

Review Article**How Many Doctors Do We Need in Sudan?****Zuhair Ali, DPH**

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Introduction

Sudan is the largest country in Africa and Arab world with an area of about 2.5 million square kilometers, which is almost equal to Western Europe. The population of Sudan is one of the rapidly growing populations in the world with about 35 million population and a growth rate of about 2 %. (Table-2)

In the year 2005 a peace agreement was signed to put an end to the longest civil war in Africa in the last decades after 22 years of conflict. In the first five years of this century oil started to become a significantly rising source of hard currency. Its daily production rose to more than 500,000 barrels by the end of 2005 and it is expected to reach a daily production of 1 million barrels before or during 2008. The per capita annual income rose from 310 US\$ in 2000 to 530 US\$ in 2004(table-2). This is expected to rise to double or more in 2006-2007 due to increasing production and price duplications. This rising improvement of economic status would lead to many changes in people life style by improving the availability of food and water supply, accommodation, environment, education, health services, transport & telecommunication.

The health status has many indicators that describe the final health outcome of the population e.g. life expectancy, mortality rates and morbidity rates. Some indicators describe the availability and use of health resources and service as national health expenditure, number of health centers, hospital beds and trained work force.

Doctors are at the summit of the health service providing personnel and there are rising numbers

of them after the increase in numbers of medical schools from four in 1989 to more than 25 medical schools graduating more than 1500 doctors each year in 2006. The real challenge is how to make the best use of these figures by good planning to cover different geographical areas and different specialties and levels of health service provision: primary, secondary and tertiary. This should be preceded by a scientific estimation of the need with precise estimation of training chances and migration trends.

Objectives

The aim of this paper is to propose a scientific estimation of Sudan need for doctors in short and strategic terms through the achievement of the following steps:

- Project estimated figures of Sudan need for doctors to reach the average standards of doctor-population ratios in our region.
- Project estimated figures of annual graduation and postgraduate training rates to reach the optimum standards over a strategic plan.
- Propose estimated figures of doctors that our current economic status can afford for a first stage goal in three years time.
- Suggest measures to optimize distribution in different specialties and geographical zones and manage migration.

Methods

The paper is a review of available literature and statistics handling selected economic and health indicators for the purpose of comparison between Sudan and some selected regional and international standards. Besides it went through some experiences of developed countries to estimate the

need for doctors and to control their training and distribution. The review collected data from the following:

1. Statistical data of: WHO atlas, World Bank data, Sudanese MOH records and strategic human resources plan 2004-2013, USA statistical abstract.
2. Published scientific papers that discuss planning of human resources for health.

Results

Socioeconomic status of Sudan in regional and global context

Despite the international economic growth in the developed countries, a lot of people are suffering from poverty impact on their health. Many

economic indicators show that Sudan and other sub-Saharan countries have a lot to do to reach average international levels.

Despite the doubling of the gross national income (GNDP) of Sudan from 08.2 Billion US\$ in 1994 to 18.7 in 2004, its economic indicators still lies around the sub-Saharan region levels in the year 2004⁽¹⁾. Sudan indicators compared to international average and some selected countries in the year 2003 are shown in table -1. It shows that our figures in the year 2003 are far from the international average figures. However, economic status is improving since the beginning of this millennium as shown in world bank data in Table-2 which shows some indicators in 2000 and 2004⁽²⁾.

Table 1: Selected word development indicators in some countries (2003)

Country/region	GNI per capita, Atlas method (current US\$)	Life expectancy at birth, total (years)	Population, total (million)
World (2003)	5552	66	6289.8
Ireland (2003)	27430	78	0003.99
KSA (2003)	8880	72	0023.3
Jordan (2003)	1940	72	0005.3
Sudan (2003)	440	56	0034.9
Kenya (2003)	430	48	0032.7
Nigeria (2003)	380	43	0125.9
Sub-Saharan (2004)	600	46	0719

Source: world Development indicators, World Bank 2006.

Table 2: Sudan data profile 2000-2004 (World Bank Data)

Indicators // years	2000	2004
Total population	32.9 million	35.5 million
Annual population growth %	2.1	1.9
Life expectancy at birth – in years	55.9	56.5
GNI great national income (US\$)	10.3 billion	18.7 billion
Per capita GNI (US\$)	310.0	530.0
Foreign direct investment (US\$)	392million	1500 million
Line and mobile phone subscribers/1000 pop	12.5	58.5
Internet users per 1000 people	0.9	32.1

Source: world Development indicators, World Bank 2006.

In the first five years of this century oil started to become a significantly rising source of hard currency. Its daily production rose from 270,000 barrels in 2003 to 320,000 in 2004 and more than 500,000 by the end of 2005. It is expected to reach a daily production of 1 million barrels before or during 2008⁽³⁾.Our current economic indicators may

be more than double that appeared in 2003 comparison if not triple. WHO data shows that in 2002 total health expenditure percentage in Sudan was 4.9% of GDP, and the total health expenditure per capita was only 58 US\$. This can now be brought to more than 200 US\$ per capita by GDP & percentage duplication to 10% of GDP. Health

spending percentage of (GDP) world average is 8.8 %. The private sector participation ranged between 1.5-3% of the (GDP) in the majority. USA is an extreme exception with private sector participation of 7-8%of GDP⁽⁴⁾.

Human resources for health indicators

The economic status of the country and region would finally affect the lifestyle and health status. In Sudan life expectancy at birth is about 56.5 years compared world average, 49 in Africa and 76 in developed countries⁽⁵⁾. Similar to other indicators health professionals per capita has regional and country differences as displayed in tables-3 &4.

Table 3: average doctor: pop(100,000) ratios among WHO regions (2004)

Region	Africa	S. E Asia	East Mediterranean	Americas	Europe
Doctors	17	45	96	212	327
Nurses	71	59	159	414	663

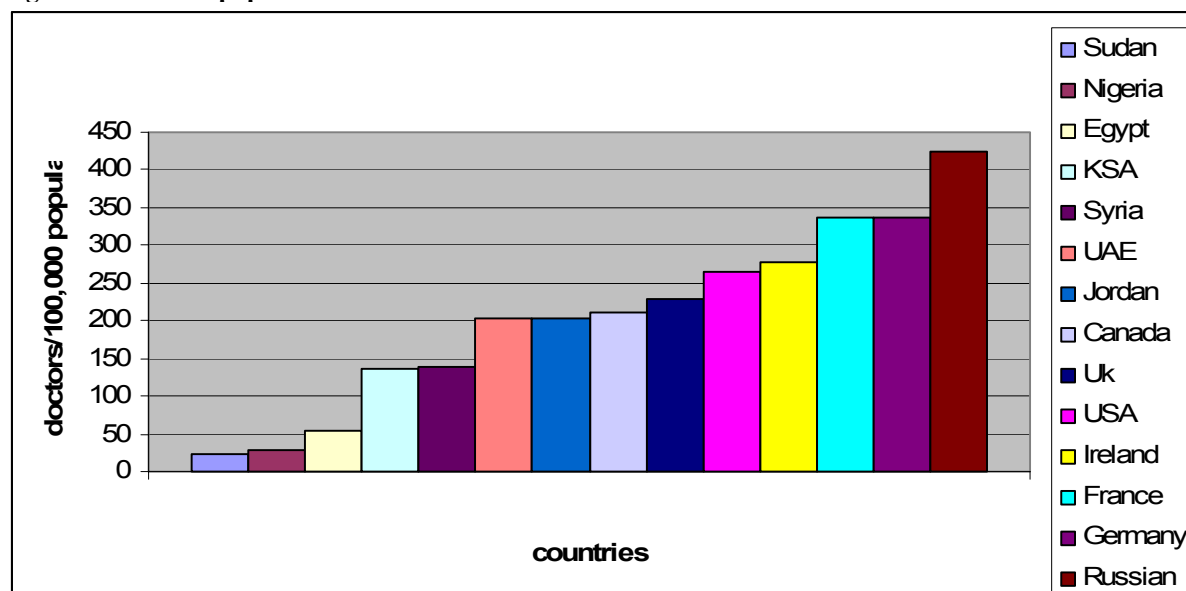
Source: WHO Atlas Data, 2004.

Table 4: hospital beds & doctors-population ratios in selected countries

Country	Doctor per100,000 population (year)	Hospital beds per 100,000 Population(year)
Sudan	22 (2004)	70 (2002)
Egypt	54 (2002)	220 (2002)
KSA	137 (2004)	220 (2001)
Syria	140 (2001)	150 (2003)
UAE	202 (2001)	220 (2002)
Jordan	203 (2004)	160 (2003)
UK	230 (1997)	420 (2000)
Ireland	279 (2004)	350 (2003)
France	337 (2004)	780 (2002)
Germany	337 (2003)	890 (2002)
Russian Fed.	425 (2003)	1050 (2003)
Nigeria	28 (2003)	

Source: WHO Atlas Data, 2004.

Figure-1: Doctors population ratios in selected counties



Data in Table-4 are extracted from WHO atlas data. It included individual countries from different WHO regions. Jordan, Syria and Egypt are selected as regional non oil producing countries in addition

to Saudi Arabia and UAE as Gulf States example. Four European countries: France, Germany, UK and Ireland are included to compare figures to developed world standards. Russian figures are

included as an exceptional example of high figures. Nigeria as an oil producing state and high population with poor figures⁽⁵⁾. The comparison shows that Sudan needs to increase the number of doctors in 2004 by a factor of 4.5 (2-9 times) to reach regional levels within the eastern Mediterranean region. An increase by 10-15 times is needed to reach developed European countries, and by up to 20 to reach Russian levels. We also need to increase our bed capacities by 2-3 times for regional Arabic levels, by 5-12 to European levels and by 15 to reach the Russian levels.

Sub-Saharan Region has 10% of world population with very high disease burden. Many countries have few (HRH) human resources for health today than they did 30 years ago with 38 of the 47 countries not meeting WHO minimal standard of doctor-pop ratio of 1:5000 (20/100,000). Thirteen countries have fewer than 10:100,000 e.g. 2 in Tanzania (2002), 3 in Ethiopia (2003), 5 in Uganda (2002) and Malawi has only 139 doctors for a population of 12 Million. Causes that lead to the severe shortage of HRH include the few available numbers due to low production and retention of doctors, inadequate and inappropriate training, poor distribution of staff and low motivation. Even where available, unaffordable to be hired due to budgetary and fiscal constraints that is affected by the ceiling on country's overall spending (health 10% GDP) and growth restrictions on civil service budget leading to hiring freezes. Moreover, the weak HR management information system is an important issue that hides the magnitude of the

problem. Some countries had some steps to improve their status e.g. Malawi started a six Year emergency HR program to top salaries and Ghana increased salaries and allowances.⁽⁶⁾

Sudan current situation and future plan

The planning of supply of and demand for HRH (human resources for health) in health care is a neglected topic characterized by significant methodological weaknesses. Despite attempts to plan, several countries have experienced cycles of shortages and surpluses of health professionals. Lack of attention to basic economic principles such as incentives and labour markets is widely noticed.⁽⁷⁾ In Sudan there are 22.6 medical officers for 100.000 population and 3.6 specialist doctor to 100.000 populations in the year 2005.⁽⁸⁾ The record of HRH planning in Sudan is rather weak. HR department in the Federal Ministry of Health (FMOH) was for several years underestimated and poorly staffed. The 10 year national health strategy for the period 1992-2002 projected an unrealistic numbers of staff that have never been achieved. The relation between health service authorities and medical education institutions has always been weak and fragmentary ⁽⁹⁾. Currently there is another strategic 10 years plan for HRH adopted by the ministry of health for the period 2004-2013. This plan described the current position and extracted estimated figures of needed human resources including doctors. It adopted service target approach to estimate the need for doctors by the year 2013 to be as follows:

Table-5: Estimated need for doctors by the MOH plan (2004-2013)

2013	Needed figure	Expected graduation	Surplus, deficit
Medical officer	11770	17778	6008
General specialists	5652	5500	-152
Sub specialist	739	200	-539

Source: The 10 years HRH Plan, FMOH 2004

These figures were extracted on a basis of the estimated need of new health services that will provide health care to a population of more than 42

millions by the year 2013. The plan described the need for services with detailed targets at the levels of primary care units, health centers, rural and

district hospitals. It based the expected expansion per population to reach the targets of 1 health unit per 5000 population, one health centre per 20,000 rural and 50,000 urban populations in addition to one rural hospital per 150000-250,000 population. However, for the regional and national hospitals it accepted the currently available figures. It proposed the addition of only six tertiary centers in the states and none at the national level. The plan included many surgical and public health subspecialties but did not include separate figures for most of the medical subspecialties including cardiology, gastroenterology and oncology. It estimated outwards migration percentage to be as low as 7.1-8.8 %. Based on annual intake of medical schools in ministry of higher education data, the plan estimated the annual graduation of doctors to range between 1450 (2006) and 1982 (2010). It expected a calculated figure of 6965 graduates in the years 2011-2013. The overall expected surplus during the whole ten years plan is estimated to be (6008) doctors⁽¹⁰⁾.

Although health workforce shortage has always been a recognized problem during the past years, oversupply of health personnel is another problem that started to manifest during the 1980s. Unemployment, underemployment and/or inappropriate employment are all manifestations of the problem of HRH oversupply. HRH shortages and oversupply can exist simultaneously in one country as is the case when misdistribution is rampant in a country. The annual growth rate of medical schools was three times greater in developing countries (4.1%) than in the developed countries (1.4%)⁽¹¹⁾. Sudan has witnessed a tremendous increase in the number of medical schools (from 4 in 1989 to 30 in 2006). Unemployment among doctors started to show recently given an impression of saturation of the country health system regarding doctors.

To project the suitable number of doctors needed for Sudan, we will examine in the following sections some country examples for need assessment and HRH projections.

USA example of need assessment and planning

For most countries, expansion of their training capacity was possibly an arbitrary decision dictated by the growing demand for medical education. The type of HRH planning followed by many countries in the past did not prevent imbalances and may even have encouraged them. This denotes the importance of having a national HRH policy and having a national HRH coordinating council. The admission policies of the health training institutions must be revised to take account of the employment capacity of the health sector.⁽¹¹⁾ Hence we are going to handle the experience of two developed countries examples.

A review of USA statistical data of the year 2003 showed that the average figure of doctors: population of the whole country was 266/100,000. There was difference between states in the range of 170-440⁽¹²⁾.

A. AAMC meeting: The Association of American Medical Colleges (AAMC) held an annual Spring meeting of the Council of Deans, to answer the following question:

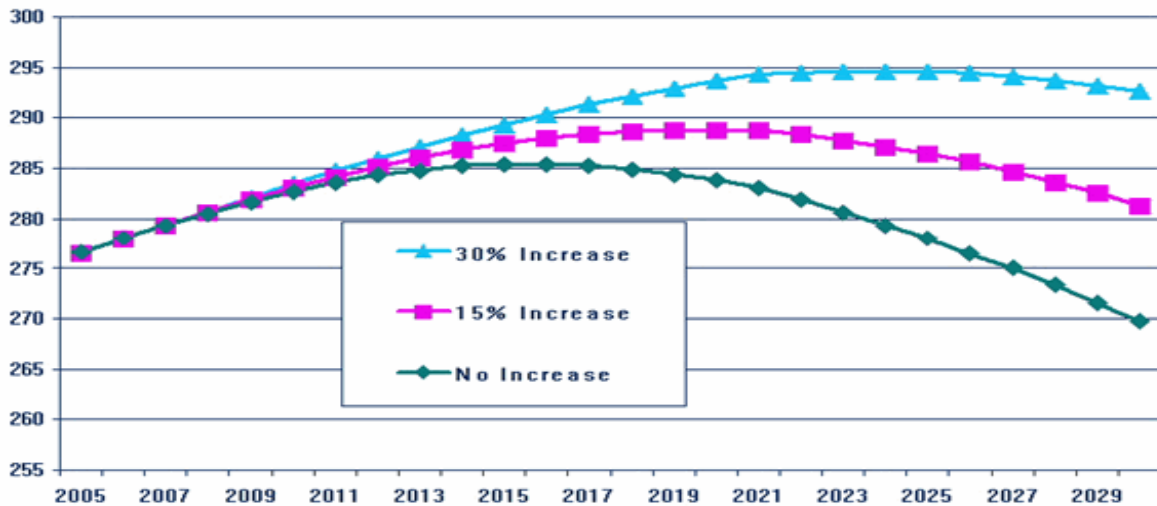
(With and without an increase in physician enrollment and new medical schools, will we have enough physicians to care for the aging population?)

They reviewed the international figures of doctors per population in 20 developed countries with a range of doctor per 100,000 population between 130 (Korea) to 448(Greece). The figure was 264 in USA. They also expected that there will be a slight increase in doctors till 2015 due to the fact that in the 1970s, a major increase in the production of physicians occurred. The AAMC has recommended an increase of 30 percent in the national production

of physicians at medical schools (see figure-2). This increase is called for by 2012 and would allow the

United States to have nearly 295 physicians per 100,000⁽¹³⁾.

Figure 2: Active physicians per 100.000 populations 2005-2030



Source: Website of the Medical University of South Carolina, USA 2006.

B. Florida study: In 1999, a major study of the future demand and supply of physicians in Florida and in the country as a whole was commissioned. It found that physician shortages would become evident by 2002 and become increasingly problematic until at least the year 2020 when the annual shortage could be as much as 12,000 physicians⁽¹⁴⁾.

C. Post graduate training opportunities (16 vs. 20 thousands): While the number of U.S. medical school graduates has remained constant at about 16,000 per year for the past two decades, first-year residency positions have grown to about 20,000.⁽¹⁵⁾ The AMA is recommending that entry-level resident slots be gradually cut to 120% of the number of 1997 graduates. Such a reduction would cut about 3,000 positions. In 1997, residency intake was 24,516 (137% of 17,907 graduates). 74% were US graduates vs. 26% immigrant doctors⁽¹⁶⁾.

D. Which specialty? In 1997, the Council on Graduate Medical Education (COGME) proposed an equal target of 9,879 residency intake for

generalist and sub-specialist training; but real figures showed increased intake in sub-specialist training by 41% vs. 7% reduction from target in generalist training intake.⁽¹⁷⁾ COGME reports recommended to provide postgraduate medical education to 110 % of the number of graduates with a 50-50 split between generalist and specialist providers.(generalists includes general internists, general pediatricians, family practitioners, and obstetrician-gynecologists.) it was 35% generalists: 65% (specialist). The surgical specialties decided in 1970 that they needed to exercise "birth control" and students interest in surgery leveled off as they recognized the drop in opportunities. There was an estimated need of one consultant in geriatric medicine per 4,000 population aged over 75 (equivalent to 50,000 of all ages) compared to one consultant per 80,000 population for each specialty of Diabetes and endocrinology, cardiology, respiratory, gastroenterology. Number of physicians would be greater in districts with a large commitment to teaching or research⁽¹⁸⁾.

F. Death and retirement: It was projected that in the year 2000 over 14,000 physicians would be lost due to retirement and death. That number is expected to increase steadily and dramatically to over 23,000 in 2020⁽¹⁸⁾.

Canada example

A. Doctor-population ratio and Population growth: In 2004 Canada had 60,612 practicing doctors with 5% increase from 57,803% in 2000. however, due to population growth, the doctor-population ratio remained stable (189 in 2004, vs. 188 in 2000)⁽¹⁹⁾.

B. Migration back: In the period between 2000 and 2004, the number of physicians who left Canada declined by 38%. In 2004, 262 physicians left Canada (vs.317 returned); this is down from 420 physicians who left in 2000, and a significant decrease from the peak of 771 physicians who moved abroad in 1994⁽¹⁹⁾.

C. Estimated need for doctors graduation: Ryten et al, estimated the need for doctors to be graduated in 2007 to be 2000 doctors compared to 1578 students who were graduated in 2000. They referred to one study which showed that about 3.3 % of enrolled students in medical schools did not graduate. They considered an estimated 387 net annual migration and 900-1100 doctors to retire at 65 or die annually. They estimated a percentage of 22% of Canadian doctors will retire within 10 years in 2002⁽²⁰⁾.

D. Different trend in generalists or specialists: Between 2000 and 2004, the number of family physicians increased from 94 to 98 per 100,000 compared to a decline from 93 to 91 in specialists per 100,000 population and the number of international medical graduates in family medicine in Canada rose 12 %, compared to a (9.4%) drop in specialist graduates numbers⁽²¹⁾.

E. British Columbia (B.C.) an example of decentralized action

B.C. has one of the highest per capita rates of physicians: At 200 doctors per 100,000 population in 2003 compared to 187 national average. It had a healthy split between rural and urban family doctors with the best Rural:Urban family physician supply ratio in the country.. B.C. adopted medical school expansion which is expected to increase intake to 256 in 2007 from 128 in 2001. The number of entry-level residency positions increased from 128 in July 2003 to 180 in 2005/06 and is expected to increase to 256 by 2011/2012. The state also adopted a faster immigration process for international doctors allowing the internationally trained doctors to gain permanent resident status in six to eight months after practicing in B.C. for a minimum of nine months on a temporary work permit,- instead of up to three years previously.(22)

Discussion

A. Current and future estimated needed number of doctors in Sudan: To reach our regional standards (in the range 50-200 doctors per 100,000 people) for our current 35 million population we need 17,500-70,000 doctors, i.e. up to 3-10 times the figure available in 2004. We can divide the gap to four stages as milestones of development at 50, 100, 150, 200 doctors per 100,000 population. The population growth must be considered. The currently available plans must be revised with better ambition and more scientific revision that will be discussed by doctors of different interest and international exposure.

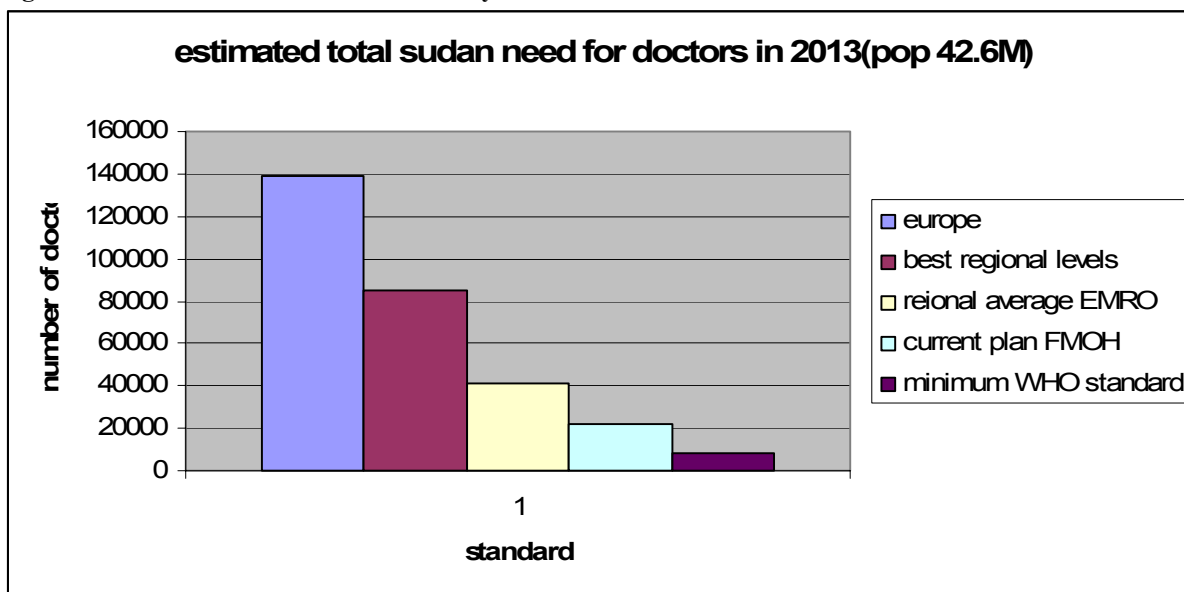
- For the first stage, there should be an urgent plan to have 17500 jobs for doctors to have doctor-population ratio of 50:100,000 (similar to Egypt).
- The second stage is to have doctor-population ratio of 96:100,000.(EMRO average)

- The third stage is to have doctor-population ratio of 150:100,000.(Syria and KSA)
- The fourth stage is to have doctor-population ratio of 200:100,000.(Jordan and UAE)

In the year 2013, we are expected to have 42.6 million population according to FMOH plan, this needs 8520 doctors to achieve the minimum acceptable ratio by the WHO, (20:100,000). We will need more than 40000 doctors to reach the

current regional standards (EMRO:96/100,000), and about139302 doctors to reach the European average (326/100,000). The current FMOH plan with expected total need of 17161 in addition to the available figure in 2002 of 5500 in the same plan would hardly bring us to a ratio of 50/ 100,000 if the effect of migration, retirement and death are all marginalized (Fig 4).

Figure -3: Doctors needed in Sudan in the year 2013:

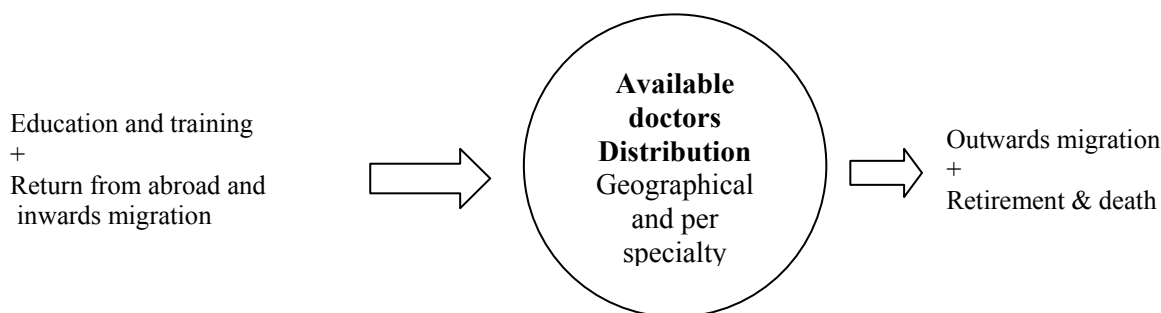


Source: the Author

To reach the proposed ratios we should consider several factors as mentioned in the

Diagram in figure-4 and discussed in the coming sessions.

Figure 4: Available doctors' equation



Source: the Author

B. Graduation and Training Capacity: To reach our optimum goal of 200/100,000 over two decades we should consider the growth of population which is around 2%.We should work hard to have a roughly estimated figure of 70-100 thousand

doctors working in the country after two decades. If every doctor will practice for 30-35 years inside the country from graduation till retirement we need an annual graduation and post graduate training of a figure in the range between 2000 to 3000 doctors as

rough estimation. Half these figures are needed to achieve a midway goal of 100/10,000. We should also consider an expected period of 5-10 years of migration for different economic or academic purposes among about one third of our graduates. USA which has doctor population-ratio of about 270/100,000 graduates annually more than 16000 doctors and have about 20,000 annual training residency intake, the gap is filled by overseas doctors after a medical assessment exam (USMLE). To have proportional figures as USA to our current population size (35Sudan/296.4USA=11.8%) we would need an annual graduation of about 1888 doctors with a bigger annual postgraduate training intake of 2360 doctors.(immigration factor is negative in our case while it has a significant positive impact in the doctors: population ratio in USA; 264/100,000). After graduation, postgraduate training should be equal to graduate numbers if not more (USA 140% currently, 110-120%future plan).

Comparison to Canadian figures with doctor population ratio of 188:100,000 in 2000, with an annual graduation of 1578. Both population and doctors numbers rose by around 5 % in 2004 to keep the ratio in 189. Proportionally, Sudan population will need growing numbers of graduates starting from more than 1700 graduates annually. The figure of medical schools intake should consider dropped students number which was found to be around 3.3% in one Canadian study.(immigration factor had negligible negative impact in the ratio in Canada 188/100,000, and the population growth is minimal in the Canadian society).

C. Specialization: Available training posts are expected to shape the future of specialty distribution. Reviewed data recommended the adoption of 50:50 or 65:35 proportion of generalist: specialist ratio. Bigger ratios are needed in earlier

stages of the plan. Generalist includes family physician (GP), general medicine, general surgery, pediatrics in addition to Obstetrics and gynecology. A Generalist-population ratio of 70-100/100,000 is recommended in USA. Training capacity of specialties should be distributed according to the estimated need according to prevalence and incidence of diseases and population distribution. A national body is expected to monitor the needs and keep updated data of human resources movement and distribution.

D. Geographical distribution: Geographical distribution can be optimized by decentralized posts and training grants and chances. Different states can have their own plans to meet their targeted doctor population ratios similar to Florida (USA) and British Columbia (Canada) examples. Significant incentives will be needed to attract doctors to remote underserved areas. This can include scaled financial allowances (e.g. four geographical scales in the range of 500-2000 US\$ monthly payment according to area, experience and specialty need)

E. Migration: Many factors govern the migration of doctors which can be classified in some studies as pull and push factors. I would discuss three of these here:

- i. Financial income is the most important factor for those moving to Gulf States where monthly payments (in US\$) are approximately in the range of 1000-2000 for non-specialized doctors, 2000-4000 for specialists and 4000-8000 for consultants. In 1995-1999, the range of monthly payment for junior doctors in Sudan was in the range of 20-40 US\$. i.e. around 2% of the salaries in the Gulf. Fortunately it is much improved since then as oil started to participate in the economic status improvement. According to 2001 act- even The President of the country and Federal Ministers monthly whole payment was only

around 1600-2000 US\$ till 2005.(basic salary 800 US\$ or less). (23)

- ii. ii- Training opportunities push doctors to go to the west, traditionally to UK, Ireland, USA & Canada. etc. In Sudan, although more than 20 medical schools were established since 1990, only one body is providing postgraduate training bringing the medical education bottleneck to an upper level.
- iii. iii-For those who have already left the country the difficulty is more complicated including the overall economic impact on lifestyle (accommodation, transportation, education & health services for their families) and professional standards(hospital structure, technologies, research...etc.). The big gap between the developed countries and our current condition in Sudan makes the decision to go back more difficult. Let alone the tight job vacancies and technical difficulties in civil service and legislation that governs recognition of qualifications and training (24).

I would recommend the following to optimize doctors migration outcome:

- 1- Urgent creation of medical vacancies: comparable to those in the basic and higher educational fields that occurred since 1989 both centrally and at states levels.
- 2- Increasing the postgraduate training capacity to 100-120% of the numbers of annually graduated doctors with more training residencies in different states with medical schools, and more generalist training.
- 3- Improving the doctors formal income to about 30-50% of their counterparts in the neighboring Gulf States. I would suggest that basic monthly payments should be kept at rates (in US\$) not less than 500-600 for non specialized doctors, 1000-1200 for young specialists and 2000-3000 for consultants and experts.

- 4- Promoting the links with Sudanese doctors abroad to encourage their input in the development of health system and raising profession standards. Besides , it would be wise manage migration by allowing unpaid renewable leaves for 5-10 years periods while keeping job numbers and continuous pension , social and health insurance payments.(Syria and Egypt workers in the Gulf examples).

F. Doctor payment: How much can our economy afford: The need for better doctors per population ratios and the need to control migration for economic purposes needs an optimized equation between the number of posts and the monthly payment amount. The economic indicators comparison discussed earlier showed that there is significant improvement in economic status 2000-2004. We expect our per capita income to be doubled between 2003-2007. It was 5% of KSA citizens. It might now be equal or better than 10% of those old figures in KSA. Accordingly, in a very rough and simplified estimation current economy can afford to posts that would bring the average to one third that of KSA doctors: population ratio at 30% of average monthly payments in KSA. That means we can currently afford 17500 posts

Conclusion and recommendations:

- There is real need for an accurate updated electronic database for all Sudanese doctors who wish to practice medicine in the country in any stage of their career with periodic revision (e.g. three yearly). This need to be governed and utilized by a national body that coordinates doctors graduation, training, distribution & migration trends.
- We should plan to reach the target of 200 doctors per 100,000 population as an optimum future target. This can be divided in 4 milestones.

- Annual graduation and training intake would be expected to lie in the range of 2000-3000 doctors to maintain a ratio of 200/100,000 doctors: population ratio in the future for the growing population and the high migration turnover for economic or professional causes. This needs more precise estimation studies.
- Training posts should be planned in numbers equal or more than graduates figures and that should consider the planned standard targets for each specialty.
- We should encourage 55-65 % of training residencies for generalist training. This would need more bodies to be involved in training centrally and peripherally.
- We should aim to achieve an urgent 3-5 years target of 50 doctors per 100,000 population which would mean 17500 doctors all over the country.
- Our country improving economic status would afford these figures in monthly payments that is at least about 30% of their counterparts in the Gulf countries.
- To achieve better geographical distribution, we should adopt significant financial and professional incentives in 3-4 geographical scales of the country. Besides, new posts should be allocated to different states proportional to their population.
- For underserved areas allowance escalation Sudan states can be stratified for 3-5 geographical zones of salary scales and each state can have 2-3 strata within its scale.
- States should be encouraged to have their own targets and plans and to adopt their own initiatives which should be supported by central government and international organizations.
- There is a bad need to have at least double the doctors figures in nursing personnel and a

similar study in this field is highly recommended.

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