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Human Resources Crisis in the Zambian Health System: A Call for Urgent Action

August 2005

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Abstract

Human resources are the cornerstone of a health system. Without a strong and skilled health workforce, the Zambian public sector health system cannot deliver adequate and appropriate care to its population. Over the past few years, the human resources situation in the Zambia public sector has reached a point of severe crisis and inability to provide basic health services, primarily due to three interrelated factors. First, the country is losing substantial numbers of health workers to countries that offer better conditions of service, or are changing professions to ones that offer more attractive opportunities. Second, Zambia's medical and professional schools have a limited capacity to train additional staff. Third, the country is one of the epicenters of the catastrophic HIV/AIDS pandemic in Southern Africa.

There are three main findings in this report. First, attrition rates for all health staff have increased dramatically compared to historical trends. Second, looking only at national human resources figures may obscure important trends *within* the country. Third, many facilities will soon start experiencing severe constraints in expanding their HIV/AIDS services. Such findings will assist policymakers to make decisions on how to handle the human resource crisis during this critical HIV/AIDS scale-up.

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Acronyms

ART	Antiretroviral Therapy
FTE	Full-time Equivalent
HR	Human Resources
MOH	Ministry of Health
PMTCT	Prevention of Mother-to-child Transmission
PHR<i>plus</i>	Partners for Health Reform <i>plus</i>
USAID	United States Agency for International Development
UTH	University Teaching Hospital
VCT	Voluntary Counseling and Testing
WHO	World Health Organization

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Executive Summary

Human resources are the cornerstone of a health system. Without a strong and skilled health workforce, the Zambian public sector health system cannot deliver adequate and appropriate care to its population. Over the past few years, the human resources situation in the Zambia public sector has reached a point of severe crisis and inability to provide basic health services, primarily due to three interrelated factors:

First, the country is losing substantial numbers of health workers to countries that offer better conditions of service, or are changing professions to ones that offer more attractive opportunities. It is estimated that the number of Zambian-trained doctors practicing in the United States and Canada alone was more than 10 percent of the number practicing in Zambia.

Second, Zambia's medical and professional schools have a limited capacity to train additional staff. Countrywide, the country currently has only one medical school, three nursing schools, and three technical colleges graduating doctors, nurses, and laboratory technicians and pharmacists. In 2004, Zambia's output from medical and professional schools produced only 49 doctors, 540 nurses, 66 pharmacists, and 38 laboratory technicians, far below the graduation rates required to maintain staffing levels.

Third, the country is one of the epicenters of the catastrophic HIV/AIDS pandemic in Southern Africa. National surveillance data estimates an adult prevalence rate of 16.5 percent (World Health Organization, 2004); in urban areas, the rate is up to 27 percent. In 2003 alone, 89,000 people died of AIDS. It is anticipated that provision of comprehensive and robust HIV/AIDS services will require additional health workers at all levels of care. As HIV/AIDS services are expanded and human resources shifted towards HIV/AIDS services accordingly, the already critical situation of the overall health workforce will likely be further aggravated.

Attempts to alleviate these shortages have met with limited success. Even though the Zambian health sector has received significant financial support to fight HIV/AIDS, malaria, and tuberculosis from the World Bank, the Global Fund, the President's Emergency Plan for AIDS Relief, and other bilateral sources, this support has primarily gone to expand interventions such as antiretroviral therapy (ART), opportunistic infections, prevention of mother-to-child transmission (PMTCT), and voluntary counseling and testing (VCT). Unfortunately, these funds are not available for recruitment and retention of health workers.

This document analyzes the human resource requirements associated with scaling up the provision of ART, PMTCT, and VCT services in the public health sector. It uses data collected from the recent facility assessment of 10 major public hospitals to estimate human resource requirements for scaling up these HIV/AIDS services. The report estimates future national human resource needs based on current attrition, graduation, and retention. Furthermore, it explores a range of policy implications, including the effects of salary increase on attrition and emigration; alternative ART staff model; and opportunities for human resource mobilization. It is vital to point out that the provision of HIV/AIDS services is changing dramatically in the country. Certain policy and programmatic decisions on how key health staff will be mobilized at lower levels of care have yet to be made.

There are four main findings in this report. First, attrition rates for all health staff have increased dramatically compared to historical trends. Data show that doctors have the highest attrition rate (9.8 percent) followed by nurses (5.3 percent) and pharmacists (4.6 percent). Second, looking only at national human resources figures may obscure important trends *within* the country. The analysis indicates that there are differences in urban and rural attrition rates, leading to net losses of staff in rural areas (Eastern, Luapula, Northern, and Western provinces) and net staff gains in urban areas (Copperbelt and Lusaka provinces). Third, many facilities will soon start experiencing severe constraints in expanding their HIV/AIDS services. Data from the 10 hospitals indicate that, on average, facilities are utilizing 1.4 full-time equivalent (FTE) doctors on ART services (a total of 8.2 FTE doctors at all facilities treating 3,800 ART patients). Comparing the FTE staff to the total number of staff at the provincial facilities suggests that there is room for expansion of ART services to a certain point. However, note that the doctors at University Teaching Hospital (UTH) (which is by far the largest facility) are each treating 43 patients per day, and the counselors are seeing 40 patients per day, far above the average, meaning that UTH facility staff spend less time treating/counseling each patient than any of the other facilities. This suggests that UTH staff may be seriously overworked.

Based on the assessment, the following recommendations are suggested:

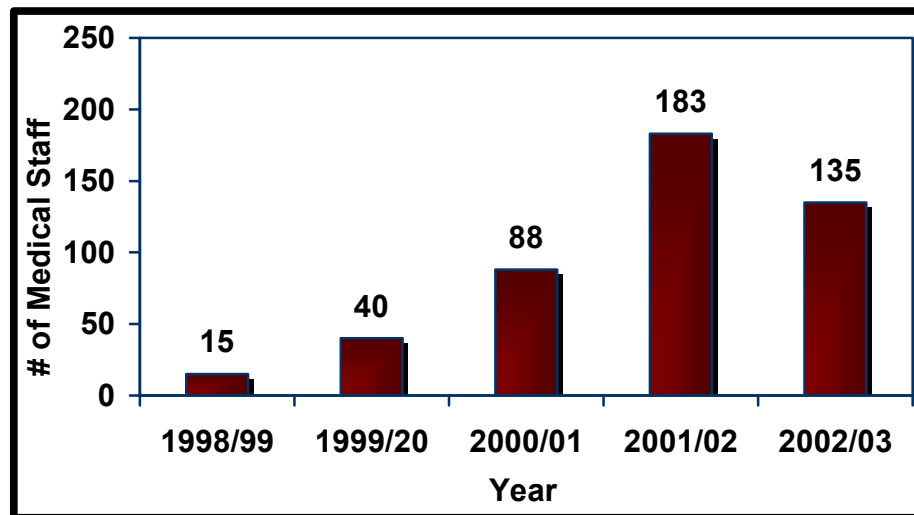
- ▲ *Delegate certain tasks from doctors to clinical officers and to nurses.* Anecdotal evidence indicates that stable ART patients could be seen for follow-up visits by nurses rather than doctors without adverse effects on treatment quality. National Guidelines would need to be modified and appropriate training programs instituted to facilitate this nurse-focused service delivery scenario.
- ▲ *Delegate laboratory processing of HIV/AIDS screening confirmation tests from laboratory technicians to other cadres.* Since rapid testing is now available in most hospitals, the country should consider delegating this task to other cadres to relieve laboratory technicians who are already engaged in the collection of blood samples and reading the results. This task does not necessarily require a high level of laboratory training to process rapid HIV/AIDS diagnostic tests. Again, National Guidelines would need to be modified and appropriate training programs instituted to facilitate this scenario.
- ▲ *Raise compensation levels.* Significant numbers of doctors and nurses are leaving the public health sector to go to the Zambian private sector and to other countries (particularly Australia, Botswana, South Africa, and the U.K.) where compensation levels (salaries and other incentives) are much higher. The country should consider introducing incentives for health professionals to remain in the country. This may include salary supplements as well as the introduction of housing allowances, training programs, and opportunities for advancement.
- ▲ *Engage private pharmacies for dispensing antiretroviral drugs to relieve pharmacists in facility pharmacies.* Given the shortage of pharmacy staff, the government should consider outsourcing some pharmacy services to the private sector, using performance-based contracts.
- ▲ *Bring foreign health workers to Zambia.* Zambia already has an appreciable number of health workers from other countries; hiring additional foreign workers could alleviate human resource shortfalls in the short term.

1. Background and Purpose

Human resources are the cornerstone of a health system. Without a strong and skilled health workforce, the Zambian public sector health system cannot deliver adequate and appropriate care to its population. Over the past few years, the human resources situation in the Zambia public sector has reached a point of severe crisis and inability to provide basic health services, primarily due to three interrelated factors:

First, the country is losing substantial numbers of health workers to countries that offer better conditions of service, or are changing professions to ones that offer more attractive opportunities. It is estimated that the number of Zambian-trained doctors practicing in the United States and Canada alone was more than 10 percent of the number practicing in Zambia (Hagopian et al., 2004). Nurses have also been leaving the country in the hundreds. According to the Nursing and Midwifery Council in the United Kingdom, a total of 461 Zambian nurses were recruited between 1998-2003. These trends seem to be getting more severe with time, with more and more health professionals seeking employment abroad. Figure 1 shows the 1998-2003 trend in the recruitment of Zambian nurses to work in the U.K.

Figure 1: Zambian Nurses Recruited by the United Kingdom 1998-2003



While these figures are alarming by themselves, it is likely that similar trends can be seen in migration of Zambian health personnel to other popular destinations such as Australia, Botswana, South Africa, the United States, and Canada, making the gross effect much more severe (Liese and Dussault, 2004). Significant resources are expended in the training of these health care professionals, and the loss of their skills through increased attrition represents a serious long-term problem. This situation is further exacerbated by increasing mortality of health care workers due to HIV/AIDS.

Table 1: Health Sector Human Resources (2003)

Health Worker Type	Number in Public Sector	Annual Graduates	Annual Attrition Rate
Doctors	756	49	9.8%
Nurses	7,251	540	5.3%
Pharmacists	61	20	4.2%
Lab Technicians	292	38	3.5%
Total	8,360	693	5.4%

Source: Zambia Ministry of Health Human Resource database and Zambia Round Four Global Fund Application

Second, Zambia's medical and professional schools have a limited capacity to train additional staff. Countrywide, the country currently has only one medical school, three nursing schools, and three technical colleges graduating doctors, nurses, and laboratory technicians, and pharmacists respectively. In 2004, Zambia's output from medical and professional schools produced only 49 doctors, 540 nurses, 20 pharmacists, and 38 laboratory technicians, far below the graduation rates required to maintain staffing levels.

Third, the country is one of the epicenters of the catastrophic HIV/AIDS pandemic in Southern Africa. National surveillance data estimates an adult prevalence rate of 16.5 percent (World Health Organization [WHO], 2004); in urban areas, rates are up to 27 percent. In 2003 alone, 89,000 people died of AIDS. The legacy of the HIV/AIDS pandemic is terrible – in 2003, there were almost a million people living with HIV/AIDS and 620,000 orphans countrywide.

As a result, Zambia faces severe and worsening problems in maintaining a health workforce capable of providing basic healthcare to all their citizens. The country's shortage of doctors is the most severe: between 1999 and 2002, the number of doctors in the country actually *decreased* from 1,283 to 559. The physician to population ratio has declined dramatically over the past few decades, from 1:10,000 in 1975 to 1:19,000 today, far below the WHO recommended minimum standard of 1:10,000 (World Bank, 1978; WHO, 1998). With annual attrition rates of 9.8 percent for doctors, these trends seem likely to worsen over the next few years. Recent data from the Ministry of Health (MOH) indicate that shortages of key health workers are particularly bad in particular regions of the country; select provinces registering annual attrition rates of more than 20 percent for doctors. All these data suggest the possibility of disastrous consequences for the Zambian health sector.

Attempts to alleviate these shortages have met with limited success. Even though the Zambian health sector has received significant financial support to fight HIV/AIDS, malaria, and tuberculosis from the World Bank, the Global Fund, the President's Emergency Plan for AIDS Relief, and other bilateral sources, this support has primarily gone to expand interventions such as antiretroviral therapy (ART), opportunistic infections, prevention of mother-to-child transmission (PMTCT), and voluntary counseling and testing (VCT). Unfortunately, these funds are not available for recruitment and retention of health workers (Office of the U.S. Global AIDS Coordinator, 2004; Global Fund, 2003).

In addition, macroeconomic reforms implemented since the early 1990s have aimed at achieving sustained, purposeful improvements in the efficiency, equity, and effectiveness of the health sector. The vision is "to provide Zambians with equity of access to cost-effective, quality healthcare as close to the family as possible." Zambia's National Health Strategic Plan 2001-2005 reflects the country's commitment to achieving the health reform vision, and tackling HIV/AIDS is a key priority in this period (MOH, 2000).

However, many national and international policymakers feel frustrated by macroeconomic impediments – whether perceived or real – outside of their control and falling under the responsibility of officials with macroeconomic responsibilities. These barriers include ceilings on total public expenditures, which are often cited as a reason for inability to hire or appropriately pay health care providers; ceilings in the number of positions in the civil service establishment; and limited autonomy for health sector managers to recruit, deploy, motivate, and lay off public sector health care providers. Policies affecting the public-private mix of health service and providers are also a concern (World Bank, 2004).

As HIV/AIDS services are expanded and human resources shifted towards HIV/AIDS services accordingly, this already critical situation will likely be further aggravated. This report was commissioned to investigate three key questions pertaining to the provision of HIV/AIDS services (specifically ART, PMTCT, and VCT):

- ▲ The number of key staff¹ *available* for the provision of these services;
- ▲ The number of key staff *required* to provide services under various scenarios; and
- ▲ The magnitude of the *Zambian human resource “gap,”* defined as the difference between available and required key staff.

¹ Key staff is defined as doctors, nurses, lab technicians, and pharmacists.

2. Methodological Approach

The technical approach included three steps. The first step was a comprehensive desktop review of government documents, articles, and other publications concerning trends in Zambian human resources over the past decade.

Second, researchers conducted a rapid assessment of multiple facilities in March 2004 to estimate available and required human resources associated with scaling up ART, PMTCT, and VCT services in the public health sector in Zambia. In total, 10 public sector hospitals currently providing these services were assessed, including the national referral hospital, central hospitals, and provincial general hospitals (see Table 2).

Table 2: Facilities Assessed, and Their Level of Care

Name of Facility	Level of Care
Chipata Hospital	Secondary
Kabwe Hospital	Secondary
Kasama Hospital	Secondary
Kitwe Hospital	Tertiary
Lewanika Hospital	Secondary
Livingstone Hospital	Secondary
Mansa Hospital	Secondary
Ndola Hospital	Tertiary
Solwezi Hospital	Secondary
University Teaching Hospital	Tertiary

Facilities were chosen to reflect several factors:

- ▲ Geographic representation (10 provinces represented)
- ▲ Both secondary and tertiary levels of care
- ▲ Currently providing key HIV/AIDS Services (ART, PMTCT, VCT)

A two-person team was sent to each facility. Using a pre-tested survey instrument, data were collected on the number of patients currently being treated, the number of staff of each cadre, and the number of patients treated by each staff member in one full workday.

Finally, key informant interview were conducted with senior officials at the Central Board of Health and Ministry of Health.

3. Findings

The major findings from the assessment are presented below. The first section provides an overview of the human resource situation and trends countrywide (national level), the second examines these trends at the provincial level, and the third looks in detail at the human resources situation at the 10 facilities visited.

3.1 National Human Resources Estimates and Projections

Based on data from the national human resource database, there are fewer than 800 doctors and 300 laboratory technicians currently practicing in Zambia; the numbers of nurses and pharmacy staff is slightly closer to the numbers needed. The data also indicate that attrition rates for health staff, historically low, have increased dramatically over the past decade. Based on 1999-2004 attrition rates and graduation rates indicated in Zambia's Round Four Global Fund application, the authors have estimated expected trends in human resource stocks over the next five years (see Table 3).

Table 3: Zambian Public Sector Human Resources Stocks: 2004-2009 Extrapolations

Staff Type	Annual Graduates	Annual Attrition (%)	Staff Available		Projected Stock			
			2003	2004	2005	2006	2007	2008
Doctors	49	9.8%	756	731	708	688	669	653
Nurses (registered & enrolled)	540	5.3%	7,251	7,408	7,557	7,698	7,832	7,959
Pharmacists	20	4.2%	61	78	95	111	127	141
Lab Technicians	38	3.5%	292	320	347	373	398	422
Total	693	5.4%	8,360	8,584	8,798	9,003	9,199	9,387

Source: MOH Human Resource database and Zambia Round Four Global Fund Application

As shown in Table 3, the country is experiencing increasing annual attrition rates among all health staff. Doctors have the highest attrition rate (9.8 percent) followed by nurses (5.3 percent) and pharmacists (4.2 percent). It is important to note that the total numbers of doctors are *decreasing* with time while the total numbers of nurses, laboratory technicians, and pharmacists is increasing slightly.

The big question that program planners and policymakers are asking is whether, given current human resources stocks, the country can reach major targets, such as those of the WHO 3 by 5 Initiative and Millennium Development Goals, using available human resources.

The country is currently implementing the second phase of the National ART program, under which the 10 study facilities were expected to treat 10,000 patients by the end of 2004, a 60 percent increase in their ART patient load (Kombe and Smith, 2003). Zambia recently received approval for Round Four Global Fund activities, which stipulate the ART targets shown in Table 4. VCT targets are based on the number of people who must be tested to result in the ART patient target. Finally,

under the WHO 3 by 5 Initiative, an effort to provide ART to 3 million people by the end of 2005, Zambia is expected to treat a total of 100,000 patients (WHO, 2003). It assumes that 25 percent of those tested are positive (Huddart et al., 2004) and 20 percent of positive are eligible for treatment. PMTCT targets assume that 93 percent of pregnant women receive antenatal care; that 70 percent of those receiving antenatal care are tested for HIV/AIDS, 25 percent of whom test positive; and that 75 percent of those testing positive will accept treatment (Huddart et al., 2004).

Table 4: Estimated Human Resources Needed to Achieve Global Fund ART, PMTCT, and VCT Targets

Staff Type	Year				
	2004	2005	2006	2007	2008
Target (# of Patients)					
ART Target	10,000	25,000	45,000	65,000	85,000
PMTCT Target	55,000	55,000	55,000	55,000	55,000
VCT Target	200,00	500,000	900,000	1,300,000	1,700,000
Required Human Resources					
Doctors	10	26	47	68	88
Nurses	69	173	312	450	589
Pharmacists	15	37	67	96	126
Lab Techs	92	229	412	595	779

Recall that one set of data collected during the facility assessment was the number of patients the average staff member at these facilities treats in one full day. These have been used to derive the approximate length of time (i) doctors spend with patients on initiation and follow-up of ART patients; and (ii) counselors spend with patients on pre- and post-test VCT counseling. Times for laboratory technicians and pharmacists were based on data collected by Initiatives Inc. in 2004 (Huddart et al., 2004). These times are used to calculate the number of patients that can be served annually by each staff member. Table 5 shows the number of patients one member of each staff cadre could treat if they worked full-time for an entire year.² (See Annex A for a detailed look at the calculations underlying these estimates). In order to reach 85,000 ART patients by 2008, the number of doctors would increase from 10 to 88 FTEs, nurses would increase from 69 to 589 FTEs, and laboratory technicians would increase from 92 to 779 FTEs. These annual staff requirements are applied to Global Fund ART, PMTCT and VCT targets, yielding an estimate of the staff required to provide ART, PMTCT and VCT services (Table 5).

Table 5: Average Number of Patients Treated Annually by an FTE Staff, by Staff Cadre

Staff Cadre	ART	PMTCT	VCT
Doctor	692	N/A	N/A
Nurse	1,925	2,160	3,123
Lab Tech	251	3,692	3,869
Pharmacist	675	N/A	N/A

Source: Zambia Round Four Global Fund Application

² The term used to describe this is a full-time equivalent (FTE) staff member.

Zambia subscribes to the WHO 3 by 5 Initiative and it is estimated that the country will reach the target of 100,000 ART patients by the end of 2005. This is a very ambitious plan that calls for rapid scale-up of the ART program. Based on current annual patient loads. Zambia requires 104 doctors, 692 nurses, 916 laboratory technicians, and 148 pharmacists to achieve WHO 3 by 5 Initiative (2005) targets.

To put these HR requirements into the context of the available stock, it is necessary to take into account the effects of reassigning staff from other health activities to ART, PMTCT and VCT services. To do this, the authors begin by determining staff required to provide “baseline” (2004) health services to the baseline population. This baseline is then extrapolated into the future modified by the prevalent population growth rate, under the reasonable assumption that increasing the number of staff at the same rate as the population growth rate 2.7 percent (2) results *ceteris paribus* in a steady level of health human resources.

Looking at the trend over time, any additional staff entering the workforce beyond this baseline requirement would contribute to raising the level of health services, and any staff reassigned from other health activities to ART, PMTCT, and VCT services would contribute to lowering the level of health services.³ Thus comparing the total staff needed (baseline staff need plus staff needed to achieve the targets of major initiatives) with the available staff gives us a quantitative measure of the level of health human resources compared to baseline levels.

In Table 6, by comparing columns B and D, we observe that the number of pharmacists and laboratory technicians is sufficient to sustain and perhaps raise current levels of health services. The annual growth in the number of nurses, however, is slightly below the population growth rate, and the diminishing number of doctors coupled with increasing population suggests an alarming downward trend in the doctor-population and nurse-population ratios.

Table 6: The Zambian Human Resources Gap (2008)

Staff Type	Number of Staff in 2008:				
	(A) Needed for Global Fund ART PMTCT & VCT	(B) Required to Maintain 2003 Per Capita Staff Levels	(C) = (A) + (B) Projected Need	(D) Total Available (Projected)	(E) = (D) –(C) HR Gap
Doctors	88	866	954	653	-301
Nurses	742	8,230	8,972	7,959	-1,013
Lab Techs	897	332	1,229	422	-807
Pharmacists	126	69	195	141	-54

Note: Deficits are shown as negative values

Comparing columns C and D (i.e., including the staff needs for Global Fund ART, PMTCT, and VCT activities) shows that all cadres experience 2008 human resources gaps of different magnitudes. Nurses are the most numerous cadre and their deficit is just over 10 percent of needed nurses. Laboratory technicians, on the other hand, exhibit a deficit of more than 65 percent of the number needed.

³ Note that this statement makes no assumption about whether current health service levels are adequate.

3.2 Provincial Human Resources Estimates and Projections

Looking only at national human resources figures may obscure important trends *within* the country. Table 7 shows estimates of Zambia's health sector human resources by province, in 2004 and extrapolated to 2008 under certain assumptions.⁴

Table 7: Estimated Zambian Provincial Human Resources Stocks: 2004 and 2008

Province	Doctors		Nurses		Lab Techs		Pharmacists	
	2004	2008	2004	2008	2004	2008	2004	2008
Central	36	25	663	689	28	35	8	13
Copperbelt	222	215	1,945	2,272	83	115	25	48
Eastern	32	15	645	587	20	24	5	8
Luapula	22	10	296	264	17	20	4	6
Lusaka	278	316	1,714	2,119	87	124	14	27
Northern	24	11	299	269	12	14	4	6
North-Western	35	18	483	452	21	26	4	7
Southern	47	27	979	957	36	44	11	19
Western	36	17	384	350	15	18	3	6

Source: MOH Human Resource database

The results reflect the preferences of health professionals for urban areas differences in the urban and rural attrition rates, leading to net losses of staff in rural areas (Eastern, Luapula, Northern, and Western provinces) and net staff gains in urban areas (Copperbelt and Lusaka provinces).

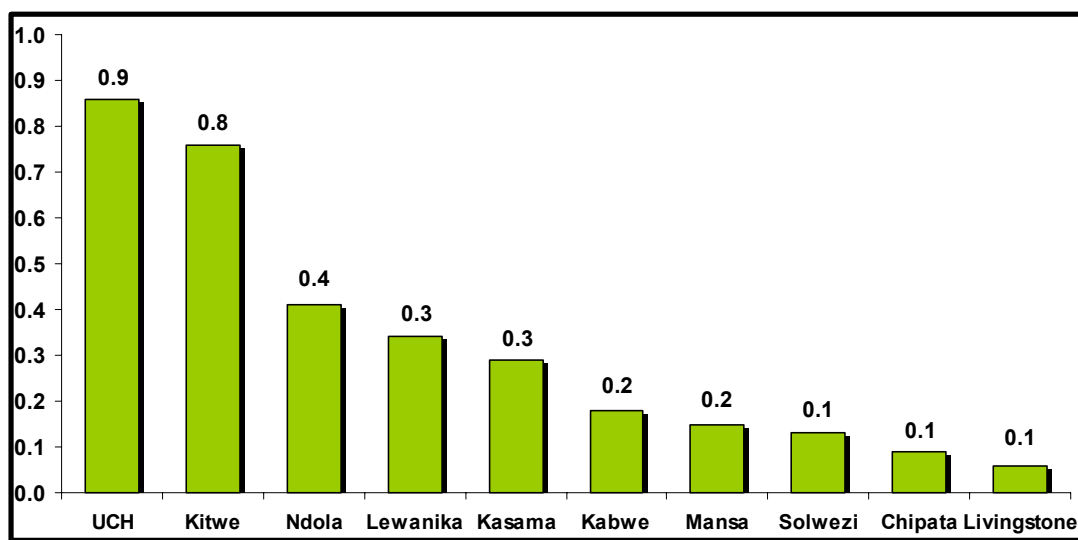
Using the same extrapolations as for national data, we have calculated the number of staff required in 2008 to simply sustain current (2004) levels of health human resources in each province. The results show which provinces are likely to experience the greatest human resources gaps, assuming current trends continue. There is significant variation between provinces. For doctors, the gap varies from only 8.5 percent of available (Lusaka) to more than 60 percent (Eastern, Luapula, Northern, North-western, and Western provinces). For nurses, the gap is much smaller, varying from gaps of more than 20 percent (Eastern, Luapula, Northern, and Western provinces) to less than 2 percent in Lusaka. For laboratory technicians, the situation is most severe, with gaps ranging from around 75 percent of available staff (Copperbelt and Western provinces) to around 33 percent (Luapula, North-western, and Southern provinces). Finally, for pharmacists, the variation is widest, ranging from gaps of around 50 percent of available staff (Lusaka and Eastern and Northern provinces) to *surpluses* (Central, Luapula, North-western, and Southern provinces). Over all staff cadres, Lusaka and Central provinces seem to have the lowest gaps and Luapula and Western provinces the highest.

⁴ See Annex B for the assumptions governing these extrapolations.

3.3 A Closer Look at Health Workers at Major Facilities

Based on data collected during the facility assessment, a total of 3,800 ART patients are currently being treated at the 10 facilities. The facilities have a total staff complement of 435 doctors, 2,021 nurses, 94 laboratory technicians, 31 pharmacists, 260 counselors, and nine social workers. Data were also collected on the reported number of ART patients the average doctor in these facilities treats in one full workday (29) and the reported number of patients the average counselor provides with VCT counseling in one full workday (17). Based on this data we estimate the number of FTE doctors and nurses working in ART and VCT at the 10 facilities (Figure 2).⁵

Figure 2: Full-time Equivalent Doctor Labor Utilized for ART at Each Facility



On average, the facilities are utilizing 1.4 FTE doctors on ART services (a total of 8.2 FTE doctors at all facilities treating 3,800 ART patients). Comparing the FTE staff to the total number of staff at these facilities suggests that there is room for expansion of ART services to a certain point, especially at provincial facilities. However, note that the doctors at University Teaching Hospital (UTH) (which is by far the largest facility) are each treating 43 patients per day, and the counselors are seeing 40 patients per day, far above the average, meaning that UTH facility staff spend less time treating/counseling each patient than any of the other facilities. This suggests that UTH staff may be seriously overworked. However, these figures may be misleading for a number of reasons:

- ▲ The fact that some doctors work part-time in the private sector means that the actual number of FTE doctors available at the facility is lower than the numbers given above;
- ▲ Many of the doctors counted in the “available” figures actually serve in an administrative capacity and so do not actually treat patients, overestimating the number of doctors available to treat patients; and

⁵ Public sector health workers have on average the following days of leave each year: 36 days vacation; 20 days sickness; 12 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 8-hour day, a worker is actively providing client service for six hours and that two hours are for other work, such as staff meetings and logistics management, or with waiting time (Huddart et al., 2004: 35).

- ▲ Only a small subset of the available staff has been trained in HIV service provision.

Looking at future trends, if scaling up of ART under the National ART program and Global Fund is to be achieved, the 10 facilities visited should be expected to bear an increased patient load. Assuming uniform scale-up within each facility type, the authors apply the patient loads seen in the 10 facilities to calculate numbers of patients each type of facility must treat to achieve the initial target of 10,000 ART patients:

- ▲ UTH = 3,600
- ▲ Kitwe and Ndola = 2,000 each
- ▲ General hospitals = 330 each

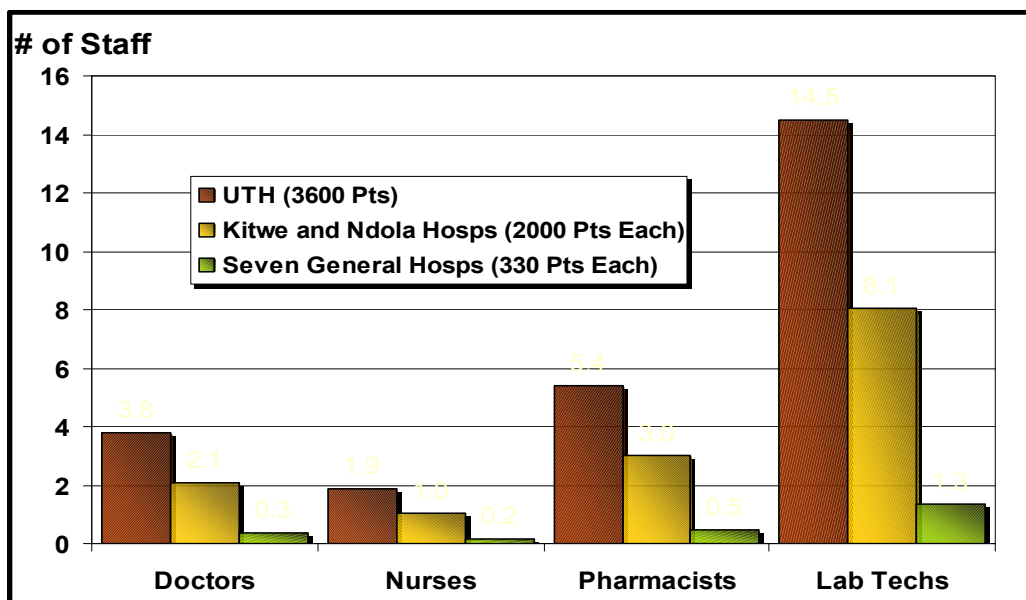
The annual staff requirements presented above (Table 3) are applied to these facility patient targets, yielding the staff required at each facility to provide ART, PMTCT, and VCT services under Global Fund targets (see Table 8). Examining Table 4, for each staff cadre, the first row represents the staff required to achieve the 2004 ART target (treating 10,000 ART patients). The second row represents the staff required to achieve the 2005 ART, PMTCT, and VCT targets (25,000 ART patients, 55,000 PMTCT patients, and 500,000 VCT patients).

Table 8: FTE Staff Required at Each Facility Under Two Scenarios

Staff Required	Hospital										
	UTH	Chipata	Kabwe	Kasama	Kitwe	L'nika	L'stone	Mansa	Ndola	Solwezi	Total
Doctors											
10,000 ART Patients	3.8	0.3	0.3	0.3	2.1	0.3	2.1	0.3	2.1	0.3	12.1
2005 Targets (all services)	9.4	0.9	0.9	0.9	5.2	0.9	5.2	0.9	5.2	0.9	30.4
Nurses											
10,000 ART Patients	1.9	0.2	0.2	0.2	1.0	0.2	1.0	0.2	1.0	0.2	6.1
2005 Targets (all services)	62.8	5.8	5.8	5.8	35.0	5.8	5.8	5.8	35.0	5.8	173.1
Lab Techs											
10,000 ART Patients	5.4	0.5	0.5	0.5	3.0	0.5	3.0	0.5	3.0	0.5	17.3
2005 Targets (all services)	83.1	7.6	7.6	7.6	46.3	7.6	7.6	7.6	46.3	7.6	229.0
Pharmacists											
10,000 ART Patients	13.4	1.2	1.2	1.2	7.5	1.2	7.5	1.2	7.5	1.2	46.6
2005 Targets (all services)	36.2	3.3	3.3	3.3	20.2	3.3	20.2	3.3	20.2	3.3	116.6

Figure 3 compares the projected number of staff with the number required to achieve national (2004) ART targets (10,000 patients).

Figure 3: Staff Required at Each Facility to Treat 10,000 ART Patients



At all facilities, a total of 10 FTE doctors, five FTE nurses, 15 FTE pharmacists, and 40 FTE lab technicians will be needed. It is clear from these estimates that a large number of additional laboratory technicians will be required to scale up ART services.

Looking towards the future, we then compare the projected number of staff in 2005 with the number required to provide comprehensive HIV services (ART, PMTCT, and VCT) under 2005 targets. We can see that HIV services will require between 4 percent and 10 percent of available doctors, with the exception of Livingstone (which would require 38 percent of available doctors).

Comparing the number of available laboratory technicians and pharmacists to the numbers required for HIV services, we see that the number of required staff exceeds the total staff available at the facility, with the exception of laboratory technicians at Kabwe and Mansa hospitals, which require 85 percent and 95 percent of available laboratory technicians, respectively. It is clear that, in all cases, the number of laboratory technicians and pharmacists required far exceeds the number available, suggesting that the implementation of these (2005) HIV plans will have significant adverse effects on the human resources remaining to provide other health services at these facilities. The figures for nurses are far more encouraging, with HIV services only requiring between 0.2 percent (Livingstone) and 1.3 percent (Ndola) of available nurses.

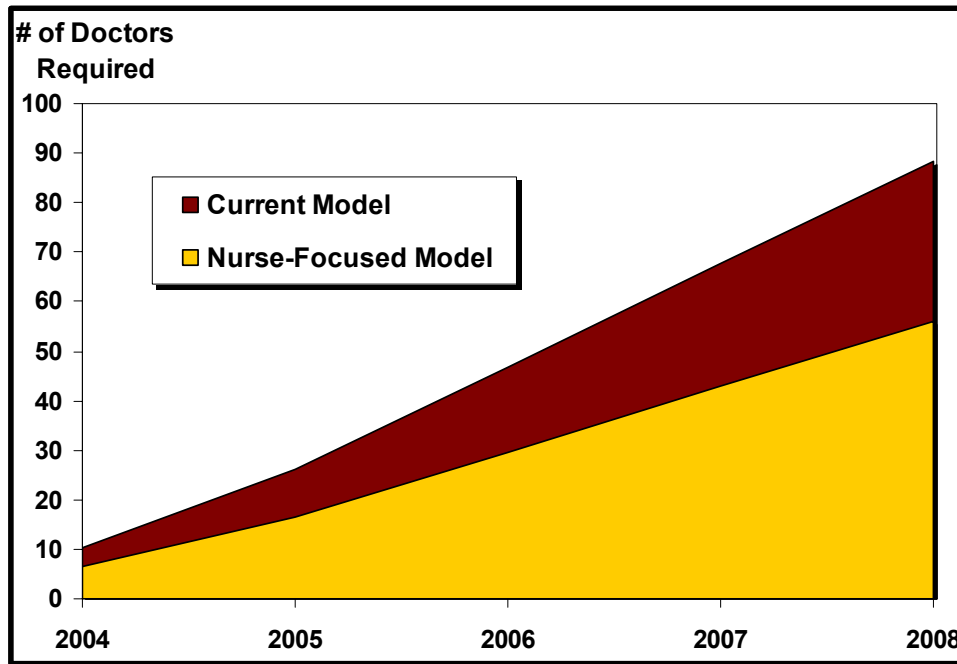
4. Proposed Plan of Action for Alleviating HR Shortfalls

According to the assessment, the numbers of available doctors, laboratory technicians, and pharmacists represent serious constraints to the capacity of Zambian health facilities to scale up ART, PMTCT, and VCT services. To alleviate these constraints, a number of policy-driven strategies have been discussed.

4.1 Delegating Certain ART Tasks from Doctors to Clinical Officers and Nurses

Anecdotal evidence indicates that stable ART patients could be seen for follow-up visits by nurses rather than doctors without adverse effects on treatment quality. National Guidelines would need to be modified and appropriate training programs instituted to facilitate this nurse-focused scenario (see Figure 4). Note that the number of required doctors is dramatically reduced under this scenario, freeing up a large number of doctors for other medical services. While the number of nurses required to provide these services does increase as a result, the effect is negligible given the large quantity of trained nurses in Zambia.

Figure 4: Number of Doctors Available and Required for Global Fund Targets



4.2 Delegating the Laboratory Processing of HIV/AIDS Screening and Confirmation Tests from Laboratory Technicians to Other Cadres

Because rapid testing for VCT is now available in most hospitals, the country should consider delegating this task to other cadres to relieve laboratory technicians who are already engaged in the collection of blood samples and reading the results. This task does not necessarily require a high level of laboratory training to process rapid HIV/AIDS diagnostic tests. Again, National Guidelines would need to be modified and appropriate training programs instituted to facilitate this scenario.

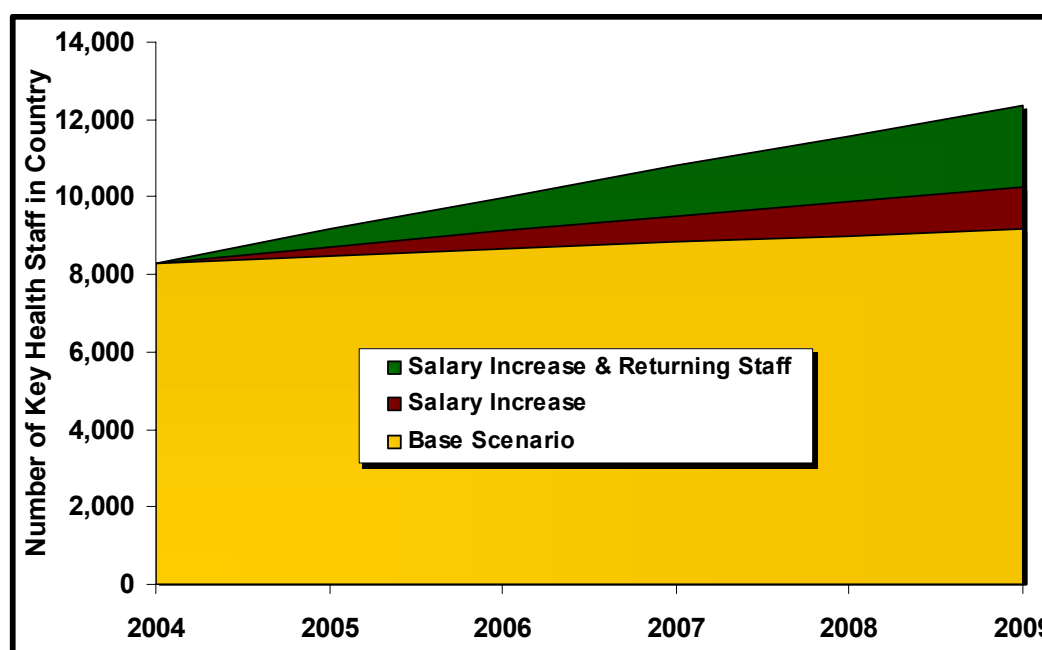
4.3 Raising Compensation Levels

Significant numbers of doctors and nurses are leaving the public sector to go to the Zambian private sector and even to other countries (particularly Australia, Botswana, South Africa, and the U.K.) where compensation levels (salaries and other incentives) are much higher.

Zambia should consider introducing incentives for health professionals to remain in the country. This may include salary supplements as well as the introduction of housing allowances, training programs, and opportunities for advancement. These distinctions are not made in this analysis. In Figure 5, three scenarios are explored. The first is the baseline scenario, under which compensations levels are not raised. This scenario simply follows the human resources trends outlined in Section 4.1.

The second scenario examines the effects on future staff attrition of increasing compensation levels to a level of parity with the private sector, Australia, Botswana, and South Africa. The effects are modeled under the assumption that attrition due to staff taking unpaid leave, absconding, resigning, and transferring would be reduced to zero with the increased salaries, leaving a “base attrition rate.”

Figure 5: The Effects of Salary Increase on Attrition and Emigration of Key Health Staff



The third scenario attempts to capture the effects of higher compensation levels on the *return of staff already abroad* in addition to the attrition effects.⁶ The results show that a salary increase results in positive growth in the number of doctors (negative under the base scenario). This effect is significantly increased when the effect of returning staff is included. The same is the case for all staff cadres. It is important to note that this does not take into account the likely influx of neighboring (Zimbabwean, Congolese, Tanzanian, and Malawian) workers into Zambia as wage gaps are opened. Thus the real effects may be greater than estimated above. A comprehensive study of individual behavior in laboratory or markets for health workers should be conducted to obtain a more complete picture of the likely results of these interventions.

4.4 Engaging Private Pharmacies to Dispense Antiretroviral Drugs to Relieve Facility Pharmacists

The government should seriously consider contracting-out some services to the private sector using performance-based agreements. The data presented above clearly show that there is a severe shortage of pharmacy staff in Zambia. Given the current shortage of pharmacists in the public sector, the government should continue working private pharmacies to dispense subsidized antiretroviral drugs. This would dramatically reduce the burden on pharmacists at the facilities and allow them to work on other activities. The authors strongly recommend demonstration projects in urban areas before moving into rural areas.

4.5 Bringing in Foreign Health Workers

Large numbers of foreign health workers are already practicing in the public sector in Zambia. It is not clear how many are in the country at any given time. While these workers are from all over the world, two countries (Cuba and Zaire) account for the majority. Hiring additional foreign workers could alleviate Zambia's human resources shortfalls in the short run. However, a number of steps would need to be taken to facilitate this. These would include:

- ▲ Necessary immigration legislation would need to be enacted.
- ▲ Ministry of Health would need to develop a human resources plan stipulating the numbers of staff to be hired from each source and their expected compensation levels.
- ▲ Ministry of Finance would need to approve the expenditure and release the funds.
- ▲ Based on the staff deficits estimated above, and salaries in the public, private, and non-governmental organization sectors, hiring enough workers to eliminate the staff deficit would cost around \$US2.6 million in 2005, \$4.4 million in 2006, \$6.1 million in 2007 and \$8.6 million in 2008.

⁶ The third scenario assumes that all staff lost due to these reasons since 2000 return to the country between 2005 and 2009 and that a similar amount of staff lost before 2000 also return during the same time period.

Annex A: Calculation of Number of Patients Treated per Staff Member Annually

Service	Staff Type	Frequency	Sessions per year	Minutes Per Session	Minutes Per Patient Year	Annual Workdays	Annual Work Minutes	Patients Per Staff Per Year
ART	Doctors: Initiation		1	18	18			
	Doctors: Follow-up		4	12	49			
	Doctors: Total				67	180	64,800	962
	Nurses		5		34	180	64,800	1,925
	Laboratory Tech: Full Blood Count and Blood Sugar		4	53	214			
	Laboratory Tech: CD4 Count		2	10	20			
	Laboratory Tech: Viral Load		1	25	25			
	Laboratory Tech: Total				259	180	64,800	251
	Pharmacists		12	8	96	180	64,800	675
	Total				782			
VCT	Counselor: Pre-test		1	12				
	Counselor: Post-test (-ve)	75%	1	8				
	Counselor: Post-test (+ve)	25%	1	10				
	Counselor: Total		1	21	21	180	64,800	3,123
	Laboratory Tech: Screening	100%	1	13				
	Laboratory Tech: Conf	25%	1	15				
	Laboratory Tech: Total		1	17	17	180	64,800	3,869
	Total				21			
PMTCT	Counselor: Pre-test		1	13				
	Counselor: Post-test (-ve)	75%	1	16				
	Counselor: Post-test (+ve)	25%	1	20				
	Counselor: Total		1	30	30	180	64,800	2,160
	Laboratory Tech: Screening	100%	1	14				
	Laboratory Tech: Conf	25%	1	15				
	Laboratory Tech: Total		1	18	18	180	64,800	3,692
	Total				48			

Annex B: Number of ART Patients and Staff at Each Facility

Data	Hospital													
	UTH	Chipata	Kabwe	Kasama	Kitwe	Lewanika	Livingstone	Mansa	Ndola	Solwezi	Total	UTH	Kitwe & Ndola Central Hospitals	General Hospitals
# of Patients	1,380	119	135	130	768	250	126	55	768	70	3,801	1,380	1,536	885
Number of Facilities											10	1	2	7
Average											380	1,380	768	126
% of Total	36.3%	3.1%	3.6%	3.4%	20.2%	6.6%	3.3%	1.4%	20.2%	1.8%	100.0%	36.3%	40.4%	23.3%
Each as % of Total											10.0%	36.3%	20.2%	3.3%
Patients per day ⁷														
Doctor	43	35	20	12	27	20	60	10	50	14	29.1	43.0	39	24
Counselor	40	10	49.5	2	5	10	4	14	15	24	17.35	40.0	10	16
Total Staff														
Doctors	229	9	11	12	61	10	14	13	62	14	435	229	123	83
Nurses	695	122	159	113	267	104	181	99	204	77	2021	695	471	855
Laboratory technicians	20	7	9	7	12	4	7	8	17	3	94	20	29	45
Pharmacists	4	1	1	1	12	1	4	3	2	2	31	4	14	13
Counselors	26	65	32	22	9	37	34	6	23	6	260	26	32	202
Social Workers	4	1	1	0	1	0	0	0	2	0	9	4	3	2

⁷ These reported figures are significantly higher than previous estimates derived from pilot studies conducted under the 2003 Zambia Workforce Assessment.

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