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Comprehensive Assessment of Human Resources for Health in Côte d'Ivoire

August 2005

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Abstract

Many countries are exploring ways of mobilizing large number of physicians, nurses, counselors, midwives, laboratory technicians, and other health workers in order to meet service targets of their governments and of international initiatives while simultaneously maintaining basic health care services. Despite knowing that lack of human resources (HR) will impede their reaching targets, few countries have conducted comprehensive assessments to estimate the existing stock of health care workers and project HR needs into the future. Therefore, Partners for Health Reform^{plus} conducted a comprehensive assessment of the public health sector in Côte d'Ivoire to quantify HR available and what is needed to maintain basic health services while scaling up HIV/AIDS services to reach targets at the national level and at the global level through initiatives such as the President's Emergency Plan for AIDS Relief, the World Health Organization's 3 by 5 Initiative, and the Millennium Development Goals.

In Côte d'Ivoire, civil conflict and worsening socio-economic conditions have increased the demand for public health services and exacerbated the shortage of HR in the public sector. Data show that HR levels decreased across all health worker types from 2002 to 2003, although levels rose slightly in 2004. Limited public budgets impede recruitment of health workers into the civil service. Attrition rates are high among social workers, generalized doctors, and nurses, and medical school graduation rates have declined.

The assessment shows that meeting targets will require substantial HR mobilization. It recommends that Côte d'Ivoire support the development of a long-term HR plan and HR database and make better use of its trained health professionals. An assessment of HR in the private sector is suggested to provide a comprehensive picture of the entire health sector. Similarly, it must protect existing services from collapsing due to an HR shortage.

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Acronyms

AIDS	Acquired Immune Deficiency Syndrome
ART	Antiretroviral Therapy
CDC	U.S. Centers for Disease Control and Prevention
CDV	<i>Conseil de Dépistage Volontaire</i>
DHR	Department of Human Resources (<i>Direction des Ressources Humaines</i>)
FTE	Full-Time Equivalent
GDP	Gross Domestic Product
GF	Global Fund to Fight AIDS, Tuberculosis and Malaria
HIV/AIDS	Human Immunodeficiency Virus/Acquired Immune Deficiency Syndrome
HIV	Human Immunodeficiency Virus
HR	Human Resources
IMF	International Monetary Fund
INFAS	<i>Institut National de Formation des Agents de Santé</i> (National Institute for Health Workers Training)
INFS	<i>Institut National de Formation Sociale</i> (National Institute of Social Training)
MAP	Multi-Country HIV/AIDS Program
MOH	<i>Ministère de la Santé et de la Population</i> (Ministry of Health and Population)
NGO	Non-Governmental Organization
PEPFAR	President's Emergency Plan for AIDS Relief
PHF	Primary Health Facility
PHR_{plus}	Partners for Health Reform _{plus}
PMLS/MAP	<i>Projet Multisectoriel de Lutte contre le Sida</i> /Multisectorial AIDS Project
PMTCT	Prevention of Mother-to-Child Transmission of HIV
PTME	<i>Prévention de la Transmission de la Mère à l'Enfant du VIH</i>
TB	Tuberculosis
UFR	<i>Unités de Formation et de Recherche des Sciences Médicales</i> (Units of Medical Science Research and Training)
UN	United Nations
UNAIDS	Joint United Nations Program on HIV/AIDS
UNICEF	United Nations International Children's Emergency Fund
USAID	United States Agency for International Development
USG	United States Government
VCT	Voluntary (HIV) Counseling and Testing
WHO	World Health Organization

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Executive Summary

The shortage of human resources (HR) in the health sector is common in many sub-Saharan African countries (U.S. Agency for International Development [USAID], 2003). The number of trained health care providers has historically been inadequate, but in recent years many countries have suffered from scarcities of almost all cadres of health workers. Production of health workers has not kept pace with needs, especially with the ever-increasing burden of diseases brought about by HIV/AIDS and resurgent epidemics.

Challenges to health sector HR often reflect political, social, and economic problems within countries (World Health Organization [WHO], 2005). Since 2002, the situation surrounding health sector HR in Côte d'Ivoire has reached crisis proportions due to civil war (USAID, 2003). The overall functioning of health services has been severely affected, resulting in the population having only limited access to health care, particularly in conflict zones (Joint United Nations Programs on AIDS, 2004). According to WHO's Health Action in Crisis Report in November 2004, 70 percent of health facilities across the country are not functioning. The majority of medical staff have relocated or fled, or are unable to go to work due to lack of security. Public health programs, including immunization, have been halted, and essential drugs are out of stock in many locations. Furthermore, the health surveillance system across the country is very weak. All those factors contribute to increasing the risk of communicable diseases (WHO, 2004).

Côte d'Ivoire faces three main challenges to expanding HR for health. First, it is very complex to estimate the total number of health workers needed to deliver HIV/AIDS and other basic health services without a comprehensive methodology. Currently, directors of regional health offices identify HR requirements in an empirical way. The Department of Human Resources of the Ministry of Health and Population/*Ministère de la Santé et de la Population* (MOH) consolidates these regional requirements into national ones and transmits them to the Ministry of Civil Service. Even though the country has good ratios of health personnel to the total population compared to other West African countries, data show that the health system requires additional health workers to effectively deliver needed health services. These HR requirements have increased with the expansion of HIV/AIDS programs and the resurgence of other diseases due to the civil conflict.

Second, due to declining socio-economic conditions and structural adjustment measures recommended by the International Monetary Fund (IMF)/World Bank, the Ministry of Civil Service in collaboration with the Ministry of Finance has restricted recruitment of civil servants since 1996. This has resulted in an imbalance between the number of health workers currently employed and the number needed by the MOH, as shown by 2001 and 2004 data. On average, the actual number of health workers hired during this period represents only 40 percent of the expressed need.

Third, the civil service entrance examination, introduced in 1996 to serve as "gate keeper" to the civil service in response to public sector budgetary constraints, impedes absorption of trained health workers into the public health sector. Even though the MOH Department of Human Resources identifies real needs, a considerable number of doctors fail to enter the public sector.

The specific purpose of this report is to quantify the HR now available and that needed by the public health sector to achieve the HIV/AIDS service targets of the government and its partners including the Global Fund to Fight AIDS, Tuberculosis and Malaria (GF), the President's Emergency Plan for AIDS Relief (Emergency Plan, or PEPFAR), the World Bank's Multi-Country HIV/AIDS Program for Africa (MAP), and WHO's 3 by 5 Initiative. The data collected can also be used to examine HR issues pertaining to other priority health services, as well as to the health sector as a whole.

Of the 301 health facilities surveyed, only 5 percent (four National Institutes university hospitals, seven regional and general hospitals, and five health centers) offered antiretroviral treatment (ART) in 2004. During the same period, medical doctors, both general practitioners and specialists treated 1,272 patients in AIDS-related care (ART, voluntary counseling and testing [VCT], prevention of mother-to-child transmission [PMTCT], and opportunistic infections). In the assessment, facilities reporting on ART services stated that each doctor saw on average 13 patients per day. This average was skewed by three facilities that reported that their doctors saw on average respectively 35, 35, and 60 patients per day; if these facilities were removed from the survey sample, the average falls to six patients per doctor per day. Each counselor¹ provided services to approximately 13 VCT patients per day and 21 PMTCT patients per day. It was also reported that on average doctors spend 30 minutes per ART patient per visit. Similarly, counselors¹ spend on average 19 minutes per VCT patient and 18 minutes per PMTCT patient. One general trend in the provision of HIV/AIDS services at these facilities is the rapid increase in the number of health workers delivering AIDS-related care. In 2002, 73 medical doctors, 60 nurses, 88 midwives, and 21 lab technicians were working in AIDS-related care. In 2004, the stock of health workers providing HIV/AIDS-related care more than doubled: 144 medical doctors, 121 nurses, 221 midwives, and 53 lab technicians.

This report makes six main observations. First, it presents current and future HR stock for the health sector. The total HR stock available² in 2004 is estimated at 11,749. Of this total, nurses make up the majority (58 percent) followed by midwives (18 percent) and doctors (14 percent). Applying the 2004 baseline (graduation and attrition rates) and assuming that HR policies stay unchanged, the HR stock is estimated at 10,023 full-time equivalents (FTEs) by 2008. This is a 15 percent reduction in the total stock in 2004 and may affect the delivery of basic health services.

In discussing future projections, it is vital to understand how many health workers actually enter the public sector. Data from 2001 and 2004 indicate that the total number of staff hired in the public sector was estimated to be 40 percent of the total number of graduates in a given year. (Nurses are the exception, with nearly 90 percent of graduates hired into the public sector.) We assume that the remaining graduates enter the private sector, remain unemployed, go abroad, or work elsewhere. We explore two scenarios of how future stock will evolve using the current 40 percent hiring rate into the public sector and an optimistic scenario using a higher rate of 90 percent. Based on the 40 percent hiring rate assumption, the projected stock of medical doctors would decrease to 1,559 in 2008, a 2 percent decrease from the 2004 total. Nurses would also realize a 19 percent decrease from the 2004 total, to 5,568, in 2008. In fact, all staff types would see a decrease in stock with the exception of pharmacists, which would grow to 298 in 2008, a net increase of 49 percent from 2004. Given the low number of new graduates and high attrition rates, the total HR stock projected in 2008 is estimated at 10,023, a 15 percent decrease compared to 2004.

¹ According to PMTCT protocol, doctors, nurses, midwives, psychologists, etc. can be considered counselors.

² Only health providers and social workers were included in the survey. Administrative workers were excluded.

Second, the public health sector has suffered from very high levels of attrition. The year 2002 witnessed a mass exodus of health workers. The public sector lost one-fifth of its medical doctors (general practice and specialists) and one-quarter of its nurses. Clearly, the country faces a dire shortage of nurses. The high rate of attrition and the small annual cohort of nurses entering the public sector are the principal reasons for the shortage of nurses. Strategies to address these shortages should include reducing attrition and/or increasing graduation numbers. For example, if the attrition rate for nurses were reduced by half, the projections of additional nurses in 2008 range from 840 (at a 40 percent hiring rate) to 870 (at a 90 percent hiring rate). Furthermore, if attrition rates were reduced by half and the number of nursing graduates doubled for that period, the projected additional number of FTE nurses would be in the range of 1,314 to 1,936 in 2008. In comparison, the shortfall under the 40 percent projection of the nursing corps would be 2,031 in 2008.

Third, the distribution of health workers has been further skewed towards Abidjan, the capital and largest city in Côte d'Ivoire. The assessment shows that, since the civil conflict began in 2002, the Lagunes region (of which Abidjan is also the capital) had 64 percent of all doctors, 48 percent of all nurses, 74 percent of all pharmacists, 48 percent of all lab technicians, and 67 percent of all social workers. In 2004, those figures rose in all health professions, especially among lab technicians (66 percent in the Lagunes region) and social workers (77 percent). With the violence taking place primarily outside of Abidjan, it is of little surprise that health workers in peripheral areas retreated to the economic center of the country. Abidjan might have become a temporary safe haven, but it is unclear whether these health workers would return to their former provincial posts if the civil conflict ended. In addition to this imbalance between Abidjan and the rest of the country, there are disparities among regions. Savanes, a region in the North, has substantially fewer medical workers in each staff cadre than does the region of Haut-Sassandra in the Southwest, even though both regions have the same population (roughly 1.2 million).

Fourth, the question of whether Côte d'Ivoire can meet the HIV/AIDS targets is a complex one that requires thorough analysis of the situation, including HR policies and strategies. This report only quantifies the number of doctors, nurses, pharmacists, and lab technicians needed to meet the ART and VCT/PMTCT targets under different initiatives. In 2008, Côte d'Ivoire and PEPFAR calls for 77,000 patients to receive ART. To meet the ART and VCT/PMTCT targets in 2005, the total HR needed is about 666 FTE. This number would rise to 1,699 in 2008, with counselors and lab technicians making up the majority of the needed HR stock. It is important to mention that the HIV/AIDS HR requirements are a subset of the total HR in the public health sector and the country must balance the delivery of comprehensive HIV/AIDS activities with other basic health services such as malaria, diarrhea diseases, immunizations, maternal and child health, etc.

Fifth, the nurse shortage in Côte d'Ivoire remains the biggest HR impediment toward meeting the major national and international HIV/AIDS targets. Given this existing shortage, it will be difficult to scale up new services requiring nursing personnel, such as PMTCT, even though the total additional level of effort required appears to be minimal; e.g., only 32-39 additional full-time nurse equivalents needed across the country to prevent 19,241-23,569 infections.

Finally, in terms of the health workforce, in 2008 the country will not be able to maintain basic health services and it will be increasingly challenging to deliver HIV/AIDS services. Using the current 40 percent hiring rate into the public sector, projections show a shortage of health workers across all categories – doctors, nurses, and lab technicians – which will only worsen over time. The shortfall in 2008 is projected to be 331 doctors (or 18 percent of the total needed), 2,005 nurses (27 percent), and 533 lab technicians (54 percent). At the same time that the health system is unable to hire according to the needs, unemployment among doctors, lab technicians, and pharmacists is high.

The following recommendations are made to address the short-and long-term HR shortages:

- ▲ The government in consultation with development partners should examine and agree on options for mobilizing additional health workers to serve in underserved rural areas. Experience from other sub-Saharan African countries shows that, to attract health workers to serve in rural areas, incentives such as school fees for their children, housing allowance, transportation, and in-service training should be provided. Other options being considered or implemented in other countries include hiring of contract workers, retraining and redeploying paramedical or community health workers, and mounting and redoubling serious efforts to recruit and train additional health professionals.
- ▲ The government should develop innovative strategies to motivate the health personnel. Those strategies could include providing regular in-service training under the supervision of a professional; participation in seminars and workshops at the national and even international level; introduction of annual information exchange forums and sharing/diffusion of best practices and experiences between professionals working in HIV/AIDS services delivery; periodic organization of the preventive sessions for “burn out” or exhaustion syndrome among care providers.
- ▲ Côte d’Ivoire is fortunate to have a great number of doctors, pharmacists, and dental surgeons, but unfortunately a high number of these health workers are unemployed. If the country is to meet its national targets for AIDS-related care, the wage bill for the human resources to carry out ART, VCT, and PMTCT must be carefully considered. In 2002, Côte d’Ivoire spent only 1.18 percent of its gross domestic product (GDP) on health, plus 0.41 percent in health sector investment. (In the same year, it disbursed 2.96 percent of its GDP in external debt obligations [IMF, 2004].) Of the total public health budget, salaries usually constitute 40 to 60 percent. It is clear that the current level of health spending cannot sustain the wage bill for the required health personnel to reach national targets. The next stage of planning should price out the wage bill for the increased number of health workers and should involve the Ministry of Finance and the Ministry of Planning. Furthermore, the government should renew discussions with all relevant actors on removing or addressing constraints to employing an adequate number of health personnel needed to meet both national and international health objectives.
- ▲ Côte d’Ivoire needs to take a very close look at the root causes of attrition of nurses. Urgent and aggressive measures should be put in place to reduce their attrition rate. Additionally, the government should consider increasing by about 50 percent the intake of nursing students at the National Institute for Health Worker Training. The shortage of nurses and allied health personnel is the most critical constraint to scaling up PMTCT, which is the most effective means of preventing new infections. In addition, increasing the number of nurses trained and retained appears to be among the most cost-effective of possible interventions.
- ▲ Urgent and concerted solutions between the government and partners in general, and stakeholders in particular, must be found to solve the problem of unemployment among doctors, lab technicians, and pharmacists. Experience from other sub-Saharan African countries (e.g., Uganda) has shown that countries are hiring and paying additional personnel to work specifically on GF, PEPFAR, and MAP programs, using resources from these organizations.

- ▲ Currently it may be impossible for Côte d'Ivoire to absorb the total number of unemployed health professionals in the corps of doctors, pharmacists, and dental surgeons. However, this “surplus” should serve as a net advantage to the country – Côte d'Ivoire might want to consider exploring formal mechanisms of sending unemployed health workers to other sub-Saharan countries. This exportation of qualified health professionals could be done through the channel of bilateral cooperation, or within the framework of free labor market, and therefore could contribute financially to the reconstitution of the initial stock or to help run the tertiary institutions.
- ▲ The MOH should put in place a strong coordinating mechanism of different stakeholders delivering HIV/AIDS services. This could have a considerable impact on the provision of comprehensive and efficient ART, VCT, and PMTCT services.
- ▲ The government must take stock of HR available in the private sector. In order to fully understand HR needs for basic health care and specifically HIV/AIDS care, assessments of HR in the for-profit and non-profit private sector are essential.

1. Introduction

The shortage of human resources (HR) in the health sector is common in many sub-Saharan African countries (U.S. Agency for International Development [USAID], 2003). The number of trained health care providers has historically been inadequate, but in recent years many countries have suffered from scarcities of almost all cadres of health workers. Production of health workers has not kept pace with needs, especially with the ever-increasing burden of diseases brought about by HIV/AIDS and resurgent epidemics.

Issues concerning HR for health are often a reflection of political, social, and economic challenges within countries (World Health Organization [WHO], 2005). Since 2002, the case of Côte d'Ivoire has reached crisis proportions due to the effects of the civil war (USAID, 2003). The overall functioning of health services has been severely affected by the conflict, resulting in very limited access to health care, particularly in conflict zones (Joint U.N. Commission on HIV/AIDS [UNAIDS], 2004). According to the WHO Health Action in Crisis Report in November 2004, 70 percent of health facilities across the country are not working. The majority of medical staff has relocated or fled, or is unable to go to work due to lack of security. Public health programs, including immunization, have been halted, and essential drugs are out of stock in many locations. Furthermore, the health surveillance system across the country is very weak. All those factors contribute to increasing the risk of communicable diseases (WHO, 2004).

With an adult HIV prevalence rate of 7 percent in the general population (UNAIDS, 2004), Côte d'Ivoire is one of the West African countries hardest hit by the HIV/AIDS epidemic (Futures Group, 2004). In fact, AIDS is the leading cause of death among adults (UNAIDS, 2004).

In such an adverse environment, scaling up health services delivery, particularly HIV/AIDS services, will require a significant increase in the number of health care personnel trained to provide antiretroviral therapy (ART), voluntary counseling and testing (VCT), prevention of mother-to-child transmission (PMTCT), treatment of opportunistic infections, and general basic health services.

2. Background

2.1 Current Health Coverage

The favorable socio-economic conditions and the political stability that Côte d'Ivoire enjoyed after its independence in 1960 created an environment conducive to the development of a strong health sector. For example, the stock of health workers increased from fewer than 100 workers in 1960 to more than 10,000 in 1980, including 400 doctors (*Programme National de Développement*, 1996-2005). The considerable investments in the health sector during this period helped the country to provide adequate access to and coverage of basic health services. Box 1 shows the coverage rates per inhabitant more recently, between 1998 and 2000. It is important to note that most of the coverage rates are within WHO standards for low-income countries.

Box 1. Health Coverage per Inhabitant, Côte d'Ivoire, 1998-2000

1998	1999	2000
Coverage of primary health facilities (PHF)		
1 PHF per 13,516 inhabitants	1 PHF per 12,112 inhabitants	1 PHF per 12,257 inhabitants
Hospital coverage		
1 public hospital per 225,979 inhabitants	1 public hospital per 227,185 inhabitants	1 public hospital per 230,983 inhabitants
Coverage of hospital bed per inhabitants		
1 bed per 2,643 inhabitants	1 bed per 2,691 inhabitants	1 bed per 2,890 inhabitants

Source: Ministère délégué auprès du Ministre de la solidarité charge de la santé (2002)

Ratios of doctors, nurses, and midwives per capita also are close to the WHO standards, as shown in Box 2; in 2000, there was one doctor per 9,739 inhabitants, one nurse per 2,374 inhabitants, and one midwife per 2,081 inhabitants.

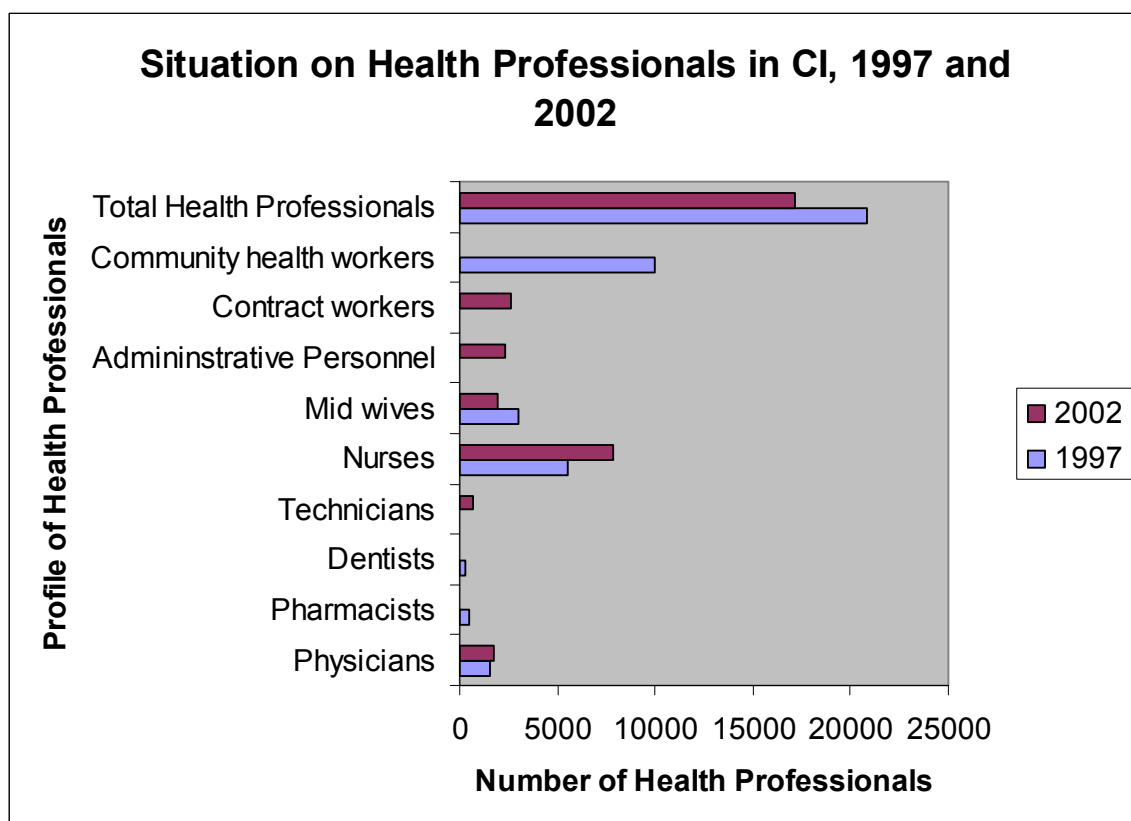
Box 2. Ratio of Medical Coverage in Côte d'Ivoire

Staff Type	WHO Standards	Situation 2000
Doctor	1/10,000	1/9,739
Nurse	1/5,000	1/2,374
Midwife	1/5,000	1/2,081

Source: Ministère délégué auprès du Ministre de la solidarité charge de la santé (2002)

The health situation has not improved much since 2000. In addition to the HIV/AIDS epidemic, Côte d'Ivoire continues to face other major health challenges. For example, in 2001, 400,402 cases of clinical malaria were reported, 133,243 of the cases were in children under 5 years and 7,002 in pregnant women (WHO, 2004). In the same year, the cases of tuberculosis reported for treatment were 6,510 (University of California at San Francisco, 2004). Between 1997 and 2002, data on the health situation shows a negative impact on the HR crisis, seen in Figure 1 (WHO representative in Côte d'Ivoire, 1997).

Figure 1. Numbers of Health Professionals in Côte d'Ivoire, 1997 & 2002



Sources: Ministry of Health and Population (1997), Ivory Coast Health (September 2002)

2.2 National Response to Scale Up Services

Côte d'Ivoire, with a HIV/AIDS prevalence estimated at 7 percent in the general population (UNAIDS, 2004), is one of the countries most affected by HIV/AIDS epidemic in West Africa. In fact, of its 16.8 million people, 570,000 are living with HIV/AIDS. Of that number, 300,000 (52.6 percent) are women ages 15-49, and 40,000 (7 percent) are children under age 15. The number of deaths due to AIDS, at the end of 2003, was estimated at 47,000 people, and 310,000 children have lost one or both parents to AIDS (UNAIDS, 2004). Given the relative stability that the country is now experiencing, it is expected that the adult prevalence rates may rise due to the return of refugees, opening of borders, resumption of trade and the demobilization of military (Garrett, 2005). Also, according to the Global Fund to Fight AIDS, Tuberculosis and Malaria (GF), the gross mortality rate attributable to HIV is predicted to increase to around 53 percent in 2005 (GF, 2002).

The government of Côte d'Ivoire has made commendable efforts to combat this pandemic, setting up required structures for the prevention, treatment, and mitigation of HIV/AIDS, and by initiating cooperation with bilateral and multilateral organizations in order to roll back the pandemic, with all its related calamitous effects.

The national response actually started in 1987 with activities to prevent and treat opportunistic infections, and to set up a system of case notification. In 1988, Côte d'Ivoire was one of the first countries in sub-Saharan Africa to, in partnership with UNAIDS, initiate research on HIV/AIDS infection in pregnant women. In 1998, UNAIDS started a pilot project to improve access to ART that the government has since taken over. The Ministry of the Fight against AIDS was created specifically to coordinate activities to combat the disease. A global and multi-sectorial approach was developed, from which a national strategic plan (2002-2004) was created.

Certain noticeable and encouraging results were achieved, but progress remains inadequate given the magnitude of the epidemic. As of June 2004, the number of adults (ages 15-49) with advanced HIV infection receiving ART was only 2,025, while 78,000 infected people are in need of treatment (UNAIDS, 2004). Also in 2004, 27 sites were providing ART (U.S. Centers for Disease Control and Prevention, April 2005). Only 18 public sites and three non-governmental organizations (NGOs) were providing VCT services in June 2004 (UNAIDS, 2004), and, in February 2005, only 16 health facilities – out of approximately 1,381 in the country – offered PMTCT services (Ministry of Health and Population/*Ministère de la Santé et de la Population* [MOH], 2005).

New initiatives have reinforced the efforts of the government and its traditional partners such as UNAIDS, WHO, the U.S. government (USG), and ANRS (*Agence Nationale de Recherche*). For example, the Global Fund approved more than US\$18 million for a two-year effort to strengthen the national response to the HIV/AIDS epidemic (GF, 2002). In 2005, the USG contributed approximately US\$43 million to prevent, treat, and otherwise aid in the fight against HIV/AIDS over five years. The World Bank scheduled US\$50 million for HIV/AIDS operations (World Bank, 2005), and the WHO 3 by 5 Initiative and other bilateral cooperation entities, such as Belgium Cooperation, are also reinforcing government efforts.

These new funds resulted in expanding national coverage for HIV/AIDS services. It is expected that these efforts will contribute to:

- ▲ Increased access to quality VCT services in all the regions of Côte d'Ivoire by 2007 (*Programme Conseil de Dépistage Volontaire* (CDV), the (U.S.) President's Emergency Plan for AIDS Relief [Emergency Plan, or PEPFAR] 2005, *Projet RETROCI-CI*, 2005);
- ▲ Reduced HIV/AIDS transmission from mother-to-child by 40 percent by reinforcing the operations of already existing sites and setting up an extension plan of sites by the end of 2007 (MOH, January 2005) to include one PMTCT center in every health region and one PMTCT center in every district; and
- ▲ ART offered to at least 30,000 HIV/AIDS-infected people by the end of 2005 by setting up in 2004 an action plan to take care of infected people in the capitals of all 15 health regions³ (*Atelier sur la généralisation de la prise en charge des personnes vivant avec le VIH/SIDA en Côte d'Ivoire*, 2004).

³ Côte d'Ivoire has 15 health regions, 19 administrative regions.

Partners involved in the support for HIV/AIDS programs have set up individual objectives for the short and medium terms. The Global Fund aims to provide treatment to 25,000 new HIV patients by 2008; PEPFAR aims to provide treatment to 77,000 infected people by the same year. The WHO 3 by 5 Initiative aims to provide treatment to 63,000 people by 2005. Other projects, such as the ESTER (*Ensemble pour une Solidarité Thérapeutique Hospitalière en Réseau*) and the *Projet Multisectoriel de Lutte contre le Sida*/Multisectoral AIDS Project (PMLS/MAP) have also set targets to reach in the same timeframes.

Having mobilized the funds, the attention of the partners has shifted to other issues that could constrain expansion of HIV/AIDS services. One of the constraints is that of human resources to deliver the expanded services, particularly important given that Côte d'Ivoire has experienced almost five years of civil war that increased the demand for health services and exacerbated the HR shortage.

The war has caused a massive demographic upheaval, forcing an estimated 800,000 people (almost 5 percent of the total population) to flee their homes (Futures Group, 2004) and leaving the north and west of the country with diminished access to essential public and social services. These conditions will likely increase the number of HIV/AIDS cases among the most vulnerable groups as well as the incidence of severe malnutrition and maternal and infant mortality (World Bank, 2005). The health sector is severely affected, as many health centers have been forced to discontinue services due to the departure of key staff and dwindling supplies of essential medicines and equipment. Few structured health promotion activities are in place, aside from humanitarian services provided by international NGOs such as Doctors without Borders (*Médecins Sans Frontières*), *Médecins du Monde*, faith-based organizations, and U.N. agencies such as UNICEF and the Office of the U.N. High Commissioner on Refugees (UNHCR) (Futures Group, 2004).

2.3 National Capacity for Producing Health Personnel

Three major institutions produce the majority of health professionals in Côte d'Ivoire: the Unit of Medical Science Research and Training (*Unité de Formation et de Recherche des Sciences Médicales*, UFR), which includes the odonto-stomatology, pharmaceutical and biological sciences; the National Institute for Health Workers Training (*Institut National de Formation des Agents de Santé*, INFAS); and the National Institute of Social Training (*Institut National de Formation Sociale*, INFS). UFR has two branches, in Abidjan and Bouaké, which together produce approximately 300 doctors annually. Between 2002 and 2004, the UFR in Abidjan produced 947 doctors and awarded 424 certificates of specialized studies in various fields. Meanwhile, the UFR in Bouaké, established in 1997, graduated 61 students between 2002 and 2004.

The UFR of pharmacy, created in 1977, has produced an estimated total of 804 pharmacists. Since 2000, the annual number of graduates has been decreasing remarkably (112 in 2002 and 85 in 2004). Despite the small number of pharmacy graduates, it was reported that few of them practice in the public health sector for any appreciable period of time. They usually move to the private pharmaceutical sector, which offers better benefit packages. Other reasons for their dissatisfaction and departure are the lack of recognition of their work and the lack of the drugs in health facilities.

The UFR of odonto-stomatology produces slightly more than 20 dental surgeons annually (21 in 2002, 28 in 2003, and 26 in 2004). In 2001, the public health sector had 323 dental surgeons, a ratio of 1 dental surgeon for 133,547 inhabitants, whereas WHO suggests a ratio of 1 per 12,000 inhabitants for developing countries similar to Côte d'Ivoire.

The INFAS and INFS are in charge of training a large proportion of health care workers. From 2002 to 2004, 677 registered nurses, 426 midwives, 262 specialized nurses and midwives, 116 laboratory technicians, and 38 pharmacy managers were trained. The INFS also trained 133 social workers between 2002 and 2004.

2.4 Emerging Challenges for Expanding Human Resources for Health

Côte d'Ivoire has three main challenges to expanding HR for health. First, it is very complex to estimate the total number of health workers needed to deliver HIV/AIDS and other basic health services without a comprehensive methodology. Currently, directors of regional health offices identify HR requirements in an empirical way. These requirements are then consolidated by the MOH Department of Human Resources to establish national requirements for the health sector that are later transmitted to the Ministry of Civil Service. Even though the country has good ratios of health personnel to the total population compared to other West African countries, data show that the health system requires additional health personnel to effectively deliver needed health services. The requirements for health personnel have increased with the implementation of HIV/AIDS programs and the resurgence of other diseases due to the civil conflict.

Second, due to the declining socio-economic conditions and structural adjustment measures recommended by the International Monetary Fund (IMF)/World Bank, the Ministry of Civil Service in collaboration with the Ministry of Finance have restricted recruitment of civil servant since 1996. This has resulted in an imbalance between the number of health workers currently employed and the number needed by the Ministry of Health and Population, as shown by 2001 and 2004 data in Table 1. On average, the number of health workers hired into the public sector in 2001 and 2004 represented only 40 percent of the expressed need.

Table 1. Public Health Sector HR Needs vs Actual Hires 2001 and 2004

Professional categories	Total number needed by Ministry of Health & Population	Number employed	Total number needed by Ministry of Health & Population	Number employed
	2001	2001	2004	2004
Doctors	160	119	247	117
Pharmacists	70	22	11	32
Dental surgeons	25	20	16	15
Nurses	1,300	377	949	305
Midwives	500	173	473	196
Special health technicians	227	219	211	187

Third, the civil service entrance examination, introduced in 1996 as the “gate keeper” to public sector employment in response to budgetary constraints, impedes absorption of trained HR into the public health sector. Even though the MOH Department of Human Resources identifies need, a considerable number of doctors fail to enter the public sector. Table 2 shows that, in 2004, the numbers of doctors, pharmacists, and dental surgeons recruited are much lower than the number graduated from the UFRs.

Table 2. UFR Graduates vs Civil Service Hires 2004

Staff types	UFR graduated in 2004	Number recruited into Civil Service	Estimated number of unemployed
Doctors	312	117	195
Pharmacists	96	32	64
Dental surgeons	26	15	11

Of 312 doctors graduated in 2004, only 117 joined the civil service; the remaining 195 were “unemployed.” While some of them may have joined the private or NGO sectors, these sectors did not absorb all of them, so the problem of an unemployed surplus of trained doctors remains. A similar problem is observed for dentists and pharmacists. Out of the total number of dental surgeons counted in May 2005, approximately 112 were unemployed.

3. Objectives and Methodology

3.1 Objectives

The objective of this activity was to collaborate with the Ministry of State, the Ministry of Health and Population, and USG partners to conduct a comprehensive assessment of the HR available and required to scale up HIV/AIDS services and deliver basic health services in Côte d'Ivoire. The report attempts to answer three main questions: How many health professionals are available today? Which categories of health professionals are required to provide HIV/AIDS services? How will the number of health professionals vary in the future? Finding answers could be an important step toward the identification of appropriate solutions for HR planning and management in the Côte d'Ivoire health sector in general, and for HIV/AIDS services in particular.

3.2 Data Collection

The evaluation of HR for health was conducted only in public sector health facilities. Three interrelated approaches were used to gather information on the current number of health workers and facilities providing HIV/AIDS services.

First, a comprehensive review of both published and unpublished documents was conducted to better understand the current HR situation and to inform instrument development. The review focused on issues such as graduation rates from training and research institutions of medical sciences, odontology, and pharmacy and biological sciences, and the national institute of training for health workers. The review also focused on staff attrition, staff training, etc.

Second, the team conducted interviews with key informants in the Ministry of State, Ministry of Health and Population, Ministry of the Fight against AIDS, development partners, and other key stakeholders to gather information on HIV/AIDS service delivery, policy, and strategies for HR.

Finally, data were collected from 301 facilities across the country. A team of 30 data collectors (see Annex A for team members) was trained to conduct interviews at the 301 facilities (Annex B) chosen using a structured questionnaire. Specifically, information on service targets for ART, VCT, PMTCT and PMTCTplus, and numbers of health workers providing HIV/AIDS services, staff attrition, and staff training was collected at each facility. Data were then entered into SPSS and analyzed in STATA.

3.3 Sample Size

Because HIV/AIDS services vary considerably across the country, the research team randomly sampled 301 of 1,381 health facilities. The facilities were chosen to reflect a variety of factors including geographic location, level of HIV/AIDS care (primary, secondary, tertiary), and the HR distribution. To get a representative sample with a margin of error of plus or minus 5 percentage

points at a 95 percent confidence level, a sample of 301 facilities was identified (Annex B). As a result of these inclusions, all university hospital centers, all regional hospital centers, and all general hospital were included with certainty in the sample. Since the assessment focuses on HIV/AIDS services, all facilities offering such services were also included in the sample with certainty.

The remaining health facilities were equally divided among 15 health regions, knowing that the health regions of Lagunes 1 and Lagunes 2 (both of Abidjan) had respectively 15 and 17 health facilities included with certainty in the sample, because of their belonging to the above criteria.

Thus, a systematic sampling was drawn from the remaining health facilities by using a step of survey, with random selection of the first number in each region. The step of the survey was obtained by dividing the remaining health facilities of the population by the number of regions as illustrated in Box 3.

Box 3. Systematic Sampling Method

If, K = the sampling interval and

R = a random number between 1 and K ,

Then the R th facility on the list of facilities in the region was selected first and then every K th facility is selected thereafter until the required number of facilities for the sample has been chosen.

Table 3 shows the distribution of health facilities by health region.

Table 3: Distribution of Facilities by Region

Region	HIV facilities selected with certainty	Other facilities selected with certainty			Number of other facilities sampled	Total
		University hospitals	Regional hospitals	General hospitals		
LAGUNES 1	9	1		5		15
LAGUNES 2	16	2		5		23
SUD-COMOE			1	4	10	15
MOYEN-COMOE	6		1	1	7	15
HAUT SASSANDRA			1	2	13	16
FROMAGER	1			1	14	16
MOYEN CAVALLY			1	2	12	15
BAS SASSANDRA	4		1	4	7	16
LACS			1	3	11	15
AGNEBY			1	1	13	15
SUD BANDAMA			1	1	13	15
NZI COMOE			1	4	11	16
MARAHOUÉ			1	2	12	15
ZANZAN			1	2	13	16
VALLEE DU BANDAMA		1		4	11	16
SAVANES			1	3	12	16
MONTAGNES			1	3	12	16

Region	HIV facilities selected with certainty	Other facilities selected with certainty			Number of other facilities sampled	Total
		University hospitals	Regional hospitals	General hospitals		
DENGUELE-BAFING			1	1	13	15
WORODOUGOU			1	1	13	15
TOTAL	36	4	15	49	197	301

3.4 Projection Approach

This assessment projects HR needs using a consistent methodology under different scenarios. The average time staff spend in providing care per patient on each activity is multiplied by the target number of patients receiving the service, yielding overall HR needs. These numbers are then expressed as full-time equivalents (FTE). In Côte d'Ivoire, it is assumed that workers have 211 days (1,688 hours) per year of patient interface time (i.e., including non-service delivery work time, such as administrative work or down time).

4. Findings and Discussion

This chapter presents the key findings from the assessment. The first part describes characteristics of institutions that deliver HIV/AIDS services. The second part projects current and future health stock using graduation and attrition rates of key health workers. The final part explores the potential for current HR to deliver services to meet major targets such as PEPFAR, the Millennium Development Goals (MDGs), and the WHO 3 by 5 Initiative.

4.1 Major Characteristics of Facilities Delivering HIV/AIDS Services

Of the 301 health facilities surveyed, only 5 percent (four National Institutes university hospitals, seven regional and general hospitals, and five health centers) offered ART in 2004. During the same period, medical doctors, both general practitioners and specialists treated 1,272 patients in AIDS-related care (ART, VCT, PMTCT, and opportunistic infections). In the assessment, ART facilities reported that each doctor saw on average 13 patients per day. This average was skewed by the fact that three facilities report that their doctors saw on average respectively 35, 35, and 60 patients per day; if these facilities were removed from the sample, the average falls to six patients per doctor per day. Each counselor⁴ provided services to approximately 13 VCT patients per day and 21 PMTCT patients per day. It was also reported that doctors spend on average 30 minutes per ART patient per visit. Similarly, counselors⁵ spend on average 19 minutes per VCT encounter and 18 minutes per PMTCT patient. One general trend in the provision of HIV/AIDS services at these facilities is the rapid increase in the number of health workers delivering AIDS-related care. In 2002, 73 medical doctors, 60 nurses, 88 midwives, and 21 lab technicians were working in AIDS-related care. In 2004, the stock of health workers providing HIV/AIDS-related care more than doubled: 144 medical doctors, 121 nurses, 221 midwives, and 53 lab technicians.

4.2 Estimating Current and Projected HR Needed to Deliver HIV/AIDS and Other Basic Health Services

This section discusses the three main observations of the assessment. First, it presents current and future HR stock. The total HR stock available in 2004 is estimated at 11,749.⁵ Of the total stock, nurses make up the majority (58 percent) followed by midwives (18 percent) and doctors (14 percent). Applying the 2004 baseline (graduation and attrition rates) and assuming that HR policies stay unchanged, the total HR stock is estimated to drop to 10,023 FTE by 2008. This is a 15 percent reduction from 2004 and may affect the delivery of basic health services. The key assumptions underlying the projections are outlined in Annex C.

⁴ According to PMTCT protocol, doctors, nurses, midwives, psychologists, etc. can be considered counselors.

⁵ Only health providers and social workers were included in the survey. Hence, the reported health worker number does not include administrative workers.

In discussing projections of future HR, it is vital to understand how many health workers actually enter the public sector. Data from 2001 and 2004 indicate that only 40 percent of the total number of graduates in all health professions are hired into the public sector in a given year. (Nurses are the exception; nearly 90 percent of nursing graduates are hired into the public sector.) We assume that the remaining graduates enter the private sector, remain unemployed, go abroad, or work elsewhere. We explore two scenarios of how future stock will evolve using the current 40 percent hiring rate into the public sector and an optimistic scenario using a higher rate of 90 percent. As shown in Table 4a, all staff types would see a decrease in stock with the exception of pharmacists, which would grow to 347 in 2008, a net increase of 74 percent from 2004. The projected stock of medical doctors would decrease to 1,559 in 2008, a 2 percent decrease from the 2004 total. Nurses would also realize a 19 percent decrease from the 2004 total, to 5,568 in 2008. Given the low number of new graduates and high attrition rates, the total HR stock projected in 2008 is estimated at 10,023, a 15 percent decrease compared to total HR stock in 2004.

Table 4a. Current and Projected Stock of Health Professionals at a 40% Hiring Rate

Health workers	HR stock in 2004	Average number of graduates (2002-04)	40% of avg. number of graduates hired in the public sector (2002-04)	Average annual attrition rate (2003-04)	Estimated HR stock			
					2005	2006	2007	2008
Doctors	1,592	336	134	0.09	1,583	1,574	1,567	1,559
Nurses	6,842	313	125	0.07	6,488	6,159	5,853	5,568
Midwives	2,147	142	57	0.09	2,011	1,887	1,774	1,671
Dentists	256	25	10	0.03	256	256	255	255
Pharmacists	200	118	47	0.04	239	276	312	347
Lab technicians	460	38	15	0.04	457	454	451	448
Social workers	252	44	18	0.17	227	207	189	175
Total	11,749				11,261	10,813	10,401	10,023

Note: Projected stock in a given year is the previous year stock plus 40 percent of average number of graduates from 2002 to 2004 minus the product of the average attrition rate from 2003 to 2004 and the previous year stock. HR numbers are all expressed as FTE.

The second scenario estimates the stock of health professionals if the public sector were to absorb 90 percent of the total graduates. Currently, only nursing graduates are hired at this 90 percent rate, but if other health professions also reached this level, the situation will change dramatically, as shown in Table 4b. The stock of medical doctors would rise to 2,146 in 2008, a 35 percent increase from the 2004 total. Lab technicians would realize a 13 percent increase from the 2004 total, or 520 lab technicians in 2008. The pharmacists would grow to 568 in 2008, a net increase of 184 percent from 2004. The dramatic increase would be due to the large annual graduate cohort in pharmacy; an average of 118 pharmacists matriculated annually from 2002 to 2004. The only reductions would occur among social workers, nurses, and midwives, as the HR stock in the last two groups would decrease by 10 and 11 percent (respectively) by 2008.

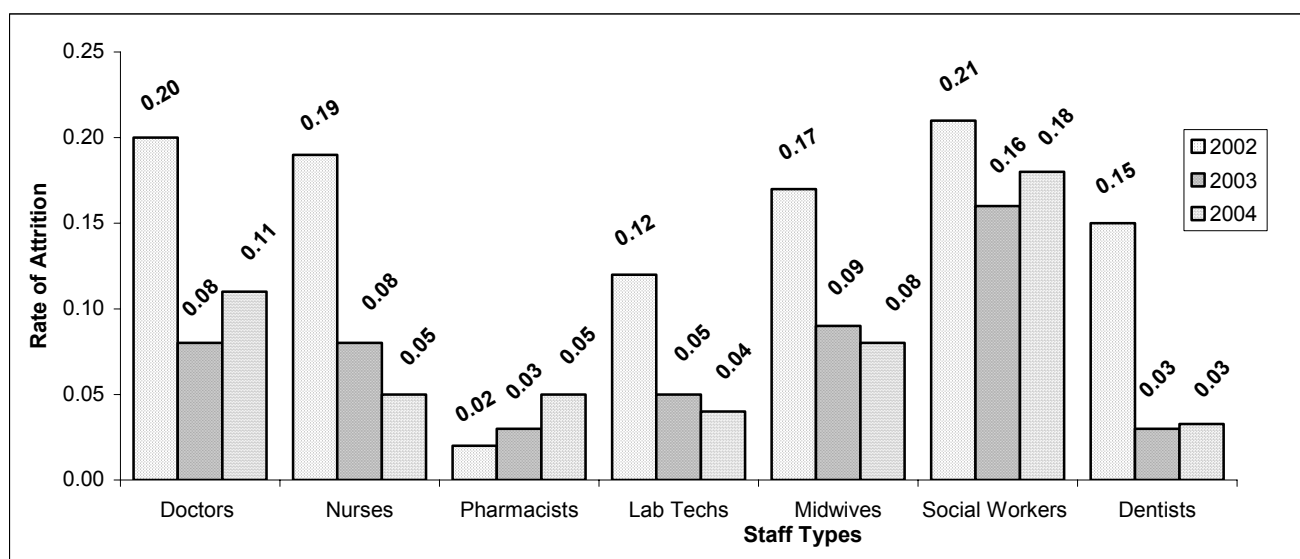
Table 4b. Current and Projected Stock of Health Professionals at a 90% Hiring Rate

Health workers	HR stock in 2004	Average number of graduates (2002-04)	90% of total number of graduates hired in the public sector (2002-04)	Average annual attrition rate (2003-04)	Estimated HR stock			
					2005	2006	2007	2008
Doctors	1,592	336	302	0.09	1,751	1,895	2,026	2,146
Nurses	6,842	313	281	0.07	6,644	6,460	6,289	6,130
Midwives	2,147	142	128	0.09	2,082	2,022	1,968	1,919
Dentists	256	25	23	0.03	268	280	291	302
Pharmacists	200	118	106	0.04	296	392	482	568
Lab technicians	460	38	34	0.04	476	491	506	520
Social workers	252	44	40	0.17	249	247	245	243
Total	11,749				11,766	11,787	11,807	11,828

Note: Projected stock in a given year is the previous year stock plus 90 percent of average number of graduates from 2002 to 2004 minus the product of the average attrition rate from 2003 to 2004 and the previous year stock. HR numbers are all expressed as FTE.

The second major observation is that the public health sector has suffered from very high levels of attrition. Figure 2 shows the attrition rates for selected health professions from 2002 to 2004. The year 2002 witnessed a mass exodus of health workers. The public sector lost one-fifth of its medical doctors (general practice and specialists) and one-quarter of all its nurses. Political instability has contributed to the high attrition rates across the country. Data from the 301 facilities indicate that of those health workers who left the public health system, 59 percent of doctors, 75 percent of nurses, 67 percent of midwives, 59 percent of lab technicians, and 37 percent of social workers cited the political crisis as the primary reason for their departure.

Figure 2. Attrition Rate, Selected Health Professions, Côte d'Ivoire, 2002-2004



Northern regions⁶ in particular suffered from a grand exodus due to the political unrest. According to the assessment, 78 percent of doctors, 65 percent of nurses, 59 percent of midwives, and 50 percent of social workers in the north left their posts in 2002 (Table 5), where 6.5 million or 37 percent of the national population reside. There are no data to indicate where these health workers went, although one can speculate that they moved south. In the southern regions (i.e., the rest of the country) in the same year the rate of departure for all health workers except social workers was less than 10 percent. As the political crisis has waned, attrition rates due to the crisis declined steadily in most health professions. See Annex D for more detail.

Table 5: Attrition Rates by North and South, Selected Health Professionals, Côte d'Ivoire, 2002-04

	North			South		
	2002	2003	2004	2002	2003	2004
Doctors	0.78	0.14	0.10	0.07	0.07	0.11
Dentists	0.65	0.00	0.00	0.04	0.03	0.04
Nurses	0.59	0.08	0.04	0.06	0.08	0.07
Midwives	0.65	0.07	0.05	0.08	0.10	0.08
Lab technicians	0.31	0.17	0.00	0.08	0.04	0.05
Social workers	0.50	0.22	0.00	0.15	0.16	0.19
Pharmacists*	0.00	0.00	0.00	0.02	0.04	0.05

* Pharmacists numbered less than five across the North over the three years, and none of them left their post during this period.

The third observation is that the distribution of health workers has been further skewed towards Abidjan, the capital and largest city in Côte d'Ivoire, as shown in Annex E. The assessment shows that since the civil conflict began in 2002, the Lagunes region (whose capital is Abidjan) had 64 percent of all doctors, 48 percent of all nurses, 74 percent of all pharmacists, 48 percent of all lab technicians, and 67 percent of all social workers. In 2004, those figures rose in all health professions, especially among lab technicians (66 percent in Lagunes) and social workers (77 percent). With the civil violence primarily outside of Abidjan, it is little surprise that health workers in peripheral areas retreated to the economic center of the country. Abidjan might have become a temporary safe haven, but it is unclear whether these workers would return to their provincial posts if the civil conflict ended. Not only does an imbalance exist between Abidjan and the rest of the country, but there are geographic disparities among regions as well, as shown in Annex E. Savanes, a region in the north, has substantially fewer medical workers in each profession than the region of Haut-Sassandra in the southwest, even though both regions have the same population (roughly 1.2 million).

4.3 Can Current HR Deliver HIV/AIDS Services to Achieve PEPFAR, Millennium Development Goals, and WHO 3 by 5 Targets?

This section explores the number of health workers needed to achieve national, MDGs, PEPFAR, and WHO 3 by 5 targets using the average times reported in Section 4.1. For example, Côte d'Ivoire has set a national target of 77,000 ART patients to be reached in 2008 and development partners are either directly or indirectly contributing to this goal. The projections below assume that

⁶ The northern regions are Zanzan, Worodougou, Bafing, Denguélé, Savanes, Dix-Huit, Montagne, Vallée du Bandama, and Haut-Sassandra.

the staff are working full time (211 days per year according to national norms) and are seeing a certain number patients for certain amount of their time per year under each activity.

Scenario 1: How Many Health Workers are Needed to Achieve National and PEPFAR Targets?

The question of whether Côte d'Ivoire can meet national HIV/AIDS targets (which happen to be the same for PEPFAR) is a complex one that requires thorough analysis of the situation including HR policies and strategies. This report quantifies only the number of doctors, nurses, pharmacists, and lab technicians needed to meet the ART and VCT/PMTCT targets under the national and PEPFAR initiatives. In 2008, PEPFAR calls for 77,000 patients to receive ART in Côte d'Ivoire. The VCT figures are derived from the ART targets.⁷ As shown in Table 6, to meet the ART, VCT/PMTCT targets in 2005, the total HR needed is about 666 FTE. This number would rise to 1,699 in 2008, with counselors and lab technicians making up the majority of the needed HR stock. It is important to mention that the national and PEPFAR HR requirements are a subset of the total HRH in the public sector and the country must balance the delivery of comprehensive HIV/AIDS activities with other basic health services such as malaria, diarrheal diseases, immunizations, and maternal and child health.

Table 6. Projected Need for Health Personnel to Meet National and PEPFAR Targets, Côte d'Ivoire, 2005-2008

ART				
	2005	2006	2007	2008
Target Number of Patients	23,100	46,200	61,600	77,000
Staff Type				
Doctors	50	100	134	167
Nurses	50	100	134	167
Pharmacists	25	50	67	84
Lab technicians	25	50	67	84
VCT/PMTCT				
	2005	2006	2007	2008
Target Number of Patients	721,429	1,072,085	1,341,714	1,676,629
Staff Type				
Counselors*	344	511	639	798
Lab technicians	172	255	319	399

⁷ # of additional ART patients needed in a given year = # of clients receiving VCT in that year x % of VCT clients testing positive (assumed to be twice the prevalence rate, due to adverse selection) x % of positive VCT clients expected to be eligible for ART (20% WHO) i.e. VCT# = ART# x 100/14 x 100/20 = ART#/(14% x 20%)

TOTAL				
	2005	2006	2007	2008
Target Number of Patients	744,529	1,118,285	1,403,314	1,753,629
Staff Type				
Doctors	50	100	134	167
Nurses	50	100	134	167
Pharmacists	25	50	67	84
Lab technicians	197	305	386	483
Counselors*	344	511	639	798

*According to the PMTCT protocols, trained doctors, nurses, midwives, psychologists, etc. can be considered counselors.

As seen in Table 7, the projected need for FTE health workers in 2008 is a combination of staff required to maintain 2004 per capita staff levels (provider-to-patient ratios) and staff needed for national and PEPFAR ART, VCT, and PMTCT services. This is compared to the number of projected public sector staff, giving a measure of the shortfall in HR to maintain the baseline (2004) level of basic health services. By using the current 40 percent hiring rate into the public sector (except for nurses, who are estimated to experience a 90 percent hiring rate), this projection shows an overall shortage of health professionals. Although Côte d'Ivoire would have a projected surplus in pharmacists through 2008, the country faces a severe shortage of doctors, nurses, and lab technicians, which will only worsen over time. Côte d'Ivoire is projected to have in 2008 a shortfall of 331 doctors (or 18 percent of the total needed), 2,005 nurses (27 percent), and 533 lab technicians (54 percent). Data show that it will be difficult to maintain basic health services and therefore increasingly challenging to deliver national and PEPFAR HIV/AIDS services.

The most shocking finding is that Côte d'Ivoire faces a dire shortage of nurses. The high rate of attrition and the small annual cohort of nurses entering the public sector are the principal reasons for the shortage. Unlike their medical peers, nursing graduates enter the public sector at a rate of nearly 90 percent but, as shown in Table 7, the projected shortfall of nurses is approximately 1,443, or nearly 19 percent of the projected need.

Table 7. Projected Surplus (or Deficit) of Health Workers in Côte d'Ivoire to Maintain Basic Health Services of 2004 Baseline

Staff Type		2005	2006	2007	2008
Doctors	Projected Available	1,583	1,574	1,567	1,559
	Projected Total Need	1,666	1,756	1,823	1,890
	Surplus / Deficit	-83	-182	-256	-331
Nurses*	Projected Available	6,644	6,460	6,289	6,130
	Projected Total Need	7,029	7,218	7,395	7,573
	Surplus (Deficit)	-385	-758	-1,106	-1,443
Pharmacists	Projected Available	239	276	312	347
	Projected Total Need	229	258	279	300

Staff Type		2005	2006	2007	2008
	Surplus / Deficit	10	18	33	47
Lab technicians	Projected Available	457	454	451	448
	Projected Total Need	667	783	874	981
	Surplus / Deficit	-210	-329	-423	-533
Counselors**	Projected Available	N/A	N/A	N/A	N/A
	Projected Total Need	344	511	639	798
	Surplus / Deficit	-344	-511	-639	-798

*Nurses is the only profession in this table where the 90 percent hiring rate is used; the 40 percent hiring rate is used for all other professions.

**According to PMTCT protocols, trained doctors, nurses, midwives, psychologists, etc. can be considered counselors.

Note: Total need in a given year is measured as the sum of health workers needed for AIDS-related care plus the number of health workers needed to maintain the ratio of provider to the general population for 2004 independent of ART, VCT, and PMTCT. Annual population growth rate for Côte d'Ivoire is 2 percent (U.S. Central Intelligence Agency [CIA], 2005); therefore, the stock of health personnel would increase annually by two percent to maintain the ratio of 2004. HR numbers are all expressed as FTE.

Strategies that address these shortages include reducing attrition rates and/or increasing graduation numbers. For example, if attrition rates for nurses were reduced by half, the projections of additional nurses in 2008 would be 870 (at a 90 percent hiring rate). Furthermore, the high rate of hiring nursing graduates offers a ray of hope if Côte d'Ivoire can train much larger cohorts of nurses rapidly. If attrition rates were reduced by half and the number of nursing graduates doubled for the 2005-2008 period, the projected additional number of FTE nurses would be approximately 1,936 (again, at a 90 percent hiring rate) in 2008. This number of additional nurses is encouraging, because those nurses could cover not only the projected demand for nurses but also most or all of the projected need for VCT and PMTCT counselors.

Scenario 2: Reaching the Millennium Development Goals

Côte d'Ivoire is one of the signatories to the MDGs. Under this initiative, the country has pledged to reduce maternal and child mortality, and the prevention of mother-to-child-transmission is an essential part of that effort. Because MDG country targets for Côte d'Ivoire are not quantified, this report only discusses the number of infections prevented under PMTCT and does not clarify whether the MDGs in Côte d'Ivoire will be met. As programs develop, further analysis must be completed to determine where Côte d'Ivoire stands in reaching the MDGs.

With a birth rate of 35.5 children per 1,000 of the population, Côte d'Ivoire will have roughly 614,000 live births in 2005. With a HIV-prevalence rate of 10.8 percent, 66,347 mothers are estimated to be HIV-positive. Without any prevention efforts, the transmission rate from mother to child is 39 percent; an effective PMTCT would cut that rate to 10 percent. Without PMTCT, Côte d'Ivoire would expect 25,875 HIV-infected newborns; with PMTCT, only 6,635 babies would be infected, thus preventing 19,240 infections in 2005. PMTCT is projected to prevent 20,448 infections in 2008, 21,295 in 2010, and 23,569 in 2015.

How many health personnel are needed for PMTCT? Currently, Côte d'Ivoire uses a team of one nurse (counselor), one midwife (pre- and post-natal care), and one laboratory technician (testing) to treat an average of 10 PMTCT patients per day. Over the course of a year, that team would work 211

days and treat 2,100 PMTCT patients. Approximately 32 nurses, 32 midwives, and 32 lab technicians would cover the 66,347 mothers in need of PMTCT in 2005. With a stable birth rate, a slightly bigger cohort – 39 nurses, midwives and laboratory technicians – could handle the demand for PMTCT through 2015, as shown in Table 8. Despite the relatively small number of health personnel required, expanding PMTCT would place more stress on an increasingly understaffed public health system. The persistent lack of nurses and lab technicians would continue to limit the capacity of the public health sector to offer PMTCT.

Table 8: HR Requirements to Prevent HIV Infections – 2005, 2008, 2010 & 2015

	2005	2008	2010	2015
All births	614,323	652,884	679,926	752,535
HIV-positive mothers	66,347	70,511	73,432	81,274
HIV+ newborns <i>without</i> PMTCT treatment	25,875	27,499	28,638	31,697
HIV+ newborns with PMTCT treatment	6,635	7,051	7,343	8,127
Infections prevented	19,241	20,448	21,295	23,569
FTE nurses required	32	34	35	39
FTE midwives required	32	34	35	39
FTE lab technicians required	32	34	35	39

Note: To estimate the number of births, the birthrate of 35.5 per 1,000 of the general population for 2005 is used for both 2005 and 2010. To estimate the number of HIV-positive mothers, the general adult prevalence rate of 10.8 percent was used (U.S. CIA, 2005). Of those HIV-positive mothers, it is assumed that 39 percent of their newborns would also be HIV-positive without any intervention (Hira et al., 1989; Luo, 2000). An effective PMTCT is expected to reduce that figure to 10 percent; the number of infections prevented represents the difference of these figures.

Scenario 3: Meeting WHO 3 by 5 Targets

The WHO 3 by 5 Initiative set an ambitious set of targets for ART. Its target for Côte d'Ivoire is 63,000 on ART (or roughly half of those estimated to need ART) by the end of 2005. Clearly this benchmark is very ambitious and presents a substantial HR challenge. As stated in discussions of other programs, WHO HR requirements will be a subset of the total HR available in the health sector.

A rapid roll-out of ART in Côte d'Ivoire to reach the WHO 3 by 5 target in 2005 would require 158 doctors, 158 nurses, 59 pharmacists, and 59 lab technicians plus all the medical personnel to maintain the 2004 ratio between provider and population. Table 9 points to a severe HR constraint on a rapid scale-up of ART. Assuming the current 40 percent hiring rate of graduates into the public sector, only pharmacists, with a surplus of 35, will meet the estimated 2005 need. All other health workers, especially nurses, will fall short of meeting the estimated HR need. While the deficit for doctors and lab technicians is relatively small (41 doctors and 12 lab techs), the nursing shortfall is acute. For the 3 by 5 target, Côte d'Ivoire is 628 nurses short under the 40 percent hiring rate scenario, or 9 percent of the total nursing corps. That gap largely results from a graduation rate of only approximately 312 nurses per year. The scarcity of nurses remains the major HR impediment to scaling up ART, and will only worsen over time without urgent action.

Table 9: HR Requirements for WHO 3 by 5 Target, 63,000 ART Patients by 2005, Côte d'Ivoire

Staff type	A HR needed for WHO 3 by 5	B HR needed to maintain basic health services at the 2004 level for 2005	C Projected available HR stock in 2005	D Surplus / Deficit (C-B)
Doctors	158	1,624	1,583	-41
Nurses	158	6,979	6,351	-628
Pharmacists	59	204	239	35
Lab technicians	59	469	457	-12

5. Conclusions

Côte d'Ivoire lacks a sufficient number of health professionals (especially doctors, pharmacists, and dental surgeons) to maintain basic health services. The public health system is unable to hire according to its needs because of a Civil Service hiring freeze. Unemployment among doctors, lab technicians, and pharmacists is high.

The nurse shortage in Cote d'Ivoire remains the biggest HR impediment towards meeting the major national and international HIV/AIDS targets. Given this existing shortage, it will be difficult to scale up new services requiring nursing personnel, such as PMCTC, even though the total additional level of effort required appears to be minimal; e.g., only 32-39 additional full-time nurse equivalents needed across the country to prevent 19,241-23,569 infections.

Currently, most health workers are concentrated around Abidjan and the Lagunes areas, leaving the regions with very few health staff. The implementation of monetary and non-monetary incentives could encourage health professionals to work in rural areas. Also ensuring security outside of Abidjan is critical for keeping health workers in their stations in the regions.

The country faces a major challenge in recruiting health personnel to meet the national coverage goals of the major new health initiatives such as the WHO 3 by 5 Initiative, the Millennium Development Goals, the Global Fund, and PEPFAR – while maintaining staff for the basic health services.

6. Recommendations

The following recommendations are made to address the short-and long-term HR shortages:

- ▲ The government in consultation with development partners should examine and agree on options for mobilizing additional health workers to serve in underserved rural areas. Experience from other sub-Saharan African countries shows that, to attract health workers to serve in rural areas, incentives such as school fees for their children, housing allowance, transportation, and in-service training should be provided. Other options being considered or implemented in other countries include hiring of contract workers, retraining and redeploying paramedical or community health workers, and mounting and redoubling serious efforts to recruit and train additional health professionals.
- ▲ The government should develop innovative strategies to motivate the health personnel. Those strategies could include providing regular in-service training under the supervision of a professional; participation in seminars and workshops at the national and even international level; introduction of annual information exchange forums and sharing/diffusion of best practices and experiences between professionals working in HIV/AIDS services delivery; periodic organization of the preventive sessions for “burn out” or exhaustion syndrome among care providers.
- ▲ Côte d’Ivoire is fortunate to have a great number of doctors, pharmacists, and dental surgeons, but unfortunately a high number of these health workers are unemployed. If the country is to meet its national targets for AIDS-related care, the wage bill for the human resources to carry out ART, VCT, and PMTCT must be carefully considered. In 2002, Côte d’Ivoire spent only 1.18 percent of its gross domestic product (GDP) on health, plus 0.41 percent in health sector investment. (In the same year, it disbursed 2.96 percent of its GDP on external debt obligations [IMF, 2004].) Of the total public health budget, salaries usually constitute 40 to 60 percent. It is clear that the current level of health spending cannot sustain the wage bill for the required health personnel to reach national targets. The next stage of planning should price out the wage bill for the increased number of health workers and should involve the Ministry of Finance and the Ministry of Planning. Furthermore, the government should renew discussions with all relevant actors on removing or addressing constraints to employing an adequate number of health personnel needed to meet both national and international health objectives.
- ▲ Côte d’Ivoire needs to take a very close look at the root causes of attrition of nurses. Urgent and aggressive measures should be put in place to reduce their attrition rate. Additionally, the government should consider increasing by about 50 percent the intake of nursing students at the National Institute for Health Worker Training.” The shortage of nurses and allied health personnel is the most critical constraint to scaling up PMTCT, which is the most effective means of preventing new infections. In addition, increasing the number of nurses trained and retained appears to be among the most cost-effective of possible interventions.

- ▲ Urgent and concerted solutions between the government and partners in general, and stakeholders in particular, must be found to solve the problem of unemployment among doctors, lab technicians, and pharmacists. Experience from other sub-Saharan African countries (e.g., Uganda) has shown that countries are hiring and paying additional personnel to work specifically on GF, PEPFAR, and MAP programs, using resources from these organizations.
- ▲ Currently it may be impossible for Côte d'Ivoire to absorb the total number of unemployed health professionals in the corps of doctors, pharmacists, and dental surgeons. However, this "surplus" should serve as a net advantage to the country – Côte d'Ivoire might want to consider exploring formal mechanisms of sending unemployed health workers to other sub-Saharan countries. This exportation of qualified health professionals could be done through the channel of bilateral cooperation, or within the framework of free labor market, and therefore could contribute financially to the reconstitution of the initial stock or to help run the tertiary institutions.
- ▲ The MOH should put in place a strong coordinating mechanism of different stakeholders delivering HIV/AIDS services. This could have a considerable impact on the provision of comprehensive and efficient ART, VCT, and PMTCT services.
- ▲ The government must take stock of HR available in the private sector. In order to fully understand HR needs for basic health care and specifically HIV/AIDS care, assessments of HR in the for-profit and non-profit private sector are essential.

At the Ministry of State and the Ministry of Health and Population, the following recommendations could be made to improve HR stock management for health:

The Department of Human Resources should:

- ▲ Set up national standards for monitoring and evaluating health professionals by type of medical facility. That will make it possible to assess the HR need for delivery of basic health services.
- ▲ Acquire or optimize the existing software on human resources for better control and monitoring of the national HR stock for health. The department should develop a system to track the trends over time. The projected stock needed depends on how efficiently the national HR database is managed.
- ▲ Initiate the development of an overall policy of HR for health in partnership with other departments, institutions and authorities, by defining the government's vision, and a plan of personnel career development (development of competences, advantages, motivations, plan of recruitment, etc.).

The Department of Management, Training and Research should:

- ▲ Mobilize financial resources needed to implement the existing policy of continuous training. Because modern techniques of patient care are constantly evolving, training is of primary importance, helping health workers to improve or acquire new competencies for their jobs.

- ▲ Set up a concerted national program to update health professionals' practices in ART, VCT, and PMTCT in partnership with all the stakeholders delivering HIV/AIDS services. This need was strongly expressed at the peripheral level.
- ▲ Strengthen continuous training within the tertiary institutions and in partnership with the board of scientists, doctors, pharmacists, dental surgeons, and other health professionals to incorporate HIV/AIDS care in their curriculums.

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- ▲ KPANDENOU PIERRETTE
- ▲ TIMI KOUAKOU ALAIN

Annex B. Facilities Sampled

Region	Number of facilities sampled	Facility name
LAGUNES 1	15	CHU DE YOPOUGON HG DABOU HG JACQUEVILLE HG GRAND-LAHOU HG TIASSALE HG TAABO HOPITAL MILITAIRE D'ABIDJAN CAT ADJAME CIPS-CDV PLATEAU AMEPOU CENTRE EVEIL YOPOUGON FSU COMMUNAUTAIRE YOP WASSAKARA FSU COMMUNAUTAIRE YOP TOITS ROUGES FSU COMMUNAUTAIRE YOP NIANGON PMI YOPOUGON ATTIE CLINIQUE AIBEF YOPOUGON
LAGUNES 2	23	CHU DE TREICHVILLE CHU DE COCODY HG PORT-BOUET HG ALEPE HG ABOBO HG ANYAMA HG BINGERVILLE CAT TREICHVILLE USAC TREICHVILLE (CHU) PMI DELAFOSSE TREICHVILLE FSU MARCORY CNTS TREICHVILLE CIRBA TREICHVILLE FSU COMMUNAUTAIRE GRAND CAMPEMENT KOUMASSI FSU KOUMASSI DISPENSAIRE DU WARF CLINIQUE CONFIANCE DE BIETRY FSU COMMUNAUTAIRE ABOBO AVOCATIER FSU COMMUNAUTAIRE ABOBO SAGBE FSU COMMUNAUTAIRE ABOBO ANONKOUA KOUTE

Region	Number of facilities sampled	Facility name
		CDV LUMIERE ACTION ABOBO CLINIQUE AIBEF ABOBO PMI BINGERVILLE
SUD-COMOE	15	CHR ABOISSO HG ADIAKE HG BONOUA HG GRAND-BASSAM HG AYAME PMI URBAINE ABOISSO CSR AYENOUA CSR YAHOU CSR ABI CSR EBOUE CSR ASSOMLAN CSR MOHOUA CSR NGUIEME DISP RURAL SAMO PMI GRAND BASSAM
MOYEN-COMOE	15	CHR ABENGOUROU HG AGNIBILEKRO PMI AGNIBILEKRO MATERNITE DE CAFETOU ABENGOUROU DISPENSARE URBAIN DIOULAKRO ABENGOUROU CAT ABENGOUROU PMI ABENGOUROU CSU NIABLE DISPENSARE URBAIN ABENGOUROU INFIRMERIE LYCEE MODERNE CS RURAL APPOUESSO CS RURAL EHUASSO CS RURAL YAKASSE CS RURAL ABRONAMOUE CS RURAL AMORIAKRO
HAUT-SASSANDRA	16	CHR DALOA HG VAVOUA HG ISSIA DISPENSARE RURAL GONATE MATERNITE URBAIN DE DALOA SSSU DALOA CSR BOBOUABAOUAN DISPENSARE RURAL SERIA CSR ZALIHOUAN

Region	Number of facilities sampled	Facility name
		CSU ZOUKOUGBEU CSR BAOULIFLA DISP URBAIN IBOGUE DISPENSAIRE RURAL GALIOUA CSR DE SEITIFLA / VAVOUA SSSS ISSIA DISP RURAL NAHIO
FROMAGER	16	CHR GAGNOA HG OUME MATERNITE URBAINE DIOULABOUGOU GAGNOA SSSU / GAGNOA CS INTEGRE AHIZABRE CENTRE DE SANTE DE GBADJIE DISPENSAIRE RURAL GUEMENEDOU DISPENSAIRE RURAL GNAHIRIO DISP RURAL DOUKOUYO CSR IGNAGO CSR ZOHOA DISP RURAL BODOSIPA DISP RURAL DIDIA DISP RURAL MAGBEIGONEPA CSR YOKPOHUE CS URBAIN DIEGONEFLA
MOYEN-CAVALLY	15	CHR GUIGLO HG TOULEPLEU HG DUEKOUÉ DISP DE MEZOBLI / TOULEPLEU DISP URBAIN DE PEHE DISP RURAL GUIGLO DR MONA 1 ET 2 DISP RURAL ZOUHAN DISP RURAL DE PETIT GUIGLO SSSU DUEKOUÉ CSU BAPLEU DISP URBAIN GUEHEBLI CSU BLOLEQUIN DISP RURAL TINHOU PMI DE GUIGLO
BAS-SASSANDRA	16	CHR SAN-PEDRO HG SASSANDRA HG BUYO HG SOUBRE

Region	Number of facilities sampled	Facility name
		HG TABOU CLINIQUE AIBEF SAN-PEDRO PMI BARDOT SAN-PEDRO PMI BARDOT CDV APROMASAM SAN-PEDRO CSUS CAT SAN PEDRO CSR SAGO SASSANDRA DISP RURAL BAZOA CSR YAKOLIDABOUO CSR DJAMADJOKE CSR GABIADJI DISP RURAL GAOULOU
LACS	16	CHR YAMOUSSOUKRO HG DJEKANOU HG TOUMODI HG TIEBISSOU DISP RURAL DE BONIKRO CENTRE DE S RU DE N GATTADOL / N GATTADOLIKRO CSR BONIANKRO DIS KONDROKOR KPASSONOU / DIDIEVI CSR DE YAKPABO SAKASSOU DIS RURAL DE KONDROKRO DJASSA SSSU YAKRO INF LYCEE SCIENTIFIQUE YAKRO DISP RURAL AKPESSEKRO DISP RURAL SAKIARE CENTRE S INTEGRE HKB DE BOLI / DIDIEVI
AGNEBY	15	CHR AGBOVILLE HG ADZOPE INF LYCEE MODERNE ADZOPE CSR DUKENS KREMO CSU AGOU CSR GRAND AKOUDZIN CSR BECOUEFIN CSR DIASON CSR YAKASSE ME DISPENSARE RURAL DE DIEBY CENTRE DE ZONE AGBOVILLE CSR D'ANNO CSR GRAND MORIE CSR D'OFFA CSU AZAGUIE

Region	Number of facilities sampled	Facility name
SUD-BANDAMA	15	CHR DIVO HG LAKOTA SSSU DIVO DISP RURAL DE CHIEPO DISP RURAL GODILEHIRI DISP RURAL IROKPO RIA CSR TABLEGUIKOU DISP RURAL D'ASSOKO DISP RURAL BRODOUKOU PINDA DISP RURAL DIOKO DISP RURAL GOGOBRO DISP RURAL AKRIDOU-LADDE DISP RURAL GNAKOUBOUE 2 DISP RURAL NIAKOBLOGNOA CENTRE DE SANTE URBAIN ZIKISSO
N'ZI COMOE	16	CHR DIMBOKRO HG M'BAHIAKRO HG DAOUKRO HG BONGOUANOU HG BOCANDA CSR KONGOTI s/P DAOUKRO CSU OUELLE DISP RURAL AMOROKI CSU KOUASSIKOUASSIKRO CSU ARRAH CSR ANDE CSU M'BATTO PMI URBAIN DIMBOKRO DISP RURAL DJANGOKRO DISP RURAL ALLANFGOUASSOU DISPENSARE RURAL KONANDIKRO
MARAHOUÉ	15	CHR BOUAFLE HG SINFRA HG ZUENOULA CSR ZAGUIETA MATERNITE MUNICIPALE DIOULABOUGOU BOUAFLE CSR BEGBESSOU CSR NANGUEKRO OU TOS 1 DISP RURALE ZOLADANANGORO DISP RURAL BINOUEFLA CSR MAMINIGUI CSU GOHITAFLA

Region	Number of facilities sampled	Facility name
		CSR DE ZRALUO S/P DE GOHITAFLA DISPENSAIRE RURAL DEZRA 1 CSR DE BINFRA / ZUENOULA CSR MANFLA / ZUENOULA
ZANZAN	16	CHR BONDOUKOU HG TANDA HG BOUNA INFIRMERIE GARNISON BONDOUKOU CSR PINDA DSR NAMASSI / BONDOUKOU CSR TOROSANGUEHI CSR DIOULAAMBI DISP RURAL SAPIA CSU KOUNFAO CSR DIAMBA CSR TIEDIO DISP RURAL N'GUESSANBLEDOUKRO CAT BOUNA CSR ONDOFIDOUO DISP RURAL LAMBIRA
VALLEE DU BANDAMA	16	CHU BOUAKE HG BEOUMI HG SAKASSOU HG DABAKALA HG KATIOLA DISP RURAL AGBAOU CSU LOLOBO SSSU 2 BOUAKE INF COLLEGE TECHNIQUE BOUAKE CSU BELLE VILLE BOUAKE CSU DIABO CSR ANOZOUME DIS RURAL SRANBELLAKRO CSR MBORLA DIOULASSO SSSU KATIOLA DISP RURAL PETIONARA
SAVANES	16	CHR KORHOGO HG BOUNDIALI HG TENGRELA HG FERKESSEDOUGOU PMI URBAINE BOUNDIALI DISPENSAIRE RURALE TOMBOUKOU

Region	Number of facilities sampled	Facility name
		CSR N'DEOU CSU DE SINEMATIALI DISPENSAIRE RURAL TOGONIERE CSU GUIEMBE DISP KOKO TON / KORHOGO DISPENSAIRE RURAL FONONVOGO CSU MBENGUE CSU NIOFOIN CSR KAGBOLODOUGOU DISPENSAIRE RURAL LOMARA
MONTAGNES	16	CHR MAN HG DANANE HG BANGOLO HG BIANKOUMA CSSU DANANE DISPENSAIRE RURAL ZOUPLEU DISPENSAIRE RURAL BIANTOUU 2 / DANANE DISPENSAIRE URBAIN DE ZEO / BANGOLO CSR DE GOUESSESSO / BIANKOUMA DISPENSAIRE RURAL DE GAOTE / MAN CSR SANTA / BIANKOUMA DISPENSAIRE RURAL GONGOUINE 1 / MAN DISPENSAIRE RURAL DE GBKOALE / MAN CSU DE GRAND GBAPLEU / MAN CSR DE GBANGBEGOUINE YATI / MAN CSU DE KOUIBLY
DENGUELE-BAFING	15	CHR ODIENNE HG TOUBA DISPENSAIRE RURAL BOUGOUSSO CSR MAHANDIANA SOKOURANI CSR SANANFEREDOUGOU DISPENSAIRE RURAL N'GOLOBLASSO PMI URBAINE ODIENNE INFIRMERIE LYCEE CAFOP CSU SEGUELON ODIENNE DISPENSAIRE RURAL ZEGBAO CSU BOROTOU DISPENSAIRE RURAL DO MATERNITE RURALE BONTOU DISPENSAIRE RURAL TIAOUEU DISPENSAIRE RURAL SILAKORO

Region	Number of facilities sampled	Facility name
WORODOUGOU	15	CHR SEQUELA HG MANKONO CSU DIANRA CSU KONGASSO CENTRE DE ZONE MANKONO CSR ANDOUGOU INFIRMERIE LYCEE MODERNE BAD TIENINGBOUE CENTRE SANTE URBAIN DJIBROSSO CENTRE DE SANTE URBAIN KANI CSR GBOGOLO DISPENSAIRE RURAL FADIADOUGOU PMI URBAINE SEQUELA DISPENSAIRE RURAL SIANA CENTRE DE SANTE URBAIN SIFIE DISPENSAIRE RURAL MASSALA GOURAN

Annex C. Key Assumptions Underlying the Projection of Key Health Workers

- ▲ The attrition rate for each profession is the average of 2003 and 2004; it is important to note that the year 2002 was excluded from the average attrition rate because it is a time when the country experienced civil war coupled with mass attrition of health workers.
- ▲ The annual population growth rate is estimated at 2 percent. (U.S. CIA 2005).
- ▲ The HR need was estimated by multiplying the number of encounters per patient by the time needed per encounter by the size of target population. The total time is then converted into person-year by considering the number of working days per year (211), and the number of effective working hours (6), and the average share of provider's time used for HIV services (50 percent). We then multiply the number of person-years by the number of people in need of HIV/AIDS services.
- ▲ The HR stock over the next five years is assumed to be equivalent to the annual growth rate of the past three years.
- ▲ The annual number of newly trained health personnel, by profession, entering the public sector is 90 percent of the average of graduates in the particular health field from 2002 to 2004.

Annex D. Percentage of Workers Who Cited Political Crisis as the Reason for Leaving their Post in 2002-2004

Staff type/ year	Total # of staff left due to political crisis	Total # left post	Percentage of staff left due to political crisis
Doctors			
2002	118	200	0.59
2003	6	73	0.08
2004	0	107	0.00
Nurses			
2002	332	444	0.75
2003	19	186	0.10
2004	1	160	0.01
Midwives			
2002	137	205	0.67
2003	6	106	0.06
2004	4	91	0.04
Lab technicians			
2002	16	27	0.59
2003	3	15	0.20
2004	0	14	0.00
Social workers			
2002	10	27	0.37
2003	2	20	0.10
2004	0	22	0.00

Annex E. Percentage of Health Professionals in Cote d'Ivoire by District, 2002-2004

Region	Estimated regional population (1,000s)	Doctors	Nurses	Pharmacists	Lab technicians	Midwives	Dentists	Social workers	Facilities surveyed
Lagunes 1*	NA	261	511	14	78	244	20	33	15
Lagunes 2*	NA	465	768	33	138	434	68	75	23
ABIDJAN SUBTOTAL:	4,283.7	726	1,279	47	216	678	88	108	38
Agnéby	705.5	25	88	1	10	42	5	1	15
Bas-Sassandra	1,031.5	32	105	1	15	46	8	2	16
Denguélé & Bafing**	445.6	5	15	0	1	0	1	1	15
Haut-Sassandra	1,161.2	23	95	1	7	38	5	4	16
Fromager	665.3	14	75	0	2	36	2	0	16
Lacs	584.8	21	100	1	10	34	6	6	15
Marahoué	637.8	12	70	1	4	27	5	0	15
Dix-Huit Montagnes	1,156.8	8	57	0	3	8	1	1	16
Moyen-Cavally	433.6	12	41	1	7	13	3	0	15
Nzi-Comoé	890.3	23	91	1	10	41	5	2	16
Moyen Comoé	477.6	30	89	1	12	38	4	4	15
Savanes	1,189.1	4	36	0	3	7	2	3	16
Sud Bandama	808.6	15	69	1	7	36	4	1	15
Sud-Comoé	361.4	28	90	1	14	60	8	5	15
Vallée Bandama	1,306.8	23	62	0	2	18	2	0	16
Woro-dougou	391.6	4	16	0	1	9	1	1	15
Zanzan	820.9	12	67	1	4	19	3	2	16
OUTSIDE ABIDJAN SUBTOTAL:	13,068.4	291	1,166	11	112	472	65	33	263
COTE D'IVOIRE TOTAL:	17,352.1	1,017	2,445	58	328	1,150	153	141	301

* Lagunes is a single administrative region, divided into two areas for the purpose of this assessment.

** Deneguélé and Bafing are two administrative regions, combined for the purpose of this assessment.

Annex F. Reference List

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