trained doctors to France from 2011-2019

Years	2011	2012	2013	2014	2015	2016	2017	2018	2019
DZA	165	116	151	233	236	210	230	159	104
Africa	348	279	325	535	541	434	441	326	196
France	1547	1410	1489	1683	1647	1457	1315	1149	950
Ratio DZA/Africa	0,47	0,42	0,46	0,44	0,44	0,48	0,52	0,49	0,53
Ratio Africa/ France	0,22	0,2	0,22	0,32	0,33	0,3	0,34	0,28	0,21

Source: extracted from <https://stats.oecd.org/> - 26th January 2022

The more so, for DZA, recent information released by the French authorities (2022), points out that “1200 medical officers succeed in an examination to work in France”⁽³⁾. How many will be recruited remains unclear. For NGA, information released in 2022 by “the Medical and Dental Consultants Association of Nigeria (MDCAN) has said more than 100 of its members left the country in the past 24 months”⁽⁴⁾.

2.4. Policies to reverse Brain Drain in Brain Circulation in DZA and NGA

This section is three-fold dimension to reverse BD to brain circulation. First, we address what is being done to reverse brain drain: then, the root causes of brain drain are derived from a current literature; last, we proceed by suggesting some tracks to organise the mobility of HSLF.

2.4.1. *What is done on migration*

We have many actions listed in the Nigerian Migration National Policy, adopted in 2015 on brain drain in order to achieve four objectives (Adepoju, 2015, p. 29):

- (a) To identify the nature, extent and causes of brain drain and its consequences in the countries of destination on the one hand and in Nigeria on the other;
- (b) To trace the outcomes of brain drain in the countries of destination;
- (c) To propose strategies for converting brain drain into brain gain in Nigeria;
- (d) To minimize brain waste.

Up to now, no implementation report of the strategies and actions planned has been officially released. For Algeria, the migration governance is scattered between sectoral objectives, strategies and actions for institutions and many other stakeholders (civil society and NGO) develop action plans to reverse brain drain. Some actions, among others, can be listed but stopping brain drain is still challenging.

- The National Economic and Social Council (CNESE) has organised a national dialogue with our Diaspora;
- The Ministry of Foreign Affairs is involved in the creation of a national data bank of Algerian skilled overseas workers;
- NGO and Civil Society, including Diaspora Organisation have created Networks to link national skills working abroad with local firms and companies;
- The Ministry of Higher Education and Scientific Research has enacted a bill to organize the contribution of Algerian scholars living abroad to Higher Education and National Research Action Plan;

- The Ministry of Housing has opened access to the diaspora for real estate promotion;
- Investment agencies are also open to members of the diaspora for access to business creation and start-ups.

2.4.2. Root causes of brain drain and MBD

Causes of BD are complex with multiple combinations. It is admitted that root causes are the first or main drivers, there are also secondary drivers which may trigger the decision-making to move. We have many narratives but no in-depth study published and available on causes of brain drain either in DZA and NGA. From a global view on reasons for migration, released by recent surveys, on causes of medical brain drain, either for Arab countries (including DZA) or for African countries (including NGA) we have surveys on the intention of Nigerian doctors, but for DZA, some ideas have been put forward on causes of MBD recently⁽⁵⁾. Scientific and academic works exist on MBD for doctors in NGA and the USA (Imafidon, 2018) based on qualitative snowball sample.

Narratives on root causes

Various essays are produced on brain drain from Algeria. These writings listed a list of push and pull causes supposed as causal factors for HSLF to migrate. Push factors are rather similar either for HSLF or for MBD, as reported by these essays. The only differences are observed in destination countries, driven by language facilities and historical colonial ties.

The factors are mentioned by various essays for DZA: the flight of physicians, “may result from interactions between individual motivations, professional aspirations and contextual economic and social elements” (Zehnati, 2021). A recent statement can be also quoted. “Like many Algerians who choose to emigrate, many doctors are looking for a better quality of life, education for their children, reported to be stated by the President of a regional board of physicians (Terkmane, 2022).

Concerning NGA, “Most of these factors are economic and political in nature; however, social and psychological factors also contribute to human capital flight (brain drain) in the country” (Anetoh & Onwudinjo, 2020).

Causes of BD in NGA “include meagre salaries, poor and insecure working conditions, lack of career advancement opportunities and even a

lack of jobs with unemployment growing among registered doctors.” (Eriki, et al., 2015). Such causes are confirmed by the National Survey run on the intention of doctors to move. The NOI survey on MBD in NGA states that nine out of ten physicians are looking for an opportunity to migrate. (Nigeria Healthwatch ; NOIPolls, 2017).

According to an academic survey conducted on MBD (Imafidon, 2018), two main reasons for emigration are noted:

- i) “The shortage of MDs and its negative impact on population health outcomes... In Nigeria, the call-system requires MDs to work 24-hour shifts during times of manpower shortages and medical emergencies.” The on-call system is associated with greater work-related stress which, “leads other MDs to seek work opportunities abroad in less demanding work environments”. In addition, “Many participants agreed doctor burn-out ...pushes more MDs, especially young MDs to migrate”;
- ii) “Some participants linked the poor work environment and its effects on patient outcomes as another reason some MDs migrate”.

Intentions of high skilled migrants from DZA

The 5th Arab Barometer concerning the emigration propensity of Algerians high skilled is quite interesting, as reasons are provided for HSLF (workers or employers) who have the intention to move abroad.

Intentions of high skilled migrants from NGA

A survey of students concerning the causes of brain drain also indicates that the economic factor is important: “Mass unemployment” which is cited for almost 15%, “Mass poverty” for a little over 14%, more of 15% answered “Poor salaries and conditions of service”. The social and political causes are found, more than 17% mention “Poor leadership of the country” and more than 11% cited “Crises (political, religion, communal, education)”.

It should be noted that concerning the academic and non-academic staff of the universities interviewed during interviews, nine out of ten respondents ranked “poor leadership of the country” highest. They argued that if good leaders were in place, other factors causing escalation of brain drain would have been gladly arrested. Just four of them (07.4%) ranked

lack of “good rewarding system highest”. The causes least cited by students are: “Poor infrastructural facilities”, “Poor recreational facilities”, “Lack of opportunity for advancement”, “Poor education facilities”, “Poor health facilities”, “Lack of good rewarding system for hardworking manpower”, “Untimely death of manpower assets”.

2.4.3. Organising the mobility of HSLF

Up to now, we have identified some root causes for DZA and NGA. This means that there is a need to design corrective measures that will reverse the BD (and MBD) not only into BG, but mainly into Brain Circulation (BC) at three levels: international, regional and national. BC is not a new concept. It has been coined and applied mainly for developed countries (Kone & Özden, 2017), for example, within countries of EU27.

On national grounds, our focus on DZA and NGA has shed lights particularly on the lack of in-depth studies or surveys on HSLF living abroad and the abundance of narratives without evidence-based. Causes of brain drain are reported in surveys targeting potential migration and by academic qualitative studies.

Three recent reports on migrations in DZA have suggested ways and means to reduce BD and MBD. An official report, produced after an open dialogue with our Diaspora and migrants abroad, have suggested a new strategy to cope with HSLF with some 40 actions programmed on short, medium and long term. A paper published (Bezrel-Kabir, 2017) documents the causes of brain drain from Algerian university. Another recent desk research study on Youth and Mobility (Musette Y. , 2021) examines Algerian youth aspirations for mobility.

For NGA some relevant target scientific studies proposed solutions to limit human capital flight : for physicians (Imafidon, 2018) and an empirical study (Okoro, Omeluzor, & Bamidele, 2014) analyzing the challenges occasioned by brain drain or human capital flight of librarians on service delivery in Nigerian Universities and a last one, based on opinion of undergraduate students, academic and non- academic staff in two selected private universities in South West Nigeria to address the escalation of BD (Omonijo & Nnedum, 2011).

To sum up, these reports academic studies and reports, either on DZA or NGA, identified some measures to reverse BD to BC. These measures are as complex as the causes listed above. They are organised in short, me-

dium and long terms on three dimensions: political, economic and social grounds for both countries.

It is also worth noting that a constant observation of migrant flows is important for the monitoring and assessment of BD. The AU has set up a Migration Observatory recently. Hence, there is a need for all African countries to have a national Observatory on international migrations, including for HSLF. Without this knowledge-base, any actions taken will have limited effects and might even induce unexpected sides effects.

For instance, nine actions can be examined and planned to meet our goals in the long run within AU 2063 Agenda, medium term within the UN Agenda 2030 and short terms actions on bilateral, regional and multilateral existing agreements.

Table 13. Nine actions to be planned to manage brain drain from Africa

	Short	Medium	Long
<i>Political</i>	Build and maintain talent's confidence, particularly HSLF and physicians	Create channels for HSLF migration and returnees (Bilateral Agreement)	Free movement of lecturers, researchers and physicians within Africa
<i>Economic</i>	Reduce unemployment rate of graduates	Enhance the role of Diaspora in local development investment	Reduce wage inequalities between northern and southern countries, based on PPP
<i>Social</i>	Official rewards for all talents.	Develop University twinings within Africa	Build an appropriate social and cultural environment (e.g. Smart City)

Conclusion and way forward

This study on BD from Africa, with a focus on DZA and NGA, has yielded some basic facts on its rising trend during this millennium. The BD is also acute for the loss of physicians. These facts are built on available data. There is also a dire need for better data, collected on African HSLF migrant working abroad, as well as on returnees to Africa. Such data are missing.

On international level, brain drain from Africa to other world's region has always been considered as a threat for the development and now for the security of the countries of origin. The race for global talent has a cost for Africa which incur a net loss and northern developed countries derive a net gain for skills without any investment. The only real global market for the world circulation of superstars. We have examined the causes and the consequences, but not the cost. An in-depth study on the cost of brain drain is still missing.

Human mobility within Africa is still a dream.

The objectives to reverse brain drain are fixed in the protocol for free movement of persons on political grounds. The mobility of HSLF within Africa is highly dependent on economic integration of different regions to combat the rising trends of BD from Africa to Northern countries and organise BC within Africa.

The AU free trade agreement is a first step. A second step on services, including health and education integration will support the economic dynamics. On regional level, two channels have been identified, explored and are now under implementation: The circulation of high skilled migrants is enacted in the AU protocol of free movement of persons. And the final step will be an agreement on financial institutions. On social and cultural grounds, the present generation, African digital natives, their virtual world is under construction■

References

1. The stock of Algerians is more concentrated (80 percent) than Nigerians (48 percent) in OECD countries.
2. <https://www.algerie-focus.com/algerie-fuite-des-cerveaux-la-guerre-des-chiffres/>. 22 Avril 2011.
3. <https://www.jeune-independant.net/plus-de-1-200-praticiens-vont-quitter-le-pays-lexode-des-medecins-algeriens-continue/>
4. <https://www.premiumtimesng.com/news/headlines/507489-brain-drain-over-100-medical-consultants-left-nigeria-in-the-last-two-years-official.html>
5. The French government has released an information on 1200 DZA doctors having passed with success the examination to work in France. A recent qualitative research has been on DZA doctors migrating in France and Canada, the results are not yet released.

Bibliography

- Adepoju, A. (2015). National Migration Policy. Retrieved from <https://publications.iom.int/fr/books/national-migration-policy-2015>
- Akesson, L., & Baaz, M. E. (2015). Africa's Return Migrants: The New Developers? London: Zed Books.
- Anetoh, B. C., & Onwudinjo, V. G. (2020). Emigration and the problem of brain drain in Nigeria: a philosophical evaluation . Journal of African Studies and Sustainable Development, 3(1), 86- 98.
- AU. (2006). African Common Position Migration. Addis Abbaba: AU. Retrieved from <https://www.khartoumprocess.net/resources/library/reference/66-african-union-migration-policy-framework-for-africa>
- AU. (2015). Agenda 2063. Retrieved from https://au.int/sites/default/files/documents/36204-doc-agenda2063_popular_version_fr.pdf
- AU. (2018). The revised Migration Policy Framework and Plan of Action 2018-2027. Addis Ababa: AU. Retrieved from https://au.int/sites/default/files/documents/35956-doc-2018_mpfa_english_version.pdf
- AU. (2018). Treaty protocole free movement of persons in Africa. Addis Ababa: UA. Retrieved from [/sites/default/files/treaties/36403-treaty-protocol_on_free_movement_of_persons_in_africa_f.pdf](https://au.int/sites/default/files/treaties/36403-treaty-protocol_on_free_movement_of_persons_in_africa_f.pdf)
- Beine, M., Docquier, F., & Rapoport, H. (2001). Brain drain and economic growth: theory and evidence. Journal of Development Economics, 64, 275–289. Retrieved from <https://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.471.5978&rep=rep1&type=pdf>
- Bezrel-Kabir. (2017). The causes of brain drain from the Algerian University and its negative effects. La revue africaine pour les études juridiques et politiques (en arabe), 17-40.
- Cha'ngom, N. (2020). African countries and the brain drain: Winners or losers? Beyond remittances. Retrieved from https://aercafrica.org/wp-content/uploads/2020/06/D8-NARCISSE_CHANGOM-WIP.pdf
- Djelti, S. (2015). Migration Internationale et Développement. Tlemcen. Retrieved from <http://dspace.univ-tlemcen.dz/bitstream/112/7763/1/migration-fonds-fuite-cerveaux-developpement-Algerie.Doc.pdf>

- Docquier, F. (2007). Fuite des cerveaux et inégalités entre pays. *Revue d'économie du développement* 2007/2-3 (Vol., 15(2/3), 49-88. Retrieved from <https://www.cairn.info/revue-d-economie-du-developpement-2007-2-page-49.htm?contenu=resume>
- Docquier, F., Lohest, O., & Marfouk, A. (2007). Brain Drain in Developing Countries. *THE WORLD BANK ECONOMIC REVIEW*, 21(2), 103-218. Retrieved from https://openknowledge.worldbank.org/bitstream/handle/10986/4454/wber_21_2_193.pdf?sequence=1
- Dumont, J.-C., Martin, J. P., & Spielvogel, G. (2007). Women on the Move: The Neglected Gender Dimension of the Brain Drain. (IZA, Ed.) IZA . Retrieved from <https://www.oecd.org/els/mig/40232336.pdf>
- Easterly, W., & Nyarko, Y. (2007). Is the Brain Drain Good for Africa? AFDB. Retrieved from <https://www.afdb.org/fileadmin/uploads/afdb/Documents/Knowledge/30753168-EN-WILLIAM-EASTERLY-BRAINDRAIN-APRIL2008-111.PDF>
- Eborka, K. (2014). development impact of Return migration in Nigeria : Realities or Myths ? *Journal of African Migration - Ìrìnkèrindò*(7), 178.206. Retrieved from http://africamigration.com/issue/june2014/eborka_development_impact.pdf
- Eriki, P., Oyo-Ita, A., Robert Odedo, Udoh, A., Omaswa, F., & Kadama, P. (2015). Brain Drain to Brain Gain: case study on the stock and flow of medical and dental practitioners in Nigeria, with a special focus on health workforce training in Cross River state. African Institute for Health and Leadership Development. Retrieved from <http://www.prographic.com/wp-content/uploads/2016/07/0316-Nigeria-Case-Study-web.pdf>
- Gubert, F., & Nordman, C. (2008). Who benefits most from Migration ? UIE. Retrieved from https://cadmus.eui.eu/bitstream/handle/1814/8888/MIREM_AR_2008_03.pdf?sequence=1&isAllowed=y
- Haque, N. U., & Kim, S.-J. (1995). Human Capital Flight": Impact of Migration on Income and Growth. *IMF Staff Papers*, 42(3), 577-607. Retrieved from <https://www.elibrary.imf.org/view/journals/024/1995/003/article-A005-en.xml#:~:text=We%20show%20that%20human%20capital,capital%20in%20the%20two%20countries.>
- ILO. (2006). Competing for Global Talent. Geneva: ILO. Retrieved from https://www.ilo.org/wcmsp5/groups/public/@dgreports/@dcomm/@publ/documents/publication/wcms_publ_9290147768_en.pdf

- ILO. (2021). Global Estimates on International Migrant Workers – Results and Methodology . Retrieved from https://www.ilo.org/wcmsp5/groups/public/@dgreports/@dcomm/@publ/documents/publication/wcms_808935.pdf
- Imafidon, J. (2018). One Way Traffic: Nigeria's Medical Brain Drain. A Challenge for Maternal Health and Public Health system in Nigeria ? Retrieved from <https://escholarship.org/content/qt5q36r5xq/qt5q36r5xq.pdf?t=pf1m10>
- IMD. (2021). IMD- World Talent Ranking 2021. IMD. Retrieved from <https://www.imd.org/centers/world-competitiveness-center/rankings/world-talent-competitiveness/>
- INSEAD. (2021). The Global Talent Competitiveness Index 2021. France: INSEAD. Retrieved from <https://www.insead.edu/sites/default/files/assets/dept/fr/gtci/GTCI-2021-Report.pdf>
- IOM. (2022). African Report on Migration: Challenging the narrative. Geneva: IOM. Retrieved from <https://publications.iom.int/system/files/pdf/africa-migration-report.pdf>
- Kone, Z. L., & Özden, Ç. (2017). Brain Drain, Gain, and Circulation. KNOMAD Working Paper 19. Retrieved from https://www.knomad.org/sites/default/files/2017-04/KNOMAD%20WP19_Brain%20Drain%20gain%20and%20circulation.pdf
- Madoui, M. (2010). Entrepreneurs d'ici et de là-bas. Retrieved from <https://hal.archives-ouvertes.fr/hal-00742976/document>
- Margolis, D. (2013). "To Have and Have Not": Migration, Remittances, Poverty and Inequality in Algeria. IZA DP No. 7747. Retrieved from <https://docs.iza.org/dp7747.pdf>
- MIREM. (2007). Retour des migrants dans les pays du Maghreb. Turin: IUE.
- MIREM. (2008). Return Migrants to Maghreb Countries :Reintegration and Development Challenges. Turin: IUE. Retrieved from https://cadmus.eui.eu/bitstream/handle/1814/9050/MIREM%20_General_Report_2008.pdf?sequence=1&isAllowed=y
- Musette, M. S. (2011). Transferts de fonds entre migrants et non-migrants en Algérie. Departement de Sociologie, Thèse de Doctorat d'Etat. Alger: Université d'Alger 2.
- Musette, M. S. (2016). Brain drain from Southern Mediterranean Countries. Mediterranean Yearbook, 320-325. Retrieved from <https://www.iemed.org/wp-content/uploads/2021/01/Brain-Drain-from-the-Southern-Mediterranean.pdf>

- Musette, M. S. (2021). Migrations estudiantines en Algérie. CREAD.
- Musette, Y. (2021). Jeunesse et Mobilité en Algérie. Vienne: ICMPD.
- Nafa, A. (2015). Rôle de la diaspora algérienne dans le développement de l'entrepreneuriat et le transfert de la connaissance.
- Nigeria Healthwatch ; NOIPolls. (2017). Emigration of Nigerian Medical Doctors. Survey Report.
- OCDE. (2019). Measuring and Assessing Talent Attractiveness in OECD Countries. OCDE.
- OECD. (2020). A global profile of emigrants to OECD countries: Younger and more skilled migrants from more diverse countries. OECD Social, Employment and Migration. OECD. Retrieved from <https://www.oecd-ilibrary.org/docserver/0cb305d3-en.pdf?expires=1647512743&id=id&ac-name=guest&checksum=1606492A911019CBE9A812AABD1DBC7F>
- OECD. (2020). Contribution of migrant doctors and nurses to tackling COVID-19 crisis in OECD countries. Retrieved from https://read.oecd-ilibrary.org/view/?ref=132_132856-kmg6jh3kvd&title=Contribution-of-migrant-doctors-and-nurses-to-tackling-COVID-19-crisis-in-OECD-countries
- OECD. (2021). Health at a glance 2021. Paris: OECD. doi:<https://doi.org/10.1787/ae3016b9-en>
- OIM. (2022). Afrca Migration Report.
- Okoro, C. C., Omeluzor, S. U., & Bamidele, I. A. (2014, July-September). Effect of Brain Drain (Human Capital Flight) of Librarians on Service Delivery in Some Selected Nigerian Universities. Sage Open, 1-11. doi:DOI: 10.1177/2158244014541131
- Olatuyi, A., Awoyinka, Y., & Adeniyi, A. (2013). Nigerian diasporas in the south : Harnessing the potential for national development. Retrieved from https://publications.iom.int/system/files/pdf/nigeria_diasporas.pdf
- Omonijo, D. O., & Nnedum, O. A. (2011). Understanding the Escalation of Brain Drain in Nigeria From Poor Leadership Point of View. Mediterranean Journal of Social Sciences, 2(3), 434-453.
- Özden, Ç., & Schiff, M. (2006). International Migration, Remittances and Brain Drain. World Bank. Retrieved from <https://openknowledge.worldbank.org/bitstream/handle/10986/6929/339880rev.pdf?sequence=1&isAllowed=y>

- Rustomjee, C. (2018). Issues and Challenges in Mobilizing African Diaspora Investment. Centre for International Governance. Retrieved from https://media.africaportal.org/documents/PB_no.130.pdf
- Santelli, E. (1999). Les enfants d'immigrés algériens et leur pays d'origine. Modes de relations économiques et professionnelles. REMI, 141-166. Retrieved from https://www.persee.fr/docAsPDF/remi_0765-0752_1999_num_15_2_1682.pdf
- Schiff, M. (2005). Brain Gain: ClaISM about its Size and Impact on Welfare and Growth Are Greatly Exaggerated. (W. B. 3708, Ed.) Working Paper. Retrieved from <https://openknowledge.worldbank.org/bitstream/handle/10986/8289/wps3708.pdf?sequence=1&isAllowed=y>
- Socha-Dietrich, K., & Dumont, J.-C. (2021). International migration and movement of doctors ti and within OECD 2000.2018. OECD Health Working Papers No. 126. Retrieved from [https://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=DELSA/HEA/WD/HWP\(2021\)3&docLanguage=En](https://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=DELSA/HEA/WD/HWP(2021)3&docLanguage=En)
- Sørensen, N. N. (2012). Revisiting the Migration–Development Nexus: From Social Networks and Remittances to Markets for Migration Control. In I. Migration. doi:DOI: 10.1111/j.1468-2435.2012.00753.x
- Stark, O., Helmenstein, C., & Prskawetz, A. (1997). A brain Gain with a Brain Drain. Economic Series No 45, Institute of Advanced Studies, Vienna. Retrieved from <https://www.ihs.ac.at/publications/eco/es-45.pdf>
- Terkmane, Y. (2022, février 13). Expatriation des médecins : les raisons de la saignée. Retrieved from algeria-watch: <https://algeria-watch.org/?p=81905>
- UN. (2019). Resolution 73/195 Global Compact for Safe, Orderly and Regular Migration. Ney York: UN. Retrieved from https://www.un.org/en/ga/search/view_doc.asp?symbol=A/RES/73/195
- UNDESA. (2020). World Youth Report . Social Entrepreneurship and the 2030 Agenda. UNDESA. Retrieved from <https://www.un.org/development/desa/youth/world-youth-report/wyr2020.html>
- UNDESA. (2021). Stock des migrations 2020. Retrieved from <https://www.un.org/development/desa/pd/content/international-migrant-stock>
- Venturi, B. (2017). The migration developement and security nexus revised. a perspective from the Sahel. Rome: Edizioni Nuova Cultura. Retrieved from <https://www.iai.it/sites/default/files/9788868129729.pdf>

- WEF. (2011). Global Talent Risk. Retrieved from https://www3.weforum.org/docs/PS_WEF_GlobalTalentRisk_Report_2011.pdf
- WEF. (2017). The Future of Jobs and Skills in the Middle East and North Africa. Switzerland. Retrieved from http://www3.weforum.org/docs/WEF_EGW_FOJ_MENA.pdf
- WHO. (2021). World Health Statistics. Retrieved from https://reliefweb.int/sites/reliefweb.int/files/resources/whs-2021_20may.pdf
- World Bank. (2014). A Global Assessment of Human Capital Mobility : The Role of Non-OECD Destinations. WB. Retrieved from <https://openknowledge.worldbank.org/bitstream/handle/10986/18349/WPS6863.pdf?sequence=1&isAllowed=y>
- World Bank. (2022). World Development Indicators. Retrieved from <https://data.worldbank.org/indicator>.
- Zehnati, A. (2021). L'émigration des médecins algériens : phénomène normal ou véritable exode ? Revue internationale de politique de développement. Retrieved from <https://journals.openedition.org/poldev/4432>.