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The Human and Financial Resource Requirements for Scaling Up HIV/AIDS Services in Ethiopia

February 2005

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Abstract

Ethiopia is currently one of the countries most seriously affected by HIV/AIDS, with the sixth highest number of infections in the world. To combat this epidemic, the government of Ethiopia has launched a national HIV/AIDS program focused on decreasing the vulnerability of individuals and communities to the disease, providing care and support for people living with HIV/AIDS, and reducing the adverse socioeconomic consequences of the epidemic.

As the country scales up HIV/AIDS services, increased attention is focused on identifying constraints to program expansion. One of the most important constraints is that of human resources, though this issue has received little attention nationally.

Recent data suggest that Ethiopia is facing a critical shortage of human resources to deliver even basic health services. In 1999, the physician to population ratio in Ethiopia was 1:48,000, one of the lowest in the world. The current (2003) ratio of 1:34,000 is still more than five times lower than the sub-Saharan Africa average and that of nurses (1:4,900) is more than four times lower. It is envisioned that significant numbers of health care personnel will be needed to provide antiretroviral treatment and other AIDS-related medical services since more than half of all hospital beds are occupied by AIDS patients. It is vital to point out that expanding HIV/AIDS services and shifting resources towards achieving HIV/AIDS targets may have unintended effects on other essential programs such as malaria, immunization, and maternal and child health.

Developing and implementing comprehensive capacity-development measures are not likely to be accomplished cheaply. Yet, this expansion of human capacity will be critical if the goals of the President's Emergency Plan for AIDS Relief, the Global Fund to Fight AIDS, Tuberculosis and Malaria, the World Health Organization's 3 by 5 Initiative, and Millennium Development Goals are to be achieved.

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Acronyms

AIDS	Acquired Immune Deficiency Syndrome
ANC	Antenatal Care
ART	Antiretroviral Therapy
ARV	Antiretroviral
CDC	U.S. Centers for Disease Control and Prevention
DACA	Drug Administration and Control Authority
FTE	Full-Time Equivalent
FGOE	Federal Government of Ethiopia
FMOH	Federal Ministry of Health
GFATM	Global Fund for AIDS, TB & Malaria
HAART	Highly Active Antiretroviral Therapy
HAPCO	HIV/AIDS Prevention and Control Office
HIV	Human Immunodeficiency Virus
HR	Human Resources
M&E	Monitoring and Evaluation
MGD	Millennium Development Goals
NACP	National AIDS Control Programme
NFV	Nefinavir
NGO	Nongovernmental Organization
NNRTI	Non-Nucleoside Reverse Transcriptase Inhibitor
NRTI	Nucleoside Reverse Transcriptase Inhibitor
OECD	Organization for Economic Cooperation and Development
OI	Opportunistic Infection
PEPFAR	President's Emergency Plan for AIDS Relief
PHCU	Primary Health Care Units
PHR<i>plus</i>	Partners for Health Reform <i>plus</i>
PI	Protease Inhibitor
PLWHA	People Living With HIV/AIDS
PMTCT	Prevention of Mother-to-Child Transmission
UNAIDS	Joint United Nations Programme on HIV/AIDS
UNDP	United Nations Development Program
USAID	United States Agency for International Development
VCT	Voluntary Counseling and Testing
WHO	World Health Organization

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Executive Summary

Ethiopia is currently one of the countries most seriously affected by HIV/AIDS, with the sixth highest number of infections in the world (United States Agency for International Development [USAID] 2003). According to a recent report by the Joint United Nations Programme on HIV/AIDS (UNAIDS), the national adult HIV prevalence rate is estimated at 4.4 percent. Approximately 1.5 million people are living with HIV in Ethiopia, and, of this total, about 100,000 are children (UNAIDS 2004). UNAIDS estimated 120,000 adults and child deaths occurred in the country in 2003. Estimates from the same year indicate the number of children orphaned by AIDS to total approximately 720,000 (UNAIDS 2004). The epidemic is aggravated by the fact that Ethiopia is ranked one of the poorest countries in the world, with almost half of the population living in poverty (Global Fund to Fight AIDS, Tuberculosis and Malaria [Global Fund] 2002) and a gross domestic product per capita in 2003 estimated at \$90 (United Nations Development Programme [UNDP] 2004).

In response to the severity of the epidemic, initiatives such as the President's Emergency Plan for AIDS Relief (PEPFAR), the Global Fund, the World Health Organization (WHO) 3 by 5 Initiative, World Bank Multi-country AIDS Programs, and Millennium Development Goals (MDGs) are seriously committed to expanding HIV/AIDS services. It is evident that the availability of human resources (HR) is crucial to the scale-up of key HIV/AIDS interventions. However, Ethiopia has a critical shortage of human resources to deliver even basic health services. In 1999, the physician to population ratio in Ethiopia was 1:48,000, the lowest in the world. The current (2003) ratio of 1:34,000 is still more than five times lower than the sub-Saharan Africa average and that of nurses (1:4,900) is more than four times lower (WHO 2004). It is vital to point out that, as HIV/AIDS services are expanded and resources shifted towards achieving HIV/AIDS targets, this may in fact have negative spin-off effects on other essential programs such as malaria, immunization, and maternal and child health.

The aim of this assessment was to estimate the financial and HR requirements for the expanding HIV/AIDS services in the country. Towards this aim, the authors estimated (a) the available human resources required to reach the targets of major HIV/AIDS initiatives such as PEPFAR, the Global Fund, and the WHO 3 by 5 Initiative, and (b) the financial costs of providing highly active antiretroviral therapy (HAART), prevention of mother-to-child transmission, and voluntary testing and counseling services.

The findings of the assessment highlight four key issues. First, there is already a clear shortage of human resources for health. The current doctor-to-patient and nurse-to-patient ratios are inadequate for the provision of basic health care – in fact, the doctor-to-patient ratio of 1:34,000 is less than a third of the WHO-mandated minimum of 1:10,000 for the provision of quality health care. Given this existing shortage of key human resources, the health care system is already strained and may not be well positioned to respond to the rapid scale-up of HIV/AIDS services. Of 77 HIV/AIDS staff observed during the assessment, only six (8 percent) work exclusively on HIV/AIDS services, raising concern over the number of trained staff dedicated to provide HIV/AIDS services.

Second, the severity of the HR shortage varies widely among the different staff cadres. Doctors represent the greatest constraint to scale-up of HIV/AIDS services, followed by laboratory technicians and pharmacists. With an attrition rate among public sector physicians estimated at 9.6 percent per year, the number of doctors moving to higher-paying jobs in the private sector and abroad severely constrains national efforts to increase access to basic health care let alone to scale up the service delivery model for HAART, which requires large numbers of them to provide HIV/AIDS care. Attrition rates for nurses and paramedics (lab technicians, pharmacists, etc.), however, are low at 3.2 percent and 6.3 percent respectively.

Third, the FMOH antiretroviral therapy (ART) staffing model of two doctors, two nurses, one pharmacist, and one lab technician is highly oriented towards doctors in comparison to models in other countries. This puts additional stress on Ethiopia's already extremely limited number of doctors. Elsewhere in the world, recent trends have shifted towards less doctor-intensive models that delegate certain responsibilities to nurses, clinical officers, assistant medical doctors, and others (and in some cases from nurses to extension workers). Adopting this type of model would allow the limited number of doctors to facilitate treatment for a larger number of patients.

Finally, it is critical to point out that the costs of HAART per patient per year are high (\$705). Currently, more than 96 percent of the total cost (\$678) is borne by the patient. In a country where the annual income of the average individual is \$90 (UNDP 2004) and where over 60 percent of the population lives under the poverty line, HIV/AIDS services are unaffordable for the vast majority of the population. Reports from health staff indicate that fewer than 10 percent of patients testing positive for HIV/AIDS can afford to pay for antiretroviral (ARV) drugs (Personal Interview, St. Paul's Hospital Staff 2004). While Ethiopia has an elaborate system of fee waivers and exemptions for health services, given current government policy, these are unlikely to apply to HIV/AIDS services. However, U.S. government officials recently announced that ARV drugs under PEPFAR will be offered free-of-charge in Ethiopia (PLUSNEWS 2004), suggesting a possible way to alleviate financial constraints. It should be kept in mind, however, that continued donor support will be required to sustain patients placed on ART under PEPFAR beyond 2008.

To allow Ethiopia to achieve major targets in its the National Strategic Plan as well as PEPFAR, Global Fund, WHO 3 by 5, and MDG targets for HIV/AIDS, the authors make four main recommendations:

- ▲ First, the Federal Government of Ethiopia (FGOE) should take a strong leadership role in addressing the human capacity issue. The issue should be high on the national agenda, and active dialogue and coordination on practical solutions should be initiated with development partners including USAID, the United States Centers for Disease Control and Prevention, the World Bank, WHO, and other bilateral agencies.
- ▲ Second, the FGOE in collaboration with development partners should consider implementing an alternative ART staffing pattern. Under a "nurse-intensive" staffing scenario, HIV/AIDS services could be scaled up without depleting the number of doctors or nurses available for other basic health services.
- ▲ Third, over the long run, the FGOE should consider asking partners to supplement salaries for public sector health workers to reduce attrition rates. Public sector health staff wages are one-third their private sector equivalents and less than 10 percent those of Organization for Economic Cooperation and Development (OECD) countries.

- ▲ Fourth, measures should be taken to reduce patient out-of-pocket expenditures on HIV/AIDS services (HAART drugs, screening, confirmation and monitoring tests), which are extremely high and not currently subject to government subsidies. Furthermore, the federal government should engage in intensive negotiations with local and international pharmaceutical companies on further reducing prices for ARV drugs (which are significantly higher than prices in neighboring countries) or consider bulk purchase of drugs from one pharmaceutical company.

1. Introduction

Ethiopia is ranked as one of the poorest countries in the world (Global Fund to Fight AIDS, Tuberculosis and Malaria [Global Fund] 2002). Access to health care is severely constrained, and 75 percent of the population suffers from some type of communicable disease and malnutrition (Mitike, Lemma, Berhane, et al. 2002). The Joint United Nations Programme on HIV/AIDS (UNAIDS) estimated the country's population in 2003 to be 72.4 million (UNAIDS 2004), with almost half of the population living in poverty (Global Fund 2002), and the gross domestic product per capita in 2003 to be \$90 (United Nations Development Programme [UNDP] 2004).

With an adult HIV prevalence rate of more than 4.4 percent (UNAIDS 2004), the country ranks sixth in number of infections in the world (United States Agency for International Development [USAID] 2003). To combat this epidemic, the Federal Government of Ethiopia (FGOE) has launched a national HIV/AIDS program focused on decreasing the vulnerability of individuals and communities to the disease, providing care and support for people living with HIV/AIDS (PLWHA), and reducing the adverse socioeconomic consequences of the epidemic.

As Ethiopia continues to scale up HIV/AIDS services, increased attention is being focused on identifying constraints to program expansion. One of the most important constraints is that of human resources (HR), though this issue has received little attention nationally. Several studies of human capacity development¹ in sub-Saharan Africa indicate that there are not enough counselors, social workers, doctors, nurses, and laboratory technicians to serve the overwhelming and increasing population that is in need of antiretroviral therapy (ART), prevention of mother-to-child transmission (PMTCT), and voluntary testing and counseling (VCT) services.

The chronic HR shortage is extremely serious in Ethiopia. With more than half of all hospital beds occupied by AIDS patients (Strategic Framework 2001), it is envisioned that significant numbers of health care personnel will be needed to provide ART and other AIDS-related medical services. Furthermore, it is likely that the supply of health care staff will need to be further expanded by bringing in alternative health care workers such as lay counselors and community health workers. Experience from other countries has shown that developing and implementing comprehensive capacity-development measures are not likely to be accomplished cheaply. Yet this expansion of human capacity will be critical if the goals of the President's Emergency Plan for AIDS Relief (PEPFAR), the Global Fund, the World Health Organization (WHO) 3 by 5 Initiative, and Millennium Development Goals (MDGs) are to be achieved.

¹ Human capacity development is defined as the development and strengthening of the ability to lead, plan, implement, and monitor and evaluate expanded HIV/AIDS prevention, care, and treatment programs.

2. Background

Ethiopia is currently one of the countries most seriously affected by HIV/AIDS. As noted above it ranks sixth in the world in number of HIV infections (USAID 2003). The current national adult (15–49) HIV-prevalence estimate from sentinel surveillance sites is 4.4 percent. Approximately 1.5 million people living with HIV/AIDS, 120,000 of whom are children (UNAIDS 2004). UNAIDS also estimates 120,000 adult and child deaths from AIDS in Ethiopia in 2003. Estimates from the same year indicate that the number of children orphaned by AIDS to total as high as 720,000 (UNAIDS 2004).

Heterosexual sexual transmission is responsible for most infections in Ethiopia, with the highest infection rates concentrated in females aged 15–24 years in urban areas (15 percent prevalence 2001/2002) (UNAIDS 2003). The 2002 Behavioral Surveillance Survey by Mitike, Lemma, Berhane, et al. indicates that, while knowledge of sexual transmission is widespread (98 percent), use of safe practices is low (<50 percent condom use with non-regular partner). In addition, knowledge of HIV/AIDS, including its transmission and prevention, is thought to be lower among women than men (Garbus 2003). Mother-to-child transmission contributes the second highest number of new HIV infections each year – almost 20 percent of estimated cases – a problem that may be fueled by high fertility and a tradition of breastfeeding.

In response to the epidemic, Ethiopia established a National Task Force on HIV in 1985 as the HIV/AIDS first began to surface. In 1987, the Federal Ministry of Health (FMOH) established and funded the National AIDS Control Programme (NACP) to raise HIV/AIDS awareness and lead the development of a national policy to combat the disease. The current national HIV/AIDS policy, approved by the Federal Council of Representatives in 1998, was developed to enable a multi-sectoral approach and framework for conducting prevention, care, and support activities – including the protection of the rights of PLWHA. A multi-sectoral response is critical, as the HIV/AIDS epidemic must be addressed in the complex dynamics of Ethiopia’s current food crises, civil war, and conflicts with Eritrea (USAID 2003). The HIV/AIDS Prevention and Control Office (HAPCO, established in 2000 as the National HIV/AIDS Prevention and Control Council) serves as the multi-sectoral body charged with implementing the federal and regional HIV/AIDS plans, examining and approving annual plans and budgets, and monitoring plan performance and impact (Strategic Framework 2001). The Council, which is chaired by the President of the Republic and includes government ministries, regional presidents, nongovernmental organizations (NGOs), religious organizations, PLWHA associations, and other prominent stakeholders, has declared HIV/AIDS to be “a national emergency” (Global Fund 2002).

The overall goal of the national HIV/AIDS policy is to prevent the spread of HIV/AIDS, decrease vulnerability of individuals and communities to HIV/AIDS, provide care and support for PLWHA, and reduce the adverse socioeconomic consequences of the epidemic. To support these goals, the main objectives of the health sector NACP include reducing infection rates by 25 percent by 2007 and scaling up baseline coverage of national strategic interventions in all 11 regions of Ethiopia. The interventions for scale-up include VCT, treatment of opportunistic infections (OIs), sexually transmitted infection management, blood safety, PMTCT, epidemiological surveillance and monitoring and evaluation, and the large-scale introduction of ART.

In addition to the efforts of the federal government, development partners such as the PEPFAR, the Global Fund, the WHO 3 by 5 Initiative, the U.S. Centers for Disease Control and Prevention (CDC), and the World Bank's Multi-country AIDS Programs have also demonstrated serious commitment to expanding HIV/AIDS services in Ethiopia. PEPFAR targets include the provision of ART to 15,000 people in 2004 and 210,000 people by 2008. The 3 by 5 Initiative aims at providing ART to 210,000 people by 2005 (UNAIDS 2003), while the Global Fund targets 58,000 individuals by 2005 (Global Fund 2002).

However, these efforts of the federal government and development partners to scale up strategic interventions – particularly ART – will require considerable recruitment and training of nurses, physicians, counselors, technicians, midwives, and other professionals. Furthermore, demand for VCT in both urban and rural communities is increasing. In 2002, the government designated 23 facilities as PMTCT/VCT centers, including 12 private and eight NGO facilities (Garbus 2003). Counseling and testing of pregnant mothers is to be provided with antenatal care (ANC) services, for which demand is very high. Although current utilization of ANC is only 27.37 percent, under Global Fund targets 35,000 mothers are to receive PMTCT services in 2005, which puts tremendous demand on PMTCT/VCT centers.² Global Fund targets also currently state that these facilities are to screen 200,000 clients in 2005, and so the number of centers must increase considerably (Global Fund 2004). In light of these issues of expansion, overcoming HR constraints will be a critical issue and must be underscored as the country strives to scale up interventions to control a devastating epidemic.

The HR crisis is a common theme across many African countries. With limited and often shrinking budgets, governments face the constant challenge of keeping civil service salaries in line with inflation. The health sector is no exception. As a result, public sector health professionals are either migrating to countries that offer better conditions of service, moving to the private sector, or changing professions to ones that offer more attractive opportunities. In addition, some are themselves affected by HIV/AIDS. As a result, attrition rates of 25-50 percent per year have been reported among health workers.

Recent data suggests that Ethiopia has a critical shortage of human resources to deliver even basic health services. In 1999, the physician to population ratio in Ethiopia was 1:48,000, the lowest in the world. The current (2003) ratio of 1:34,000 is still more than five times lower than the sub-Saharan Africa average, and that of nurses (1:4,900) is more than four times lower (WHO 2004). It is vital to point out that, as HIV/AIDS services are expanded and resources shifted towards meeting HIV/AIDS targets, this may in fact have negative spin-off effects on other essential programs such as malaria, immunization, and maternal and child health.

² It should be noted that the majority of PMTCT services in Ethiopia are offered under CDC and other donor programs.

3. Purpose and Methodology

The purpose of this activity was to assess the financial and human resource requirements for scaling up ART, VCT, and PMTCT services in Ethiopia with reference to current PEPFAR, Global Fund, and WHO 3 by 5 Initiative scale-up plans. The assessment used the AIDSTreatCost model to estimate the total number of staff required to deliver ART, PMTCT, and VCT services. Key findings from this report will provide the Federal Ministry of Health, donors, policymakers, and other key stakeholders valuable information to use when planning for scale-up of HIV/AIDS services. In addition, this report is intended to stimulate discussions on potential solutions to HR deficiencies and allow program planners to determine the required number of doctors, nurses, counselors, lab technicians, and other professionals needed for a scale-up.

3.1 Site Selection

Out of the 58 facilities currently certified by the FGOE to provide HIV/AIDS services, a total of six public hospitals were selected to participate in the assessment: Adama Regional Hospital (Nazareth), Black Lion Hospital (Addis), Felege Hiwot Regional Hospital (Bahir Dar), Police Force Hospital (Addis), St. Paul's Regional Hospital (Addis) and Zewditu Hospital (Addis). The site selection criteria included geographic location, status of providing ART, coverage rates, and the ability to provide relevant and timely information.

3.2 Data Collection Process

Comprehensive data on the clinical and programmatic events for ART, PMTCT, and VCT services were gathered using a standard questionnaire. The research team interviewed health providers directly involved in the provision of the above services. In addition to the interviews, selected time and motion observations were conducted at each of the hospitals. Specifically, data on the volume of patients/clients, type and number staff, salaries/compensation, treatment protocols and monitoring tests of each service were obtained. Because antiretroviral (ARV) drugs are not currently provided at the hospital pharmacies, data on the drug types and costs were collected from the Ethiopian Red Cross Society headquarters and City Municipal Pharmacy outlets.

To complement the data from the hospitals, the research team interviewed officials from the FMOH, the HAPCO, the World Bank, WHO, CDC, the Drug Administration and Control Authority (DACA), and others.

3.3 Costing Approach

The approach used in estimating the total costs of providing ART, PMTCT, and VCT focused on the total incremental costs directly related to the provision of the above services. Thus the costs of health infrastructure (buildings, etc.), which allow for the provision of *all* health services, are not included. Using a bottom-up costing approach, individual cost components were identified, estimated,

and/or calculated on a per-patient basis as accurately as possible. These costs were then aggregated, yielding a total per-patient cost. This was multiplied by the desired target number of patients, yielding a total program cost. ART and PMTCTplus costs were estimated annually; PMTCT and VCT costs were estimated per episode.

4. Key Findings and Discussions

This section presents key assessment findings from the assessment, organized into four subsections: Section 4.1 presents the major characteristics of HIV/AIDS service delivery at the six hospitals. Section 4.2 presents the human resources requirements for scaling up HIV/AIDS services. Section 4.3 discusses the financial costs of providing HAART, PMTCT, and VCT services in Ethiopia. Finally, section 4.4 presents the total costs of achieving 2004 PEPFAR targets.

4.1 Characteristics of HIV/AIDS Service Delivery at the Assessment Hospitals

HIV/AIDS service delivery approaches at all six assessment hospitals diverge from FMOH guidelines for ART, PMTCT, and VCT services, which dictate that HIV/AIDS services be offered in an integrated fashion. At the hospitals visited, the services were operated as stand-alone activities, each with its own hospital space, supplies, and staff, although some nurses and lab technicians move between services.

Accurate information regarding the total number of patients currently receiving ART services countrywide was not available. When this assessment commenced, several HIV/AIDS experts estimated that 4,500 to 5,500 patients were served at the 58 facilities currently authorized by the FMOH to provide ART services. During the assessment, the six facilities alone were found to provide ART services to a total of 4,876 patients (2,763 men, 2,113 women, and 50 children), suggesting that the earlier approximation underestimated national coverage of ART.

Assessment teams made three salient observations regarding HR required for HIV/AIDS care. First, all the facilities had adequate staff trained to implement current HIV/AIDS activities (treating patients, analyzing test results, keeping records, doing administrative tasks, etc.). The staff – 19 doctors, 38 nurses, and 20 lab technicians – spend slightly more than half (54 percent) of their time providing HIV/AIDS-related services to 4,876 patients, PMTCT services to 528 patients, and VCT services to 16,799 clients. The remainder of their time is spent on other clinical and managerial activities. While trained staff in the assessment hospitals are currently adequate, it should be noted that only six (8 percent) work exclusively on delivering HIV/AIDS services, raising concern over the number of trained staff dedicated to providing these services as scale-up occurs. Second, when actual HIV/AIDS work time was determined, the full-time equivalent (FTE) of staff at the six sites was calculated to be eight doctors, 24 nurses, and 10 lab technicians. Third, it is important to note that responsibilities vary by staff cadre. For example, doctors provide only ART services; nurses and lab technicians are involved in ART, PMTCT, and VCT services. According to the FMOH National Strategic Plan, every facility authorized to provide ART services must have pharmacists trained in ART provision. However, the government restricts dispensing of ARVs to municipal and Ethiopian Red Cross pharmacies. Therefore, although trained pharmacists are currently working within the surveyed hospitals, they do not dispense ARV drugs.

The service delivery characteristics observed at the facilities inform the following discussion of existing and future stock of health and HIV/AIDS care human resources.

4.2 HR Requirements for Scaling Up HIV/AIDS Services

It is generally recognized that Ethiopia has a critical shortage of human resources to deliver basic health services. In analyzing the nature and extent of this shortage, this section presents major findings and discussions related to three key questions. First, it presents current and projected stock of key health workers. Second, it estimates the HR requirements to maintain basic health services at baseline levels. Finally, it estimates HR requirements for scaling up ART, PMTCT and VCT services and total cost of the programs.

Current and Projected Stock of Key Health Workers

Table 1 shows projected growth in the number of public sector doctors, nurses, pharmacists, and laboratory technicians in Ethiopia. (Assumptions governing these projections are in Annex A.) Using 2003 HR data from *Health and Health-related Indicators* (Federal Democratic Republic of Ethiopia/Ministry of Health [FDRE/MOH] 2004) and assuming that existing conditions are unchanged, the projected growth in the number of doctors is fewer than 200 from the baseline year of 2003 through 2008; other health worker cadres will experience a higher growth rate. This is due largely to a high attrition rate for public sector doctors – estimates based on 1999-2003 data suggest an annual loss of 9.6 percent of doctors, higher than the estimated 3.2 percent of nurses and 6.3 percent of lab technicians and pharmacists.

Table 1: Projected Human Resources for Public Sector Health Care in Ethiopia, 2003-2008

Staff Type	Average Graduates per Year	Average Attrition per Year (1999-2003)	HR Projections					
			Available in 2003	2004	2005	2006	2007	2008
Doctors	159*	9.6%	1,162	1,210	1,253	1,292	1,328	1,360
Nurses	1,754	3.2%	14,123	15,419	16,673	17,887	19,061	20,197
Pharmacists	233	6.3%	1,140	1,302	1,453	1,595	1,728	1,853
Lab Technicians	397	6.3%	1,915	2,192	2,451	2,694	2,921	3,135

Note: Figures rounded to nearest whole number.

* Includes only those qualified to provide HIV/AIDS services (general practitioners, obstetrician/gynecologists, infectious disease specialists, pediatricians, and internists).

Human Resources Required to Sustain Current Basic Health Services

The second issue concerns the projected number of staff required to maintain baseline levels of essential health services. Using the national population growth rate of 2.7 percent (FDRE/MOH 2004), it is estimated that the country will need an additional 200 doctors, 2,036 nurses, 164 pharmacists, and 276 lab technicians by 2008 to sustain current (2003) levels of health services.³ (Table 2 shows total numbers needed 2004-08.) Comparing these figures with the HR projections in Table 1, and assuming attrition rates do not increase, the growth in nurses, pharmacists, and lab technicians is likely sufficient to sustain and perhaps raise current levels of health service delivery. The projected number of doctors in 2008, however, is only marginally more than the number required to keep pace with population growth, suggesting that doctors represent a limiting factor to the maintenance and expansion of health services in Ethiopia.

³ We recognize that a multitude of factors influence the level of health services. However, this paper is concerned with the ceteris paribus effect of human resources on health service levels.

Table 2: Projected HR Needs to Sustain Current Basic Health Services

Staff Type	Number of Staff Required to Keep Pace with Population Growth (baseline service level)					
	2003	2004	2005	2006	2007	2008
Doctors	1,162	1,194	1,226	1,260	1,294	1,330
Nurses	14,123	14,509	14,905	15,312	15,730	16,159
Pharmacists	1,140	1,171	1,203	1,236	1,270	1,304
Lab Technicians	1,915	1,967	2,021	2,076	2,133	2,191

Note: Figures rounded to nearest whole number

Distribution of Human Resources

The third issue concerns the distribution of HR across the country. Examining data only on the national level may obscure important trends within the country. Therefore, with the aim of investigating the regional distribution of key staff, the authors apply the same projections, under the illustrative assumption that attrition in rural areas is twice that of urban areas (Personal Interview, FMOH Planning Department 2004).

Table 3 shows some interesting variations among regions when comparing projected number of doctors in each region with the number required to provide basic services and to keep pace with population growth. Given high attrition rates, by 2008, in only three of the 11 regions (Addis Ababa, Dire Dawa, and Harari) does the number of doctors keep pace with population growth, indicating that most regions will experience a *reduction* in health care human resources (particularly doctors) over the next few years.

Table 3: Projected Distribution of Doctors among Regions

Region	Number of Doctors Required						
	2003 Baseline	2005			2008		
		Keep pace	Projected #	Difference	Keep pace	Projected #	Difference
Addis Ababa	271.7	280.0	312.9	+32.9	292.9	366.0	+73.1
Amhara	20.3	21.2	21.2	0.0	22.6	22.2	-0.4
Afar	174.0	183.4	182.4	-1.0	198.5	191.9	-6.6
Benshangul	22.6	23.8	23.7	-0.1	25.7	24.9	-0.8
Dire Dawa	40.5	42.6	45.4	+2.8	45.9	51.4	+5.5
Gambella	14.3	15.0	15.1	+0.1	16.2	16.0	-0.2
Harari	53.6	56.2	59.3	+3.1	60.3	66.2	+5.9
Oromia	244.3	258.5	256.6	-2.0	281.4	270.4	-11.1
SNNPR	208.6	220.9	218.0	-2.9	240.8	228.5	-12.3
Somali	38.1	40.2	40.2	0.0	43.4	42.5	-0.9
Tigray	73.9	77.9	78.0	+0.2	84.3	82.7	-1.6

These HR projections do not take into account the effects of HIV/AIDS on the workforce itself. Estimating these effects can only be accomplished by linking the provision of ART, PMTCT, and VCT services to the human resources required to provide them. The section below attempts to quantify the HR requirements of ART, PMTCT, and VCT services under major initiatives currently being implemented in the country.

4.2.1 Estimating HR Requirements to Achieve Targets of International HIV/AIDS Initiatives

As discussed above, several international initiatives are currently involved in expanding HIV/AIDS services; major among them are PEPFAR, the Global Fund, the WHO 3 by 5 Initiative, the World Bank Multi-country AIDS Programs, and MDGs. To determine the HR requirements of achieving the targets set by these initiatives, the authors use the basic assumption that hospitals will apply the prescribed FMOH staffing pattern for delivering ART services (two doctors, two nurses,⁴ one pharmacist, and one lab technician). However, the FMOH does not specify the number of patients this team is capable of treating over a given period of time. One way to estimate this number is by observing the number of patients served at the six assessment facilities. However, this approach has two drawbacks. First, the staffing patterns observed for ART services followed the FTE ratio of 8:4:2 (doctor: nurse: lab technician). This does not correspond to the FMOH ratio of 2:2:1. Second, we have no way to determine whether the staffing patterns in use at these facilities are sustainable and replicable as HIV/AIDS services are scaled up in existing facilities and introduced at new facilities. In fact, anecdotal evidence suggests that staff may have insufficient time for HIV/AIDS patients because they are providing other vital basic health services. In the absence of precise methods to estimate HR requirements for scaling up HIV/AIDS services and to comply with FMOH guidelines, the authors developed a set of empirical measures to estimate the maximum number of patients that could be treated per day by each staff type at a particular level of care. These measures included clinical guidelines, time and motion observations, rules of thumb, reports from ART physicians, and expert opinion. While the measures are inherently subjective to some degree, they provide enough direction for us to make educated estimates. Based on these measures, the number of patients that could be treated by a physician working full-time on ART service delivery is estimated at 20 patients per day,⁵ as shown in Box 1.

It should be noted here that public sector health workers have on average the following days of leave each year: 35 days vacation; 20 days for sickness; 13 public holidays; and 12 days for mother's leave (females only). Based on 260 weekdays/year, the average number of days worked each year by one worker is 180. It is assumed that in each eight-hour day, a worker is actively providing client service for six hours and that two hours are for other work, such as staff meetings, logistics management, or waiting time (Huddart, Furth, and Lyons 2004).

⁴ One nurse and one nurse-counselor

⁵ Maximum value of 20 minutes per patient (20 patients per day in a standard eight-hour day with a one-hour lunch break and 20 minutes of travel/down time) obtained from the average reported time spent per patient for ART doctors at the six assessment facilities (assumes 25 percent of cases are initiation – 38 minutes each, and 75 percent follow-up – 15 minutes each); corroborated by the opinion of two high-level FMOH officials and three experienced physicians. While this is based on observation, the authors feel this is comparable to what is happening in other African countries. For example, Uganda and Zambia both use Center for Disease Prevention and Control protocols on VCT, which is 20 patients per day in a standard eight-hour day.

Box 1: Estimated Number of ART/PMTCTplus Patients per Doctor per Year

An ART doctor sees 20 patients per workday...
= 20 patients per day × 180 workdays per year
= 3,600 patient-visits per year
Assuming that patients make an average of 9 visits* per year,
→ $3600 \div 9 = 400$ patients per doctor per year
Given that an ART team includes 2 physicians, each team can provide adequate ART services to...
 $400 \times 2 = \underline{800 \text{ ART/PMTCT-plus patients per year}}$

* Average of eight follow-up visits per patient per year at the six study facilities.

Similarly, based on information collected from providers at the study sites, selected time and motion observations, and expert opinion, the authors calculated the number of patients that could be provided with PMTCT/VCT services in a year as shown in Box 2:

Box 2: Estimated Number of PMTCT/VCT Clients per Year

One PMTCT/ VCT nurse/counselor sees 10 patients per workday,* and
One lab tech conducts 50 tests per workday...
→ A team of 5 counselors and 1 lab tech can see...
 $50 \text{ patients per day} \times 180 \text{ workdays per year}$
= 9,000 PMTCT/VCT patients per year

* Maximum value of 42 minutes per patient (20 for pre-test counselling, 20 for post-test counselling and two for drawing blood samples) based on FMOH clinical guidelines for VCT and confirmed by the average reported time spent per patient for VCT counsellors at the 6 facilities (18, 19 and 2 minutes for pre-and post-test counselling and blood draw respectively and 20 minutes of travel/down time) and confirmed in interviews with Family Health International staff engaged in a study of burn-out rates among VCT counsellors.

The following sections use the numbers of patients given in the above calculations to estimate the human resources required to achieve the targets of three major HIV/AIDS initiatives in Ethiopia.

Scenario 1: Can Ethiopia Achieve PEPFAR Targets?

National Targets

PEPFAR has established targets for the number of clients to reach in 2004 and 2008. Starting in 2004, the plan calls for providing 14,168 patients with ART, 5,750 with PMTCT, 832 with PMTCTplus, and 51,000 with VCT. By 2008, PEPFAR aims to provide ART to 210,000 patients. (No PMTCT or VCT targets are stated for 2008.) Table 4 shows the human resources, by type of staff, required to achieve PEPFAR targets, using the estimation approaches described above. As with earlier discussions, the estimates assume that PEPFAR activities take place predominantly in public health facilities.

Table 4: PEPFAR HR Requirements for 2004 and 2008

Staff Type	Number of FTE Staff Required to Achieve PEPFAR Targets			
	2004		2008	
	ART/PMTCT+	VCT/PMTCT	ART/PMTCT+	VCT/PMTCT
Doctors	38	0	525	0
Nurses	38	32	525	442
Pharmacists	19	0	263	0
Lab Technicians	19	6	263	88
Total	114	38	1576	530

To put these HR requirements in context, we compare them with the human resources required to keep pace with population growth. Table 5 shows the 2008 projections of key staff: (a) required to achieve PEPFAR targets for ART, PMTCT/VCT services, (b) expected to be in the public sector, assuming current training and attrition rates; (c) required to maintain the 2003 per capita staff levels for all non-PEPFAR services.

Table 5: Health Workers Available and Required to Achieve PEPFAR Targets (2008)

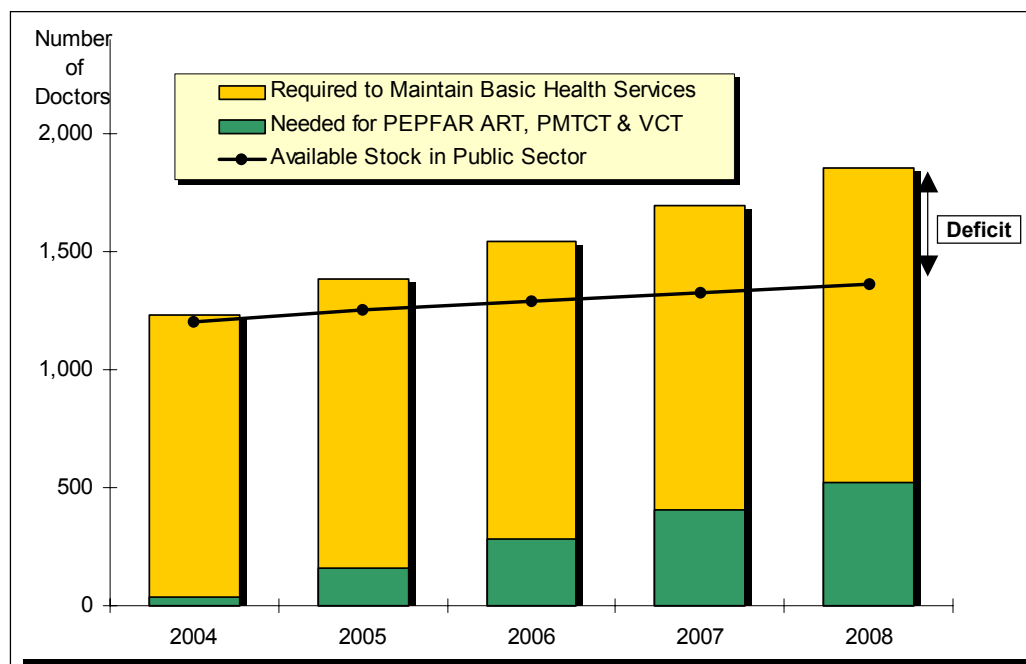
Staff Type	Number of Staff in 2008:				
	(A) Needed for PEPFAR ART, PMTCT & VCT	(B)* Required to Maintain 2003 Basic Health Service Levels	(C) = (A) + (B) Projected Need	(D)* Total in Public Sector (Projected)	(E) = (D) – (C) Difference Between Need and Available
Doctors	525	1,330	1,855	1,360	-495
Nurses	967	16,159	17,126	20,197	3,071
Pharmacists	263	1,304	1,567	1,853	286
Lab Technicians	351	2,191	2,542	3,135	593

* Column B estimates based on figures provided in Table 2. Column D estimates based on Table 1.

The projected need for total health staff (Table 5, column C) in 2008 is a combination of staff required to maintain 2003 per capita staff levels (provider–patient ratios) and staff needed for PEPFAR ART, PMTCT, and VCT services. This total is then compared to the number of public sector staff estimated to be actually available. The estimates for 2008 (Table 5, column E) show a surplus of 3,071 nurses, 286 pharmacists, and 593 lab technicians. Assuming other (non-HIV/AIDS) health care investments also are made, this HR surplus should help the FGOE to improve basic health services over and above providing staff for PEPFAR-supported activities.

In contrast, results for doctors indicate a deficit of 495. This shortfall would represent 36 percent of the total public sector doctors in the country. Figure 1 shows the trend of doctors required to provide basic health services *and* work on PEPFAR activities.

Figure 1: Projected Need and Availability of Doctors between 2004-2008 for PEPFAR



Regional Targets

PEPFAR 2004 ART scale-up plans indicate ART targets for selected facilities expected to provide ART services nationwide. Using the estimations of HR requirements presented in the previous sections, the number of doctors required to achieve PEPFAR targets in each region in Ethiopia was calculated (Table 6). Calculations assume the PEPFAR scale-up will proceed in the same regional proportions as 2004 allocations.

**Table 6: Number of Doctors per Region, 2008:
Available vs. Total Projected Need (for PEPFAR and Keeping Pace with Inflation)**

Region	Available	Total Projected Need	Difference (% of Available)
Addis Ababa	366	606	-66%
Amhara	22	30	-37%
Afar	192	237	-23%
Benshangul	25	34	-35%
Dire Dawa	51	70	-35%
Gambella	16	24	-51%
Harari	66	84	-27%
Oromia	270	331	-22%
SNNPR	229	261	-14%
Somali	43	51	-21%
Tigray	83	110	-33%

Estimates show that all regions will experience a deficit in doctors needed, but especially of note are Addis Ababa's deficit of more than 60 percent and Gambella's of more than 50 percent. The smallest deficit, that of SNNPR, is less than 14 percent, because PEPFAR is not yet as active there as elsewhere.

Scenario 2: Can Ethiopia Achieve Global Fund Targets?

In July 2004, Ethiopia received approval for their (Round 4, March 2004) application to the Global Fund to support HIV/AIDS activities from 2004 to 2008. Ethiopia's application outlines ART and PMTCT targets for 2004-2009 (Global Fund 2004). While no explicit VCT targets were given, the application indicated that VCT targets are driven by ART targets (since VCT is the entry point for ART) – allowing the authors to estimate VCT targets.

Table 7: Ethiopia's Proposal to Global Fund: ART, PMTCT, and VCT Client Targets

Year	ART	PMTCT & VCT
2004	25,000	200,070
2005	58,000	1,253,000
2006	75,000	643,939
2007	100,000	946,970
2008	125,000	946,970
2009	150,000	946,970

Using the same methodology as above, we calculated the number of doctors required to meet Global Fund targets, as a percentage of the total number of doctors in the country and the percent drop in health service levels. By 2008, the total number of required doctors under the Global Fund plan is 1,643, or 17 percent less than the projected national stock of doctors. While this shortfall is less than that of PEPFAR, it is expected that Global Fund HIV/AIDS interventions will be implemented *in addition to* those of PEPFAR.

Scenario 3: What would it take to reach WHO 3 By 5 target?

The WHO 3 by 5 Initiative is an effort to provide ART to 3 million people by 2005. Under this initiative, Ethiopia is expected to treat a total of 210,000 patients with ART by 2005 (WHO 3 by 5 2004). It is not clear from the document whether this 210,000 would count those on ART under PEPFAR or Global Fund programs. This would require the use of more than 43 percent of all the existing public sector doctors in Ethiopia, resulting in a 28 percent deficit. These estimates suggest that the 3-by-5 targets are unrealistic and unsustainable – and would have detrimental implications for the rest of the health system.

In summary, the scenarios above provide a quick look at Ethiopia's overall health and HIV/AIDS human resource needs over the next few years. In all three scenarios, the country has insufficient doctors to maintain current health services and simultaneously achieve the targets of the HIV/AIDS initiatives. To meet those targets, Ethiopia should start looking at either producing more doctors or changing its HIV/AIDS service delivery model.

4.3 Understanding the Financial Costs of Providing HAART, PMTCT, and VCT

This section focuses on *total costs* associated with HAART program requirements that would typically be included in the government’s health budget. Most costs of HAART can be divided into five general categories: (1) ARV drugs; (2) monitoring tests; (3) capital equipment; (4) training; and (5) labor. Obviously the introduction of a large-scale public program to provide ART will require new investments in capital such as equipment, but estimating such costs are not within the scope of the current assessment. HAART costs are expressed as average annual figures and represent the total cost of the government HAART program. VCT costs are expressed per “episode.”

4.3.1 HAART Costs

The total annual cost of providing HAART is estimated at \$705 per patient. ARV drugs account for the greatest proportion of the total cost (67 percent), followed by monitoring tests (29 percent), lab equipment (2 percent), staff salaries (2 percent), and training (less than 1 percent).

ARV Drugs. As noted above, HAART program costs are dominated by the cost of ARV drugs, which represent two-thirds of the total cost. The cost of ARV drugs ranges from \$348 to \$995, depending on the type of combination offered to the patient (Box 3).⁶ Clinical guidelines for HIV/AIDS service provision indicate that the following four drug combinations constitute a first-line treatment regimen (1NRTI + 1NNRTI).⁷ No second-line regimen has been specified, though high-level, countrywide, participatory consultations are currently underway to identify these drugs.

Box 3: ARV Treatment Regimens and Annual Prices per Patient

Lamivudine (3TC) + Stavudine (D4T) + Nevirapine (NVP)	\$348
Combivir [Zidovudine (AZT) + Stavudine] + Nevirapine	\$471
Lamivudine + Stavudine + Efavirenz (EFV)	\$873
Combivir + Efavirenz	\$995

All four first-line regimens were observed at the six study facilities and at the two ARV dispensing pharmacies (Red Cross). Prescription guidelines and frequencies varied widely between facility and even between doctors at the same facility. In most cases, no clear facility-specific prescription guidelines existed; each doctor made these decisions independently despite the existence of national guidelines. ARV drug prices obtained from the municipal and Ethiopian Red Cross pharmacies coincided closely with those quoted by physicians, and are shown in Box 3.

Monitoring Tests. The cost of monitoring tests, if administered according to FMOH guidelines, represents the second largest component of total costs. FMOH clinical guidelines specify that routine monitoring tests should be done monthly based on clinical needs as well as cost implications. In the study facilities, however, the researchers observed that routine monitoring tests were typically provided only in cases of drug toxicity or other complications; otherwise, routine monitoring was

⁶ The conversion rate used for all costs is \$1 US = 8.6 Birr.

⁷ For clinical and immunological treatment failure a PI-based regimen Nefinavir with NRTI is the first-line regimen.

rare. Table 8 presents the costs of monitoring tests and the total annual per patient costs of these tests if they were performed in accordance with the FMOH guidelines.

Table 8: Costs of Lab Monitoring Tests per Patient

Test	Frequency (per year)	Unit Cost (Birr)	Annual Per Patient Cost (Birr)	Annual Per Patient Cost (\$)
Full Blood Count	4	17	68	\$7.91
Blood Chemistry	4	43	172	\$20.00
Blood Sugar	4	8	32	\$3.72
CD4 count	2	256	512	\$59.53
Viral load	1	1000	1000	\$116.28
Total	15	1324	1784	\$207.44

Labor. Average staff salaries were reported as 1,500 Birr per month (approx USD \$174) for physicians and 1,000 Birr per month (approx USD \$116) for other staff members (Personal Interview, FMOH Planning Department, 2004). The low cost of labor is a factor of public sector salaries for health workers being low. When public sector salaries are compared with private, they are about half their private sector equivalent (Personal Interview, FMOH Planning Department, 2004). Table 9 presents the annual, per patient costs of labor based on the standard staffing model presented above.

Table 9. Annual Costs of HAART-related Labor per Patient

Staff Type	Number Required to treat 880 Patients Annually	Annual Salary (Birr)	Annual Cost (Birr)	Annual Per Patient Cost (\$)
Doctors	2	1500	3000	\$5.23
Nurses	2	1000	2000	\$3.49
Pharmacists	1	1000	1000	\$1.74
Lab Technicians	1	1000	1000	\$1.74
Total	6		7000	\$12.21

Lab equipment. The equipment required for conducting lab services related to the provision of ART, PMTCT, and VCT services includes CD4 and viral load equipment and chemistry and hematology analysis machinery. None of the facilities visited had CD4 or viral load equipment, and only two of the six were able to conduct routine chemistry and hematology analysis, the majority referring these tests to external labs. As a result, no data were available on the cost of HIV/AIDS lab equipment (e.g. flow cytometer and real-time polymerase chain reaction). The reported cost of a chemistry analyzer was 260,000 Birr (\$30,233) and that of a hematology analyzer 200,000 Birr (\$23,256), yielding an annual per patient cost of \$13.16 for lab equipment.⁸ Note that this cost does not take into account the fact that chemistry and hematology analysis equipment is often used for other, non-HIV/AIDS tests.

⁸ This assumes a 20 percent annual equipment depreciation rate and that each machine serves 813 ART patients per year (average observed at the six facilities).

Training. The FMOH, in conjunction with HAPCO, has developed strict regulations regarding human resources for quality HIV/AIDS service provision. In order to qualify to administer ARV drugs, treat HIV/AIDS patients, or conduct HIV/AIDS monitoring, screening, or confirmation tests, all health staff must attend a one-week training course organized by DACA (DACA 2003) in conjunction with HAPCO and the FMOH.

The cost of each round of training has been estimated at 64,996 Birr (HAPCO 2004), which covers 60 participants per round (yielding a total cost of \$126 per participant). Assuming two weeks of training for each staff member per year, this yields an annual, per patient cost of \$1.89. The low training costs result from the fact that training is conducted within the country in organized “rounds,” allowing for significant economies of scale. Participation in training programs abroad would raise these costs considerably.

4.3.2 PMTCT and VCT Costs

Based on the HR estimations presented in Section 4.2.1, five counselors and one lab technician can provide PMTCT/VCT services to 9,000 patients per year. Using the salaries and training costs shown above, this yields per episode costs of \$0.93 (labor) and \$0.48 (training).

For PMTCT services, patients pay \$0.60 for a single dose of nevirapine (mother and child) (Kombe and Smith 2003), bringing the total PMTCT cost to \$2.01 per patient per episode.

For VCT services, the majority of facilities in Ethiopia use an Abbott test for screening and a Capillus test for confirmation, at an average cost of 25 Birr (\$2.91) per patient, bringing the total VCT cost to \$4.31 per client per episode.

4.4 Total Cost of Achieving PEPFAR HAART Targets

Given the annual per-patient cost of HAART presented above (\$705), the cost of achieving the PEPFAR (2004) HAART target is estimated at: $\$705 \times 15,000 \text{ patients} = \10.58 million . Achieving PMTCT (5,750 patients) and VCT targets (51,000 clients) would cost an additional \$11,600 and \$220,000 respectively. Note that these costs do not include the administrative and managerial costs of setting up and managing programs of this size.

5. Conclusions

There is clearly a severe shortage of human resources for health care in Ethiopia. The current doctor-to-patient and nurse-to-patient ratios are inadequate for the provision of basic health care – in fact, the doctor-to-patient ratio of 1:34,000 is less than a third of the WHO-mandated minimum of 1:10,000 for the provision of quality health care. Given existing constraints, the Ethiopian health care system is may not be well positioned to respond to the rapid scale-up of HIV/AIDS services. Of 77 HIV/AIDS staff observed, only six staff members work exclusively on HIV/AIDS services, raising concern regarding the system-wide effects of utilizing all trained staff to provide HIV/AIDS services

The greatest constraint to the scale-up of HIV/AIDS services is the shortage of qualified, trained doctors, followed by laboratory technicians and pharmacists. With an attrition rate among physicians estimated at 9.6 percent per year, the number of doctors moving to higher-paying jobs in the private sector and abroad severely constrains national efforts at increasing access to basic health care or scaling up HIV/AIDS services. The attrition rate for nurses and paramedics (lab technicians, pharmacists, etc.), however, are relatively low at 3.2 percent and 6.3 percent respectively. This highlights some important issues to consider related to service delivery models that require large numbers of doctors, such as ART.

The FMOH antiretroviral therapy staffing model (two doctors, two nurses, one pharmacist and one lab technician) is highly oriented towards doctors in comparison to models elsewhere in the world. This puts additional stress on Ethiopia's already extremely limited number of doctors. Several countries are debating whether they should shift from doctor-focused to less doctor-intensive models. This would mean that certain responsibilities would be delegated to nurses and in some cases from nurses to community health workers. Adopting this type of model would lessen the burden on physicians, and possibly facilitate the provision of ART treatment to more patients by utilizing available HR.

Finally, it is critical to point out that the costs of HAART per patient per year are high (\$705). In the absence of government subsidies, more than 96 percent of the total cost (\$678) is borne by the patient. In a country where the annual income of the average individual is \$90 (UNDP 2004) and where over 60 percent of the population lives under the poverty line, HIV/AIDS services are unaffordable for the vast majority of the population. Reports from health staff indicate that fewer than 10 percent of patients testing positive for HIV/AIDS can afford to pay for ARV drugs (Personal Interview, St. Paul's Hospital staff 2004). While Ethiopia has an elaborate system of fee waivers and exemptions for health services, given current government policy, these are unlikely to apply to HIV/AIDS services. However, U.S. government officials announced recently that ARV drugs under PEPFAR will be offered free-of-charge in Ethiopia (PLUSNEWS 2004), suggesting a possible solution to alleviating financial constraints. It should be kept in mind, however, that continued donor support will be required to sustain patients placed on ART under PEPFAR beyond 2008

6. Recommendations

To allow Ethiopia to achieve major targets including those in the National Strategic Plan as well as PEPFAR, Global Fund, WHO 3 by 5, and MDG targets for HIV/AIDS, the authors present four main recommendations:

- ▲ First, the FGOE should take a strong leadership role in addressing human capacity issues. The issue should be high on the national agenda and active dialogue and coordination on practical solutions should be initiated with development partners including USAID, CDC, World Bank, WHO, and other bilateral agencies.
- ▲ Second, the FGOE in collaboration with development partners should consider implementing an alternative ART staffing pattern. Under a “nurse-intensive” staffing scenario, HIV/AIDS services could be scaled up without depleting the number of doctors or nurses available for other basic health services.
- ▲ Third, over the long run, the FGOE should consider asking partners to supplement salaries for public sector health workers to reduce attrition rates. Public sector health staff wages are one-third their private sector equivalents and less than 10 percent those of Organization for Economic Cooperation and Development (OECD) countries.
- ▲ Fourth, measures should be taken to reduce patient out-of-pocket expenditures on HIV/AIDS services (HAART drugs, screening, confirmation, and monitoring tests), which are extremely high and not currently subject to government subsidies. Furthermore, the federal government should engage in intensive negotiations with local and international pharmaceutical companies on further reducing the price for ARV drugs (which is significantly higher than equivalent prices in neighboring countries) or consider bulk purchase of drugs from one pharmaceutical company

Annex A: Assumptions Governing HR Estimations

	1999	2000	2001	2002	2003	Average	Average (excluding 2002)
Doctors	1,283	1,263	1,366	1,888	2,032		
Qualified Doctors	734	722	781	1,080	1,162		
Graduates	182	210	188	243	285	222	
Attrition Rate		16.0%	7.8%	-17.7%	4.9%		9.6%
Nurses	5,498	6,713	7,723	12,838	14,160		
Graduates	1,416	1,399	2,164	1,562	1,465	1,754	
Attrition Rate		3.0%	5.0%	-23.0%	1.7%		3.2%
Paramedics	1,989	2,201	2,758	3,824	4,641		
Graduates	613	671	917	656	1,054	782	
Attrition Rate		18.2%	4.1%	-3.9%	-3.5%		6.3%

1. All values derived from *Health and Health-related Indicators* (FDRE/MOH 2004).
2. Qualified doctors for HIV/AIDS services include general practitioners, obstetrician/gynecologists, infectious disease specialists, pediatricians, and internists.
3. Average attrition rates are calculated by subtracting the average annual increase in number of doctors from the number of average annual graduates.
4. Linear growth assumed, because of no significant upward or downward trend in numbers of graduates.
5. The average annual increase in number of doctors excludes 2002 figures because of distortions caused by a large influx of medical staff from the Ethiopia-Eritrea war.
6. Attrition rate of qualified doctors is assumed to be the same as that of all doctors.
7. Annual increments and graduation rates for lab technicians and pharmacists use figures for paramedics.
8. Note that the “attrition” figures include all leakages from the system, including departure, retirement, and death.

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