



# ESTIMATING THE COSTS OF PROVIDING HIV/AIDS SERVICES IN PUBLIC HEALTH FACILITIES IN CÔTE D'IVOIRE



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## Mission

The Health Systems 20/20 cooperative agreement, funded by the U.S. Agency for International Development (USAID) for the period 2006-2011, helps USAID-supported countries address health system barriers to the use of life-saving priority health services. HS 20/20 works to strengthen health systems through integrated approaches to improving financing, governance, and operations, and building sustainable capacity of local institutions.

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**Submitted to:** Toussaint Sibailly, USAID/Cote d'Ivoire  
Karen Cavanaugh, CTO  
Yogesh Rajkotia, co-CTO  
Health Systems Division  
Office of Health, Infectious Disease and Nutrition  
Bureau for Global Health  
United States Agency for International Development

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Abt Associates Inc. | 4550 Montgomery Avenue, Suite 800 North | Bethesda, Maryland 20814 |  
P: 301.347.5000 | F: 301.913.9061 | [www.healthsystems2020.org](http://www.healthsystems2020.org) |  
[www.abtassociates.com](http://www.abtassociates.com)

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## **DISCLAIMER**

The author's views expressed in this publication do not necessarily reflect the views of the United States Agency for International Development (USAID) or the United States Government.



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# ABSTRACT

Resource estimation for the provision of HIV/AIDS services has recently gained national and international attention. Many low resource countries are now conducting resource estimation exercises to guide program scale-up. To respond efficiently to the HIV/AIDS epidemic in the Côte d'Ivoire, and to scale up prevention, treatment, care and support services to People Living With HIV/AIDS, the Ministry of Health and Public Hygiene and other stakeholders require evidence-based costing data to guide program planning and implementation of services. To assist in this effort, the Health Systems 20/20 project in collaboration with the MSHP and ENSEA carried out a study to estimate the cost of providing a range of HIV/AIDS services through public health facilities. In October and November 2007, data were collected on the costs of HIV Counseling and Testing (CT), Prevention of Mother-to-Child Transmission (PMTCT), Antiretroviral Therapy (ART), related laboratory services, diagnosis and treatment for tuberculosis (TB), and Care and Support Services (CSS) in 2006. Unit costs per patient receiving each service were estimated. This information will facilitate future estimation of the costs of scaling up coverage for HIV/AIDS services as outlined in the HIV/AIDS Strategic Plan for Côte d'Ivoire.



# ACRONYMS

<b>AIDS</b>	Acquired Immunodeficiency Syndrome
<b>AMU</b>	Universal Health Insurance ( <i>Assurance Maladie Universelle</i> )
<b>ART</b>	Antiretroviral Therapy
<b>ARV</b>	Antiretroviral drug
<b>CAT</b>	Specialized Tuberculosis facilities ( <i>Centre Anti-Tuberculeux</i> )
<b>CD4</b>	Cluster of Differentiation 4
<b>CDC</b>	Centers for Disease Control (Atlanta)
<b>CECI</b>	Côte d'Ivoire Business Coalition against AIDS ( <i>Coalition des entreprises de Côte d'Ivoire contre le SIDA</i> )
<b>CHR</b>	Regional Hospital ( <i>Centre Hospitalier Régional</i> )
<b>CHU</b>	Teaching (Tertiary) Hospital ( <i>Centre Hospitalier Universitaire</i> )
<b>CNLS</b>	National Advisory Board for the Fight Against AIDS ( <i>Conseil National de Lutte contre le SIDA</i> )
<b>CSS</b>	Care and Support Services
<b>CT</b>	Counseling and Testing
<b>CTB</b>	Belgian Technical Cooperation ( <i>Coopération Technique Belge</i> )
<b>DEPS</b>	Professional and Health Care Facilities Department ( <i>Département des Etablissements et Professions de Santé</i> )
<b>DHS</b>	Demographic and Health Survey
<b>DIEM</b>	Department of Infrastructure, Equipment and Maintenance
<b>DIPE</b>	Ministry of Health Information, Planning and Evaluation ( <i>Direction de l'Information et de la Planification et de l'Évaluation</i> )
<b>DOTS</b>	Directly Observed Therapy, Short-course
<b>EC</b>	European Commission
<b>EIS-CI</b>	AIDS Indicator Survey-Côte d'Ivoire ( <i>Enquête sur les Indicateurs du SIDA-Côte d'Ivoire</i> )
<b>ELISA</b>	Enzyme-Linked Immunosorbent Assay
<b>ENSEA</b>	Ecole National de Statistiques et Economie Appliquée
<b>EPIC</b>	Public Establishment with Commercial Interests ( <i>Etablissement Public à Intérêt Commercial</i> )
<b>FCFA</b>	Franc Communauté Financière Africaine
<b>GFATM</b>	Global Fund to Fight AIDS, Tuberculosis and Malaria

<b>GTZ</b>	German Technical Cooperation ( <i>Gesellschaft für Technische Zusammenarbeit</i> )
<b>HAART</b>	Highly Active Antiretroviral Therapy
<b>HG</b>	General Hospital ( <i>Hôpital Général</i> )
<b>HIV</b>	Human Immunodeficiency Virus
<b>HRH</b>	Human Resources for Health
<b>IEC</b>	Information, Education and Communication
<b>MIS</b>	Management Information System
<b>MLS</b>	Ministry for the Fight Against AIDS ( <i>Ministère de Lutte contre le SIDA</i> )
<b>MSHP</b>	Ministry of Health and Public Hygiene ( <i>Ministère de la Santé et de l'Hygiène Publique</i> )
<b>NGO</b>	Non-Governmental Organization
<b>OI</b>	Opportunistic Infection
<b>OVC</b>	Orphans and Vulnerable Children
<b>PCR</b>	Polymerase Chain Reaction
<b>PEPFAR</b>	President's Emergency Plan for AIDS Relief
<b>PLWHA</b>	People Living With HIV/AIDS
<b>PMTCT</b>	Prevention of Mother-to-Child Transmission of HIV
<b>PNDS</b>	National Health Sector Plan ( <i>Plan National de Développement Sanitaire– PNDS</i> )
<b>PNLS</b>	National Program for the Fight Against AIDS ( <i>Programme Nationale pour la Lutte contre le SIDA</i> )
<b>PNPEC</b>	National Program of Medical Care for PLWHA ( <i>Programme National de Prise en Charge médicale des personnes vivant avec la VIH</i> )
<b>PSP</b>	National Central Pharmacy ( <i>Pharmacie de Santé Publique</i> )
<b>PMTCT/PTMe</b>	Prevention of Mother-to-Child Transmission ( <i>Prévention de la Transmission Mère-Enfant</i> )
<b>SCMS</b>	Supply Chain Management System
<b>SIG</b>	Health Information System ( <i>Système d'Information et Gestion</i> )
<b>SPA</b>	Service Provision Assessment
<b>STI</b>	Sexually Transmitted Infections
<b>TB</b>	Tuberculosis
<b>UNDP</b>	United Nations Development Program
<b>UNFPA</b>	United Nations Population Fund
<b>UNICEF</b>	United Nations International Children's Emergency Fund
<b>USAID</b>	United States Agency for International Development
<b>WHO</b>	World Health Organization

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# COLLABORATORS

## LIST OF SUPERVISORS AND DATA COLLECTORS

Dr. SIKA Lazare	(ENSEA)
Dr. ATTE Boka	(MSHP/ DEPS)
GUETAT Dyana	(HS 20/20)
GNAORE Patrick	(ENSEA)
ZIRIMBA Léa	(ENSEA)
Dr KOUAKOU Zéphirin	(MSHP/DIPE)
LIGUE Olivia	(ENSEA)
ODJE Koffi	(ENSEA)
KRA Armel	(MSHP/DRH)
N'DJOMON Yves	(ENSEA)
ADJE Niamkey	(ENSEA)
ANO Daniel	(ENSEA)
ANI Goli Serges	(ENSEA)
BEUGRE Marie-Joseph	(ENSEA)

## LIST OF INSTITUTIONS PARTICIPATING IN THE STUDY

ACONDA  
CAT – Abengourou  
CAT – Adjame  
CHR – Divo  
CHR – Abengourou  
CHU – Cocody  
CHU – Yopougon  
CHU – Treichville  
CSR – Assuamé Agnibilekrou  
CSU – Ougoudou  
DIEM – Direction de l’Infrastructure, de l’Equipement et de la Maintenance  
Dispensaire Rural – Banacomoe  
Dispensaire Urbain – Dioulakro  
Dispensaire Urbain – Notre Dame des Apôtres  
FSUCom – Port Bouët II  
HG – Anyama  
HG – Port Bouët  
PMI – Abengourou  
PNPEC – Programme National de Prise en Charge Médicale des Personnes Vivant avec le VIH/SIDA  
SCMS – Supply Chain Management Systems  
UNDP – United Nations Development Programme  
PSP – Pharmacie de Santé Publique



# EXECUTIVE SUMMARY

The Republic of Côte d'Ivoire is one of the most affected by the HIV/AIDS epidemic in West Africa. According to the recent AIDS Indicator Survey, the adult HIV prevalence rate is 4.7 percent among the general population.<sup>1</sup> Many of the infected population are young adults (15-49 years old), and there is a higher infection rate among women than men (6.4% compared to 2.9%). The country also bears the burden of a related increase in tuberculosis (TB) cases due to HIV co-infection (co-infection estimates range from 24 to 47%). The National HIV/AIDS Strategic Plan (2006-2010) is being implemented and a National Plan for Health (PNDS) for 2008- 2012 has been drafted and is currently being validated by the Ivorian authorities. However, the gap between available and needed resources to combat the epidemic is large, and current efforts need to be strengthened. In preparation for further scaling up its response to the HIV/AIDS epidemic, the government requested an estimate of the resources currently devoted to HIV/AIDS service provision.

The objective of this study was to estimate the costs of providing HIV/AIDS medical services through public sector facilities in Côte d'Ivoire in 2006, and provide a basis to estimate the resource requirements for sustaining and scaling up such services in the future. Data were collected from 16 health facilities in four health zones of the country during October and November 2007. The sample selection, based on purposive sampling reflected all levels of the public health service provision pyramid as well as urban and rural settings. Price and service utilization data were also collected from central government agencies, international donor partners, and NGOs.

The researchers estimated the unit costs of Counseling and Testing (CT), Antiretroviral Therapy (ART), Prevention of Mother-to-Child Transmission (PMTCT), laboratory monitoring tests, TB services, and Care and Support Services (CSS). The table below provides a summary of the estimated unit costs of the different HIV/AIDS services in 2006.

## SUMMARY OF UNIT COSTS FOR SELECTED HIV/AIDS SERVICES (2006)

Service	Denominator	Unit cost	Unit cost
		(\$)	(CFA)
CT	Per client counseled and tested	\$6.35	3,196
ART	Per patient receiving ART per year	\$384.30	192,148
PMTCT	Per pregnant woman counseled and tested	\$6.12	3,059
LAB	Per HIV+ patient receiving monitoring test	\$37.39	18,694
TB	Per patient receiving TB services per year	\$120.98	60,391
CSS	Per patient receiving CSS per year	\$135.93	67,964

<sup>1</sup> AIDS Indicators Survey in Côte d'Ivoire (2005)

The following findings are highlighted from this study. First, the unit cost of CT services was estimated at \$6.35 per client with staff time comprising more than 50% (\$3.83 per patient). Staff costs ranged from \$1.69 per patient at the TB centers to \$5.84 per patient at the tertiary level.

Second, ART service constitutes the largest portion of unit costs among all the HIV/AIDS services at \$384 per patient per year. The cost of ART was largely driven by the price of antiretroviral drugs, as expected, but labor costs contributed about 18% of the total. The unit cost of laboratory monitoring tests, including staff time, was equivalent to about 10% of the unit cost of ART per year.

Third, the cost of HIV counseling and testing per pregnant woman in 2006 was \$4.45, including staff costs, training, and HIV test kits. The cost per HIV+ pregnant woman for ARV prophylaxis and nutritional counseling was \$13.00, including staff time and ARV medications. The cost per HIV+ pregnant woman in need of ART was \$191.18, including staff time and ARV medications.

Fourth, the average cost per HIV/TB patient per year for TB diagnosis, treatment and monitoring was an estimated \$121 in 2006. Given the different labor allocations at different facility levels, this ranged from \$108 at health dispensaries to \$144 at secondary and general hospitals. TB unit costs were driven by the price of drug regimens. Care and support services were reportedly very time-intensive activities and therefore associated with high staff costs.

Fifth, several interesting non-cost findings also emerged. For example, only 79% of pregnant women who received pre-test counseling during prenatal visits accepted the option to obtain an HIV test. Furthermore, only two-thirds of the women who tested positive received ARV prophylaxis.

Sixth, the researchers found a high rate of prescriber compliance to recommended first-line ARV regimens, with 94% of patients receiving recommended combinations. However, the researchers also found that 4% of patients are still receiving only 2 antiretroviral drugs (duo-therapy).

Finally, the researchers also found that although national protocols indicate all patients on ART should receive a viral load test every 6 months, this has not been translated into reality for the majority of individuals on treatment as there are reportedly only two viral load machines and one thermocycler in public health facilities in the country.

The information obtained from this study provides stakeholders, including the Government of Côte d'Ivoire, with key costing data as well as information on other aspects of providing care to PLWHA. In the near future, the Ministry of Health in collaboration with the Health Systems 20/20 project plans to use the costing data to provide estimates of the cost of scaling up services under different scenarios. Researchers also hope that some of the non-cost issues which came to light during this study will provide avenues for further discussion and research in Côte d'Ivoire.

# I. BACKGROUND AND PURPOSE

Several estimates have recently been undertaken to estimate the cost of scaling up HIV/AIDS services to achieve universal coverage in low- and middle-income countries. Among these is the 2007 UNAIDS report <sup>2</sup>, which presents two scenarios, scale up to universal access by 2010 or phased scale up to reach universal access by 2015 in low to middle income countries. The UNAIDS study defines universal access as treatment coverage of 80% of those in need, providing antiretroviral therapy to 13.7 million people worldwide in 2010 and to 21.9 million in 2015. In either case, the gap between available and needed resources is large and needs to be addressed.

Côte d'Ivoire is one of the countries most affected by the HIV/AIDS epidemic in West Africa, with an HIV/AIDS prevalence rate estimated at 4.7 percent in the general population<sup>3</sup>. Most of the epidemic's victims are young adults (15-49 years) with a higher infection rate among women (6.4% women are infected compared to 2.9% of men). The country is also marked by a resurgence of tuberculosis (TB) due to HIV infections. During the last five years, the number of TB cases increased from 17,242 in 2001 to 21,204 in 2006<sup>4</sup>.

For more than a decade, the Government of Côte d'Ivoire has made commendable efforts towards developing a health system able to meet the needs of the population, with a particular emphasis on the fight against the three major transmissible diseases: HIV/AIDS, tuberculosis and malaria. The United States has been particularly supportive of these efforts over the last fifteen years. In recognition of the importance of expanding access to HIV/AIDS service, the country has undertaken several analytical activities to estimate the costs and resource requirements to help guide the planning and delivery of these services across the country. For example, PEPFAR has assisted Côte d'Ivoire's Ministry of Health and Public Hygiene (MSHP) in a number of HIV/AIDS related strategic information studies. Abt Associates carried out an initial Human Resources for Health assessment in the public sector<sup>5</sup> (through the Partners for Health Reform<sup>plus</sup> project) and then later in the private sector <sup>6</sup> (through the Private Sector Partnerships-One project). These studies evaluated the human resource situation which need to be addressed to tackle the fight against AIDS efficiently. In 2007, an HIV/AIDS Service Provision Assessment was conducted throughout the country under the Health Systems 20/20 project, documenting the existing availability and distribution of human resources, infrastructure and equipment.<sup>7</sup>

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<sup>2</sup> UNAIDS, 2007, *Financial Resources Required to Achieve Universal Access to HIV Prevention, Treatment, Care and Support*, Geneva

<sup>3</sup> Institut National de la Statistique (INS) et Ministère de la Lutte contre le Sida [Côte d'Ivoire] et ORC Macro (2006), *Enquête sur les Indicateurs du Sida, Côte d'Ivoire 2005*. Calverton, Maryland, U.S.A. : INS et ORC Macro.

<sup>4</sup> Rapport annuel 2006 PNLT (*Programme National de Lutte Contre le Tuberculose*, National TB Program) non diffusé.

<sup>5</sup> Butera D, Fieno JV, Diarra S, Kombe G, Decker C, and Oulai S, July 2005. *Evaluation des besoins en ressources humaines pour réaliser les objectifs du Plan d'Urgence du Président des Etats-Unis contre le SIDA (PEPFAR) et offrir des services de santé de base en Côte d'Ivoire*, Bethesda, MD: The Partners for Health Reform<sup>plus</sup> Project, Abt Associates Inc.

<sup>6</sup> Lee, Won Chan, Gilbert Kombe, Suzanne D. Diarra, Damascene Butera, Amy Holdaway, Alison Bishop, Kreda Boci, and Olai Soumahoro. December 2006. *Human Resources for Health in the Private Sector: Understanding the Capacity, Motivation and Skills Mix in Cote d'Ivoire*. Bethesda, MD: Private Sector Partnerships-One project, Abt Associates Inc.

<sup>7</sup> Kombe G, Steffen M, Holdaway A, Srinath K.P., Butera D, Diarra S, Kadjo D, Landry M, Seka F, Kraffa B, Ebah-Aka L, Tuho M, Oulai S, Atte B. August 2007. *Cote d'Ivoire: Service Provision Assessment*. Bethesda, MD: Health Systems 20/20 project, Abt Associates Inc.

The purpose of this study was to estimate the costs of providing HIV/AIDS services in public sector health facilities in Côte d'Ivoire. The report provides practical information to policymakers and program planners about HIV/AIDS service costs.

The structure of this report is as follows. Section 1 provides background information on HIV/AIDS in Cote d'Ivoire. Section 2 addresses the methodology and data sources. Section 3 presents findings on the unit costs for CT, ART, PMTCT, TB and CSS interventions, and Section 4 concludes.

## 1.1 OVERVIEW OF HEALTH FINANCING ISSUES

Health financing in Côte d'Ivoire has been largely dominated by a strong public sector financed through general taxation revenue and out-of-pocket expenditures by users. Fees for service at public facilities were instituted in the 1980s as part of the Bamako Initiative, as was cost recovery for drugs. With the objective of providing improved health care to the general population, several different options for risk sharing have been discussed in Côte d'Ivoire. In the 1990s, pilot community based financing projects were conducted with the help of the Belgian Technical Cooperation and the Cooperation Française. At the beginning of the millennium the focus switched to a concept of Universal Health Insurance based on different "caisses" or insurance funds, somewhat similar to the French model. However, given the political upheavals of 2002 and the continuing instability, little headway has been made in improving financial accessibility to health care, through these or other mechanisms.

Total expenditure on health was estimated at US\$33 per capita in 2004.<sup>8</sup> Sixty-eight percent (68%) of this total was contributed out-of-pocket by households, through cost recovery in public health facilities and utilization of private providers. The government of Côte d'Ivoire devotes approximately 5% of its national budget to the health sector, or around 6000 FCFA per person per year, approximately \$12. Including the cost of drugs procured in the private sector and bought by consumers through private pharmacies, total health spending was over 200 billion F.CFA per year <sup>9</sup>.

A review of the 2002-2004 National HIV/AIDS Strategic Plan<sup>10</sup> revealed good mobilization of international funds for the financing of the different activities related to the fight against HIV/AIDS. Eighty one percent of total estimated financing was generated thanks to joint efforts between the government and donor partners. These resources allowed for the financing of different priority actions which had been previously laid out in national plans. However, two problems were identified, the weak mobilization of internal resources and the lack of overall coordination of resources. Based on its own calculations and according to the objectives set out in the 2006-2010 national HIV/AIDS plan<sup>11</sup>, the estimated total cost of the fight against AIDS is estimated at 297 billion F CFA (US \$577 million) of which 168.5 billion F CFA (\$327 million) or 57 % would be allocated to care and treatment.

With the current state of the economy, emerging as it is from a conflict situation, it is clear that the national treasury will not be able to finance this ambitious program on its own. The National Council for AIDS, the coordinating institution for the fight against HIV/AIDS, expects that these funds will largely

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<sup>8</sup> World Health Organization Statistical Information System (WHOSIS), [http://www.who.int/whosis/database/core/core\\_select.cfm](http://www.who.int/whosis/database/core/core_select.cfm).

<sup>9</sup> Annexe fiscale de la loi de finances 2001, Côte d'Ivoire.

<sup>10</sup> Conseil National de Lutte Contre le SIDA, Secrétariat, June 2006, *Plan Stratégique Nationale de Lutte contre le VIH/SIDA 2006/2010*, Abidjan, RCI.

<sup>11</sup> PNPEC and MSHP, November 2005, *Politique Nationale de Prise en Charge Global des Personnes Vivant avec le VIH dans le Secteur Santé*, 1st edition, Abidjan, Republic of Côte d'Ivoire.

be mobilized via international donors although it also counts on the participation of local governments and Faith-Based Organizations. The treasury will also provide financing through general tax revenues. It is recognized that an increasing proportion of health spending should be generated internally, and different options for health financing coverage have been studied with an emphasis currently placed on the implementation of a social security system, *Assurance Maladie Universelle (AMU)*.

### **I.1.1 PUBLIC SECTOR FINANCING**

The financial contribution by the national government for the fight against AIDS has been variable over the years. For example, the budget allocated to the MLS by the central government in the years 1999, 2000, 2001 and 2002 was 2.4 billion, 3.7 billion, 1.3 billion, and 3.1 billion FCFA respectively. The national allocations for antiretroviral drugs (ARVs) were around 750 million FCFA over 1999-2002, planned for the PSP budget, the institution responsible for acquiring ARVs for the Côte d' Ivoire during this time period.

A large proportion of the resources devoted to the health sector and subsequently to the fight against AIDS takes the form of salaries for human resources for health. The majority of doctors and nurses in the country are salaried staff of the MSHP, although those funds are not usually reflected in the ministry's budget and are paid directly from the national treasury. Public sector salaries, for the health sector and others, are considered low<sup>12</sup> and health care providers often supplement their income with businesses or private sector provision of services on the side. Despite inflation, public sector salaries have not increased in many years.

During the review of the 2002-2004 strategic plans, and the intermediate plan for 2005, it was noted that the financial incentives used by the government to promote private sector involvement in the fight against HIV/AIDS were not accessed to the expected levels. Despite legal frameworks allowing for tax incentives for private businesses involved in the fight against AIDS, the total amount of the public subsidy in 2004 only reached 5 million FCFA (11,700 US \$).

### **I.1.2 PAYING FOR HIV/AIDS SERVICES**

As noted previously, cost recovery has been implemented in the Côte d'Ivoire since 1995 with both fee-for-service and revolving drug funds. Following this same principal, and although access to treatment became officially free since August 2008, some fees have in the past been applied to PLWHA for their care and treatment.

Initially, access to care for PLWHA was limited to diagnosis and treatment of opportunistic infections (OI) with cotrimoxazole. During the tenth International Conference on AIDS and STIs (10ème CISMA) held in Abidjan in 1997, the president of Côte d'Ivoire, Henri Konan Bedie, declared that ARVs would be subsidized, and this initiative was financed through UNAIDS beginning in 1998. In April 2003, a

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<sup>12</sup> Butera D et al. (2005), *Evaluation des besoins en ressources humaines pour réaliser les objectifs du Plan d'Urgence du Président des Etats-Unis contre le SIDA (PEPFAR) et offrir des services de santé de base en Côte d'Ivoire*.

consensus workshop led to the official introduction of generic ARVs into the therapeutic protocols, although they had been available on the market in Côte d'Ivoire since 1997<sup>13</sup>.

In July 2004, in an effort to ensure greater access to care, the government of Côte d'Ivoire, along with its partners, opted to provide antiretroviral treatment for PLWHA (including ARVs and the related blood tests) for 5000 FCFA per quarter for adults. Children and pregnant women receive ARV prophylaxis for free (as part of the prevention of mother-to-child transmission, PMTCT) as do health care providers in the public sector when exposure is work-related. In 2006, the quarterly cost of ARV treatment was further reduced to 3000 FCFA. Since August 2008, the MSHP stipulates that public facilities should provide ARV free of charge.

The most common opportunistic infection in Côte d'Ivoire is tuberculosis. As in many sub-Saharan African countries, tuberculosis diagnosis and treatment is subsidized by the government and is offered free of charge nationwide.

## 1.2 THE MAJOR ACTORS IN THE FIGHT AGAINST HIV/AIDS

The public sector, non governmental sector, private sector, and international donor partners all work together in the fight against AIDS in Côte d'Ivoire.

### 1.2.1 THE PUBLIC SECTOR

The Ministry of Health and Public Hygiene (Ministère de la Santé et de l'Hygiène Publique – MSHP) is the principal actor in the provision of medical care to PLWHA. Public health facilities provide care throughout the country, ranging from the primary level including rural and urban health centers, the secondary level with general and regional hospitals and the tertiary specialized institutions. The total number of public health facilities listed in 2006 by the MSHP was 1,389. Of these, 1,357 were level 1 public health facilities (health centers, general hospitals, dispensaries), 17 were level 2 public health facilities (regional hospital centers) and 15 were level 3 public health facilities (university hospital centers and specialized national institutes). The MSHP plays an important role in providing care and treatment for HIV/AIDS in terms of collaboration and partnering at central and decentralized levels, providing care at public facilities, providing and training human resources for health, and also spearheading monitoring and evaluation of activities.

The role of the MSHP in care and treatment for PLWHA is supported by its participating institutions, which are National Program of Medical Care for PLWHA (Programme National de Prise en Charge Médical des Personnes Vivant avec le VIH/SIDA- PNPEC) and the Pharmacie de la Santé Publique – PSP (National Pharmacy). PNPEC is the primary technical partner for the MSHP. It performs important role in the definition of intervention zones where different players carry out activities as well as in the collaboration and coordination for the development of national procedures and associated manuals. PNPEC is also instrumental in organizing the monitoring and evaluation of activities and the training of human resources for health.

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<sup>13</sup> Juillet A., Malaval C., Moatti J.P. (2001), L'impact de l'Initiative sur la disponibilité et l'accessibilité des médicaments, dans « *L'accès aux traitements du VIH/Sida en Côte d'Ivoire – Evaluation de l'Initiative ONUSIDA – Aspects économiques, sociaux et comportementaux* », sous la direction de Philippe Msellati, Laurent Vidal, Jean-Paul Moatti, ANRS, collection Sciences Sociales et Sida, pp. 115-132.

The PSP is also a key player in providing the necessary medical inputs for the care of PLWHA. The PSP is the national purchase center and warehouse and is the primary supplier of antiretrovirals in Côte d'Ivoire. It is responsible for the distribution of medicines and other medical supplies for the entire country. It also manages cost recovery related to its products and ensures the monitoring and evaluation of the management of medicines and other inputs. The PSP benefits from the financial and technical support of various development partners including the Global Fund, PEPFAR, UNAIDS, the Clinton Foundation, WHO and the EC.

Another critical actor in Côte d'Ivoire, is the Ministry for the Fight Against AIDS (Ministère de la Lutte Contre le Sida - MLS), created in 2003. Its mission is to plan, orient, coordinate, monitor and evaluate the programs related to the fight against HIV/AIDS, and mobilize technical and financial resources for all sectors involved in the fight nationwide. In effect, the MLS has the mandate to coordinate all the interventions for the fight against AIDS. This ministry plays a major role in researching and obtaining financing and technical support, collaborating in monitoring and evaluation of HIV/AIDS activities, implementing and coordinating preventive activities at community level and developing the National Strategic plan for the Fight Against AIDS.

### **I.2.2 NON GOVERNMENTAL ORGANIZATIONS (NGOS)**

Non governmental organizations play an essential part in the fight against AIDS, and are key implementers of the national response to HIV/AIDS in Côte d'Ivoire. They are the primary representatives of civil society. The number of NGOs involved in the fight against AIDS has been increasing recently at a significant rate, for example from 234 in 2001 to 306 in 2002. Many of the NGOs which are involved in providing care for PLWHA receive financial and technical support from international donors, such as the US government through the President's Emergency Plan for AIDS Relief (PEPFAR) and the Global Fund to Fight AIDS, Malaria and Tuberculosis (GFTAM). Researchers found that ACONDA, the Elisabeth Glaser Pediatric Aids foundation (EGPAF) and the Supply Chain Management System (SCMS) were particularly active in contributing to the provision of care to PLWHA through public health facilities.

### **I.2.3 THE PRIVATE SECTOR**

The private sector has a key role to play in the fight against AIDS. In Côte d'Ivoire private sector actors include private providers and also business groups and private companies. Côte d'Ivoire has a diverse mix of private health care providers, ranging from traditional to modern practitioners, providing services from their homes or large clinical establishments. Private providers can be classified by their for-profit or non-profit commercial orientation and by their type of ownership – for example, individual/group-owned practices and mission/charitable clinics. The 2005 private sector study<sup>14</sup> found that a small proportion (7.8%) of private health facilities nationwide are providing HIV/AIDS-related services, concentrated in urban areas, especially the Lagunes region.

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<sup>14</sup> Butera D, et al. (2005), op. cit

## **I.2.4 INTERNATIONAL DEVELOPMENT PARTNERS**

The support provided by development partners, both bi-lateral (PEPFAR, CTB, GTZ, French Cooperation, and Japanese Cooperation) and multilateral partners (Global Fund, WHO, UNICEF, UNAIDS, UNFPA, and UNDP) is far from negligible. These organizations provide technical and financial assistance for national strategic planning, coordination of interventions, and operationalizing national monitoring and evaluation. They also support community mobilization, the intensification of prevention activities, and improvement of access to care through decentralization/ deconcentration of interventions.

Significant international resources have been mobilized for the implementation of national policy programs for the fight against HIV/AIDS, TB and malaria and for strengthening national capacities for better management of resources. A large percentage of external financing for the care and treatment for HIV/AIDS in Côte d'Ivoire come from the US government through PEPFAR and from the Global Fund to Fight AIDS, Tuberculosis and Malaria.

### **I.2.4.1 PEPFAR**

The United States government, through the President's Emergency Plan for AIDS Relief (PEPFAR), is by far the largest donor for the fight against HIV/AIDS in Côte d'Ivoire. The 2007 commitment alone was US \$84 million. This funding is used for comprehensive HIV/AIDS prevention, care, and treatment programs throughout the country, especially in the north and west. This is translated into scaled-up antiretroviral medication purchases, treatment of HIV-and-tuberculosis co-infections, and care and support of OVCs.

For implementation purposes, PEPFAR works through partners and subpartners in country. In Côte d'Ivoire these include a range of institutions from government ministries to local community- and faith-based organizations. PEPFAR has over 30 partners and 44 sub partners in Côte d'Ivoire implementing projects with PEPFAR funds.

### **I.2.4.2 GLOBAL FUND (GFATM)**

The Global Fund to Fight AIDS, Tuberculosis and Malaria predominantly plays a financing role in the fight against AIDS, in the sense that it finances national proposals and disbursements are dependent on execution. In this sense, the institution functions much like one of the multilateral banks, although all allocated funds are grants as opposed to loans. Côte d'Ivoire has received funding of US \$69 million total for the three diseases of which \$51 million are for AIDS proposals financed under the second, third and fifth round. The first of the three projects was initially to last five years and was largely devoted to prevention, care and treatment. Côte d'Ivoire was supposed to ensure availability of ARVs under this financing, although disbursement difficulties resulted in SCMS (funded by PEPFAR) stepping in to prevent stock outs. The specific objective of this project was to supply 25 000 PLWHAs with their medication. The subsequent two projects, under the third and fifth rounds, focused more on advocacy, IEC, the involvement of civil society and awareness building. The two later projects were developed after the political crisis in 2002 and place a greater emphasis on reaching rebel controlled zones. CARE, replacing UNDP, is currently the Principal Recipient for the GFTAM awards in Côte d'Ivoire.

## **I.3 PROVIDING CARE TO PEOPLE LIVING WITH HIV/AIDS IN CÔTE D'IVOIRE**

Côte d'Ivoire initiated its response to the AIDS epidemic in 1985 with the establishment of the Central Coordinating Bureau (*Bureau Central de Coordination – BCC*) followed by the creation of the *Comité National de Lutte contre le SIDA* - (National Committee for the Fight Against AIDS) in 1987. This institution was subsequently transformed into the currently existing *Programme National de Lutte contre le SIDA*- PNL (National Program for the Fight Against AIDS). The PNL initially included the fight against sexually transmitted infections (STI) and then the fight against TB as well.

Côte d'Ivoire has a multi-pronged strategy to confront HIV in both the public and private sectors. From the outset, counseling and testing (CT) was offered in a wide range of facilities. By end of 2003, 20 CT sites were functioning and the number had grown 56 in 2005 (14 autonomous sites and 42 integrated sites) and 147 CT sites by 2006. PMTCT has been another key strategy. There were 36 sites offering PMTCT services in 2004, 75 in 2005, and 147 in 2006. In 2006 the majority of CT centers were integrated with PMTCT services.

Additionally, the government started providing highly active anti-retroviral therapy (HAART) to AIDS patients in the mid 1990s. ARVs became increasingly accessible with declining drug prices and increased donor funding to support their use. In August 2008, ARVs became available at public facilities free of charge. Following the development and implementation of the highly active antiretroviral therapy (HAART) access policy between 1998 and 2000 (UNAIDS initiative for access to treatment), seven accredited sites were initiated nationwide. The number had increased to 52 in 2005. By August 2007 there were 89 functional sites providing ART, 124 providing counseling and testing and 111 establishments providing PMTCT<sup>15</sup>.

There have been important advances in treatment for PLWHA in Côte d'Ivoire over the last five years, with improvements in medical care and access to antiretrovirals. The initiative to provide access to anti retroviral medication began in 1998, extending coverage to the entire country, establishing accredited centers and providing ambulatory care. There is currently a push to diversify providers, scale up coverage and expand care options. Various institutions and public organizations are involved in this initiative, supporting the national response and the fight against AIDS.

### **I.3.1 THE HEALTH SECTOR PLAN AND THE FIGHT AGAINST HIV/AIDS**

The Health Sector Plan 2008 – 2012 (PNDS) is currently being finalized for Côte d'Ivoire. While this document covers all the priorities of the health sector, it builds on the existing strategic plan for AIDS (2006-2010)<sup>16</sup>. Its principal objective related to care of PLWHA concerns the level of coverage and the quality of both preventive and curative care in Côte d'Ivoire from now until 2012, and ensuring that coverage reaches all PLWHA throughout the country. This is a challenge in a country which is emerging from political instability and near-civil war. As the nation's over arching goal is to limit the spread of the epidemic and thus reduce the related mortality and morbidity, it is clearly necessary that preventive and curative care be provided nationwide.

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<sup>15</sup> DIPE, octobre 2007, Rapport semestriel des activités VIH/SIDA dans le secteur de la santé en Côte d'Ivoire - janvier - juillet 2007, 136 p

<sup>16</sup> Comité National de Lutte Contre le SIDA, Secrétariat, June 2006, *Plan Stratégique National de Lutte contre le VIH/SIDA 2006-2010*, Abidjan, République de Côte d'Ivoire.

As defined in the PNDS, the key strategy for access to care in the Côte d'Ivoire is to move towards greater decentralization of care and the integration of activities related to care (ARV, OI, Lab monitoring, pediatric care) in existing public health establishments. This will permit the expansion of treatment to PLWHA in all health districts nationwide. A district-based approach will increase the number of patients on ARVs which in turn will contribute to improved quality of life for PLWHA. Particular focus is given to pediatric care during this period (2006-2010).

The general objective of the PNDS as related to HIV/AIDS care is to increase the number of patients on ARVs from 20 000 to 104 000 by 2010. This will be done by ensuring medical care for PLWHA in all health districts, increasing the number of centers which provide medical care related to HIV/AIDS. Pediatric care will be made available in all centers which provide HIV care. Increased attention will be given for HIV-TB co-infection, improving CT levels among TB patients and increasing TB diagnosis among PLWHA. Access to necessary drugs will be assured in all care centers, subsidizing costs for patients. Finally, a quality assurance mechanism for HIV care will be implemented by creating a technical group responsible quality assurance of medical care related to HIV/AIDS as well as elaborating norms, guidelines and quality standards for medical care.

Another priority area of the AIDS plan is PMTCT which is part of prevention strategy in the 2006-2010 AIDS plan. The main goal is to reduce HIV transmission from mothers to their children by 5% by 2010. The principal identified goals are to increase the number of prenatal clinics offering PMTCT services from 10 % to 70%, increase the testing of pregnant women from 21% to 50%, and reduce the rate of mother to child HIV transmission from 13 % to 5% among women who receive PMTCT services. These goals will be reached by expanding the PMTCT program, developing an integrated communication plan about PMTCT and implementing innovated approaches in PMTCT.

## 2. METHODOLOGY

### 2.1 OVERALL APPROACH

The goal of this analysis was to estimate the marginal costs of providing HIV/AIDS medical services through public sector facilities in Côte d'Ivoire in 2006. The general methodology applied in this study was to determine unit costs for the provision of voluntary HIV counseling and testing (CT), antiretroviral therapy (ART), prevention of mother-to-child transmission (PMTCT), tuberculosis diagnosis and treatment (TB), and care and support services (CSS). Data on youth-friendly services (YFS) were not available. Estimates were based on the required inputs of drugs, tests, labor, and equipment, on a per-patient or per-service basis. The reference year for all estimates was 2006, and the exchange rate used was US\$1 = 500 CFA.

### 2.2 DATA COLLECTION

To provide a complete picture of the direct costs of HIV/AIDS service provision through the public sector in Cote d'Ivoire, the researchers collected data both from the health facility level and from experts within central-level government ministries and donor organizations. The researchers also reviewed pertinent secondary data sources, including information on the epidemiology of the HIV/AIDS epidemic in Cote d'Ivoire and national policies and protocols for HIV/AIDS treatment.<sup>17,18,19</sup> The 2007 *Cote d'Ivoire HIV/AIDS Service Provision Assessment*<sup>20</sup> also provided useful background information on the availability of services and equipment throughout the country.

Four teams of interviewers and supervisors collected the facility-based and central-level data between October 29 and November 7, 2007. Team supervisors included experts from the MSHP and from the Ecole Nationale de Statistique et d'Economie Appliquée (ENSEA). Interviewers included current or former graduate students from ENSEA, most of whom had previously participated in the 2007 *HIV/AIDS Service Provision Assessment*. Health Systems 20/20 staff provided two days of training to the 12 interviewers, which included in-depth review of all survey protocols, an overview of costing methodologies, and practical exercises. Representatives of PNPEC, DIPE, MLS, and DIEM also attended the training and provided useful guidance to the data collectors. HS 20/20 staff persons, along with ENSEA staff, oversaw all field work and reviewed all completed survey protocols for accuracy and completeness. The data were entered into an Excel spreadsheet at HS 20/20 headquarters in Bethesda, MD.

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<sup>17</sup> Institut National de la Statistique (INS), Ministère de la Lutte contre le Sida (MLS), and ORC Macro (2006), *Enquête sur les Indicateurs du Sida, Côte d'Ivoire 2005* [AIDS Indicator Survey, Cote d'Ivoire 2005], Calverton, Maryland, U.S.A.: INS and ORC Macro.

<sup>18</sup> PNPEC and Ministère de la Santé et de la Population (MSP) (November 2005), *Politique Nationale de Prise en Charge Globale des Personnes Vivant avec le VIH dans le Secteur Santé*, Abidjan: MSP and PNPEC.

<sup>19</sup> PNPEC (August 2005), *Guide de Prise en Charge de l'Infection à VIH/SIDA de l'Adulte et de l'Enfant (2<sup>nd</sup> edition)*, Abidjan: PNPEC.

<sup>20</sup> Kombe, Gilbert, Mona Steffen, Amy Taye, Laurel Hatt, K.P. Srinath, Suzanne Diarra, Damascene Butera, Dyana Guetat, Blaise Kraffa, Moïse Zanga Tuho, Firmin Seka, Laurence Ebah-Aka, and Oulai Soumahoro (2007). Côte d'Ivoire: Evaluation des Prestations de Services. Bethesda, MD: Health Systems 20/20 Project, Abt Associates Inc.

Survey protocols were developed using examples from previous HIV/AIDS costing studies conducted by Abt Associates Inc., with input from Ivorian health system experts and local and international HIV/AIDS clinicians. The protocols were translated into French and reviewed by local clinicians for clarity and accuracy. The survey was pre-tested in two hospitals in Abidjan in October 2007 and revised according to the interviewers' recommendations.

For the facility-based data, the researchers selected a purposive sample of public sector facilities in regional clusters: the health zones of Lagunes 1 & 2 (in and around the city of Abidjan), Sud Bandama (Divo), and Comoé (Abengourou). The sampling frame was taken from the 2007 *HIV/AIDS Service Provision Assessment*, which had identified facilities that were key providers of HIV/AIDS services. The sample was selected to represent urban and rural providers at all levels of the government health system and to ensure that interviewed facilities had a sufficient volume of HIV/AIDS clients to provide meaningful responses. The sample included 3 tertiary teaching hospitals (CHU Treichville, CHU Cocody, and CHU Yopougon); 2 secondary regional hospitals (CHR Abengourou and CHR Divo); two general hospitals (HG Anyama and HG Port Bouet); 3 urban health centers (CSU Ougoudou, FSU-COM Port Bouet II, and PMI Abengourou) and one rural health center (CSR d'Assuame Agnibilekrou); 2 urban dispensaries (Dioulakro and Notre Dame des Apotres) and one rural dispensary (Banacomoe); and 2 tuberculosis care centers (CAT d'Abengourou and CAT d'Adjame). A total of 16 facilities were visited. Two of the dispensaries in the final sample were replacements for dispensaries that had not yet been providing HIV/AIDS services as of 2006, and were selected as they provided similar characteristics.

The main information collected from health facilities focused on the types of HIV/AIDS services they provided and the time spent by different types of providers on each component of service. The researchers included time spent by both internal (salaried) and external (paid by a non-governmental organization or donor) staff, since a substantial portion of VCT services were provided in 2006 by the local NGO ACONDA. Information was gathered on the volume of clients served by reviewing facility registers for 2006 as well as asking providers to estimate how many patients they saw each week for the different units of service. Total provider time spent on training for HIV/AIDS-related services was estimated by facility administrators. Finally, providers were also asked about the standard protocols and tools that they used: for instance, which HIV screening tests, ARV regimens, TB drugs, and monitoring tests were used in 2006.

Researchers collected data on the prices of antiretroviral drugs, tuberculosis drugs, HIV screening tests, and other related medical supplies from the national pharmacy procurement agency (Pharmacie de Santé Publique, PSP); from the Supply Chain Management Systems project (SCMS), the main procurement agency for the United States President's Emergency Plan for AIDS Relief; and from the United Nations Development Program (UNDP), the primary recipient of Global Fund support until 2006. These input price data were obtained through face-to-face interviews during the study period in November 2007 as well as through a review of invoices, receipts, and expenditure tracking reports.

From the National Program for the Care of People Living with HIV/AIDS (PNPEC), researchers collected information on the total number of clients seen for each HIV/AIDS-related service throughout the country, at each level of care provision. In addition to collecting data from health facilities on their available laboratory equipment, we also interviewed experts at the Department of Infrastructure, Equipment and Maintenance (DIEM) and reviewed invoices and reports to obtain data on the purchase prices and amounts of functional equipment owned by laboratories across the country. We also interviewed representatives of ACONDA to collect their patient volume and staffing data from 2006, some of which was not available at the facility level.

Finally, salary data were obtained in August 2007 from the Ministry of Public Employment (*Ministère de la Fonction Publique et de l'Emploi*) as part of USAID's pilot project, "Incentives Scheme for Health Workers in Hard-to-fill Posts in Cote d'Ivoire." These data included the salaries paid to new recruits by employment sector and job category, as of 2004.<sup>21</sup> Data on salaries were available for physicians, pharmacists, laboratory specialists, laboratory technicians, nurses, midwives, social workers, counselors, nutritionists, nurse's aides, orderlies (filles/garçons de salle), and various administrative staff. Community health workers were assumed to have an earning power equivalent to an orderly. While it is widely assumed that workers employed by NGOs such as ACONDA earn higher salaries than government employees, for the purposes of estimating the cost of HIV/AIDS services in the *public* sector the researchers applied government salaries to their labor estimates. Monthly salaries were converted to hourly rates assuming a 40-hour work week. We assumed that average salaries were the same across the country. It is important to note that official salaries are likely less than total payments to government employees, given the variety of monetary and non-monetary benefits that many employees are entitled to. However, no data were available on these supplemental payments.

## 2.3 DATA ANALYSIS

In general, to estimate the allocation and cost of staff time, researchers asked providers to estimate how many hours per week on average they spent providing each component of HIV/AIDS care. We then multiplied the time each provider spent by their hourly salary, and divided by the recorded number of clients seen by that facility. These results were averaged across the facilities at each level to improve the reliability of reported results. Researchers also censored outliers and any reported results that were clearly implausible. All analyses were conducted in Microsoft Excel 2003.

To estimate the costs of training for each unit of service, researchers asked each facility to estimate the total number of provider-days spent on training related to CT, PMTCT, ART, TB, and care and support services. Total annual training days for all HIV/AIDS services were amortized over three years. The number of days was then multiplied by provider salaries and divided by the total number of patients seen for each service type.

Hours worked per week were limited to 40 in those cases where more, for any staff category, since there seemed to be a tendency to overestimate the amount of time devoted to various services.

## 2.4 LIMITATIONS

The health facilities in our sample did not constitute a representative random sample of all public health facilities in the country. The researchers selected a purposive sample in 4 health zones and included those higher-level facilities that were known to serve large numbers of HIV+ clients. This was done to maximize data quality for a minimal cost. For security and cost reasons, the researchers did not include any facilities in the northern region of the country.

As noted above, bonuses and extra payments in addition to official salaries (e.g. "primes") were *not* included in these cost estimates because no published data are available on such payments; this may mean that actual staff time costs to the government are higher than reported here. In general, these results should be considered indicative of the magnitude of the cost of providing HIV/AIDS care through

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<sup>21</sup> Ministère de la Fonction Publique (2004), "Catalogue des Mesures Nouvelles – An 2004, Incidence Financière des Recrutants Nouveaux 2004, Secteur Santé," Abidjan, Côte d'Ivoire.

the public sector, rather than precise or absolute figures. Despite this limitation, our estimates provide a greater level of reliability than those available from earlier studies, allowing for improved decision making and planning for future activities.

The authors included costs directly associated with HIV/AIDS care for which data were available and could be obtained within the budget and time at our disposal. We did not include general overhead costs (e.g. hospital management and administration, utilities, maintenance of infrastructure) in our estimates. Some costing studies in the literature have applied a flat percentage (such as 10%<sup>22</sup>) to the unit costs per patient for overhead costs; others have used time-and-motion studies or spatial analyses to develop algorithms for allocating overhead costs. Our scope of work did not focus on measuring overhead costs that would allow for such detailed estimates. We also did not include the depreciation costs of health facility infrastructure. Given budget and time constraints, we did not include the costs of all types of opportunistic infections (OI) experienced by HIV/AIDS patients; it is very difficult in a retrospective study to separate out OIs from other population infections and estimate their direct costs. Tuberculosis was assumed to account for the bulk of OI costs (the national TB program estimates that one third of patients infected with TB in rural areas are co-infected with HIV, and 45% in urban areas)<sup>23</sup>. Under Care and Support Services (CSS), the facilities in our sample did not report providing support for orphans and vulnerable children, so our estimates exclude this kind of support. As well, the national pharmacy reported that it did not procure nutritional supplements for PLWHA in 2006, so this study could not estimate the cost of nutritional supplementation.

None of the facilities in our sample provided “Youth-Friendly Services” in 2006. Team leaders provided in-depth training to our data collectors on the definition of YFS and ensured that they were persistent in trying to gather data on this topic. However, providers were unfamiliar with the term, and none reported providing YFS services. This study is therefore unable to estimate the cost of providing YFS. It appears that YFS initiatives have only very recently emerged in Cote d’Ivoire.

Finally it should be noted that researchers did not collect any data on the indirect costs to the patients, such as transportation or lodging.

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<sup>22</sup> See for instance R. Chandler and S. Musau (2004), *Estimating the resource requirements for scaling up Uganda’s ART policy*, Bethesda, MD, Abt Associates Inc.

<sup>23</sup> <http://www.essentialdrugs.org/emed/archive/200606/msg00093.php>

## 3. FINDINGS AND DISCUSSION

This section presents the unit cost of each of the services mentioned above. For each unit of service, the text first outlines the specific definitions, assumptions and approach used for estimating unit costs.

### 3.1 COUNSELING AND TESTING

For the purpose of this costing, counseling and testing (CT) was defined as the provision of counseling prior to HIV testing (pre-test counseling), the conduct of the HIV screening test itself and a confirmation test if the screening result was positive, and the provision of post-test counseling. The Abbott Determine rapid test is used for screening in Cote d'Ivoire, while the Genie II rapid test is used for confirmation of a positive result.

The denominator used for CT unit costs was the total number of clients who received pre-test counseling during 2006 in the sampled facilities. In our sample of 16 facilities, 18,650 clients received pre-test HIV/AIDS counseling; 92% of these clients proceeded to be tested for HIV and received post-test counseling. According to PNPEC, 63,680 clients received CT services nationwide in 2006.

The components of the unit costs of CT included staff time, test kits and supplies. Labor costs included time spent by health providers on pre- and post-test counseling, collection of blood specimens, lab analysis, and administrative tasks related to HIV testing and counseling. The cost of test kits and any additional supplies needed for the collection of blood specimens was estimated based on data from SCMS, and 14% was added to the base price for shipping and security fees as indicated on SCMS invoices.

The reported cost of the Abbott Determine rapid test for HIV, including shipping and any necessary supplies not included in the test kit, was \$1.19 in 2006 (Table I). The Genie II rapid test was administered to patients that received a positive result on the Abbott Determine. The total cost of the Genie II test was \$3.00. Thus the per-client cost of the tests per patient with a negative result was \$1.19, while the cost per positive client was \$4.19

CT unit costs per patient are correlated with the HIV prevalence rate among those tested, since patient populations with higher rates of HIV will need more confirmation tests. The overall positive test rate in our sample of facilities was 37%, ranging from 18% at the dispensary level to 44% in the tuberculosis centers (see Annex Table A.1 for reported HIV seroprevalence rates). Given this positive test rate, the weighted average cost of the rapid tests was \$2.22 per patient tested.

**TABLE 1. COST PER HIV TEST (2006)**

Type of rapid test	Unit price		Total (\$US)	Total (CFA)
	including supplies	Shipping & security fees		
Abbott Determine	\$1.04	\$0.15	\$1.19	570
Genie II	\$2.63	\$0.37	\$3.00	1,450
Cost per patient: Negative			\$1.19	570
Cost per patient: Positive			\$4.18	2,020
<b>WEIGHTED AVERAGE PER PATIENT</b>			<b>\$2.22</b>	<b>1,108</b>

On average, providers reported spending 18 minutes per patient on pre-test counseling and 21 minutes per client on post-test counseling. The total time per client including collection of blood specimens, lab testing, analysis and administrative tasks was estimated at 1.68 hours. Approximately half of this time was spent by social workers, counselors, nurses and midwives, while 29% of the per-patient time was reportedly spent by doctors, especially at higher-level facilities (see Annex table A.2 for a complete breakdown of provider time by provider type and facility level).

Overall, the average cost of staff time for CT was \$3.83 per patient. This ranged from \$1.69 per patient at the TB centers to \$5.84 per patient at the tertiary level (Table 2). The average cost of staff time spent attending CT-related trainings was \$0.30 per client.

In sum, the unit cost of CT services was \$6.35 per client.

**TABLE 2. UNIT COSTS OF CT PER CLIENT COUNSELED AND TESTED, BY LEVEL OF FACILITY (2006)**

Cost component	General /					Overall (\$US)	Overall (CFA)
	Tertiary Hospitals	2ndary Hospitals	Health Centers	Dispensaries	TB Centers		
	(N=3)	(N=4)	(N=4)	(N=3)	(N=2)	(N=16)	(N=16)
Staff costs	\$5.84	\$3.52	\$2.98	\$2.97	\$1.69	\$3.83	1,917
Training costs	\$0.26	\$0.29	\$0.17	\$0.18	\$0.47	\$0.30	149
HIV screening and confirmation tests	\$2.34	\$2.39	\$1.85	\$1.67	\$2.42	\$2.22	1,108
<b>TOTAL (N=18,650)</b>	<b>\$8.44</b>	<b>\$6.19</b>	<b>\$5.01</b>	<b>\$4.82</b>	<b>\$4.58</b>	<b>\$6.35</b>	<b>3,196</b>

### 3.2 ANTIRETROVIRAL THERAPY

Antiretroviral therapy (ART) includes the provision of first-line and second-line antiretroviral drugs to eligible AIDS patients, as well as laboratory tests needed to monitor the progression of the disease and the efficacy or toxicity of treatment. The denominator for ART unit costs in our analysis was the total number of adults and children who received ART at the sampled facilities during 2006. Eleven facilities in our sample (7 hospitals, 2 health centers and 2 TB centers) offered ART services, serving a total of

7,049 patients. We obtained detailed data on the combinations of ARV drugs prescribed to 6,314 of these patients; statistics were not available for the remainder of patients.

The researchers estimated the average per-patient, per-year cost of first-line and second-line ARV regimens for adults and children. All prices were taken from invoices and tracking reports from the end of 2006 provided by SCMS.<sup>24</sup> We asked each facility to provide detailed information about the specific ARV combinations provided and the number of children and adults on each regimen. Standard per-patient annual doses for each drug combination were calculated based upon WHO<sup>25</sup>, NIH<sup>26</sup>, and on-line references.<sup>27</sup> Since the dosage of stavudine (D4T) varies by patient body mass, the researchers followed the approach used by SCMS and assumed that 75% of adult patients weighed less than 60kg and 25% weighed 60 kg or more.<sup>28</sup> Dosages for children were estimated using CDC reference height and weight charts<sup>29</sup> and assuming that the average HIV+ child in Cote d'Ivoire was at the 25<sup>th</sup> percentile of this reference for height and weight. Approximately half of children under 15 were assumed to take liquid formulations, while the remainder were assumed to swallow tablets.

All reported ARV regimens were included in the estimates of per-patient ART costs, regardless of whether they were recommended by national protocols. Adult drug combinations were allocated to the “first-line” or “second-line” categories as they were reported by the facilities. The researchers did not ask facilities to report pediatric regimens according to whether they were first-line or second-line therapies since the 2005 national policy guidelines did not list recommended second-line pediatric combinations; instead, we allocated pediatric regimens to first- or second-line in accordance with SCMS's 2007 *ARV Quantification Report*. A 12% shipping fee was observed on invoices and added to the cost of all ARV treatment regimens. In developing overall weighted per-patient estimates, we assumed that 5% of the total individuals on ART in Cote d'Ivoire were under age 15, as reported in the SCMS report for the end of 2006.<sup>30</sup> We also assumed a 3% switching rate between first and second-line regimens for both adults and children, based upon the analysis described in the SCMS report.

In 2006, the average unit price of first-line ARVs for adults was \$231 per year (Table 3), while the average price of second-line ARVs for adults was \$1,612 (Table 4). Approximately 94% of adults on first-line regimens were taking recommended combinations of drugs, as indicated in the November 2005 national protocol (*Politique Nationale de Prise en Charge Globale des Personnes Vivant avec le VIH dans le Secteur Santé*). The per-patient unit price of these recommended first-line regimens was \$226 per year. Fifty-four percent (54%) of adults on second-line regimens were taking officially recommended combinations according to the above-referenced national protocol, with a per-patient price of \$1,760 per year. Our facility surveys also indicated that 4% of adults on first-line ARVs were receiving only 2 drugs (the combination AZT+3TC).

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<sup>24</sup> Some price information was also provided by the National Public Health Pharmacy (PSP) and by the UNDP. However, these agencies procured a much smaller selection and volume of drugs. The prices they reported were typically in line with what SCMS reported, or slightly higher. Given that prices for ARVs are likely to fall over time, we elected to use the SCMS prices for our analyses.

<sup>25</sup> WHO (2004), *Scaling up antiretroviral therapy in resource-limited settings: treatment guidelines for a public health approach* (2003 revision), Geneva: World Health Organization.

<sup>26</sup> Panel on Antiretroviral Guidelines for Adult and Adolescents. Guidelines for the use of antiretroviral agents in HIV-1-infected adults and adolescents. Department of Health and Human Services. January 29, 2008; 1-128. Available at <http://www.aidsinfo.nih.gov/ContentFiles/AdultandAdolescentGL.pdf>. Accessed 18 March 2008.

<sup>27</sup> See for instance <http://www.rxlist.com>.

<sup>28</sup> Burn R. and Sliney I. (2007), *ARV Quantification Report Cote d'Ivoire March 2007*, Arlington, VA: Partnership for Supply Chain Management,.

<sup>29</sup> Centers for Disease Control and Prevention, National Center for Health Statistics Growth Charts (<http://www.cdc.gov/nchs/about/major/nhanes/growthcharts/datafiles.htm> ).

<sup>30</sup> It should be noted that 11% of the ART patients in our sample were children, however.

**TABLE 3. ESTIMATED COST OF FIRST-LINE ADULT ARVS (2006)**

<b>Drug regimen</b>	<b>Number of patients</b>	<b>Percentage of patients</b>	<b>Estimated price per patient-year (\$US)</b>	<b>Estimated price per patient-year (CFA)</b>
*D4T + 3TC + NVP	2,576	46.40%	\$ 92	46,000
*D4T + 3TC + EFV	1,352	24.40%	\$ 247	123,500
*AZT + 3TC + EFV	603	10.90%	\$ 328	164,000
AZT + 3TC	228	4.10%	\$ 130	65,000
*AZT + 3TC + NVP	186	3.40%	\$ 173	86,500
*AZT + 3TC + IDVr	174	2.70%	\$ 416	208,000
*D4T + 3TC + IDVr	110	2.00%	\$ 335	167,500
*AZT + 3TC + SQVr	99	1.80%	\$ 1,408	704,000
*AZT + 3TC + ABC	75	1.40%	\$ 694	347,000
*TDF + 3TC + LPVr	46	0.80%	\$ 1,247	623,500
D4T + 3TC + LPVr	24	0.30%	\$ 1,049	524,500
AZT + 3TC + LPV	23	0.40%	\$ 1,130	565,000
*TDF + 3TC + NFV	17	0.30%	\$ 1,826	913,000
D4T + 3TC + DDI	9	0.20%	\$ 541	270,500
D4T + 3TC + NFV	7	0.10%	\$ 1,627	813,500
DDI + 3TC + EFV	4	0.10%	\$ 731	365,500
D4T + DDI + IDVr	3	0.02%	\$ 800	400,000
D4T + DDI + EFV	2	0.04%	\$ 712	356,000
TDF + 3TC + IDVr	2	0.04%	\$ 533	266,500
TDF + DDI + IDV	2	0.04%	\$ 986	493,000
ABC + 3TC + IDVr	1	0.02%	\$ 762	381,000
ABC + DDI + IDV	1	0.02%	\$ 1,214	607,000
AZT + D4T + EFV	1	0.02%	\$ 323	161,500
AZT + EFV + ABC	1	0.02%	\$ 737	368,500
<b>TOTAL</b>	<b>5,546</b>	<b>100.00%</b>	<b>\$ 231</b>	<b>115,500</b>

\*Recommended regimens according to "Politique Nationale de Prise en Charge Globale des PVVIH dans le Secteur Sante " (2005)

\*Costs do not include transportation or wastage.

**TABLE 4. ESTIMATED COST OF SECOND-LINE ADULT ARVS (2006)**

<b>Drug regimen</b>	<b>Number of patients</b>	<b>Percentage of patients</b>	<b>Estimated price per patient-year (\$US)</b>	<b>Estimated price per patient-year (CFA)</b>
*ABC + DDI + IDVr	16	21%	\$ 1,214	607,218
D4T + 3TC + NFV	15	19%	\$ 1,627	813,544
*ABC + DDI + LPVr	11	14%	\$ 1,928	964,208
*TDF + DDI + NFV	7	9%	\$ 2,278	1,139,003
D4T + DDI + EFV	5	6%	\$ 712	355,881
D4T + 3TC + ABC	4	5%	\$ 484	242,117
*ABC + DDI + NFV	3	4%	\$ 2,507	1,253,369
SQV + LPVr	3	4%	\$ 2,279	1,139,277
ABC + DDI + EFV	2	3%	\$ 1,126	563,089
*ABC + DDI + SQVr	2	3%	\$ 2,207	1,103,385
D4T + DDI + NFV	2	3%	\$ 2,092	1,046,162
*TDF + DDI + LPVr	2	3%	\$ 1,700	849,842
TDF +LPV + SQVr	2	3%	\$ 2,485	1,242,693
AZT + 3TC + NFV	1	1%	\$ 1,708	854,151
D4T + 3TC + DDI	1	1%	\$ 541	270,708
TDF + 3TC + LPV + EFV	1	1%	\$ 1,445	722,533
*TDF + DDI +SQVr	1	1%	\$ 1,978	989,018
<b>TOTAL</b>	<b>78</b>	<b>100%</b>	<b>\$ 1,612</b>	<b>806,032</b>

\*Recommended regimens according to "Politique Nationale de Prise en Charge Globale des PVVIH dans le Secteur Sante " (2005)

\*Costs do not include transportation or wastage.

The average unit price of first-line ARVs for children was \$416 per year (Table 5), and the average price of second-line and other ARVs (official or otherwise) was \$2,218 (Table 6).

**TABLE 5. ESTIMATED COST OF FIRST-LINE PEDIATRIC ARVS (2006)**

Drug regimen		Number of patients	Percentage of patients	Estimated price per patient-year (\$US)	Estimated price per patient-year (CFA)
*D4T + 3TC + EFV	I	153	39%	\$ 381	190,254
*AZT + 3TC + EFV	I	150	38%	\$ 520	260,229
*AZT + 3TC + NVP	I	53	13%	\$ 353	176,307
*D4T + 3TC + NVP	I	29	7%	\$ 213	106,332
*AZT + 3TC + LPV	I	6	2%	\$ 234	116,937
*AZT + 3TC + ABC	I	I	0.3%	\$ 622	310,793
AZT + 3TC + IDV	I	I	0.3%	\$ 234	116,937
*D4T + 3TC + ABC	I	I	0.3%	\$ 482	240,817
<b>TOTAL</b>		<b>394</b>	<b>100%</b>	<b>\$ 416</b>	<b>207,973</b>

\*Recommended regimens according to "Politique Nationale de Prise en Charge Globale des PVVIH dans le Secteur Sante" (2005)

\*Costs do not include transportation or wastage.

**TABLE 6. ESTIMATED COST OF SECOND-LINE AND "OTHER" PEDIATRIC ARVS (2006)**

Drug regimen		Number of patients	Percentage of patients	Estimated price per patient-year (\$US)	Estimated price per patient-year (CFA)
AZT + 3TC + NFV		157	53%	\$ 2,349	1,174,712
D4T + 3TC + NFV		94	32%	\$ 2,209	1,104,737
D4T + DDI + NFV		11	4%	\$ 2,566	1,282,765
*AZT + DDI + NFV		9	3%	\$ 2,705	1,352,740
D4T + DDI + EFV		9	3%	\$ 737	368,281
*DDI + ABC + LPV		7	2%	\$ 1,134	567,242
DDI + 3TC + NFV		3	1.0%	\$ 2,557	1,278,581
3TC + EFV + LPV		2	0.7%	\$ 677	338,651
ABC + DDI + EFV		2	0.7%	\$ 1,073	536,564
DDI + 3TC + EFV		1	0.3%	\$ 728	364,097
DDI + 3TC + LPVr		1	0.3%	\$ 790	394,775
<b>TOTAL</b>		<b>296</b>	<b>100.00%</b>	<b>\$ 2,218</b>	<b>1,108,752</b>

\*Identified as second-line pediatric regime by SCMS (2007).

Table 7 below displays the weighted average cost of ARV drugs, combining the per-patient per year prices for adults and children on first- and second-line regimens. Shipping costs added an additional 12% to the total price. Overall, the average cost per patient per year for ARV drugs in 2006 – including shipping charges – was \$316.

**TABLE 7. SUMMARY OF UNIT PRICES FOR ARVS (2006)**

<b>Regimen</b>	<b>Distribution of ART patients</b>	<b>Average observed price per year (\$US)</b>	<b>Average observed price per year (CFA)</b>	<b>Price per year including freight (\$US)</b>	<b>Price per year including freight (CFA)</b>
Adult first-line	92.2%	\$ 231	115,500	\$ 259	129,360
Adult second-line	2.9%	\$ 1,612	806,032	\$ 1,806	902,756
Pediatric first-line	4.9%	\$ 416	207,973	\$ 466	232,929
Pediatric second-line/other	0.2%	\$ 2,218	1,108,752	\$ 2,484	1,241,802
<b>WEIGHTED AVERAGE (N=7,049)</b>	<b>100%</b>	<b>\$ 282</b>	<b>141,155</b>	<b>\$ 316</b>	<b>158,094</b>

Next, the researchers estimated the cost of staff time to provide ART services. This included time for the initiation of therapy, drug provision, patient follow-up, provision and analysis of laboratory tests, administrative tasks related to ART services, and training. The average patient made 12 visits per year. Staff in the facilities we visited reported spending approximately 22 hours per patient per year on the provision of ART (excluding laboratory clinician time, which is described below). Average annual staff time ranged from 14 hours per patient at TB centers to 25 hours per patient at general and secondary hospitals.

On average, the bulk (58%) of provider time (12.7 hours per patient) was spent by doctors, with nurses (3.2 hours), pharmacists (2.9 hours), and counselors (1.8 hours) also spending substantial time. Please refer to Annex table A.3 for the complete breakdown of staff time for ART. On average, the cost of this staff time totaled \$68 per ART patient per year. Given different levels of effort at different types of facilities, this ranged from \$35 per patient at the TB centers to \$83 per patient at general and secondary hospitals. The time spent by providers on trainings related to ART accounted for an additional \$0.36 per patient per year.

In sum, the cost of ARV drugs and staff time for ART was \$384 per patient per year (Table 8).

**TABLE 8. UNIT COST OF ART SERVICES PER PATIENT, BY LEVEL OF FACILITY (2006)**

<b>Cost component</b>	<b>Tertiary Hospitals (N=3)</b>	<b>General / 2ndary Hospitals (N=4)</b>	<b>Health Centers (N=2)</b>	<b>TB Centers (N=2)</b>	<b>Overall (weighted, \$US 2006) (N=11)</b>	<b>Overall (weighted, CFA 2006) (N=11)</b>
Staff costs	\$ 77.12	\$ 83.46	\$ 49.52	\$ 34.84	\$ 67.75	33,876
Training costs	\$ 0.46	\$ 0.48	\$ 0.16	\$ 0.13	\$ 0.36	178
ARV drugs	\$ 316.19	\$ 316.19	\$ 316.19	\$ 316.19	\$ 316.19	158,094
<b>TOTAL (N=7,049)</b>	<b>\$ 393.77</b>	<b>\$ 400.12</b>	<b>\$ 365.87</b>	<b>\$ 351.15</b>	<b>\$ 384.30</b>	<b>192,148</b>

### 3.2.1 LABORATORY MONITORING TESTS

All patients receiving ART should be regularly monitored to track the progression of their HIV infection and monitor the infection's responsiveness to treatment. According to national HIV/AIDS clinical guidelines, HIV+ clients not yet eligible for ART should also be routinely monitored. Ten (10) facilities in our sample reported that they performed some laboratory monitoring tests on site for HIV/AIDS patients, while other facilities referred patients elsewhere for lab tests. The denominator for our analysis of laboratory monitoring test costs was the total number of HIV+ patients on ART or HIV+ patients who received a monitoring test at one of the facilities in our sample (N=10,890).

PNPEC has published guidelines that outline the type and frequency of recommended monitoring tests.<sup>31</sup> Tests to be given at the initiation of treatment and twice per year thereafter include CD4 count, complete blood count, blood chemistry analysis (including blood glucose, creatinine, and amylase), and liver function tests (transaminases). Viral load tests are recommended twice per year after initiation of therapy<sup>32</sup>, although according to the DIEM, only two viral load machines and one thermocycler are available in Cote d'Ivoire.<sup>33</sup> Data collectors asked each health facility in our sample to detail the actual frequency with which they provide each test or refer patients for testing, and used these reported results to estimate annual per-patient costs.

The data collectors gathered information on the total time spent by laboratory specialists and technicians on each HIV/AIDS-related monitoring test. We estimated the cost of test kits, reagents, and other needed inputs for automated clinical analyzers based upon detailed procurement invoices provided by SCMS. We quantified additional disposable or consumable materials required for blood extraction, processing and disposal, such as gloves, lancets, and pipettes. SCMS purchased supplies for four brands of clinical analyzers: Hitachi, Lysa, Konelab and Cobas. For the attribution of the costs per patient it was assumed that the larger machines were located in higher volume labs such as tertiary hospitals and the smaller machines were used in lower-level facilities. No procurement information was available for estimating the cost of complete blood counts; costs were assumed to be in line with fees charged to uninsured patients.<sup>34</sup>

To estimate the cost of equipment, the researchers interviewed representatives of the DIEM as well as laboratory workers in each facility. We asked about the total number of viral load analyzers and flow cytometers (for CD4 count measurements) available in the country, and their purchase prices. Other equipment, such as blood chemistry analyzers, centrifuges, incubators, microscopes, refrigerators, and x-ray machines were excluded from our analysis since they are used for a variety of non-HIV/AIDS services. We assumed a 5-year time horizon for depreciation of the equipment. The per-year cost of CD4 count equipment was then divided by the total number of patients reported by PNPEC to have received ART services in 2006 (26,348 patients). The per year cost of viral load machines was divided by the total number receiving ART services at the general hospital level or above in 2006 (16,590 patients) under the assumption that patients at the health center level or below were unlikely to receive viral load tests. It should be noted that as the volume of patients receiving these laboratory tests increases, the per-patient cost of equipment will decrease.

Table 9 below displays the average reported time spent on each type of test by laboratory personnel, the average frequency with which each test was prescribed by clinicians in these facilities, and the per-

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<sup>31</sup> PNPEC (2005), *Guides de Prise en Charge de l'Infection a VIH/SIDA de l'Adulte et de l'Enfant, Niveaux A, B et C.*

<sup>32</sup> PNPEC (2005), *Guide de Prise en Charge de l'Infection a VIH/SIDA de l'Adulte et de l'Enfant, Niveau B.*

<sup>33</sup> This information is also reflected in the 2007 *Cote d'Ivoire HIV/AIDS Service Provision Assessment.*

<sup>34</sup> *Tarifification des Actes en Côte d'Ivoire, Tableau N°2: Tarification Reduite Applicables Aux Usagers Sans Protection Sociale.*

test costs of the inputs needed to perform each test, including shipping fees. The reported frequency of each test is within the range suggested by national protocols.<sup>35</sup> Only one facility in our sample (CHU Treichville) reported providing viral load tests, so results for this test should be treated with caution. Overall, the weighted average cost per patient per year for HIV/AIDS-related monitoring test kits, reagents and supplies was \$24.30

**TABLE 9. COSTS OF HIV/AIDS MONITORING TESTS KITS, REAGENTS AND SUPPLIES (2006)**

<b>Type of test</b>	<b>Minutes per test</b>	<b>Reported tests per patient per year</b>	<b>Per-test cost of test kits, reagents, and supplies (\$US)</b>	<b>Per-test cost of test kits, reagents, and supplies (CFA)</b>
Full blood count	13	2.7	\$0.20	100
CD4 count	45	2.8	\$3.49	1,745
Blood chemistry tests	72	2.6	\$1.05	527
Liver function tests	21	2.5	\$1.24	619
Viral load*	390*	0.8*	\$9.99	4,995
<b>WEIGHTED AVERAGE PER PATIENT PER YEAR</b>			<b>\$24.30</b>	<b>12,149</b>

\*Only one tertiary facility provided information on viral load tests, so result should be treated with caution.

As shown in Table 10, the total cost of providing HIV/AIDS monitoring tests per patient per year is \$37.39. On average, laboratory specialists and technicians spent an estimated 6.8 hours per patient performing HIV/AIDS-related monitoring tests. Annex Table A.4 provides further detail on the breakdown of staff time for laboratory monitoring tests. The total cost of laboratory staff time per patient was \$13 per year (Table 10). Finally, the per-patient depreciated cost of CD4 count and viral load analyzer machines was estimated at \$4.94 per patient.

**TABLE 10. UNIT COST OF LABORATORY TESTING PER HIV+ CLIENT RECEIVING A MONITORING TEST, PER YEAR (2006)**

<b>Component of costs</b>	<b>Cost per patient (\$US)</b>	<b>Cost per patient (CFA)</b>
Staff costs	\$ 13.09	6,545
Monitoring tests and supplies	\$ 24.30	12,149
Equipment (CD4 + viral load)	\$ 4.94	2,468
<b>TOTAL (N=10,890)</b>	<b>\$ 37.39</b>	<b>18,694</b>

<sup>35</sup> PNPEC (August 2005), *Guide de Prise en Charge de l'Infection à VIH/SIDA de l'Adulte et de l'Enfant (Niveau B)*, 2nd edition.

### 3.3 PREVENTION OF MOTHER-TO-CHILD TRANSMISSION

Prevention of Mother-to-Child Transmission (PMTCT) was defined in our study as follows:<sup>36</sup>

- Routine HIV counseling and testing for all pregnant women at the first antenatal care visit;
- ARV prophylaxis to HIV-positive pregnant women to prevent transmission of the virus to the newborn;
- ARV prophylaxis to the newborn within 72 hours of delivery;
- Counseling on infant feeding to HIV-positive mothers;
- Provision of antiretroviral treatment to HIV-positive pregnant women during the third trimester of pregnancy if clinically indicated.

For purposes of analysis, estimates of the unit costs of PMTCT services were broken down into three components: counseling and testing (to be provided to all pregnant women; in our sample,  $N=15,152$  counseled and  $N=12,023$  tested); prophylaxis and nutritional counseling (to be provided to HIV+ pregnant women,  $N=717$ ); and ART (to be provided to HIV+ pregnant women with clinical need,  $N=56$ ). According to the facilities in our sample, approximately 79% of pregnant women who received pre-test counseling went on to be tested for HIV. The reported seroprevalence rate among those tested ranged from 5% at the dispensary level to 16% at the tertiary hospital level, with an overall average of 9%. The researchers thus assumed that 9% of pregnant women who received the Abbott Determine screening test also were administered the Genie II confirmation test.

Three types of ARV prophylaxis are detailed in Cote d'Ivoire's national protocols and all three are used to some extent in public facilities, according to the information collected. The original protocol for ARV prophylaxis is a single dose of nevirapine to the mother at the onset of labor, followed by a 2 mg/kg dose of nevirapine to the newborn within 72 hours of delivery. A second protocol indicated in national guidelines is a short course of AZT from the 36<sup>th</sup> week of pregnancy through delivery, with an extra dose given at the beginning of labor.<sup>37</sup> Finally, an updated protocol<sup>38</sup> has also been recommended although there is reportedly a lack of national consensus on its use.<sup>39</sup> This is a daily dose of AZT to the mother during the third trimester, triple therapy (AZT+3TC+NVP) during delivery, and AZT+3TC for the first 7 days postpartum.

Most (11 out of 12) facilities in our sample that provided ARV prophylaxis to HIV+ pregnant women reported that they used the standard nevirapine regimen: 200 mg to the mother at the onset of labor and a 2 mg/kg dose provided to the infant within 72 hours of delivery. One facility provided the more recently recommended protocol of AZT during the third trimester, AZT+3TC+NVP during delivery and AZT+3TC for 7 days postpartum. Table 11 below displays information on the estimated costs of these prophylactic regimens. The cost of the nevirapine-only regimen was approximately \$0.09 per mother/baby pair. The total cost of the more extensive AZT regimen was estimated at \$31.11 per pregnant woman. The weighted average cost of these two regimens, based upon observed usage rates

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<sup>36</sup> PNPEC and MSP (2005), *Politique Nationale de Prise en Charge Globale des Personnes Vivant avec le VIH dans le Secteur Santé*.

<sup>37</sup> PNPEC (2005), *Guide de Prise en Charge de l'Infection a VIH/SIDA de l'Adulte et de l'Enfant, Niveau C*, p. 64.

<sup>38</sup> PNPEC and MSP (2005), *Politique Nationale de Prise en Charge Globale des Personnes Vivant avec le VIH dans le Secteur Santé*.

<sup>39</sup> PNPEC (2005), *Guide de Prise en Charge de l'Infection a VIH/SIDA de l'Adulte et de l'Enfant, Niveau C*, p. 64.

in our sample, was \$1.08 per pregnant HIV+ woman. While information on the use of the other protocol (600mg AZT daily from 36 weeks gestation + 600mg during delivery) was not available in our survey, the estimated cost per pregnant women would have been \$8.24.

**TABLE 11. ESTIMATED COST OF ARV PROPHYLAXIS REGIMENS (2006)**

<b>Drug regimen</b>	<b>Total number of pregnant women</b>	<b>Cost per mother / baby (\$US)</b>	<b>Total cost including freight (\$US)</b>	<b>Total cost including freight (CFA)</b>
NVP 200 mg to mother during labor	694	\$ 0.06	\$ 0.07	33
NVP 2 mg/kg to newborn	694	\$ 0.02	\$ 0.02	9
AZT (3rd trim.) + triple therapy during delivery	23	\$ 27.77	\$ 31.11	15,553
<b>WEIGHTED AVERAGE</b>	<b>717</b>	<b>\$ 0.96</b>	<b>\$ 1.08</b>	<b>539</b>

Two facilities in our sample provided ART (e.g., ARV provided for the purposes of treating the pregnant woman, not merely preventing HIV transmission to the newborn) to pregnant women with clinical need during the third trimester. Reported combinations of drugs are detailed in Table 12 below. The weighted average cost per patient was estimated at \$147.

**TABLE 12. ESTIMATED COST OF ARVS FOR PREGNANT WOMEN DURING 3RD TRIMESTER (2006)**

<b>Drug regimen</b>	<b>Number of patients</b>	<b>Percentage of patients</b>	<b>Estimated cost per patient (\$US)</b>	<b>Cost per patient including freight (\$US)</b>	<b>Cost per patient including freight (CFA)</b>
AZT + 3TC	42	75%	\$ 32	\$ 36	18,183
AZT + 3TC + NFV	14	25%	\$ 427	\$ 478	239,162
<b>WEIGHTED AVERAGE</b>	<b>56</b>	<b>100%</b>	<b>\$ 131</b>	<b>\$ 147</b>	<b>73,428</b>

Next, we estimated labor costs associated with PMTCT services. Total time spent on PMTCT counseling and testing was assumed to be equivalent to reported time spent providing general CT services (1.7 hours per patient). Of the reported total time spent by midwives on all PMTCT services, 75% was allocated to counseling and testing, and 25% was allocated to provision of prophylaxis and nutritional counseling. Reported time spent by social workers, counselors, lab specialists and lab technicians was allocated to counseling and testing. Reported time spent by nurses, nurse's aides, orderlies, and nutritionists was allocated to provision of prophylaxis and nutritional counseling. Reported time spent by doctors and pharmacists was allocated to provision of ART. Pregnant women in need of ART during the third trimester were assumed to make six visits, each equal in duration to the reported time per patient contact for general ART services, for a total of 11.5 hours. Training costs were included in the estimate for the counseling and testing component of PMTCT, to spread the cost over the largest number of clients.

Table 13 displays the level of effort and cost per patient according to each component of PMTCT care. The cost of HIV counseling and testing per pregnant woman in 2006 was \$4.45, including staff costs, training, and HIV test kits. The cost per HIV+ pregnant woman for ARV prophylaxis and nutritional counseling was \$13.00, including staff time and ARV medications. Finally, the cost per HIV+ pregnant woman in need of ART was \$191.18, including staff time and ARV medications.

**TABLE 13. UNIT COSTS OF PMTCT SERVICES (2006)**

<b>Service and cost component</b>	<b>Hours per patient</b>	<b>Cost per patient (\$US)</b>	<b>Costs per patient (CFA)</b>
<b>Counseling and testing pregnant women during routine antenatal care</b>			
Staff costs	1.7	\$ 2.89	1,447
Training		\$ 0.15	76
HIV tests (N=12,023 tested)		\$ 1.41	703
<b>SUBTOTAL COUNSELING AND TESTING</b>			
(N=15,152 counseled)		\$ 4.45	2,226
<b>ARV prophylaxis and nutritional counseling for HIV+ pregnant women and newborns</b>			
Staff Costs	7.5	\$ 11.93	5,963
ARV medications (N=717)		\$ 1.08	539
<b>SUBTOTAL PROPHYLAXIS (N=717)</b>			
		\$ 13.00	6,502
<b>ART for HIV+ pregnant women during third trimester</b>			
Staff costs	11.5	\$ 44.33	22,164
ARV medications (N=56)		\$ 146.86	73,428
<b>SUBTOTAL ART (N=56)</b>			
		\$ 191.18	95,592
<b>AVERAGE TOTAL COST PER PREGNANT WOMAN (N=15,152)</b>			
	2.1	\$ 6.12	3,059

To generate an overall, weighted estimate of the cost of PMTCT services per pregnant woman, we used observed rates of prophylaxis, nutritional counseling and ART at the facilities in our sample as weights. Six percent (6%) of all pregnant women who received an HIV screening test – or stated differently, 65% of the pregnant women who tested positive for HIV – received ARV prophylaxis and nutritional counseling. We therefore applied 6% of the per-patient cost for ARV prophylaxis and nutritional counseling to the weighted average unit cost of PMTCT services. Similarly, only 0.5% of the pregnant women tested (5% of the HIV+ pregnant women) received antiretroviral therapy, so we applied 0.5% of ART costs to the average unit cost of PMTCT services. In sum, the average total cost of PMTCT services per pregnant woman was \$6.12.

### 3.4 TUBERCULOSIS DIAGNOSIS AND TREATMENT

Tuberculosis services were defined to include diagnosis of tuberculosis infection via sputum smear microscopy and/or x-ray, antibiotic treatment, and monitoring for treatment effectiveness. The denominator for this unit of service was the total number of patients ( $N= 11,766$ ) who reportedly received TB diagnosis and/or treatment in 2006 from the nine facilities providing TB services in our sample.

Not all TB patients in this sample were co-infected with HIV and tuberculosis. Most facilities do not routinely keep statistics on co-infection rates; “best guesses” were only reported by five of the nine facilities in our sample and ranged from 11% to 75%.<sup>40</sup> However, we assumed that the provider time costs per TB patient would not likely vary dramatically between HIV-infected and non-infected populations. This assumption may not hold if most co-infected patients are treated at tertiary facilities, where staff costs tend to be higher.

To estimate the cost of medications for the treatment of TB, the researchers referred to WHO guidelines for treatment of HIV/TB co-infected populations.<sup>41</sup> We assumed that HIV+ TB patients were more likely to be on a second-line course of antibiotic treatment than non-HIV-infected patients; overall, researchers assumed that 7% of HIV/TB co-infected patients were receiving the “failure” regimens.<sup>42</sup> We also assumed that 5% of the co-infected patients were children under 15 and calculated children’s dosages assuming an average weight of 12 kg per child. Prices for TB drugs were obtained from 2006 invoices provided by the PSP. Isoniazid prophylaxis for patients with latent TB was excluded from our estimates of TB costs, as no data were available on rates of HIV+ individuals who are household contacts of TB patients; the researchers assumed that the bulk of the costs of TB diagnosis and treatment were accounted for by active rather than latent TB cases. This means that we may have slightly overestimated the cost of TB drugs if some HIV+ patients were receiving isoniazid alone. All HIV/TB co-infected patients were assumed to be taking a daily dose of cotrimoxazole.

Table 14 displays a summary of the cost of TB medications, according to the patient’s drug resistance profile (standard or after treatment failure) and phase of treatment (initial or continuation). The cost of standard DOTS therapy in 2006 was \$24 per patient for a 6-month course. The cost of second-line therapy was \$464 for a 6-month course. Six months of cotrimoxazole treatment was estimated to cost \$34. Overall, the weighted average cost of TB drugs per co-infected patient was estimated at \$88.

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<sup>40</sup> The WHO estimated that 24% of incident tuberculosis cases were HIV+ as of 2005, while PEPFAR’s 2006 Cote d’Ivoire Country Operational Plan (COP) estimated that 47% of incident TB cases were co-infected. See WHO (2007), *Global tuberculosis control - surveillance, planning, financing*, [http://www.who.int/tb/publications/global\\_report/2007/xls/afr.xls](http://www.who.int/tb/publications/global_report/2007/xls/afr.xls), and PEPFAR (2006), Cote d’Ivoire FY 2006 Country Operational Plan, <http://www.pepfar.gov/about/77698.htm>.

<sup>41</sup> WHO (2007), *Tuberculosis care with TB-HIV co-management: Integrated Management of Adult and Adolescent Illness*, WHO/HTM/HIV/2007.01.

<sup>42</sup> One source has estimated that TB treatment relapses in HIV+ patients are approximately 10-fold higher than in non-HIV+ patients with TB, primarily due to drug intolerance and nonadherence. See Schieferstein et al. (2000), “Treatment failure and relapse in HIV-patients with Tuberculosis”, *Int Conf AIDS* 2000 Jul 9-14.

**TABLE 14. COST OF TB DRUGS (2006)**

Type of treatment	Estimated percentage of HIV/TB patients	Treatment phase	Regimen	Duration (months)	Cost per patient (\$US)	Cost per patient (CFA)
Category I: HIV/TB coinfection, standard DOTS	93%	Initial	(RHZE)	2	\$ 14.83	7,414
		Continuation	(RH)	4	\$ 9.13	4,563
Category II: HIV/TB coinfection, after treatment failure or interruption	7%	Initial	(RHZE)S	2	\$ 417.54	208,768
		Continuation	(RHZE)	1	\$ 7.17	3,584
		Continuation	(RH)E	3	\$ 39.37	19,685
Cotrimoxazole	100%	All		6	\$ 33.52	16,758
<b>WEIGHTED AVERAGE DRUG COSTS PER HIV/TB PATIENT (N=11,766)</b>					<b>\$ 88.28</b>	<b>44,139</b>

Note: R = rifampicin, H = isoniazid, Z = pyrazinamide, E = ethambutol, S = streptomycin

Labor costs associated with TB services included time for patient consultations, collecting and analyzing sputum specimens for diagnosis and follow-up, performing and analyzing x-rays for diagnosis, observing patient treatment (where relevant), and training. Eight of the nine facilities reported that they used Directly Observed Therapy, Short-course (DOTS) for tuberculosis treatment.<sup>43</sup> Community health workers (CHWs) or clinic-based health providers were used as DOTS observers in the two TB centers, which accounted for 74% of all TB patients in our sample, while the reported DOTS observer in the other six facilities was the patient's family. Drawing upon international protocols for TB diagnosis and treatment, researchers assumed that each TB case would receive at least one x-ray and 5 sputum smear analyses per year (3 for initial diagnosis and 2 to confirm treatment success).<sup>44</sup>

Providers spent an estimated 13.1 hours per TB patient per year on average; this ranged from 10.1 hours (at the dispensary level) to 25.9 hours (at the general/secondary hospital level) per patient per year. About 3.7 hours of this time was spent by doctors, with another 2.8 hours spent by CHWs and 3.0 hours by lab personnel. Please see Annex table A.7 for a complete breakdown of provider time allocation, by level of facility. The average cost of this provider time was \$30.61 per patient per year. Time spent on trainings related to TB services added another estimated \$0.19 per patient in 2006. Finally, the cost of supplies and materials needed for sputum smear tests and x-rays was estimated at \$1.90 per patient per year.

Table 15 below summarizes each component of the unit cost of TB services. The average cost per HIV/TB patient per year for TB diagnosis, treatment and monitoring was an estimated \$121 in 2006. Given the different labor allocations at different facility levels, this ranged from \$108 at health dispensaries to \$144 at secondary and general hospitals.

<sup>43</sup> The WHO estimated 74% DOTS coverage in Cote d'Ivoire in 2005 (see WHO [2007], *Global tuberculosis control - surveillance, planning, financing*).

<sup>44</sup> Tuberculosis Coalition for Technical Assistance (2006), *International Standards for Tuberculosis Care*, [http://www.who.int/tb/publications/2006/istc\\_report\\_shortversion.pdf](http://www.who.int/tb/publications/2006/istc_report_shortversion.pdf).

**TABLE 15. TB UNIT COSTS PER PATIENT, BY LEVEL OF FACILITY (2006)**

Cost component	General /					Overall	Overall
	Tertiary Hospitals (N=2)	2ndary Hospitals (N=2)	Health Centers (N=2)	Dispensaries (N=1)	TB Centers (N=2)	(weighted, \$US 2006) (N=9)	(weighted, CFA 2006) (N=9)
Staff costs	\$ 45.87	\$ 53.77	\$ 17.22	\$ 17.49	\$ 25.54	\$ 30.61	15,307
Training costs	\$ 0.61	\$ 0.15	\$ -	\$ -	\$ 0.08	\$ 0.19	94
TB drugs	\$ 88.28	\$ 88.28	\$ 88.28	\$ 88.28	\$ 88.28	\$ 88.28	44,139
Supplies for sputum smears and x-rays	\$ 1.90	\$ 1.90	\$ 1.90	\$ 1.90	\$ 1.90	\$ 1.90	850
<b>TOTAL (N=11,766)</b>	<b>\$ 136.66</b>	<b>\$ 144.10</b>	<b>\$ 107.40</b>	<b>\$ 107.67</b>	<b>\$ 115.80</b>	<b>\$ 120.98</b>	<b>60,391</b>

### 3.5 CARE AND SUPPORT SERVICES

Care and Support Services (CSS) were defined in our survey protocols as

- palliative care (symptom and pain management for terminal AIDS patients)
- nursing care for people living with HIV/AIDS
- nutritional counseling and supplementation
- home-based treatment for HIV/AIDS and opportunistic infections
- support for orphans and vulnerable children
- other social services for PLWHA (legal aid, support groups, etc.).

Survey results from the health facilities we sampled indicated that facility respondents were generally unfamiliar with the term “Care and Support Services” and may have had more difficulty estimating providers’ level of effort for these services. The most commonly provided services were nutritional counseling and social services (available at 8 facilities at all levels), palliative care (10 facilities, especially at hospitals and TB centers), and home-based care (7 facilities at all levels). One facility reported making its own nutritional supplements, but fortified protein supplementation was not provided by the facilities in our sample. The PSP confirmed that it did not procure any fortified protein supplements in 2006. Services for orphans and vulnerable children (OVCs) were also uncommon in our sample (2 facilities). Several respondents indicated that OVC care was the responsibility of NGOs and charities, not public sector health facilities.

The denominator for our analysis of care and support services was therefore the total number of clients receiving home care, palliative care, or nutritional counseling in the sampled health facilities (N=1,630). The unit cost per patient reflects labor costs only, since researchers lacked reliable data on transportation costs and other inputs associated with CSS. Providers reported spending 83 hours per patient on CSS, for a total cost of \$136 (Table 16). The main providers according to staff time were CHWs (who worked predominantly at the TB centers, providing home care), doctors and nurses (providing palliative care), and social workers (providing counseling services). Provider time spent attending trainings related to CSS cost an estimated \$0.33 per patient.

**TABLE 16. CSS UNIT COSTS PER PATIENT (2006)****Table 16. Care and support services: Unit costs per patient (2006)**

<b>Cost component</b>	<b>Hours per patient per year</b>	<b>Staff costs per patient (\$US)</b>	<b>Staff costs per patient (CFA)</b>
Doctors	13	\$ 50.37	25,186
Nurses	14	\$ 24.92	12,462
Midwives	1	\$ 2.29	1,146
Social Workers/Counselors	19	\$ 24.86	12,431
CHWs	27	\$ 24.51	12,256
Orderlies/Nurse's aides	9	\$ 8.64	4,320
<b>SUBTOTAL</b>	<b>83</b>	<b>\$ 135.60</b>	<b>67,802</b>
<b>Training</b>		\$ 0.33	163
<b>TOTAL (N=1,630)</b>		<b>\$ 135.93</b>	<b>67,964</b>

## 4. CONCLUSIONS AND RECOMMENDATIONS

As well as providing concrete costing data, the results obtained from the survey and presented in the above section provide several findings that are directly related to policy decisions for the scale up of the fight against HIV/AIDS in Côte d'Ivoire. Table 17 below provides a summary of the estimated unit costs of the different HIV/AIDS services in 2006. In sum, unit costs vary by service and by level of care. These findings can be used to guide policy decisions for the scale up of the fight against HIV/AIDS in Côte d'Ivoire.

**TABLE 17. SUMMARY OF UNIT COSTS FOR SELECTED HIV/AIDS SERVICES (2006)**

<b>Service</b>	<b>Denominator</b>	<b>Unit cost (\$)</b>	<b>Unit cost (CFA)</b>
CT	Per client counseled and tested	\$6.35	3,196
ART	Per patient receiving ART per year	\$384.30	192,148
PMTCT	Per pregnant woman counseled and tested	\$6.12	3,059
LAB	Per HIV+ patient receiving monitoring test	\$37.39	18,694
TB	Per patient receiving TB services per year	\$120.98	60,391
CSS	Per patient receiving CSS per year	\$135.93	67,964

To provide a flavor of the scale of total costs, PNPEC reported to our data collectors that 63,680 clients received CT services in 2006; multiplied by our estimated per-client costs, this totals approximately \$405,000. PNPEC also reported that 26,348 patients received ART services in 2006, for an estimated total cost (including laboratory tests) of approximately \$11.1 million.

The study found that CT had lower costs in lower level facilities, because less expensive staff provide the services. Secondary and tertiary facilities were found to rely heavily on doctors for CT services. In general, in smaller facilities nurses or social workers rather than doctors provided the counseling part of the CT and lab technicians rather than more expensive laboratory specialists performed the testing. This has implications for scaling up CT services, since it makes economic sense to strengthen the lower levels of the health pyramid. It is also the logical solution for providing adequate coverage through out the country, as expressed in the PNDS 2008-2012 and the 2006-2012 Strategic AIDS Plan, both in the north and the south and in rural and urban settings. We found that the time spent on pre- and post-test counseling was reported as 18 minutes pre-test and 21 minutes post-test. The most recent guidelines for counseling and testing published by the World Health Organization do not specify a recommended duration for counseling<sup>45</sup>; if specific guidelines are published (and enforced) in public facilities in Côte d'Ivoire, this could impact the cost per patient counseled.

Our findings show that the newer PMTCT drug regimens are costlier than the nevirapine-only regimen, as would be expected. Excluding the cost of time devoted to counseling and testing, the cost of a

<sup>45</sup> WHO and UNAIDS (2007), *Guidance on provider-initiated HIV testing and counseling in health facilities*, Geneva: WHO. Available at [http://www.who.int/hiv/pub/guidelines/9789241595568\\_en.pdf](http://www.who.int/hiv/pub/guidelines/9789241595568_en.pdf).

course of AZT from the 36<sup>th</sup> week of pregnancy through delivery was estimated at \$8.24 per HIV+ pregnant woman. Providing AZT throughout the third trimester, AZT+3TC+NVP during delivery, and AZT+ 3TC for 7 days postpartum was estimated to cost \$31.11 per pregnant woman. In contrast, providing a single dose of nevirapine to the mother and newborn was estimated to cost approximately \$0.09. In a situation where resources are scarce, decision makers will want to weigh the effectiveness of the newer drug regimes in terms of vertical HIV transmissions averted and balance this with the added cost. The nevirapine protocol has the advantage of requiring less patient contact time (during labor and immediately following delivery only) and may therefore be easier to scale up to a larger population.

Two interesting PMTCT questions related to scaling up HIV/AIDS services arose from the data, although they were not part of the original terms of reference for the study. First of all, the researchers noted that 79% of pregnant women who received counseling in our sample were ultimately tested for HIV. Given the objective of reducing mother to child transmission and providing PMTCT to all HIV positive women, it would be interesting to know why 21% of women do not get the test. The study cannot identify whether these women refused to be tested, or whether there was some procedural reason why they were “missed;” the answer to this question should suggest how those women might better be reached, and through them, their children. It was also noted that two-thirds of women who tested positive received ARV prophylaxis from the health facility where they were originally tested. It is not clear what happened to the other one-third of women who tested positive. Did these women seek ARV and other PMTCT services from other facilities, did they refuse to receive prophylaxis, or did they deliver at home and thus miss the opportunity to receive prophylaxis? If indeed most of the one-third are “drop outs,” how could the provision of prophylaxis be increased? These are all questions which could be addressed in further investigations, supplying important information for the scale up of services and increasing access.

The results for ART show that 94% of adult patients were on recommended first line regimes at a cost of \$226 per year in 2006. Six percent of patients under treatment were therefore on non-recommended first line regimens (as reported by the prescribers). This seems to be a relatively high rate of prescriber adherence to suggested protocols. Fifty-four percent of patients on treatment were on recommended second-line regimes which had an average cost of \$1760 per year per patient. This was slightly higher than the observed overall average cost for patients on second-line therapies, including the non-recommended combinations, implying that some patients are receiving cheaper but non-recommended combinations. Providers are clearly more likely to prescribe drugs that are not on standard protocols for patients in need of second-line therapy. Finally, a small percentage of patients are still on combinations which while inexpensive, are not currently part of national protocols (for example duo therapy).

We also found that 4% of patients on first line regimens were receiving duo therapy (AZT + 3TC), rather than a triple therapy combination that is standard under HAART. All of these were patients at one of the TB centers in our sample, so it is possible that there was a problem of drug stock-outs. As well, there is some disagreement among clinicians as to whether all patients on duo therapy must be started on HAART immediately or simply when there is a failure of the duo therapy with a particular patient. For clarity, MSHP may want to address this issue in a technical note.

Laboratory tests are a key component of HIV/AIDS treatment. The estimated annual cost of lab monitoring tests for persons on ART is \$37 per year, equivalent to approximately 10% of the unit cost of ART. According to national protocols, patients in Côte d'Ivoire should have a viral load test every six months after the initiation of ART. There are only two viral load machines and one thermocycler in the

country, according to DIEM and facility reports<sup>46</sup>, and most of the facilities in our sample are not currently providing viral load tests. In theory, these three currently available machines could handle the current volume of ART patients and some planned increases; a quick calculation shows that to handle a total of 70,000 ART patients the 3 machines would need to process 14 samples per hour if used full-time, which would likely be feasible. Indeed, increased use of existing machines would lower the cost per person tested since the purchase price would be distributed over a larger group of people. However, additional machines may need to be made available in other parts of the country in order to increase accessibility. This would mean budgeting for the associated investment and maintenance costs and those related to training technicians in their use (investment costs).

Tuberculosis infection rates have increased dramatically since the advent of the HIV/AIDS epidemic. In Côte d'Ivoire, specialized TB centers (*Centres Anti Tuberculeux- CAT*) are the main points of treatment for the public. Considering the relatively advanced technical capabilities of the CAT and their level in the health system structure, our data shows that the CAT achieve unit costs per patient treated (\$26) only slightly higher than primary care facilities (\$17) and are substantially cheaper than tertiary hospitals (\$46). The reason for this is largely because the CAT rely on less specialized health care providers for key tasks. For example, they reported using Community Health Workers (CHW) for supervising Directly Observed Therapy (DOTS) rather than doctors or nurses, and lab techs rather than lab specialists for diagnostic and monitoring work.

For scale up of TB services, the PNDS 2008-2012 plans to increase coverage within existing health infrastructure, rather than invest in large new infrastructure projects. Therefore, to allow TB services to be delivered throughout the country, these services have to be made available in primary and secondary level health facilities. The MSHP should consider replicating some of the strategies used by the CAT in these lower-level facilities, such as relying on CHWs for directly observed therapy. It should be noted again that six out of eight of the facilities that reportedly provided DOTS relied on family members to do the observation. Adherence to drug therapy for TB may be lower when observation is delegated to family members rather than a third party, and this could have cost implications if staff time required for high-quality TB care has been underreported.

Researchers noted during data collection that most health facilities did not know the TB/HIV co-infection rate among their patients. Consistent information on this topic is lacking at higher levels as well, as evidenced by the fact that the WHO published a TB/HIV co-infection rate of 24% in Côte d'Ivoire for 2005, while the PEPFAR 2006 Country Operational Plan estimated the co-infection rate at 47%. This type of information should be part of regularly collected data in the HMIS (*Système d'Information et Gestion – SIG*).

For the scale up of services generally, this study recommends that where CT is offered, TB testing also be available and offered. Conversely, it also makes sense that where ARVs are available, DOTS be available and offered. This study also shows that both CT and TB services are offered at lower cost in primary level facilities.

We were able to obtain only limited data on care and support services. Reported staff time allocated to CSS was quite high, at an average of 83 hours per patient per year. This likely reflects time-intensive

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<sup>46</sup> Kombe G, Steffen M, Holdaway A, Srinath K.P., Butera D, Diarra S, Kadjo D, Landry M, Seka F, Kraffa B, Ebah-Aka L, Tuho M, Oulai S, Atte B. August 2007. *Cote d'Ivoire: Service Provision Assessment*. Bethesda, MD: Health Systems 20/20 project, Abt Associates Inc.

activities such as providing home care services and nursing and palliative care for terminal patients. This study found that fortified protein supplementation was not purchased by the PSP or made available in public health facilities in 2006.<sup>47</sup> As the nutrition program for PLWHA is strengthened and as the epidemic evolves, the MSHP may wish to place more emphasis on this component as an activity for public health facilities as part of the fight against AIDS. Also, there were few facilities in our sample (as of 2006) that were providing support to Orphans and Vulnerable Children (OVCs). Some facilities reported that this was the responsibility of NGOs/charities. National policy may be unclear to local public health facilities on this matter and improved communication and training may be necessary.

Although the dynamics of the fight against AIDS in the Côte d'Ivoire mirror the growing involvement of the international community and donor organizations, it is clearly necessary to focus on institutional and organizational strengthening, both at central and decentralized levels. The sustainability and continuation of current interventions depends on such institutional strengthening.

In this phase of the study, researchers focused on estimating unit costs for 2006 and did not engage in projection analyses for future years. Such projections, which could be developed in the next phase of the study, would require very careful analytic models and input from key experts in the field, and their reliability and accuracy will be enhanced through feedback on the cost estimates presented here. In the next phase of this study, researchers could analyze the sustainability of providing HIV/AIDS services given these estimated unit costs and current levels of national and donor support. Researchers could also investigate the feasibility of developing a social health insurance model for HIV/AIDS care in Côte d'Ivoire.

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<sup>47</sup> We were informed that UNICEF procures some products for child feeding and that the World Food Program is responsible for school supplements and displaced persons camps.

## ANNEX A: ADDITIONAL TABLES

**TABLE A.1. CT: COMBINED PER-CLIENT COST OF ABBOTT DETERMINE AND GENIE II TESTS, BY LEVEL OF FACILITY**

Level of facility	Number of facilities in sample	Number of clients tested (2006)	Percent confirmed HIV+	Average price per patient tested (\$US)	Average price per patient tested (CFA)
Tertiary Hospitals	3	6,742	41%	\$2.34	1,171
General and Secondary Hospitals	4	3,230	43%	\$2.39	1,193
Health Centers	4	2,408	25%	\$1.85	927
Dispensaries	3	1,781	18%	\$1.67	834
TB Centers	2	4,489	44%	\$2.42	1,212
<b>TOTAL</b>	<b>16</b>	<b>18,650</b>	<b>37%</b>	<b>\$2.22</b>	<b>1,108</b>

**TABLE A.2. CT: ALLOCATION OF PROVIDER TIME, BY LEVEL OF FACILITY**

Provider type	General /					Overall (weighted) (N=16)
	Tertiary Hospitals (N=3)	2ndary Hospitals (N=4)	Health Centers (N=4)	Dispensaries (N=3)	TB Centers (N=2)	
Doctors	36%	40%	8%	9%	4%	<b>29%</b>
Pharmacists	9%	1%	0%	0%	0%	<b>4%</b>
Lab Specialists	7%	0%	6%	0%	0%	<b>4%</b>
Nurses	11%	5%	22%	27%	13%	<b>14%</b>
Midwives	5%	4%	43%	11%	0%	<b>12%</b>
Lab Techs	4%	18%	4%	7%	43%	<b>4%</b>
Social Workers/Counselors	25%	27%	18%	5%	19%	<b>24%</b>
Orderlies/nurse's aides	4%	1%	0%	40%	8%	<b>5%</b>
CHWs	0%	0%	0%	0%	12%	<b>2%</b>
Other	0%	4%	0%	0%	0%	<b>1%</b>
<b>TOTAL</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>
<b>Average time spent on pre- and post-test counseling (hours per client)</b>						
	<b>0.53</b>	<b>0.57</b>	<b>0.60</b>	<b>0.95</b>	<b>0.82</b>	<b>0.65</b>
<b>TOTAL HOURS PER CLIENT</b>	<b>1.56</b>	<b>1.59</b>	<b>1.65</b>	<b>1.99</b>	<b>1.86</b>	<b>1.68</b>

**TABLE A.3. ART: ALLOCATION OF TIME PER PATIENT ACROSS PROVIDER CATEGORIES**

<b>Provider type</b>	<b>Overall (weighted) (N=11)</b>
Doctors	<b>58%</b>
Pharmacists	<b>10%</b>
Nurses	<b>15%</b>
Midwives	<b>1%</b>
Social Workers	<b>1%</b>
Counselors	<b>8%</b>
CHWs	<b>3%</b>
Assistant Pharmacists	<b>3%</b>
<b>TOTAL</b>	<b>100%</b>
<i>Number of patients receiving ART</i>	<b>7,049</b>
<b>TOTAL HOURS PER ART</b>	
<b>PATIENT PER YEAR</b>	<b>22</b>

**TABLE A.4. LAB: REPORTED ALLOCATION OF TIME FOR MONITORING TESTS ACROSS LABORATORY PERSONNEL CATEGORIES**

<b>Type of personnel</b>	<b>Percentage</b>
Lab Specialists	28.3%
Lab Technicians	71.7%
<b>TOTAL (N=10 facilities)</b>	<b>100%</b>
<i>Number of HIV+ clients receiving laboratory tests*</i>	<b>10,891</b>
<b>Total laboratory staff hours per HIV+ patient per year</b>	
	<b>6.8</b>

\*Laboratory tests may have been performed in the facility, or client may have been referred elsewhere.

**TABLE A.5. PATIENTS RECEIVING PMTCT SERVICES, BY LEVEL OF FACILITY (2006)**

	General /				Overall (weighted) (N=12)
	Tertiary Hospitals (N=3)	2ndary Hospitals (N=4)	Health Centers (N=3)	Dispen- saries (N=2)	
<b>Number of pregnant women receiving pre-test counseling*</b>	<b>2,005</b>	<b>8,451</b>	<b>3,470</b>	<b>1,226</b>	<b>15,152</b>
Number of pregnant women tested	1,499	6,251	3,470	803	12,023
Number of pregnant women who tested HIV+	223	423	356	43	1,046
Number of women who received ARV prophylaxis	125	197	352	43	717
Number of pregnant women who received ART during 3rd trimester	27	29	0	0	56

\*Extrapolated to represent a full year of data.

**TABLE A.6. PMTCT: COMBINED PER-CLIENT COST OF ABBOTT DETERMINE AND GENIE II TESTS**

Level of facility	Number of facilities in sample	Number of clients tested	Percent confirmed HIV+	Average price per patient tested (\$US)	Average price per patient tested (CFA)
Tertiary Hospitals	3	1,303	16%	\$1.59	795
General and Secondary Hospitals	4	3,607	8%	\$1.37	685
Health Centers	3	2,146	10%	\$1.43	715
Dispensaries	2	723	5%	\$1.29	647
<b>TOTAL</b>	<b>12</b>	<b>7,779</b>	<b>9%</b>	<b>\$1.41</b>	<b>703</b>

**TABLE A.7. ALLOCATION OF TIME PER TB PATIENT ACROSS PROVIDER CATEGORIES, BY LEVEL OF FACILITY**

	General /					
	Tertiary Hospitals (N=2)	2ndary Hospitals (N=2)	Health Centers (N=2)	Dispen- saries (N=1)	TB Centers (N=2)	Overall (N=9)
Doctors	67%	19%	0%	0.0%	17.8%	<b>28%</b>
Pharmacists	0%	0%	0%	0.0%	4.8%	<b>3%</b>
Lab Specialists	8%	4%	5%	0.0%	0.0%	<b>2%</b>
Nurses	6%	39%	2%	47%	15.5%	<b>15%</b>
Lab Techs	13%	7%	17%	30%	22.9%	<b>20%</b>
Social Workers	6%	19%	0%	23%	3.4%	<b>5%</b>
CHWs	0%	0%	0%	0%	30.2%	<b>21%</b>
Orderlies/nurse aides	0%	11%	76%	0%	5.5%	<b>6%</b>
<b>TOTAL</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>
<i>Total number of TB patients</i>	<b>2,382</b>	<b>465</b>	<b>202</b>	<b>22</b>	<b>8,695</b>	<b>11,766</b>
<b>TOTAL HOURS PER TB PATIENT PER YEAR</b>	<b>14.4</b>	<b>25.9</b>	<b>13.8</b>	<b>10.1</b>	<b>13.1</b>	<b>13.1</b>

# ANNEX B: BIBLIOGRAPHY

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