

Influence of the US President's Emergency Plan for AIDS Relief (PEPFAR) on career choices and emigration of health-profession graduates from a Ugandan medical school: a cross-sectional study

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ABSTRACT

Objective: The purpose of this study was to determine the current work distribution of health professionals from a public Ugandan medical school in a period of major donor funding for HIV programmes. We explore the hypothesis that programmes initiated under unprecedented health investments from the US President's Emergency Plan for AIDS Relief have possibly facilitated the drain of healthcare workers from the public-health system of countries like Uganda.

Design: Cross-sectional study conducted between January and December 2010 to survey graduates, using in-person, phone or online surveys using email and social networks. Logistic regression analysis was applied to determine ORs for association between predictors and outcomes.

Setting: Located rurally, Mbarara University of Science and Technology (MUST) is one of three government supported medical schools in Uganda.

Participants: Graduates who completed a health-related degree at MUST.

Main outcome measure: Location of health profession graduates (Uganda or abroad) and main field of current job (HIV-related non-governmental organisation (NGO) or others).

Results: We interviewed 85.4% (n=796) of all MUST alumni since the university opened in 1989. 78% (n=618) were physicians and 12% (n=94) of graduates worked outside Uganda. Over 50% (n=383) of graduates worked for an HIV-related NGO whether in Uganda or abroad. Graduates receiving their degree after 2005, when large HIV programmes started, were less likely to leave the country, OR=0.24 (95% CI 0.1 to 0.59) but were more likely to work for an HIV-related NGO, OR=1.53 (95% CI 1.06 to 2.23).

Conclusions: A majority of health professionals surveyed work for an HIV-related NGO. The increase in resources and investment in HIV-treatment capacity is temporally associated with retention of medical providers in Uganda. Donor funds should be channelled to develop and retain healthcare workers in

ARTICLE SUMMARY

Article focus

- The distribution of health workers and their migration patterns from sub-Saharan African countries in the era of large-scale donor funding for HIV has not been adequately studied. This paper tracks the career path of graduates of a government supported Ugandan medical school.

Key message

- The majority of health professionals from a Ugandan medical school work for an HIV-related non-governmental organisation. The initiation of large donor supported HIV programmes is temporally associated with lower migration rates.

Strengths and limitations of this study

- The study uses empirical data to show the work distribution and migration patterns from an under-resourced rural Ugandan medical school. While the medical school faces challenges similar to many sub-Saharan African Medical Schools, it may not be representative of all medical school settings in sub-Saharan Africa.

disciplines other than HIV and broaden the healthcare workforce to other areas.

INTRODUCTION

Africa bears almost 25% of the global disease burden but less than 5% of the global health workforce¹ and 67% of the global HIV/AIDS disease burden.² Human resources for health constitute a major component of the health system, and are critical in the delivery of care including HIV/AIDS. However, many countries in sub-Saharan Africa suffer a

severe shortage of healthcare workers. Uganda has been ranked among 57 countries in the world that have a 'critical shortage' of health service providers.¹ Most of the countries that suffer a critical shortage of health workers also have a high burden of HIV.

The US President's Emergency Plan for AIDS Relief (PEPFAR) is the US Government initiative to help save the lives of those suffering from HIV/AIDS around the world.³ The programme's aim is to expand access to antiretroviral treatment for the millions of HIV-positive patients in need. Launched in 2005, PEPFAR initially targeted 15 focus countries, including Uganda. Augmented by funding from the Global Fund for AIDS, Tuberculosis and Malaria (GFATM) and other sources, PEPFAR supported an explosion of non-governmental organisations (NGOs) specialising in the delivery of HIV care and treatment in the country. These NGOs often offer better working conditions compared with government jobs.^{4 5} For example, opportunities with NGOs include higher salaries, better working conditions or personal benefits. Described as internal brain drain, these opportunities disproportionately attract healthcare workers from the public sector to the private sector, creating a shortage of health workers⁶ necessary to deliver critical services in the public-health system. For instance, the WHO mortality statistics of 2008⁷ show that the proportionate mortality rates for HIV/AIDS in Uganda were 8% and 34.4% among 0–14 and 15–59-year-olds, respectively, but the proportion of health workers whose primary job is provision of HIV-related services is unknown but thought to be disproportionately large compared with the disease burden. The areas that suffer as a result of this 'brain drain' include primary healthcare such as for maternal and child health or vaccination, as well as in tertiary facility services such as surgery or intensive care.

Shortages of health workers are also further compounded by a high attrition rate of health workers from their native countries to seek employment abroad, known as external brain drain. An estimated US\$ 2 billion have been lost from investment in training doctors in sub-Saharan Africa who are currently working abroad.⁸ Uganda is one of the countries in Africa that suffers significant health-worker shortage crisis with 12 doctors/100 000 compared with about 240/100 000 in the UK.⁹ Several studies have explained the medical graduate factors that predict working in rural areas^{10–14} but few have addressed the effect of donor funding for HIV on distribution of health workers using empirical data. Therefore, the purpose of this study was to determine the occurrence of three forms of 'brain drain', namely the outmigration, public versus private sector and disproportionate career focus on HIV among Ugandan health workers in the era of major donor funding for HIV by tracking graduates from a public Ugandan medical school in a case study. We explore the hypothesis that programmes initiated under unprecedented health investments from PEPFAR in 2005 have possibly facilitated the drain of healthcare workers from the public-health system of countries like Uganda.

METHODOLOGY

Study setting

Mbarara University of Science and Technology (MUST) is a government institution located 250 km southwest of the capital, Kampala. It was established in 1989 to address the deficit of health workers in Uganda and by the start of 2010, 932 medical alumni had graduated from the University. The medical school offers a community-based medical education curriculum and awards degree courses in medicine, medical laboratory science, nursing and pharmacy. Applicants to medical school typically matriculate after completing high school. The medical degree training lasts 5 years and all other courses last 4 years. On completion of the medicine, pharmacy or nursing degree, the trainees are required to undertake an additional year for internship training before the graduate can work independently. For the physicians, a Master's degree is a form of specialisation and is comparable to a residency programme in the USA.

Eligibility criteria

The participants were alumni of MUST's Faculty of Medicine which includes graduates from medicine, nursing, pharmacy and medical laboratory sciences. The alumni were eligible to participate if they had completed their degree at MUST at least 1 year prior to the interview. The study excluded graduates since January 2010 as most of them were either undergoing or waiting to start their internship training at the time of this survey.

Data collection

Between January and December 2010, we conducted a cross-sectional survey among the alumni of MUST who had graduated since the university's start in 1989. We obtained the annual lists of graduates from the Academic Registrar's office. First, we contacted the alumni on these lists whose phones or emails were easily available. These graduates provided additional contacts for their classmates. The process was repeated using the social network theory similar to that described by Dovlo and Nyonator¹⁵ until all contacts on a class list were obtained. Each individual contacted was either interviewed or provided with an online link via email to a structured questionnaire. Interviews lasted approximately 20 min and were conducted face-to-face or over the telephone. The questionnaire was also made generally available electronically online on social networking websites.

We collected data on demographics, postgraduate training since degree completion at MUST, current field of work (HIV-specific NGO or others) and geographic location (abroad or in Uganda). We also asked about factors that prompted graduates to leave or stay in the country ('push' and 'pull' factors, respectively). The questionnaire included a choice list of possible reasons for migration and respondents were allowed to select all the reasons that applied to them. Death of an alumnus

was determined by information from a classmate and death was confirmed when information was obtained independently from at least two classmates.

The study was approved by the Institutional Review Board at MUST and the Uganda National Council of Science and Technology.

Data analysis

We calculated the percentages for categorical variables such as gender, degrees earned, work location at an HIV-related NGO and working outside Uganda. We performed logistic regression analysis to determine the ORs for the association between predictor variables and working for an HIV-related NGO or being outside the country. We compared graduates of before and after 2005, when the PEPFAR and other large HIV-donor programmes started, to determine whether graduates after 2005 were more likely to work for HIV-related NGOs. We reported the crude and adjusted ORs (and 95% CIs) as the measures of effect for these associations. All analyses were performed using STATA V.11 (College Station, Texas, USA).

RESULTS

Baseline characteristics

By January 2010, a total of 932 alumni had graduated from MUST Medical School. Seven hundred and ninety-six graduates (85.4%) responded to our questionnaire. Twelve (1.3%) of the 932 alumni had died since graduation. One hundred and five graduates or 13.2% responded online and they were more likely to be outside Uganda compared with those who were interviewed (47% vs 6.5%, respectively, $p < 0.001$). The majority of respondents were male at 527 (66.9%), as shown in table 1. The largest number of graduates in the cohort was between ages 25 and 29.9 (30.5%), followed by 26.2% of graduates between ages 30 and 34.9 years. A large majority (78.2%; $n=618$) of respondents were doctors. At least 33% ($n=249$) of all respondents had earned a Master's degree after their first degree at MUST. The mean number of years since graduation was 6.9 years (median 6 and IQR of 7 years).

Emigration rates

Overall, 94 (12%) respondents had left the country at the time of their interview. The most frequented destination countries for these alumni were the USA (24.5%, $n=23$), the UK (17%, $n=16$), Southern Sudan (13.8%, $n=13$) and South Africa (5.3%, $n=5$). Seventy-four of the 94 alumni that had left the country (78.7%) answered whether they planned to return to Uganda soon. Thirty-eight (51.3%) reported that they planned to return soon to work in Uganda while the rest did not have plans to return to Uganda soon.

Table 1 Demographic characteristics of health-professional graduates from Mbarara University of Science and Technology

Characteristics	N (%)
First degree at MUST for respondents	
Medicine	618 (78.2)
Nursing	88 (11.1)
Medical laboratory	68 (8.6)
Pharmacy	22 (2.1)
Total	796
Gender	
Female	261 (33.1)
Male	527 (66.9)
Age categories (years)	
Less than 25	14 (1.8)
25–29.9	241 (30.5)
30–34.9	207 (26.2)
35–39.9	136 (17.2)
40 and above	96 (12.2)
Did not answer	96 (12.2)
Median number of children (IQR)	1 (2)
Median years since graduation (IQR)	6 (7)
Marital status	
Single	276 (36.6)
Living with partner	35 (4.6)
Married	440 (58.3)
Divorced/widowed	4 (0.5)
Current highest qualification	
Bachelor's	488 (65.5)
Master's	249 (33.4)
PhD	5 (0.7)
Other	3 (0.4)
Year of graduation	
2005 or before	455 (58.3)
After 2005	325 (41.7)

Source: a 2010 survey of 796 graduates of Uganda's MUST since 1989. MUST, Mbarara University of Science and Technology.

Work settings of alumni

The majority of alumni (65%; $n=510$) worked for an NGO or a private organisation. At least 50% of the alumni were working specifically for an HIV-related NGO (table 2). Fifteen per cent of respondents ($n=119$) reported that they did not spend any time at all on HIV-related activities versus 42% of respondents ($n=314$) who reported spending at least 50% of their time on HIV-related work. Of note, 33.2% of the respondents currently working in Uganda in the country reported their intention to leave Uganda in the near future if opportunities presented themselves.

Reasons for migration

The most common 'push' factors for leaving Uganda were: insufficient pay (96.9%), better employment opportunity (95.1%), insufficient training opportunities (88.6%), poor infrastructure (86.1%) and insufficient technical or diagnostic facility (81.3%). The most commonly cited 'pull' factors are shown in table 3 and were:

Table 2 Employment characteristics of health-professional graduates from Mbarara University of Science and Technology

Characteristic	N (%)
Current employment type	
Government	270 (34.6)
NGO or private	510 (65.4)
HIV-related NGO	383 (50.7)
Effort dedicated to HIV	
None	119 (15.8)
Less than 50%	317 (42.2)
At least 50%	314 (42.0)
Donor programme not HIV related	169 (22.5)
Emigration status	
Currently in Uganda	687 (87.9)
Plan to leave country	228 (33.2)
Internship in Uganda	694 (90.9)

Source: a 2010 survey of 796 graduates of Uganda's MUST since 1989.

MUST, Mbarara University of Science and Technology; NGO, non-governmental organisation.

the desire to stay with an extended family (56.9%), raising children in an indigenous culture (53.2%) and a desire to live in an indigenous culture (44.1%).

Predictors of migration and work at an HIV-related NGO

At least 15% of the health professionals who graduated in or before 2005 were living outside the country compared with 7.8% among those graduating after 2005 (χ^2 1 degree of freedom=9.2, crude OR=0.46, $p=0.002$). Graduates after 2005 were less likely to leave the country compared with those who graduated before the same year even after adjusting for gender and age (adjusted OR=0.24 95% CI

0.10 to 0.59). Also, graduates with a Master's and/or PhD degree were more likely to leave the country (adjusted OR=3.1, 95% CI 1.54 to 6.49) compared with those without these advanced degrees. Gender and course undertaken at MUST were not significant predictors of migration (table 4).

Graduates after 2005 were 50% more likely to work at an HIV-related NGO compared with those graduating before the same year (adjusted OR=1.53, 95% CI 1.06 to 2.23). Health professionals in the Medical Laboratory sciences were more likely to work at these NGOs compared with others, and graduates with a Master's and/or PhD degree were less likely to work for HIV-related NGOs (adjusted OR=0.58, 95% CI 0.41 to 0.83), but women were more likely to work at the NGOs compared with men.

DISCUSSION

In a survey of 796 graduates of a rural Ugandan medical school, we found that 12% ($n=94$) emigrated over an 18-year time period. Ninety-four alumni worked outside Uganda. The majority of respondents who remained in Uganda worked for an HIV-related NGO. Graduates after 2005 were less likely to leave the country compared with those graduating earlier. Insufficient pay and better employment opportunities were the strongest push factors cited by all respondents.

The rate of emigration from Uganda, a cumulative 12% over the 18-year lifespan of the MUST medical school, is lower than that implied by anecdotal reports, which suggest that a significant proportion of Ugandan physicians work outside the country. Very few studies have provided empirical data on the migration of health workers at the country level. One such study, however,

Table 3 Self-reported belief about push and pull factors among health-professional graduates ($n=796$) of Uganda's MUST, 2010

	Push factor	N (%) of respondents who believe factor contributes highly to migration
1	Insufficient pay	738 (96.9)
2	Better employment opportunity	722 (95.1)
3	Insufficient training opportunities	674 (88.6)
4	Poor infrastructure	655 (86.1)
5	Insufficient technical/diagnostic facility	616 (81.3)
6	Insufficient access/supply of medication	587 (77.3)
7	Personal safety	556 (73.2)
8	Family previously emigrated	493 (65.1)
9	Poor local educational opportunities for children	464 (61.4)
10	Greater public health impact	370 (49.1)
11	High Patient volume	269 (48.6)
	Pull factor	N (%) of respondents who believe factor contributes highly to staying in their home country
1	Extended family	432 (56.9)
2	Raising children in indigenous culture	402 (53.2)
3	Living in indigenous culture	335 (44.1)

Source: a 2010 survey of 796 graduates of Uganda's MUST since 1989. MUST, Mbarara University of Science and Technology.

Table 4 Factors associated with work outside Uganda or at an HIV-related NGO among MUST alumni, 2010

Predictor	OR and 95% CI of outcome variable			
	Outside Uganda		Work at HIV-related NGO	
	Crude	Adjusted*	Crude	Adjusted*
Year of graduation				
Graduation in or before 2005	1.0	1.0	1.0	1.0
Graduation after 2005	0.46 (0.29 to 0.76)	0.24 (0.10 to 0.59)	1.75 (1.24 to 2.48)	1.53 (1.06 to 2.23)
Internship				
Internship in Uganda	1.0	1.0	1.0	1.0
No internship in Uganda	0.68 (0.27 to 1.7)	0.48 (0.11 to 2.07)	2.13 (1.17 to 3.88)	1.99 (1.08 to 3.68)
Gender				
Male	1.0	1.0	1.0	1.0
Female	1.35 (0.87 to 2.11)	1.01 (0.62 to 1.65)	1.4 (0.98 to 1.99)	1.52 (1.04 to 2.21)
Degree at MUST				
Medicine	1.0	1.0	1.0	1.0
Nursing	0.58 (0.25 to 1.29)	0.42 (0.09 to 1.85)	0.82 (0.46 to 1.42)	0.62 (0.32 to 1.16)
Medical laboratory	0.19 (0.04 to 0.81)	0.21 (0.03 to 1.61)	2.23 (1.22 to 4.06)	1.96 (1.06 to 3.62)
Pharmacy†	–	–	1.62 (0.38 to 6.87)	0.85 (0.16 to 4.33)
Postgraduate training				
None	1.0	1.0	1.0	1.0
Master's and/or PhD	3.7 (2.3 to 5.9)	3.1 (1.54 to 6.49)	0.53 (0.38 to 0.75)	0.58 (0.41 to 0.83)

*Adjusted for gender and age.

†No pharmacy graduate in the survey was out of the country.

MUST, Mbarara University of Science and Technology; NGO, non-governmental organisation.

tracked medical graduates from 1984 from Makerere University medical school, the oldest in Uganda, and found that 30% of the surviving physicians were working abroad.¹⁶ The political instability during the 1980s may partly explain the outward migration. The country has experienced relative political stability since then.

The most common reasons cited for leaving the country were insufficient pay, search for better employment opportunities and insufficient training opportunities at home. These findings are consistent with a recent review of data on healthcare worker migration from sub-Saharan Africa, which showed the same reasons as being responsible for migration.¹⁷ Even more recently, higher salaries and better training abroad were cited as the reasons for wishing to work abroad among medical students in Pakistan.¹⁸

As expected, the USA and the UK were the top destinations for the alumni. Our data are in agreement with other studies that have profiled the career path of medical graduates from low resource countries, such as the recent study from Nepal.¹¹ In the USA, Canada and the UK, foreign medical graduates make up to 28% of the physicians' workforce and a majority of these are from lower income countries¹⁹ such as Uganda. In our study, new destinations such as South Sudan emerged as one of the preferred work sites for the medical graduates, highlighting the emerging role of the regional migration of health workers. South Sudan has experienced an increase in multinational donor funding for the health sector with disbursements increasing from US\$45.4 million in 2011 to US\$55.5 million in 2012,²⁰ which very likely explains the migration of Ugandan physicians to South Sudan.

Multinational funding seems to be associated with retaining MUST graduates in Uganda. Most MUST graduates remain in Uganda and work for an HIV-related NGO, and the likelihood of emigrating declined after the introduction of PEPFAR funding for HIV/AIDS treatment in Uganda. The HIV-based NGOs or research organisations very likely offered increased and more attractive opportunities for work. A study by Brugha *et al*⁴ from Zambia supports this premise. The qualitative study concluded that PEPFAR and other donor-supported programmes offer better salaries, which may be responsible for migration of health workers from the public sector to non-government facilities.⁴ Additional data on policy analysis from Zambia also show that global health initiatives (GHI), such as World Bank-supported, GFATM-supported and PEPFAR-supported programmes, may be responsible for depletion of human resources from the public sector by hiring these workers for the GHI funded projects.²¹ In our study, the respondents supported the importance of pay and the largest majority cited it as the most important push factor.

Our study offers empirical data from a well-defined population on the distribution of the health workforce in the era of multinational HIV funding. Few studies have collected data to evaluate the potential effect that the multinational HIV programmes may have had on the distribution of the health workforce. Our findings provide preliminary evidence of the potential impact that donor funding has on health workforce distribution where increased investment in HIV seems to correlate with a workforce weighted towards HIV services. Understanding this distribution and its potential driver may provide answers to questions that are critical to

addressing workforce challenges to meet disease burden more broadly.

Our findings show that increased funding streams in HIV/AIDS may have helped improve retention of indigenous healthcare workers. Additionally, HIV/AIDS funding has been effectively invested to create broader health system gains. For example, in Haiti, HIV/AIDS funding helped expand primary care services.²² In recognition of the potential wider benefits of HIV/AIDS-targeted funding, we recommend that HIV donor funds should be channelled to attract health workers into other disease areas as well in order to more widely broaden healthcare capacity. Funding opportunities could include scholarships for providing care for non-communicable diseases or maternal-child health similar to existing scholarships provided for HIV/AIDS care.²³ Additionally, such funding recognises and takes advantage of the wide reach of HIV across the spectrum of disease conditions and vice versa. For example, antiretroviral therapy is now noted to cause increased preterm births²⁴ and adversely impact risk for cardiovascular disease.²⁵ Also, the faculty should encourage other career choices among their students as evidence indicates that medical schools can be influential in making career choices.²⁶

Our study has several limitations. First, studies on predictors of the distribution of medical graduates have shown that gender and rural upbringing are significant predictors of placement of work.^{11 12} In our study, gender was a significant predictor of working at an HIV NGO. However, we were not able to collect data on the other traditional factors that are well known for migration such as rural versus urban upbringing.

Second, this study was conducted in one medical school in Uganda, which may not be representative of other Ugandan medical schools or medical schools in other resource-limited countries in Africa. We conducted this survey as a case study, representative of where graduates of a Ugandan medical school might be working professionally. Uganda has five medical schools and, except for Mbarara and Makerere, all the others were started within the past 10 years. Makerere, based in Kampala, is more than 80 years old and Mbarara is 24 years; Mbarara provides a median age sample for medical schools in Uganda. This study should be repeated in other medical schools in Uganda and other African countries to obtain a continent-wide picture of healthcare worker migration.

The third potential limitation was that we were able to reach only 85% of potential respondents. Anecdotal evidence provided by classmates suggested that most of the non-responding graduates were more likely to live abroad. We were not able to independently establish their countries of destination. The non-response may have led to an underestimate of the proportion of the alumni abroad. Another weakness was that we were not able to obtain the date of departure from the country; hence, we were not able to calculate the incidence rate for migration.

Lastly, the data also showed that a significant proportion of graduates plan to leave the country if and when

opportunities present themselves. Previous surveys have also shown high intent to migrate among Ugandan health workers.²⁷ The intention to migrate among many in our sample may suggest that the current retention of health workers is tenuous and may shift towards higher rates of migration in the future. Future studies should combine more medical schools within the country or even across countries in Africa to obtain better representation.

In conclusion, we found a temporal trend in the migration of health workers from a Ugandan medical school in relationship to the inception of large-scale HIV programmes. More studies should be performed to determine the effect of preferential employment in the HIV-related NGOs on the delivery of services for other disease conditions.

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Contributors FB participated in the design of the study, data collection, analysis, interpretation of results and drafting of the first version of the manuscript. LT participated in data collection, data entry, analysis and revision of the first draft of the manuscript. MZ participated in data collection, data entry and contributed to the first draft. VBK participated in the design of the study, drafting of the first version and revision of the manuscript. DRB participated in the design of the study, data analysis, interpretation of results and revision of the manuscript. All authors have read and approved the final manuscript.

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