SUSTAINABILITY ANALYSIS OF HIV/AIDS SERVICES IN NIGERIA

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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. Health Systems 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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SUSTAINABILITY ANALYSIS OF HIV/AIDS SERVICES IN NIGERIA

ABSTRACT

To respond efficiently and effectively to Nigeria's HIV/AIDS epidemic, program planners and policymakers need strategic information and analytical tools to assist with estimating the recurrent costs and non-pecuniary resources required to deliver HIV/AIDS services. With such tools, policymakers can assess the implications of current policy decisions on the sustainability of HIV/AIDS programs over the medium term and proactively address expected resource gaps.

Nigeria's National Agency for the Control of AIDS (NACA), in conjunction with the USAID-funded Health Systems 20/20 Project, is currently undertaking a sustainability analysis of Nigeria's response to HIV/AIDS. Using worksheets developed for this activity, data regarding epidemiology, demographics, funding levels, human resources, service delivery protocols, and service volume were collected from a sample of health facilities, health ministries, state agencies for the control of AIDS, and civil society organizations in 18 states across all six zones. In addition, information was gathered from donors, principal recipients, federal line ministries, and NACA in the Federal Capital Territory. These data serve as key inputs to a simulation model of HIV/AIDS service delivery in Nigeria. Analyses are being conducted using the Microsoft Excel-based HIV/AIDS Program Sustainability Analysis Tool (HAPSAT) to estimate the financial, human, and physical resources required to deliver HIV/AIDS services in Nigeria over a five-year time horizon.

As part of this activity, several policy scenarios will be examined, each representing different levels of care, treatment, and service delivery and corresponding resource requirements. This report presents very preliminary findings regarding financial sustainability and expected resource gaps for the purpose of discussion, data verification, and model refinement.

Results indicate that continued donor-funding commitments will be required for Years 2010-2014, as domestic revenue accounts for less than 5 percent of resources required to sustain HIV/AIDS program at current levels of service delivery. The size of the gap between the resources required and the expected level of available domestic funds for HIV/AIDS suggests that substantial innovation in health system design and health financing will be needed to mobilize domestic resources, increase operational efficiency, and ultimately reduce Nigeria's reliance on external funders of its HIV/AIDS response.

The results of data collection highlight weaknesses in processes for generating accurate, actionable strategic information regarding the financing of HIV/AIDS services. Currently, it is not possible to get a comprehensive picture of how and where resources are being expended in the HIV/AIDS response. For example, donors often reported total expenditures and budgets broken down by thematic area (treatment, care, prevention, health systems strengthening, etc.), and allocations to subrecipients and/or implementing partners. However, data provided by donors, subrecipients, or implementing partners generally did not indicate how much was spent in specific service delivery points or geographical areas, or on specific activities. Thus, the geographical distribution of expenditures and service delivery outputs is not known. Likewise, the unit costs of service delivery, especially behavioral change prevention activities and support of orphans and vulnerable children, are largely unknown and cannot be calculated readily from available data. For this reason, it is not surprising that planning documents rarely describe costing methods, calculations, or assumptions to justify the amounts requested, budgeted, or disbursed to support planned activities.

NACA's ability to coordinate, plan, and sustain a multi-sectoral response to HIV/AIDS is hindered by the lack of comprehensive information on the flow of resources, both from domestic sources and donors, to implementing partners and specific activities. Such data would be of value to donors and implementing

partners as well. The proposed Joint Funding Agreement may help harmonize donor activities and stimulate stakeholders to participate in the development and ongoing use of a standard minimum dataset for resource tracking. A shared system, into which all major funders and recipients report on expenditures and outputs, would be valuable for coordinating activities across geographical regions, target populations, and service delivery channels. Only with such information can policymakers who are measuring efficiency and effectiveness of service delivery identify service delivery gaps, avoid redundant activities, and ensure that policies are designed so that all Nigerians in need of HIV/AIDS services are reached. The success of such a coordinated effort will require dedication on the part of stakeholders, development of enabling information technology infrastructure, and the allocation of resources and expertise for tracking and reporting outputs at the point of service.

Strengthening organizations' capacity to develop data systems and use tools such as HAPSAT that support evidence-based, results-oriented decision-making is critical to sustaining and scaling up a nationally coordinated response to HIV/AIDS in Nigeria.

CONTENTS

ACRONYMS

AIDS	Acquired Immunodeficiency Syndrome
APIN	AIDS Prevention Initiative in Nigeria
ART	Antiretroviral Therapy/Treatment
ARFH	Association for Reproductive and Family Health
ARV	Antiretroviral
BCC	Behavioral Change Communication
BSI	Body Substance Isolation
CBO	Community-based Organization
CD4	Cluster of Differentiation 4
CDC	Centers for Disease Control
CHEW	Community Health Extension Worker
CSO	Civil Society Organization
CSS	Care and Support Services
DFID	Department for International Development (United Kingdom)
DOTS	Directly Observed Therapy Short-course
EIC	Education, Information and Communication
ENR	Enhancing Response to HIV/AIDS
FBO	Faith-based Organization
FGN	Federal Government of Nigeria
FHI	Family Health International
FMoH	Federal Ministry of Health
FTE	Full-time Equivalent
FY	Fiscal Year
GF	Global Fund for AIDS, TB, Malaria
GHAIN	Global HIV/AIDS Initiative Nigeria
HAPSAT	HIV/AIDS Program Sustainability Analysis Tool
HEAP	HIV/AIDS Emergency Action Program
HIV	Human Immunodeficiency Virus
LFT	Liver Function Test
LGA	Local Government Areas
M&E	Monitoring and Evaluation

MAP	Multi-country HIV/AIDS Program (World Bank)
MARP	Most At-risk Population
NACA	National Agency for the Control of AIDS
NASA	National AIDS Funding Assessment
NASCP	National AIDS and STI Control Programme
NBTS	National Blood Transfusion Service
NGO	Nongovernmental Organization
NNRIMS	Nigeria National Response Information Management System
NPA	National Plan of Action
OI	Opportunistic Infection
OVC	Orphans and Vulnerable Children
PCR	Polymerase Chain Reaction
PEP	Post-exposure Prophylaxis
PEPFAR	President's Emergency Plan for AIDS Relief
PLACA	Plateau State Agency for the Control of AIDS
PLWHA	People Living with HIV and AIDS
PMTCT	Prevention of Mother-to-Child Transmission
SACA	State Agency for the Control of AIDS
SCMS	Supply Chain Management Systems
SFH	Society for Family Health
STI	Sexually Transmitted Infections
TB	Tuberculosis
TTI	Transfusion Transmissible Infection
UNAIDS	United Nations Joint Programme for HIV/AIDS
UNFPA	United Nations Population Fund
USAID	United States Agency for International Development
USG	United States Government
WHO	World Health Organization

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EXECUTIVE SUMMARY

To respond efficiently and effectively to Nigeria's HIV/AIDS epidemic, the National Agency for the Control of AIDS (NACA), in conjunction with the Health Systems 20/20 Project, conducted a sustainability analysis of Nigeria's response to HIV/AIDS. The activity involved a national data collection compiling existing strategic information at the state and national level. We developed a model Nigeria HIV program in Microsoft Excel (using HIV/AIDS Program Sustainability Analysis Tool [HAPSAT] Version 1.5), using the collected data as inputs, in order to estimate the recurrent costs and non-pecuniary resources required to sustain and scale up HIV/AIDS services. The analysis produced estimates of the expected cost of program delivery and identified expected resource gaps in both financing and human resources. The implications of current policy decisions on the sustainability of HIV/AIDS programs over the medium term were described.

Data regarding epidemiology, demographics, funding levels, human resources, service delivery protocols, and service volume were collected from a sample of health facilities, health ministries, state agencies for the control of AIDS, and civil society organizations in 18 states across all six zones. In addition, information was gathered from donors, principal recipients, federal line ministries, and NACA in the Federal Capital Territory. These data serve as key inputs to a simulation model of HIV/AIDS service delivery in Nigeria. Experts at NACA and Federal Ministry of Health (FMoH) assisted with the customization of paper-based HAPSAT data collection worksheets for the Nigerian context. The team of data collectors received a one-day training.

In this report, three policy scenarios are examined: (1) maintaining the HIV/AIDS response at its current size and scope and (2) scaling-up the level of service delivery according to published national plans and (3) scaling up to 'universal' access defined as reaching 80 percent of those needing services. The analysis of financial, human, and physical resources required to deliver HIV/AIDS services in Nigeria under each scenario considered a five-year time horizon from 2010 to 2014. Most of the published national plans do not specify targets for all of these years (e.g., the National Plan of Action for Orphans and Vulnerable Children specifies targets through 2010). For the sustainability analysis of the scale-up scenario, we extrapolated the trends in the published plans to specify service delivery targets for the years beyond the plans' time horizons.

Preliminary findings regarding financial sustainability and expected human resource gaps are described in this report for the purpose of discussion, data verification, and model refinement. Results indicate that continued donor-funding commitments will be required for years 2010 to 2014, as domestic government spending accounts for less than 15 percent of resources required to sustain HIV/AIDS program at current levels of service delivery. The size of the gap between the resources required and the expected level of available domestic funds for HIV/AIDS suggests that substantial innovation in health system design and health financing will be needed to mobilize domestic resources, increase operational efficiency, and ultimately reduce Nigeria's reliance on external funders of its HIV/AIDS response.

The key findings of the report are as follows:

- The total cost of the volume of HIV/AIDS services, if maintained at 2009 levels through 2014, is about US$530-650 million per year. Prevention, care, and treatment constitute 35 percent, 20 percent, and 45 percent of the total cost, respectively.
- Current data suggest that Nigeria is dependent on donor funding for implementing the vast majority of HIV/AIDS services. Based on the data collected for this sustainability analysis, only 15 percent of 2008 funding came from domestic sources. The President's Emergency Plan for AIDS Relief

(PEPFAR) accounted for 70 percent of the total budget. Policymakers and donors should pay close attention to issues of sustainability of current levels of HIV/AIDS services.

- To continue scaling up HIV/AIDS services over the next five years would require an additional US$113 million per year, reaching a total annual funding level of US$1.1 billion by 2014. Reaching universal access by 2014 would require even greater resources – rising steadily to over US$2.5 billion per year by 2014. Scale-up of services will require funding not only for direct provision of services, but also development of infrastructure for training and retraining of health workers. To reconcile needs with available resources, the country needs to explore resource mobilization strategies including cost-sharing mechanisms, grants, private contributions, and increasing national contributions.
- Based on the key findings of this initial sustainability analysis of Nigeria's HIV/AIDS program, the authors offer the following recommendations:
    - Financial resource mobilization strategies should focus on both national and international sources to sustain or scale up services. Donors should renew financial commitments to maintain current service levels.
    - Efforts to further scale up services should be considered only in conjunction with assessment of the medium- to long-term capacity of the health system, especially human resources.
    - HIV/AIDS program sustainability would benefit from a set of routinely collected data that can be used as inputs to sustainability analyses. Systems for capturing and reliably transmitting this financial data to the FMoH and NACA need to be developed so the cost of collecting this information is significantly reduced.
    - Donors, nongovernmental HIV/AIDS service organizations, and the private sector, should participate in sustainability analysis to share data so that the government can make accurate estimates on what needs to be sustained or scaled up.
    - As a final note, it should be emphasized that the results presented in this report may need to be updated regularly since the context in which HIV/AIDS services are being implemented is changing rapidly. For example, donor funding continues to be unpredictable, drug costs are falling, and the state-of-art for HIV/AIDS diagnosis and treatment continues to evolve.

Attempts to collect data for this analysis highlight weaknesses in processes for generating accurate, actionable strategic information regarding the financing of HIV/AIDS services. As other investigators have observed,[1] it is not currently possible to efficiently generate a comprehensive picture of how and where resources are being expended in the HIV/AIDS response. For example, donors often reported total expenditures and budgets broken down by thematic area (treatment, care, prevention, health systems strengthening, etc.) and allocations to subrecipients and/or implementing partners. However, data provided by donors, subrecipients, or implementing partners generally did not indicate how much was spent in specific service delivery points or geographical areas, or on specific activities. Thus, the geographical distribution of expenditures and service delivery outputs is not known. Likewise, the unit costs of service delivery, especially behavioral change prevention activities and support of orphans and vulnerable children, are largely unknown and cannot be calculated readily from available data. For this reason, it is not surprising that planning documents rarely describe costing methods, calculations, or assumptions to justify the amounts requested, budgeted, or disbursed to support planned activities.

[1] Canning et al. Expenditures on HIV/AIDS and their Policy Implications. In Olusoji Adeyi, Phyllis J Kanki, Oluwole Odutolu, John A Idoko, eds. 2006. *AIDS in Nigeria: A Nation on the Threshold.* Cambridge, Mass.: Harvard University Press.

NACA's ability to coordinate, plan, and sustain a multi-sectoral response to HIV/AIDS is hindered by the lack of comprehensive information on the flow of resources, both from domestic sources and donors, to implementing partners and specific activities. Such data would be of value to donors and implementing partners as well. The proposed Joint Funding Agreement may help harmonize donor activities and stimulate stakeholders to participate in the development and ongoing use of a standard minimum dataset for resource tracking. A shared system, into which all major funders and recipients report on expenditures and outputs, would be valuable for coordinating activities across geographical regions, target populations, and service delivery channels. Only with such information can policymakers who are measuring efficiency and effectiveness of service delivery identify service delivery gaps, avoid redundant activities, and ensure that policies are designed so that all Nigerians in need of HIV/AIDS services are reached. The success of such a coordinated effort will require dedication on the part of stakeholders, development of enabling information technology infrastructure, and the allocation of resources and expertise for tracking and reporting outputs at the point of service.

Strengthening organizations' capacity to develop data systems and use tools such as HAPSAT that support evidence-based, results-oriented decision-making is critical to sustaining and scaling up a nationally coordinated response to HIV/AIDS in Nigeria.

1. BACKGROUND

Nigeria has experienced a remarkable scale-up of HIV/AIDS services over the past five years. More than 250,000 Nigerians have started on antiretroviral therapy (ART). Prevention of mother-to-child transmission (PMTCT), and voluntary HIV counseling and testing (HCT) have been expanded to more than 400 and 864 sites, respectively, throughout the country. However, the resources required to sustain the current level of HIV/AIDS services in Nigeria over the next decade have not been secured. A partnership framework is being developed with the United States Government (USG) and the level of bilateral support from the USG is expected to at least remain constant at 2009 levels in order to sustain the President's Emergency Plan for AIDS Relief (PEPFAR)-supported patients started on treatment. Future financing from other major donors, including the World Bank Multi-country AIDS Program (MAP), Global Fund to Fight AIDS, Tuberculosis and Malaria (GF), and U.K. Department for International Development (DFID) has been applied for and approved. Nevertheless, some uncertainty remains regarding the availability of external resources and the resources needs to sustain and expand programs. The National Agency for the Control of AIDS (NACA) is undertaking the assessment of the sustainability of its current portfolio of HIV/AIDS activities with the purpose of generating information to support the mobilization of resources and the design of policy.

The Nigerian government and its expanded multi-sector network of partners, including faith-based organizations (FBOs), nongovernmental organizations (NGOs), civil society organizations (CSOs), and other private and public groups, coordinated through NACA and guided by the National Strategic Framework, seek to close the human resource and technical capacity gap and build a network of health systems managers and prevention, treatment, and care providers that can efficiently utilize donor funding and domestic revenue to produce health and quality of life gains for people living with HIV and AIDS (PLWHA), orphans and vulnerable children (OVC), and the general population. This requires not only an adequate funding and human resources, but also a high level of institutional, programmatic, and financial management capacity of these organizations.

Sustainability refers to the ability of a country to support HIV/AIDS services at a desired level, scope, and scale over time. Sustainability can be broken down into three major categories: financial sustainability, organizational sustainability, and sustainability of services. Sustainability analysis seeks to assess whether delivering a package of HIV/AIDS services in the context of anticipated demographic and epidemiological trends will require more resources (financial or human) than are expected to be available.

The primary metric for evaluating the sustainability of an HIV/AIDS program is the gap between resources needed and resources available over the relevant time horizon. In addition to funding gaps, human resources and infrastructure constraints must also be addressed in order to ensure that goals of Nigeria's response to HIV/AIDS are met over the next decade.

NACA conducts sustainability analysis to jointly examining financial, human resource, and infrastructure gaps to inform strategic planning and program design, and support resource mobilization. This paper reports on a sustainability analysis examining three alternative policy scenarios for the scale-up of Nigeria's HIV/AIDS response:

1. Maintaining current (2009) service levels
2. Scaling-up moderately in accordance with policy goals outlined in several NACA documents including the GF Round 8 application, the National Health Sector Strategic

Plan for HIV & AIDS 2005-2009, the National AIDS Priority Plan 2007–2008, and the National Prevention Plan 2007–2009.

3. Reaching universal access by 2014. This scenario examines the resources needed to scale up to universal coverage reaching 80 percent of those needing HIV services.

The analysis was implemented in the HIV/AIDS Program Sustainability Analysis Tool (HAPSAT), a Microsoft Excel-based tool for conducting sustainability analysis that allows the policymaker to account for the complex interaction of HIV/AIDS program inputs, use simulation to estimate an HIV/AIDS program's output, and identify bottlenecks and slack constraints. By simulating alternative HIV/AIDS program specifications and alternative assumptions about the demographic and epidemiological context, policymakers can ensure that plans for HIV/AIDS programs are optimized for the expected resource envelope (including money, human resources, and physical capital) and gain an understanding of the sensitivity of the expected output of an HIV/AIDS program to changes in underlying assumptions and program inputs. The results of the analysis will be used to inform decisions about resource allocation across different types of HIV/AIDS services, scale-up of HIV treatment, and development of human resource and physical infrastructure, as well as to advocate for additional funding to support HIV/AIDS services into the future. By simulating alternative resource allocations, service delivery models, and productivity levels, policymakers can estimate the expected benefits of proposed innovations, identify services that are easier to sustain, quantify reliance on external funding, and plan a response to HIV/AIDS that corresponds to the expected resource envelope.

2. METHODS

2.1 HAPSAT MODEL OVERVIEW

For this activity, we used a Microsoft Excel-based tool, called HAPSAT, which was developed for modeling HIV/AIDS programs, estimating resource needs, and comparing alternative policies related to the delivery of HIV/AIDS treatment, care, prevention, and mitigation. We assessed the sustainability of Nigeria's HIV/AIDS services over a five-year time horizon from 2010 to 2014.

A comprehensive multi-sector response to HIV/AIDS is a complex system with many interacting parts. In HAPSAT, we modeled Nigeria's HIV/AIDS program (e.g., the national response) as a collection of interconnected HIV/AIDS services. This model captures the cascade effects of PMTCT and HCT services as generators of newly identified cases for ART and other services. Medical services explicitly modeled in HAPSAT include ART, PMTCT, HCT, care and support services (CSS) for PLHIV including palliative care and home-based care (HBC), prevention of medical transmission by screening blood supply and promoting injection safety (BSI), and treatment of HIV-tuberculosis (TB) co-infection (HIV-TB). Non-medical services include behavioral change communication (BCC), prevention commodities (e.g., condoms), and the support of OVC.

The resources required to deliver HIV/AIDS services are broken into three categories: financial resources (donor and government funding), human resources for health care service delivery (e.g., community health extension workers, counselors, medical doctors and medical officers, nurses and midwives, laboratory scientists and technologists, pharmacists and pharmacy assistants, administrative officers, monitoring and evaluation [M&E] officers, and managers), and physical infrastructure (buildings, vehicles, laboratory equipment, computers, communication networks, etc.).

Country-specific data were collected from NACA, federal line ministries, donors, collaborating partners, and health facilities to inform HAPSAT model parameters. The baseline data encompass the general parameters that represent the context with which any program and policy design must contend. Baseline data can be differentiated into six major categories: demographic, epidemiological, financial, labor and service, medical, and cost data.

Each component service in Nigeria's HIV/AIDS program has a defined unit of service by which the program's direct output (service volume) can be measured and reported. For example, a unit of ART service is one patient-year of ART. Using country-specific data wherever possible, we estimated unit costs for units of service. When country-specific data were not available, we attempted to use regional estimates from the literature or other sources. After the HAPSAT model was calibrated to represent the current HIV/AIDS epidemic and response in Nigeria, we estimated gaps in financial resources for sustaining current service levels and for scaling up over a five-year time horizon in accordance with policy goals outlined in several NACA documents including the GF Round 8 application, the National AIDS Priority Plan 2007–2008, and the National Prevention Plan 2007–2009.

The HAPSAT model requires two broad categories of information: baseline data and policy specifications. Taken together, this user input forms a scenario to be analyzed. The baseline data encompasses the general parameters that represent the background context against which any program and policy design must contend and take into consideration. Baseline data can be differentiated into six major categories:

- Demographic data, such as population structure, fertility rates, and mortality rates;

- Epidemiological data, such as HIV prevalence, infection, and symptom development rates, life expectancies, probabilities of transmission;
- Financial data, such as trends in donor funding and other financing sources for HIV/AIDS programs;
- Labor and service data, such as stock of health workers and volume of HIV/AIDS services delivered;
- Medical data, such as available protocols and regimens for screening, ARVs, and monitoring; and
- Cost data, such as human resource salaries, building, equipment, and consumables costs.

The demographic and epidemiological categories define the parameters of potential users of HIV/AIDS services, including HIV-positive OVC, and those receiving other CSS including HBC, nutritional support, palliative care, and hospice services. The financial data detail trends in donor funding for HIV/AIDS programs and services and outline current and potential funding possibilities. Labor and service data take into consideration the current capacity of the health workforce and service delivery. The medical data and cost data categories in large part describe the infrastructure that will be used to deliver HIV/AIDS services to the population, with a particular focus on costs of individual components.

For each programmatic area of Nigeria's HIV/AIDS response, units of service were defined to measure the program's direct output (service volume). For example, a unit of service for ART is one patient-year of treatment (Table 1).

TABLE 1

HIV/AIDS Program Component	Units of Service
HCT	1 person pre-test counseled, 1 person tested, 1 person post-test counseled
PMTCT	1 pregnant woman counseled, 1 pregnant woman tested, 1 infected pregnant woman treated with ARV prophylaxis
ART*	1 person-year of 1st line treatment, 1 person-year of 2nd line treatment, 1 person-year of pediatric treatment
CSS-HIV*	1 person-year of treatment for OI, palliative care, psychosocial support, and nutritional supplementation
TB/HIV*	1 TB case tested for HIV, 1 HIV case tested for TB, 1 HIV/TB case treated with DOTS, 1 HIV+ person receiving a course of isoniazid prophylaxis
CSS-OVC**	1 person-year of school fees, psychosocial support, nutritional supplementation, and housing
OTHER Prevention**	1 condom distributed, 1 high-risk person reached by targeted ABC activites, 1 listener-minute of mass media (e.g., radio), 1 worker reached by workplace HIV/AIDS program, 1 person receiving PEP, 1 health worker trained in PEP, BSI, safe medical injection, or universal precautions for health care settings.

Note: ARV=antiretroviral; DOTS=Direct Observation Therapy Short-course; ABC=Abstinence, Be Faithful, Condoms; PEP=post-exposure prophylaxis; OI=opportunistic infection

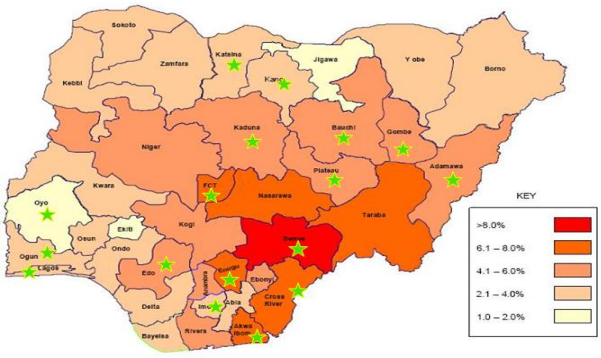
*The costs for HIV care are outpatient only, and do not include hospitalization for AIDS-related complications.

**Data on the current volume and Nigeria-specific costs and labor requirements of these services were not available for this study, but they can be included in future sustainability analyses using the current version of the HAPSAT model if country-specific input data is available.

2.2 DATA COLLECTION

A review of reports and other documents produced by NACA, the Federal Ministry of Health (FMoH), other line ministries, international donors, and implementing partners was complemented by direct data collection from service delivery points and CSOs in 18 states, covering all six zones and the Federal Capital Territory (FCT) (Figure 1). The specific states visited are shown in Table 2. They represent 54 percent of Nigeria's population and an estimated 58 percent of Nigeria's HIV cases. In each state, approximately six service delivery points were visited, as well as the state agencies for control of AIDS (SACA) and state ministry of health offices. In most states, a CSO delivering OVC care was visited. In at least one state per zone, a private facility was visited. In some cases, a local agency for control of AIDS was also visited. In total, data were gathered from approximately 100 service delivery points.

FIGURE 1. GEOGRAPHICAL DISTRIBUTION OF DATA COLLECTION SITES



Green stars mark location of data collection sites

TABLE 2. DATA COLLECTION SAMPLE FOR SUSTAINABILITY ANALYSIS

Zone, State	Population (% of Total)	HIV Prevalence (Age 15-49)
FCT Abuja	1,405,201 (1.0)	6.3%
NE, Adamawa	3,168,101 (2.3)	4.2%
NE, Bauchi	4,676,465 (3.3)	3.4%
NE, Gombe	2,353,879 (1.7)	4.9%
NC, Benue	4,219,244 (3.0)	10.0%
NC, Plateau	3,178,712 (2.3)	4.9%
SS, Cross-River	2,888,966 (2.1)	6.1%
SS, Edo	3,218,332 (2.3)	4.6%
SS, Akwa-Ibom	3,920,208 (2.8)	8.0%
SE, Enugu	3,257,298 (2.3)	6.5%
SE, Imo	3,934,899 (2.8)	3.9%
NW, Kaduna	6,066,562 (4.3)	5.6%
NW, Kano	9,383,682 (6.7)	3.4%
NW, Katsina	5,792,578 (4.1)	2.7%
SW, Lagos	9,013,534 (6.4)	3.3%
SW, Ogun	3,728,128 (2.7)	3.6%
SW, Oyo	5,591,589 (4.0)	1.8%

2.3 DATA

2.3.1 POPULATION, ECONOMICS, AND GEOGRAPHY

Nigeria has an estimated population of 152 million[2] living in 774 local governmental areas (LGAs) in 36 states and the FCT, in six geopolitical zones.

2.3.2 HIV EPIDEMIOLOGY

HIV prevalence was recently estimated using a population-based survey. In addition, the National AIDS and STI Control Programme (NASCP) conducted antenatal surveillance (Table 3). Based on this new data, approximately 3 million Nigerians are HIV-infected. Of these, about 220,000 are pediatric cases (UNAIDS 2008[3]). The most recent population-based survey and antenatal surveillance results found a HIV prevalence of 3.6 percent among those ages 15-49 years and 4.6 percent among women in antenatal clinics. These results have not yet been analyzed to generate prevalence estimated for individual states, but a 2005 study of HIV at antenatal sites reported large variation in prevalence, from a high of 10 percent in Benue to a low of 1.6 percent in Ekita.

2.3.3 CURRENT LEVELS OF SERVICE DELIVERY

Nigeria's HIV/AIDS response comprises activities in several thematic areas. The HAPSAT software refers to these categories as services. They include the clinical services (diagnosis, treatment, PMTCT, palliative care, HBC, HIV-TB services, treatment of OIs), prevention services (awareness and behavioral change, promotion of safe sex, BSI, PEP, universal precautions), mitigation (care and support of OVC), and systems strengthening (laboratory infrastructure, strategic information and planning, information systems). Naturally, there is some logical overlap between service components. For instance, some orphans may receive clinical services including ART and some awareness programs may include a counseling and testing component. To avoid double counting, all clinical services are grouped together even if they occur in the context of another program. To parallel reporting in the Nigeria National Response Information Management System (NNRIMS), counseling and testing of pregnant women is counted as part of the PMTCT service rather than as part of HCT services.

Diagnosis: HIV Counseling and Testing

There are 864 sites where HCT is available. Approximately 14 percent of the general population at risk for HIV has had an HIV test (NARHS+), although in a given year only about 1 million tests were performed, representing about 1.5 percent of the population ages 15-49. Nearly 30 percent of people most at risk (MARPs) have had an HIV test.

[2] Population Reference Bureau. Accessed Oct 15, 2009. http://prb.org/Datafinder/Geography/Summary.aspx?region=29&region_type=2

[3] UNAIDS 2008. Epidemiological Fact Sheet on HIV and AIDS http://apps.who.int/globalatlas/predefinedReports/EFS2008/full/EFS2008_NG.pdf

TABLE 3: HIV ESTIMATES AND PROJECTIONS

HIV Estimates and Projections	2008	2010	2012
HIV population			
Total	2,952,000	3,132,000	3,352,000
Males	1,228,400	1,300,000	1,387,000
Females	1,724,000	1,833,000	1,965,000
Prevalence (15-49)	3.6	3.6	3.67
Annual HIV+ births			
Total	56,681	54,380	52,113
Percent	1	0.95	0.9
Cumulative AIDS deaths			
Total	2,988,000	3,540,000	4,089,000
Males	1,375,000	1,617,000	1,858,000
Females	1,612,000	1,922,000	2,231,000
Annual AIDS deaths (yearly)			
Total	280,000	276,000	274,000
Males	123,000	121,000	120,000
Females	157,000	155,000	154,000
ART Program			
Total requiring ART (Adults)	740,000	811,000	907,000
Total requiring ART (<15yrs)	92,000	101,000	104,000
All requiring ART	833,000	912,000	1,011,000
New HIV infections			
Adult new infections	323,000	341,986	363,911
Childhood new infections	57,000	54,000	52,000
Total number of children (<15yrs) orphaned due to HIV/AIDS			
Total AIDS orphans	2,229,883	2,419,984	2,527,102
Maternal AIDS orphans	1,810,703	1,942,000	1,998,751
Paternal AIDS orphans	1,401,481	1,521,736	1,592,226
Dual orphans	1,199,833	1,273,590	1,296,765

Source: FMoH and NASCP. Forthcoming. 2008 Antenatal Surveillance Report,

Antiretroviral Treatment

According to epidemiological modeling, an estimated 740,000 Nigerians are clinically eligible for ART (Table 2), although a majority of these persons do not know they are infected. Nigeria has 269 service delivery points where ART is provided (PEPFAR Indicator 11.1, April 2008[4]). According to NACA's registry of service delivery points, 73 percent of these sites are public, 18 percent are private, and 9 percent are operated by FBOs, NGOs, or some other type of organization. It is estimated that approximately 200,000 Nigerians were receiving ART in April 2008 (PEPFAR Indicator 11.4, April 2008). By March 2009, this number had increased to 269,000, and new patients are being added at a rate of approximately 4,500 per month. Patients who are identified as HIV-infected but not eligible for ART receive "pre-ART" care to maintain their health and monitor the status of their infection.

Prevention of Mother-To-Child Transmission

There are over 430 service delivery points where PMTCT is provided. Each year, over 5 million Nigerian women are pregnant. Of these, about 20 percent receive HCT and receive their results. In 2007, out of an estimated 200,000 pregnancies among HIV-positive women, approximately 13,000 women received treatment at delivery to prevent vertical transmission.

[4] PEPFAR 2008, http://www1.usaid.gov/ng/downloads/pepfar_indicators_reference_guide.pdf

Palliative Care: Basic Health Care and Support

Palliative care includes the care of PLWHA who are clinically eligible, including those on ART, not on ART, or who have exhausted available ART options. Palliative care includes:

- Medical care
    - Pain and symptom management
    - OI treatment and prevention
- Socio-economic supports
    - Stigma and discrimination reduction
    - Income-generating activities

TB-HIV

Nearly half of Nigeria's TB patients are HIV infected. HIV-TB services focus on the testing of new HIV patients for TB and testing new TB patients for HIV. Identification of co-infected patients is important for optimizing HIV treatment regimens and controlling the spread of TB. There are over 144 TB/HIV implementing sites in 18 states. These sites have registered 26,500 TB patients, of which 17,800 were tested for HIV, and 16.6 percent tested positive.

Awareness and Behavioral Change Communication

Prevention messages and Family Life curriculum for schoolchildren, HIV education and awareness activities for youth not in school as well as youth clubs, and mass media awareness campaigns are all part of the BCC strategy. Recently, NACA completed a National Prevention Plan for 2007-2009, which outlines hundred of activities aimed at behavioral change.

Condoms and Other Prevention

Nearly 180 million condoms were distributed in 2007 through workplace programs, community mobilization and awareness events, health clinics, and the private market.

Blood Safety, Injection Safety, Universal Precautions, and Post-exposure Prophylaxis

There are 17 National Blood Transfusion Service (NBTS) centers in the country where blood is collected from voluntary non-remunerated donors and screened for the four mandatory Transfusion Transmissible Infections (TTIs): HIV1&2, hepatitis B, hepatitis C, and syphilis. The prevalence of TTIs among blood donors in 2008 are 2.6 percent for HIV (<0.1 percent among regular blood donors), 9.7 percent for hepatitis B, 2.5 percent for hepatitis C, and 0.3 percent for syphilis. The NBTS has started the hospital linkages program. The goal is to ensure that safe blood is made available at all times in hospitals. Presently, the NBTS is designing a grassroots approach to reach the local level with its services.

Orphans and Vulnerable Children

An orphan is a person under 18 years old who has at least one deceased parent. By this definition, Nigeria may have as many as 7.3 million orphans, over 10 percent of all children.[5] An additional 10.2 million children who are not orphans are considered to be in a vulnerable situation, such as living in a household where an adult caregiver is critically ill for at least three months or having to work for money, having been sexually abused, or not being enrolled in school. Thus, as many as 17.5 million children (24.5 percent of children) in Nigeria are OVC.

[5] Federal Ministry for Women's Affairs and Social Development, 2008. *Situation Assessment and Analysis on Orphans and Vulnerable Children (OVC) in Nigeria.*

An estimated one-quarter of orphans are AIDS orphans (i.e., the cause of the parent's death was AIDS), totaling an estimated 2.4 million AIDS orphans in 2010. Nearly half a million AIDS orphans have lost both parents ("double orphans"). HIV prevalence among OVC is not known, but the 2005 sero-prevalence sentinel report estimated that there are about 75,000 children born each year HIV-infected and approximately 100,000 children under 15 currently eligible for ART.[6] Currently, this growing vulnerable population is in need of a portfolio of support services including nutrition, housing, education, psychosocial support, and legal services.

The National Plan of Action for Orphans and Vulnerable Children (NPA-OVC) set forth by the Federal Ministry for Women's Affairs and Social Development is not limited to AIDS orphans, although NPA monitoring data is reported through the NNRIMS system coordinated by NACA. The NPA plans for the scale-up of OVC services from about 1 percent of OVC in 2006 to about 10 percent of OVC in 2010. The cost of the plan (excluding activities funded through other budget lines) was estimated to be US$146 million in 2006 and scale up to about US$500 million in 2010. About one-third of the budget was allocated to educational support, one-quarter to health care, and one-third to household care. Only 3.4 percent was allocated to organization, and M&E.

One challenge in including OVC in the HAPSAT analysis is that HAPSAT is focused on HIV/AIDS programmatic areas, but the OVC planning and budgeting is not specific to AIDS orphans. Although the entire OVC program could be included, that would require also including the full range of financial resources for OVC in the resource envelope. Because this was beyond the scope of the preliminary HAPSAT exercise, we instead allocated a portion of the OVC resource needs to the HIV/AIDS programmatic area of mitigation. An additional challenge is that the OVC budget includes several line items, amounting to US$96.9 million in 2010, that are part of other HIV programmatic areas: PMTCT, pediatric ART, and HIV care. Including these areas could amount to double-counting. Therefore, they were removed from the OVC area for the HAPSAT analysis.

Drug Supply Chain and Laboratory Infrastructure

Drugs for ART provision in FMoH clinics are procured and distributed through the Central Medical Stores, operated by Supply Chain Management Systems (SCMS). The operating cost of the supply chain is US$350,000, exclusive of salaries.

Laboratory infrastructure is also undergoing strengthening initiatives:

- Medical laboratory scientist trained across the country on the use of the approved national testing algorithm from both public and private laboratories
- Provision and training of CD4 cyflow operators from 55 tertiary and secondary sites across the country.
- Kit evaluation
- Early Infant Diagnosis activity in collaboration with Clinton Foundation
- Provision and installation of five PCR machines in the country awaiting activation
- Provision of additional 40 CD4 machines to be distributed to 40 assessed sites across the country.

Strategic Information, Policy Analysis, and System Strengthening

Donors have invested in health management information systems, M&E, and capacity building to improve the generation of strategic information for planning, monitoring performance, and developing policy by NACA, SACAs, line ministries, and service delivery points. Recent developments include:

[6] FMoH. 2005. *Technical Report: National HIV/AIDS Sero-prevalence Survey.*

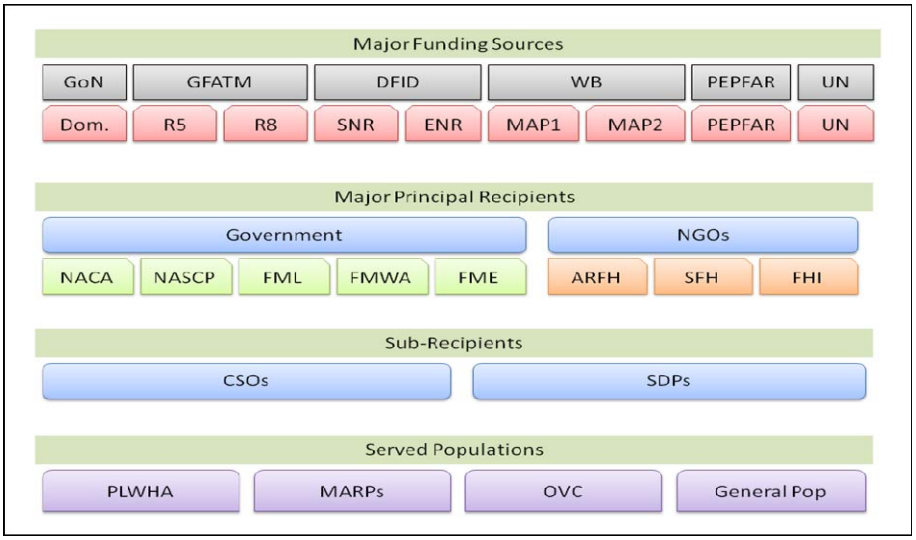
- Health Sector M&E Framework, to be disseminated
- Harmonized diagnosis, treatment, PMTCT, and TB/HIV tools developed and well circulated (though the level of use is still limited by development partners)
- Use of two databases (district health information system, or DHIS, and logistic health program management information platform, or LHPMIP) for collection of strategic information
- Existence of HIV/AIDS surveillance mechanisms in the general population and among the high-risk groups
- Ongoing capacity building in relevant areas of the health sector response (though limited)

2.4 CURRENT FINANCING OF HIV/AIDS SERVICES

2.4.1 SOURCE AND FLOW OF FUNDS

Funds for Nigeria's response to HIV/AIDS have come from domestic public financing, the domestic private sector, DFID, PEPFAR, the GF, the World Bank, and UN organizations (Figure 2). Funding flows from its original sources through principal recipients including NACA and government line ministries, and the major NGOs such as the Association for Reproductive and Family Health (ARFH), Society for Family Health (SFH), and Family Health International (FHI). Principal recipients may expend funds to directly provide services to target populations. They also fund activities of subrecipient NGO and for-profit partners, as well as CSO umbrella organizations and service delivery points such as hospitals, clinics, laboratories, and testing centers. In turn, target populations are reached by CSO prevention and mitigation activities and at service delivery points where care and treatment is available.

FIGURE 2. FLOW OF FUNDS FOR NIGERIA'S RESPONSE TO HIV/AIDS



GoN = Federal Government of Nigeria, GF = Global Fund for AIDS, TB, and Malaria, DFID= Department for International Development (UK), WB = World Bank, PEPFAR = President's Emergency Plan for AIDS Relief (US), UN= United Nations, Dom = domestic, R5 = Round 5, R8 = Round 8, SNR= Strengthening Nigeria's Response, ENR = Enhancing Nigeria's Response, MAP1= Multi-country HIV/AIDS Program I, MAP2 = Multi-country HIV/AIDS Program 2, NACA = National Agency for the Control of AIDS , NASCP= National AIDS Control and Prevention Program, FML= Federal Ministry of Labour, FMWA= Federal Ministry of Women's Affairs and Social Development, FME= Federal Ministry of Education, ARFH= Association for Reproductive and Family Health, SFH= Society for Family Health, FHI= Family Health International, CSO= civil society organizations, SDP= service delivery points; PLWHA= people living with HIV/AIDS, MARP=most at-risk persons, OVC= orphans and vulnerable children, Pop = population

Nigeria's decentralized government structure complicates the tracking of funding flows. Not all funds flowing into individual states and LGAs pass through the national level. Both government and donor

funds for the HIV/AIDS response can bypass the national level. Likewise, information does not flow readily up from LGA to state to federal levels, presenting an ongoing challenge for data collectors and managers, policymakers at NACA, and donors planning to use their funds in a way that complements extant activities.

2.4.1.1 FEDERAL GOVERNMENT OF NIGERIA

The total disbursement for HIV/AIDS activities by ministries, departments, and agencies of the Federal Government of Nigeria (FGON) from 2006 to 2009 is shown in Table 4. The largest response to HIV/AIDS has been from the FMoH and NACA. NACA is the national government agency responsible for coordinating the government's multi-sector response to HIV/AIDS. The national and state governments also employ public sector health workers and these workers' salaries are paid primarily from domestically sourced internal revenue. The salary support for health workers delivering HIV/AIDS treatment and care are included in Table 4. Domestic funding of HIV/AIDS activity has been highly variable over the past four years, and diminished substantially in 2009.

TABLE 4. DOMESTICALLY SOURCED FUNDS DISBURSED FOR HIV/AIDS TO FEDERAL LINE MINISTRIES AND GOVERNMENT AGENCIES

Ministry/Parastatal	2006	2007	2008	2009
Federal Ministry for Women's Affairs and Social Development	$391,230	$817,000	$1,409,100	$1,191
Ministry of Agriculture	$563,500	$374,827	$55,510	
Ministry of Education	$3,755,541	$1,749,052	$625,935	$106,562
FMoH	$38,237,500	$17,385,760	$55,623,249	$7,593,388
National Drug Law Enforcement Agency	$162,441			
Fed. Min. of Communication	$5,796			
FMHUD	$40,250	$24,510		
Ministry of Environment	$40,250			
Ministry of Transport	$24,150			
Ministry of Defence		$122,550		$28,465
Ministry of Youth and Development		$359,480	$213,500	
Ministry of Interior			$119,560	$204,600
Ministry of Mines and Solid Minerals				$27,280
Ministry of Labour/Productivity				$56,742
State House	$193,200			
Bureau for Public Service	$5,554,500			
National Natural Medicine Development Agency	$49,642		$68,320	$47,740
National Human Rights			$42,700	$47,740
National Population Council			$145,180	$136,400
NACA	$11,833,500	$18,762,118	$11,826,304	$6,849,816
Total	$60,851,500	$41,229,296	$74,143,164	$16,289,699

Exchange Rate US$ to Naira: 2006, 124.22; 2007, 122.40; 2008, 117.10; 2009, 146.63

NACA is also a principal recipient of funds from the World Bank and GF. NACA was responsible for the disbursement of MAP funds through the HIV/AIDS Action Fund (HAF) to CSOs during the 2002-2007 period. In 2007, NACA also disbursed ₦73.7 million of MAP funds from World Bank across federal line ministries, including ₦22.9 million to the FMoH. NACA is anticipating a second round of MAP funding from the World Bank, worth US$135 million over five years beginning in 2010.

In addition to NACA, GF Round 5 was awarded to two other principal recipients, ARFH and SFH. Of the total US$161 million awarded, the GF web site indicates US$86.5 million remain to be disbursed

(Table 5). For this analysis, it was assumed this remaining amount would be divided evenly over the years 2009, 2010, and 2011 (US$28.8 million per year).

TABLE 5. GF ROUND 5 FUNDS APPROVED, DISBURSED, AND REMAINING

	Phase 1	Phase 2	Total	Disbursed	Remaining
ARFH	$11,599,164	$14,806,985	$26,406,149	$15,378,638	$11,027,511
NACA	$50,603,661	$60,076,115	$110,679,776	$50,225,606	$60,454,170
SFH	$6,417,422	$17,676,492	$24,093,914	$9,104,484	$14,989,430
Total	$68,620,247	$92,559,592	$161,179,839	$74,708,728	$86,471,111

Source: http://www.theglobalfund.org/programs/country/?countryid=NGA

The state governments in Nigeria also make substantial financial contributions to the HIV/AIDS response. Comprehensive data are not available on the level of support by state, though it is generally believed to vary considerably across states.

State Level: Case Study – Plateau State

In Plateau state, the SACA, known as PLACA, mobilized about US$6 million over the three years 2005 through 2007. A World Bank credit was the source of 94 percent of these funds. The Bill and Melinda Gates Foundation-funded AIDS Prevention Initiative in Nigeria (APIN) was the source of 3 percent of the funds. The remaining 3 percent of funds were domestically sourced through state and local governments and public-private partnerships (Table 6). Other SACAs visited during the data collection did not provide similar financial data.

TABLE 6. PLACA BUDGET

PLACA Budget Source of Funds	Naira	USD	Percent
World Bank credit	619,883,000	$5,390,287	94%
Counterpart	10,000,000	$86,957	2%
State ministries	2,082,000	$18,104	0%
State boards and parastatals	7,023,000	$61,070	1%
LGA councils	3,960,000	$34,435	1%
APIN	18,000,000	$156,522	3%
Public-Private Partnership Fund	567,000	$4,930	0%
Total	661,515,000	$5,752,304	100%

Source: PLACA Annual Report 2008

2.4.1.2 DONORS AND MAJOR IMPLEMENTING PARTNERS

MAJOR MULTILATERAL AND BILATERAL DONORS

PEPFAR[7]

Since 2004, PEPFAR has contributed nearly US$1 billion to support comprehensive HIV/AIDS prevention, treatment and care programs in Nigeria. PEPFAR is providing US$410 million in fiscal year (FY) 2008 (Table 7) and will provide US$427 million in FY 2009.

[7] http://www.pepfar.gov/press/countries/profiles/116242.htm

TABLE 7. PEPFAR FISCAL YEAR 2008 OBLIGATIONS

Programmatic Area	Obligation (%)
PMTCT	18,363,702 (4.5)
Abstinence & Be Faithful (AB)	14,793,024 (3.6)
Blood safety	1,395,500 (0.3)
Injection safety	6,529,853 (1.6)
Other prevention	9,196,832 (2.2)
Palliative care	19,221,958 (4.7)
TB/HIV	10,466,104 (2.6)
OVC	23,013,082 (5.6)
Counseling and testing	18,628,387 (4.5)
ARV drugs	53,843,150 (13.1)
ARV services	54,640,812 (13.3)
Strategic Information	13,760,000 (3.4)
Policy	3,055,000 (0.7)
Monitoring and Surveillance	2,705,000 (0.7)
Totals	**410,203,938**

Global Fund[8]

The total funding approved for Round 8 is US$55.7 million. Detailed information on the disbursement schedule is not yet available, but for this analysis we assumed the funding will be divided evenly over five years beginning in 2011 (US$11.1 million per year). The principal recipients of GF funding are ARFH, Christian Health Association of Nigeria, the FGN National Action Committee on AIDS, NACA, SFH, and Yakubu Gowon Center for National Unity and International Cooperation. The project implemented in Round 5 with GF funding was called "Scale-up of Comprehensive HIV and AIDS Treatment, Care and Support in Nigeria: To expand access to HIV testing and counseling services to cover all 37 states of the country."

World Bank[9,10]

The objective of the HIV/AIDS Program Development Project is to assist Nigeria in reducing the spread, and mitigate the impact, of HIV infection by strengthening its multisectoral response to the epidemic through implementing a comprehensive program that includes the creation of an enabling environment for a large-scale response, and laying the foundation for scaling up HIV/AIDS prevention, care, and treatment services at the federal, state, and local levels. This project supports the government's HIV/AIDS Emergency Action Program (HEAP), which is planned to be implemented during the next three years; it also provides further support for two years after that, to assist the development and start-up of the implementation of a long-term strategy to fight against HIV/AIDS. The project fits within the MAP for the Africa Region.[11]

There are two project components. The first builds capacity by enabling newly established agencies (NACA and SACA) to: evaluate action plans submitted by the line ministries and NGOs; monitor and

[8] http://www.theglobalfund.org/programs/country/?countryid=NGA&lang=en

[9] http://web.worldbank.org/external/projects/main?pagePK=64283627&piPK=73230&theSitePK=368896&menuPK=368928&Projectid=P070291

[10] http://web.worldbank.org/external/projects/main?pagePK=64283627&piPK=73230&theSitePK=368896&menuPK=368928&Projectid=P105097

[11] See World Bank report no. 20727.

evaluate HEAP implementation and HIV/AIDS conditions in the country; and enable these agencies to act as information clearinghouses. The second component finances the plans approved by the AIDS agencies and helps with preparing programs of actions and planning. The third component funds proposals from NGOs, community-based organizations, and the private sector. The total project cost is US$96.28 million. The implementing agencies are NACA and key line ministries. An additional US$50 million has been approved for 2008–2009 to combat AIDS by supporting the HIV/AIDS Programme Development Project and introducing changes in the project and accompanying amendments to the project's legal documents. The additional financing will help finance the costs associated with the scaling up of the project from 14 to 35 states (the scale-up occurred in 2005 in conjunction with the mid-term project restructuring).

United Nations[12]

Major challenges/activities for FY 2009 are the following: Human Resource Capacity, Alignment and Harmonization, M&E, Health Systems Strengthening, Coordination at State and LGA Levels. The United Nations Development Programme (UNDP) has two major projects on HIV/AIDS in Nigeria: the Joint Donor Basket Fund to Support Nigeria's Country Coordinating Mechanism for Global Fund Grants (US$48,935) and the Strategic Planning and Implementation to address HIV and AIDS in Nigeria (US$54,742). Within the Joint United Nations Programme on HIV/AIDS (UNAIDS), the United Nations Population Fund (UNFPA) takes a leadership role in condom programming and prevention among young people and women, two groups that are increasingly at risk of infection. It also reaches out to other vulnerable populations. Linking HIV responses with sexual and reproductive health care is the overarching strategy for reaching more people cost-effectively and moving towards the goal of universal access to prevention, treatment, care and support by 2010. The priorities of UNICEF in combating AIDS in Nigeria are: primary prevention among young people, PMTCT, pediatric AIDS, and protection of OVC.

Department of International Development (UK)[13]

DFID's Enhancing Nigeria's Response to HIV/AIDS will contribute 51 million pounds (US$80 million dollars) worth of goods and services for HIV/AIDS over the 2010-2014 time horizon. This includes 35 million pounds for goods, 11 million pounds for services, and 5 million pounds transferred to UNAIDS.

SELETCED IMPLEMENTING PARTNERS

Society for Family Health

SFH received funds from three major donors, PEPFAR, GF, and DFID. In 2007, SFH received about US$18.2 million from the following sources: US$5.1 million from PEPFAR, US$4.3 million from the GF, and US$8.8 million from DFID. In 2008, SFH received US$2.1 million from the GF and US$8.8 million from DFID, but no funds from PEPFAR. SFH disbursed portions of these funds to subrecipients PPFN, FHI, NIMR, GEDE Foundation, Action AIDS, and Pathfinder. In both 2007 and 2008, SFH disbursed US$3.3 million to subrecipients (US$395,800 to PPFN, US$668,000 to FHI, US$262,500 to NIMR, US$189,000 to GEDE Foundation, US$786,520 to Action AIDS, and US$1 million to Pathfinder). SFH reports that in 2007, it spent US$457,500 on equipment for HCT and US$840,000 on supplies for HCT. SFH also reports spending US$4 million on prevention commodities.

[12] http://www.unaids.org/en/CountryResponses/Countries/nigeria.asp, http://www.undp.org/hiv/pa_africa.htm, http://www.unfpa.org/hiv/index.htm, http://www.unicef.org/nigeria/

[13] http://www.unaids.org/en/CountryResponses/Countries/nigeria.asp, http://www.undp.org/hiv/pa_africa.htm, http://www.unfpa.org/hiv/index.htm, http://www.unicef.org/nigeria/

ARFH[14]

ARFH is a not-for-profit NGO established in 1989 in response to the health and social needs of the disadvantaged groups in rural and urban communities. ARFH activities have been funded by the UNFPA, PEPFAR (HSPH/APIN, Enhanse-USAID), GF, and Clinton Foundation, among others. Its HIV-related activities related to HIV are focused on prevention and counseling and testing. In addition to operating a clinic and laboratory, ARFH activities include community mobilization, capacity building of other NGOs and CSOs, and workplace programs.

Family Health International[15]

The Global HIV/AIDS Initiative Nigeria (GHAIN) is the largest comprehensive HIV/AIDS project ever implemented in a single developing country. Begun in 2004 and funded by PEPFAR through USAID, the five-year GHAIN project is strengthening and expanding a wide range of HIV/AIDS services to support the FGN's response to the epidemic. Funded by DFID, the Strengthening Nigeria's Response to HIV/AIDS (SNR) Program aims to reduce the impact of HIV and AIDS in Nigeria by increasing the capacity of the public and private sectors and civil society organizations to respond to HIV and AIDS at the national, state, and local levels.

Civil Society Organizations

There are more than 1,300 CSOs working on HIV/AIDS in Nigeria. Most are members of one of six umbrella networks: Civil Society for HIV/AIDS in Nigeria (CiSHAN), Nigerian AIDS Research Network (NARN), Interfaith Coalition, Society for Women and AIDS in Africa, Nigerian chapter, (SWAAN), National Youth Network on HIV/AIDS (NYNETHA), Media Arts and Entertainment (MAE), and Network of People Living With HIV/AIDS in Nigeria (NEPWHAN).

2.4.2 CURRENT HUMAN RESOURCES FOR HIV/AIDS

According to a recent FHI report,[16] Nigeria has one of the largest stocks of human resources in Africa. In 2005, Nigeria had about 35,000 doctors and 210,000 nurses, 6,350 pharmacists, and 115,800 community health workers. Nigeria's medical schools produce about 2,000 doctors, 5,500 nurses, and 800 pharmacists per year. Still, only a portion of these health workers are employed in the public sector and only a portion of their time is available for HIV/AIDS care and treatment. Slightly more than half of doctors and nurses work in public sector health centers and hospitals. However, in the case of doctors, labor hours are often split between public and private sectors. Nigeria's public sector facilities lose about 2.3 percent of its doctors, 1.4 percent of nurses, 2.2 percent of pharmacists, and 1.3 percent of laboratory staff each year to attrition. National recruitment and attrition rates mask significant variability in health worker supply across zones. For example, there are an estimated seven doctors per 100,000 population in the North East zone compared with 21 doctors per 100,000 population in the South West zone. Nigerians face a wide range of health problems in addition to HIV/AIDS. Table 8 shows the projected stock of public sector health workers, 2007–2014.

Policymakers allocating resources within the health sector must consider HIV/AIDS in the context of other health priorities. To deliver new HIV/AIDS services, health workers have had to increase their effort and efficiency, and necessarily have had to reduce the delivery of services for other health problems. Accordingly, the current load on the health workforce generated by the scale-up of HIV/AIDS services has the potential to threaten access to and quality of other health services. The impact of HIV/AIDS service delivery on the availability of other health services is beyond the scope of the current analysis. However, in the analysis, the health worker resource envelope was measured in full-time

[14] http://arfh-ng.org/

[15] http://www.fhi.org/en/CountryProfiles/Nigeria/nigeriaprograms.htm

[16] Chankova S. et al. *A Situation Assessment of Human Resources in the Public Health Sector in Nigeria.* Bethesda, MD: Partners for Health Reform*plus*, Abt Associates Inc.

equivalents (FTEs), applying an assumption that only 25 percent of health worker labor hours was available for HIV/AIDS service delivery. Although this assumption is based on information from the convenient sample of health facilities that participated in the data collection, there is a significant amount of both variability and uncertainty in the estimate of the portion of health worker time available for HIV/AIDS service delivery.

In addition to the quantity of labor time required, delivering high-quality HIV/AIDS services also requires HIV-specific training. Although the production of new health workers is clearly an important factor governing the capacity of the health system to deliver HIV/AIDS services, the costs of educating health workers (pre-service training) is not included in the sustainability analysis, and the flow of new health workers is an exogenous input to the model. However, in-service training costs are included in the model as a percentage of expenditures on service delivery. In-service training is required on an ongoing basis because technologies for HIV/AIDS care are evolving rapidly and treatment standards and guidelines are frequently updated. The cost of these training programs can be viewed as a direct cost of HIV/AIDS service delivery.

TABLE 8. PROJECTED TRENDS IN THE SUPPLY OF HEALTH WORKERS IN NIGERIA, 2007-13

Health Worker Cadre	Workers	Annual Recruits	Annual Attrition Rate	Net Annual Change	Projected Number of Workers						
	2005*				**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**
Doctors and medical interns (house officers)	20,172	3,729	2.34%	5.36%	23,193	24,077	24,941	25,784	26,608	27,412	23,575
Medical interns (house officers)	2,357	2,357	100%	0%	2,357	2,357	2,357	2,357	2,357	2,357	2,178
Nurses (RNs and Midwives)	121,852	1,389	1.43%	-0.29%	120,795	120,456	120,124	119,795	119,471	119,152	102,228
Laboratory (scientists, technicians)	18,416	630	1.26%	2.16%	19,636	20,017	20,207	20,393	20,577	20,758	18,753
Pharmacy (pharmacists, techs, assistants)	12,689	451	2.16%	1.40%	13,230	13,396	13,558	13,717	13,873	14,024	12,687
Community health extension workers (J-CHEW)	59,853	1,945	1.44%	1.81%	63,162	64,198	65,219	66,225	67,216	68,194	68,194

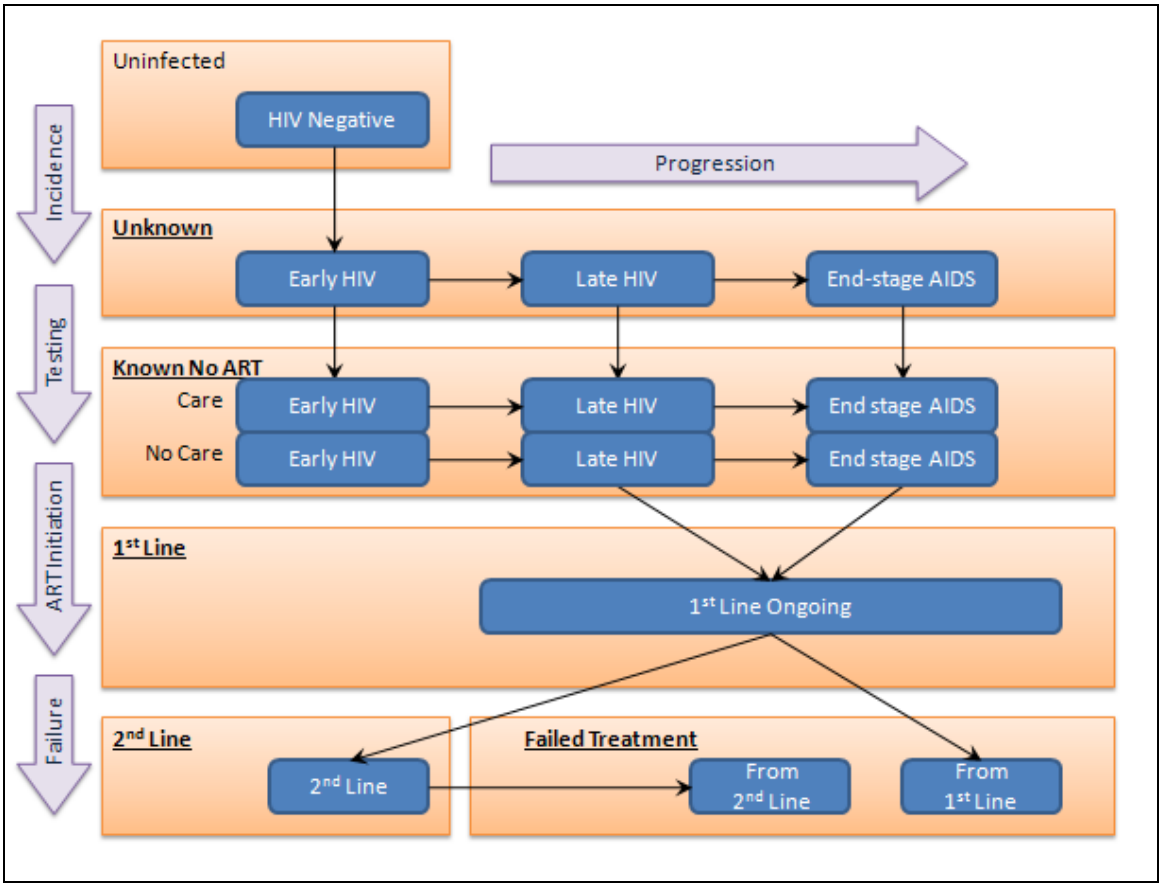
*Adapted from: Chankova S, et al. 2006. A Situation Assessment of Human Resources in the Public Health Sector in Nigeria. Bethesda, MD: Partners for Health Reformplus, Abt Associates Inc.. 2007–2013 estimates calculated by applying recruitment and attrition trends from 2005 estimates.

3. MODEL INPUTS AND ASSUMPTIONS

3.1 MODEL STRUCTURE

In the HAPSAT model, the population is distributed across several HIV-relevant health states, as shown in Figure 3. To analyze policies, a population is simulated over a five-year time horizon. During the simulation, the individuals in the population transition between health states: infections occur and progress; some individuals get tested and learn their HIV status; and known HIV cases enter care and treatment provided these services are available. These transitions are governed by model parameters. HIV incidence parameters are calibrated to match expected trends in Nigeria. Core progression and treatment effectiveness parameters are set to model defaults that can be modified to reflect country-specific situations.

FIGURE 3. HAPSAT MODEL STRUCTURE: HEALTH STATES AND POPULATION FLOWS



3.2 CALIBRATION TO EPIDEMIOLOGICAL INDICATORS

The HAPSAT model was calibrated to reflect expected HIV epidemiological trends compiled from various sources including the 2008 Antenatal Surveillance Report and UNAIDS projections. The projections in this report are based on a combination of antenatal surveillance data and population-based sampling.

To achieve reasonable calibration results that reflect recent historical trends, the model contains a two-year 'burn-in' period, which precedes the analytical time horizon. Thus, the model's time horizon begins in 2007, but the period of analysis is 2010-2014.

Table 9 compares the recent FMoH projections to the base case assumptions in the HAPSAT model. Model fitting was carried out through iterative adjustment to several model parameters including those governing progression rates from infection to ART eligibility and HIV incidence. In the base case, the average time to progress from infection to eligibility was 7.5 years, which is consistent with published estimated of HIV progression.[17]

TABLE 9. CALIBRATION TO EPIDEMIOLOGICAL TRENDS

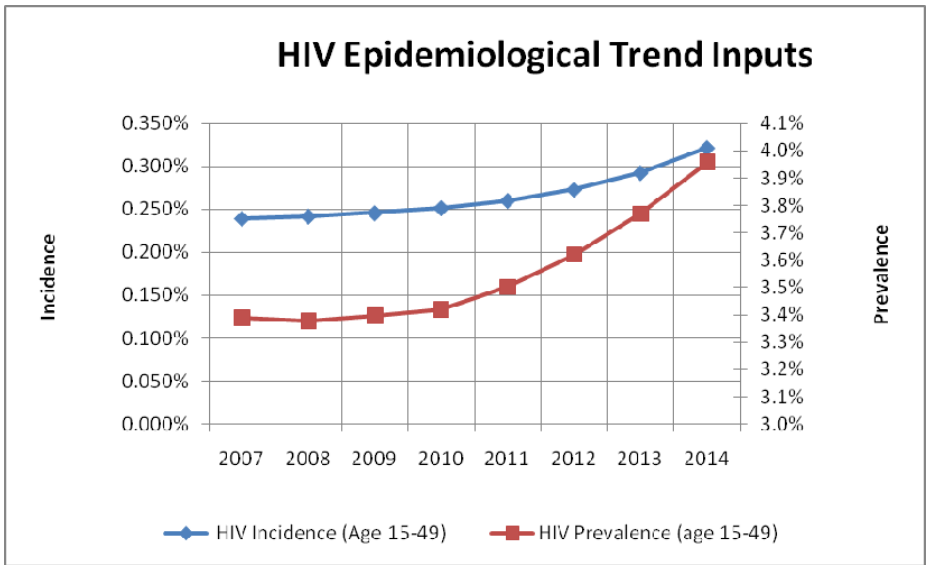
Indicator	Epidemic Projections 2008*	HAPSAT 2008 (Base case)	Epidemic Projections* 2010	HAPSAT 2010 (Base case)
Total number of PLWHA	2,952,000	2,950,205	3,132,000	3,108,151
Number AIDS deaths	280,000	297,115	276,000	319,977
Number of new infections	323,000	334,439	341,986	368,389
Number of HIV+ births	56,681	56,235	54,380	57,275
Total number with HIV eligible for ART	833,000	822,552	912,000	883,759

* From forthcoming 2008 Antenatal Surveillance Report

In the base case, HIV incidence rose over the time, from 238 per 100,000 in 2007 to 350 per 100,000 in 2013 (Figure 4). The calibration criteria prioritize, finding a good fit with historical data through 2008, so that decision-makers could be confident that HAPSAT's underlying epidemiological assumptions produce results consistent with observed short-term trends in Nigeria. Projections for 'out-years' (e.g., Year 2010 in Table 9) may reasonably differ since the model used to make projections may have different assumptions about trends in the scale-up of treatment and prevention.

[17] For example, Lutalo T, RH Gray, M Wawer N Sewankambo, et al. 2007. Survival of HIV-infected treatment-naive individuals with documented dates of seroconversion in Rakai, Uganda. *AIDS 2007* 21(suppl 6):S15–S19.

FIGURE 4. HIV INCIDENCE AND PREVALENCE TRENDS IN HAPSAT MODEL UNDER MAINTAIN SCENARIO



3.3 HIV PROGRESSION AND SURVIVAL

The model parameters governing disease progression and treatment effectiveness are shown in Table 10.

TABLE 10. HAPSAT EPIDEMIOLOGICAL MODEL PARAMETERS

Parameter	Value
Percent of births with MTC HIV transmission w/o treatment	40.0%
Percent of births with MTC HIV transmission with basic PMTCT	10.0%
Percent of births with MTC HIV transmission with enhance PMTCT	5.0%
HIV progression (% moving from not eligible to eligible) per year	12%
% of untreated HIV eligibles who die per year	25%
Average # of years before 1st line treatment fails	9
% of 1st line ART patients whose treatment fails, per year	11.1%
Average # of years before 2nd line treatment fails	8
% of 2nd line ART patients whose treatment fails, per year	12.5%
Relative risk of HIV test seeking for HIV+ asymptomatic vs. HIV-	2
Relative Risk of HIV test seeking for HIV+ symptomatic vs. HIV-	20

3.4 FINANCIAL RESOURCES

Table 11 shows the expected value of funding streams from the FGN and from major bilateral and multilateral organizations. The analysis assumes that PEPFAR (USG) would sustain funding through 2014 at the amount they obligated in 2009. PEPFAR is the largest contributor of financial resources for HIV programs. In 2007, PEPFAR supported 83 percent of ART provision. Looking forward, PEPFAR's share may increase, since previous GF grants have expired and subsequent rounds have not been awarded. The DFID Enhancing Response to HIV/AIDS (ENR) program funding has been committed for 2009 to

2013. However, UN and Gates funding are based on the assumption of the continuation of historical trends.

For the scenarios presented in this report, it is assumed that domestic revenue equal to the average of the past four years of spending will be available in the year of the time horizon. That is, we assumed the FGN would spend US$47.7 million annually on HIV/AIDS programs from 2010 to 2014. Data were not provided on state budgets for HIV/AIDS activities. No resource tracking analyses have been conducted recently in Nigeria (e.g., National Health Accounts or National AIDS Spending Assessment). It is believed that domestic revenue funds most health worker labor used to respond to HIV/AIDS; however, estimates of this expenditure were not available at the federal or state level. Therefore, in the results presented, labor costs were split out as a separate line item.

Many donor sourced funds are "earmarked" for particular programmatic areas. However, in this analysis, it was assumed that all financial resources were completely fungible across all program areas. The analysis will identify overall shortfalls, but it is possible that the analysis will fail to identify resource shortfalls within specific program areas.

TABLE 11. FUNDING SOURCES FOR HIV/AIDS PROGRAM (US$ MILLIONS)*

Financing Source	2010	2011	2012	2013	2014
FGN†	$80.5	$81.8	$83.4	$85.2	$87.0
USG	$427.0	$427.0	$427.0	$427.0	$427.0
DIFD ENR	$23.8	$23.8	$23.8	$23.8	$23.8
UN	$10.0	$10.0	$10.0	$10.0	$10.0
GF R5	$28.8	$28.8	$0.0	$0.0	$0.0
GF R8	$0.0	$11.1	$11.1	$11.1	$11.1
Gates Fnd.	$5.0	$5.0	$5.0	$5.0	$5.0
WB MAP2	$27.0	$27.0	$27.0	$27.0	$27.0
Total	**$602.1**	**$614.6**	**$587.4**	**$589.1**	**$590.9**

*PEPFAR has not been reauthorized past 2009, so estimates are based on the assumption that 2009-level funding will be maintained for the next five years.
†The FGN funding amount includes the estimated cost of human resources for health required for biomedical HIV/AIDS programs.

3.5 SERVICE DELIVERY UNIT COSTS

The unit costs for each type of service are computed using a micro-costing approach in which the unit costs of service are calculated by summing together the "ingredients" that make up that unit of service. For example, the cost of one adult patient-year of ART is made up of the cost of individual medications in a regimen, the labor costs of health workers, the cost of the laboratory tests, and overhead including in-service training and M&E. Unit costs for the clinical programmatic areas are constructed from ingredients in the following categories: drugs, laboratory, labor, training, facility or program overhead, and central-level shared costs. We were unable to collect sufficient data to apply the ingredients-based approach to costing to OVC services or prevention activities other than PMTCT and HCT. For OVC services, we populated HAPSAT with unit costs that were computed as part of the costing of the NPA for OVC. For prevention, we used the aggregated budgets in the National Prevention Plan as a baseline for cost estimation in this programmatic area.

3.5.1 DRUG COSTS

Table 12 shows the cost of ARV drugs. The cost of the drugs was based on the unit costs for individual or fixed-dose combinations in Table 10 and data collected by PEPFAR and through NNRIMS on the distribution of patients across popular regimens, shown in Figure 5 for first- and second-line regimens. The two scenarios assume the distribution of patients across first-line regimens and the distribution of

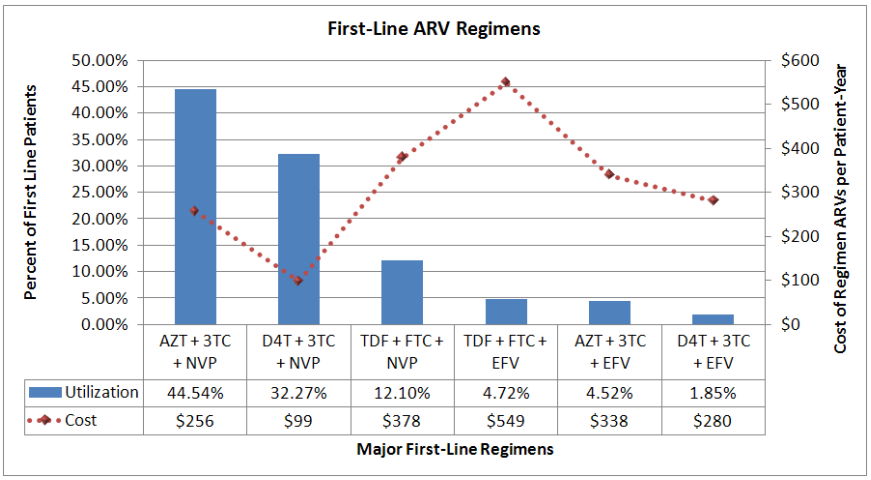
patients across second-line regimens, and ARV prices will be constant through 2013. This simplifying assumption was made for the base case because data to inform alternative assumptions were not available. However, the impact of shifting patients to different regimens and the impact of an assumed overall decline in regimen prices could be modeled with HAPSAT as sensitivity analyses.

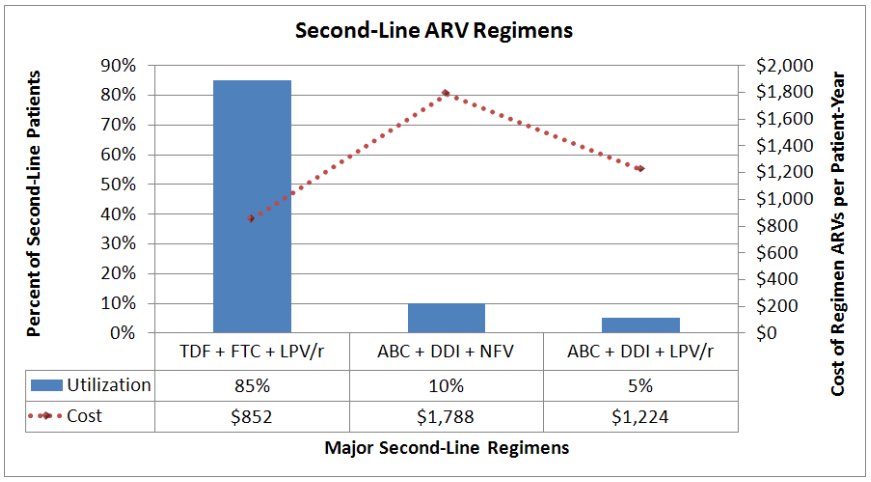
TABLE 12. COST OF ARV MEDICATIONS

Notes	Unit	Units per Day	Yearly Cost
Lamivudine 150mg	tab	2	$ 49.93
Abacavir 300mg	tab	2	$ 397.44
Stavudine 30mg	tab	2	$ 37.54
Stavudine 40mg	tab	2	$ 41.82
Lamivudine/Stavudine 150/30mg	tab	2	$ 54.75
Lamivudine/Stavudine/Nevirapine 150/30/200mg	tab	2	$ 98.77
Lamivudine/Stavudine/Nevirapine 150/40/200mg	tab	2	$ 93.68
Videx (Diadinosine) 400mg	tab	1	$ 298.91
Efavirenz 600mg	tab	1	$ 225.23
Kaletra (Lopinavir/Ritanovir)133.3/33.3mg	tab	6	$ 545.41
Aluvia (Lopinavir/Ritanovir) 200/50mg	tab	4	$ 510.79
Viracept (Nelfinavir) 250mg	tab	10	$ 1,091.76
Nevirapine 200mg	tab	2	$ 54.25
Viread (Tenofovir) 300mg	tab	1	$ 206.83
Truvada (Tenofovir / Emtricitabine) 300/200mg	tab	1	$ 324.05
Lamivudine/Zidovudine+Efavirenz 150/300 (x2) +600mg	tab	1	$ 338.48
Lamivudine/Zidovudine+Nevirapine 150/300+200mg	tab	2	$ 255.66

Source: SCMS 2007, http://www.scms.pfscm.org/scms/where/ng

FIGURE 5. ARV REGIMEN UTILIZATION AND COST: FIRST-LINE AND SECOND-LINE





The HAPSAT model includes laboratory costs for three groups of PLWHA: ART patients, pre-ART patients, non-ART patients (i.e., patients clinically eligible for, but not receiving, ART).

3.5.2 LABORATORY TEST COSTS

Table 13 lists the current assumptions regarding the average cost of a single laboratory test, exclusive of labor, laboratory machines, and overhead. This cost represents the cost of test kits, reagents, and other consumable commodities that may be used in the test.

TABLE 13. LABORATORY TEST COSTS (EXCLUDING LABOR AND CAPITAL EXPENSE)

Laboratory Costs By Test	Unit Cost
Full Blood Count*	$14.53
Combination (UC,BS,LFT)*	$78.97
CD4 Count**	$8.00
Viral Load*	$47.92
X-ray	$6.00
TB Smear*	$9.40
TB Culture*	$72.26
HIV Diagnosis Screen*	$14.53
HIV Diagnosis Confirm*	$41.36
STI-RPR*	$36.67
STI-G/C*	$28.20
OI Diagnostic- Bacterial Infection*	$18.80
Creatinine*	$10.26
Glucose*	$7.70
ALT*	$7.70
Liver Function Test*	$47.01
Hemoglobin*	$7.70
White Blood Cell*	$12.82
PCR Pediatric Diagnosis*	$27.78
Cholesterol*	$9.80
Triglycerides*	$14.50
Urine Protein*	$7.70

*The stated costs are based on the following:

1. 10% addition to cover the lab hidden costs (supplies accessories, and health and safety)

2. The conversion rate is based on $1 = 117 Naira

**PEPFAR reported $47/per test for CD4 count, but other data sources indicated a lower cost. $8 was assumed for the unit cost of a CD4 test.

The operating and maintenance cost of laboratory equipment and space is also of interest. Currently, these costs are captured in a broad assumption of a 20 percent markup of the lab test costs. The capital cost of laboratory equipment is currently omitted from the marginal economic cost analyses. In data collection, we sought information from laboratory facilities regarding the list of machines and equipment in the lab, but this was generally not available.

The labor costs for laboratory are based on the average annual salaries shown in Table 14 (next section). We assume that for one ART patient-year of care, two hours of laboratory labor is used. This corresponds to 30 minutes per patient visit to process any lab tests ordered during the clinic visit (four visits per year are assumed to involve lab orders). Two-thirds of that time is assumed to be spent by laboratory technicians and technologist, and one-third of that time is spent by laboratory scientists.

3.5.3 HEALTH WORKER LABOR COSTS

The cost of health worker labor is based on average wage rates. Nigeria's public sector health workers are paid according to a standard pay scale for government workers based on their profession and years of experience. Each state and the FCT have their own scale, and the variation in pay across states for the same level of the scale can vary as much as two-fold. The FCT and Lagos state have substantially higher wage rates than more rural states. In addition, many health workers receive additional supplements for taking on extra duties. In some health facilities, health workers are paid supplements by NGOs, although this practice is discouraged by the FMoH on equity grounds. For this analysis, we assumed all public sector health workers of a given cadre in Nigeria are paid the same rate, shown in Table 14. The amount of labor spent delivering services in the clinical program areas is shown in Table

15. These costs were assumed to rise by 4 percent per year (inflation adjusted) over the time horizon analyzed.

TABLE 14. HEALTH WORKER COSTS

Health Worker Cadre	Annual Salary
Doctors	$ 15,339
Medical interns (house officers)	$ 7,096
Registered nurse	$ 6,743
Nurse-midwives / midwives	$ 5,395
Laboratory scientists	$ 10,383
Laboratory technicians/technologists/radiographers	$ 3,426
Pharmacists	$ 10,915
Pharmacy technicians and assistants	$ 5,165
Administrators	$ 6,104
Medical record officer (Data managers)	$ 6,548
Public health (nursing) officers	$ 6,104
Environmental health officers	$ 6,548
Community health officers	$ 6,104
Community health extension workers (J-CHEW)	$ 3,496

TABLE 15. LABOR COSTS BY CADRE FOR EACH CLINICAL PROGRAM AREA

	Hours of Labor per Unit of Service					
Program Area	**ART**	**PMTCT**	**VCT**	**TB/HIV**	**Pre-ART Care**	**Palliative Care**
Unit of Service	**Patient-Year**	**Treated Pregnancy**	**Person Tested**	**DOTS Patient**	**Patient-Year**	**Patient-Year**
Doctors	2.25	-	-	1.00	0.75	0.75
Medical interns (house officers)	0.75	-	-	-	-	-
Registered nurse	0.63	0.79	0.21	1.90	0.47	0.95
Nurse-midwives	1.37	1.71	0.46	4.10	1.03	2.05
Laboratory scientists	0.60	0.75	0.20	1.79	0.45	0.90
Laboratory and radiographers	1.34	0.34	0.17	2.01	0.67	0.34
Pharmacists	0.62	0.15	0.08	0.93	0.31	0.15
Pharmacy technicians and assistants	1.34	0.34	0.17	2.01	0.67	0.34
Community health workers	-	-	-	12.00	3.00	3.00
Total cost per unit of service	$ 55.01	$ 13.07	$ 3.83	$81.60	$25.19	$28.24

3.5.4 OVERHEAD AND OTHER SHARED COSTS

A significant amount of HIV/AIDS financing is used to support capacity building, infrastructure, program management, and other shared costs. A current National AIDS Spending Assessment in Nigeria promises better quantification of expenditures in these areas. For the HAPSAT analyses presented in this report, we assumed that the costs of direct service provision were marked up by the overhead rates shown in Table 16. Facility overhead is assumed to account for amortized capital cost and recurrent costs associated with physical facilities (hospitals, health clinics, offices, etc.). Central-level overhead accounts for the centralized high-level program management including the operating costs of

NACA, SACAs, and NASCP. We additionally include a markup of drugs and other commodities to account for supply chain costs for procuring storing and transporting these commodities. The training cost could have been included in particular programmatic area costs. But information was not available to produce a detailed accounting of the training needs in each programmatic area over the next five years. Therefore, we marked up all direct costs by 5 percent to account for training generally. Finally, we included a 'Partner and Donor' overhead to account for the additional cost of delivering services that these organizations incur. This markup was applied only to the fraction of services delivered by donors and their implementing partners (e.g., PEPFAR funds allocated to FHI). The markup was not applied to donor grants to indigenous organizations (e.g., GF grant to NACA).

TABLE 16. OVERHEAD AND SHARED COSTS

Category	Markup
Facility overhead	10%
Central-level overhead	10%
Supply chain logistics (markup of drugs and commodities only)	15%
Training	5%
Partner and donor overhead (markup of services provided directly by donors or their implementing partners)	25%

3.6 POLICY SCENARIOS

Three scenarios for HIV/AIDS response are modeled:

(1) Maintain: maintaining current level of response

(2) Scale-up: scaling-up according to current national strategic plans

(3) Universal: scaling up to universal ART coverage

For each scenario, policy goals are represented in the model as target levels of service delivery. Policy goals are specified as proportions (e.g., "percentage of known ART-eligible PLWHA receiving treatment") in order to accommodate the interaction of various components of the HIV/AIDS response. Changes in the intensity of one service can impact the output of another. For example, if there were no resources allocated to HCT, it might be difficult to meet targets for ART, since the number of PLWHA who were known positive and seeking care would be lower. Similarly, scaling up ART might reduce the demand for some elements of care and support such as treatment of OIs. Likewise, over the medium term, effective prevention activities may reduce HIV incidence and the corresponding demand for treatment, care and support, and mitigation. Policy goals stated as absolute goals in source documents (e.g., 300,000 persons on ART) were converted to equivalent "proportion" parameters through a manual iterative calibration exercise.[18]

Maintain Policy

The maintain scenario assumed a constant level of 300,000 patients on ART, 1.5 million HIV tests, and 32,000 PMTCT treated each year. It was further assumed that all ART patients will move to second-line therapy after they fail first-line therapy, and that 10 percent of known HIV cases not on ART will receive clinical care and support. Pre-ART care and support included OI prophylaxis and lab monitoring. Care and support for HIV cases that were ART-eligible, but that were not receiving ART because of lack of access, included OI prophylaxis and treatment, and palliative care. It was assumed that approximately 35,000 TB-HIV cases would be detected per year and would receive DOTS.

[18] More precise calibration could be achieved using formal optimization methods (e.g., linear programming), but project resources were not sufficient to support this refinement.

Good data on current coverage and cost of OVC services were difficult to find. Table 16 shows a summary of the projected cost of implementing the NPA-OVC. This costing was performed as part of the NPA-OVC, but detail on the costing methodology was not available. Moreover, the level of implementation achieved is unknown. The NPA-OVC covered the period 2006-2010. A significant portion of the plan involved formative activities such as a review of the national Child Rights Act, guideline and information, education and communication (IEC) material development, and various trainings, which do not involve direct service provision and which may not recur annually or scale linearly as OVC services are expanded. The unit costs of direct service provision for OVC assumed in the NPA-OVC are shown in Table 17.

TABLE 17. SUMMARY OF NPA-OVC COSTING*

OVC Activity	Unit Cost	2006	2007	2008	2009	2010
Education						
Identification	$6.57	426,633	613,964	808,097	1,004,219	1,201,372
Pre-primary education; per OVC per year	$117.93	11,533	11,497	11,420	11,278	11,102
Primary education; per OVC per year	$89.14	228,856	350,685	475,729	600,805	724,775
Secondary education; per OVC per year	$278.57	60,264	101,450	145,095	190,247	236,502
Vocational education; per OVC	$214.50	43,510	45,074	55,870	76,441	97,572
Health						
National Health Insurance Scheme	$27.86	136,485	232,846	332,513	433,182	485,424
Ped ART + cotrimoxazole*	$652.79	5,075	10,117	15,074	19,849	24,425
Other cotrimoxazole*	$42.71	94,379	191,358	289,638	386,682	481,352
Adult ART for 10-18 yr olds*	$752.14	6,925	14,287	22,036	30,012	45,765
OI treatment*	$57.57	15,013	51,226	104,504	211,778	266,983
Shelter						
Housing repair	$1,785.64	-	3,900	3,900	3,900	3,900
Food & Clothing						
Nutritional support	$185.71	26,000	78,000	130,500	130,500	78,000
Nutritional gardening program; per household	$52.93	22,748	46,569	95,004	144,394	194,170
Clothing 2 pairs per year; per OVC per year	$21.36	90,990	232,846	332,513	433,182	485,424
Sandals	$14.86	45,495	232,846	332,513	433,182	485,424
Blankets/ Bedding	$13.93	12,796	43,659	44,533	45,123	45,509
Economic Strengthening						
Income-generating activities	$413.21	24,656	42,069	60,526	79,626	117,086
Business grant; per out-of-school OVC or OVC caregiver	$371.43	26,106	45,074	65,182	76,441	117,086

Totals						
OVC activities		$83,203,151	$148,149,674	$208,844,330	$259,403,987	$315,961,165
Biomedical HIV-related		$13,416,692	$28,473,395	$44,802,691	$64,239,871	$86,297,254
Non-direct activities (trainings, development, M&E)		$25,864,021 (19.9%)	$33,446,248 (15.0%)	$36,378,127 (11.8%)	$32,631,885 (8.6%)	$51,459,378 (10.6%)
Grand Total		$129,916,159	$223,655,707	$309,536,458	$381,171,425	$484,660,752
HIV/AIDS OVC Fraction of OVC		19.9%	15.0%	11.8%	8.6%	10.6%
Resource Needs for HIV/AIDS OVC		$22,987,530	$28,860,699	$30,707,680	$26,709,302	$41,591,851

*PMTCT and pediatric ART and HIV care were omitted since they are costed elsewhere in HAPSAT; adjusted to reflect an exchange rate of 140 Naira per US$

OVC service delivery is not organized purely as an HIV/AIDS programmatic area. The sectors and organizations involved in coordinating and delivering OVC services are not all HIV-focused. Moreover, financial resource envelope for OVC services includes sources that are not exclusive to HIV. Therefore, in the HAPSAT analysis, which is principally concerned with allocation of resources across HIV/AIDS programmatic area, it was necessary to consider only a portion of the total OVC services. The portion was determined by calculating the proportion of estimated AIDS OVC as a fraction of all OVC (~14 percent).

Another challenge in quantifying OVC service coverage is that there are no definitive measures of need in each service area, and no information regarding the number of different OVC services (shelter, education, psychosocial, etc.) that each OVC receives.

For the maintain scenario, we made the simplifying assumption that about14 percent (number of AIDS orphans divided by all OVC) of the budgeted amount for year 2006 in the NPA-OVC, minus the biomedical interventions (to avoid double counting), would be maintained in each year 2010-2014. The year 2006 was selected because the volume of OVC services currently being delivered is not known precisely, but key informants indicated that the scale-up projected in the NPA-OVC has not occurred.

Current prevention activities were also difficult to quantify. We assumed the annualized budget amount from the National Prevention Plan, minus the cost of biomedical prevention interventions, (US$180 million) would be maintained for each year 2010 to 2014 (Table 18).

TABLE 18. SUMMARY OF THE NATIONAL PREVENTION PLAN COSTING *

Prevention Plan Costing	Naira	US$	Per Year
Abstinence & Be Faithful (AB)	1,085,050,000	$7,750,357	$3,875,178.57
Condoms	445,000,000	$3,178,571	$1,589,286
Medical transmission	1,347,800,000	$9,627,143	$4,813,571
Research	600,000,000	$4,285,714	$2,142,857
STI management	46,616,617,000	$332,975,836	$166,487,918
New prevention tech / Male circumcision	172,000,000	$1,228,571	$614,286
Total	**50,266,467,000**	**$359,046,193**	**$179,523,096**

*PMTCT and HCT were omitted since they are costed elsewhere in HAPSAT; Exchange Rate US$1 = 140 Naira

Scale-up Policy

The scale-up scenario models the scale-up of services according to established strategic plans. Various national planning documents were used as the source for construction the scale-up scenario. The NNRIMS Operational Plan includes specification of program goals through 2010 (Table 19). In addition, there is a NPA for OVC (Table 17), and a set of scale-up targets set forth in the GF Round 8 application (Table 20). However, it is important to note that the scale-up targets in the GF Round 8 application were based a Round 8 award that was several times larger than the actual awarded amount.

TABLE 19. PROGRAM TARGETS FROM NNRIMS OPERATIONAL PLAN 2007-2010.

Activity		2008	2009	2010
PMTCT Targets				
Outcome	HIV-infected newborns per 100 live births to HIV-infected mothers	30	25	22.5
Outcome	Number (and percent) of known HIV+ pregnancies PMTCT treated with complete course	34,250 (20)	48,500 (40)	55,800 (50)
Output	Number women tested with results	640,000	900,000	1,040,000
Output	Number of PMTCT facilities	517	854	1293
Prevention				
Target	Percent of schools with teachers trained in life skills based HIV/AIDS education who taught it in past year	40	60	80
Target	Number of male condoms distributed through social marketing	212M	233M	256M
VCT Targets				
Outcome	Percent of individuals ever received HCT and got result	20	26	31
Outcome	Percent of MARPs received HCT and got result in past 12 months	33	37	41
Output	Number of people tested with results (cumulative)	1.0M	1.4M	1.6M
Output	Number of HCT outlets	1584	2614	3960
ART Targets				
Outcome	Patient volume: Percent of people with advance HIV infection receiving ART	40	60	85
Outcome	Geographical coverage: Percent of LGA with >0 health facilities providing ART	30	50	76
Output	Current number enrolled	187,000	308,600	467,500
Output	Number of SDPs giving ART	250	300	387
Palliative Care				
Output	Number of HIV receiving HBC	7,500	10,500	13,500
Output	Number of HIV receiving TB treatment	19,300	27,300	31,500
Output	Number of HIV receiving cotrimoxazole	134,500	216200	309,500
OVC				
Outcome	Percent of AIDS OVC households receiving free basic external support (In 2005, denominator was 1,300,000 households – 15% of all orphans)	10	15	20
Outcome	Geographical coverage: Percent of LGA with >0 health facilities providing ART	30	50	76
Output	Number of AIDS OVC whose households receive free basic external support	70,000	80,000	100,000

Source: NACA, NNRIMS Operational Plan 2007-2010

TABLE 20. NEEDS BY HIV PROGRAM AREA REPORTED IN GF ROUND 8 APPLICATION

PMTCT	2009	2010	2011	2012	2013
PMTCT: HIV Screening of pregnant women	1,776,000	2,220,000	2,664,000	3,108,000	3,552,000
Met by non-GF	270,107	270,107	270,107	270,107	270,107
Service gap	1,505,893	1,949,893	2,393,893	2,837,893	3,281,893
GF R8	75,000	390,000	690,000	1,332,000	1,332,000
HCT	**2009**	**2010**	**2011**	**2012**	**2013**
HCT: Testing of adults	15,000,000	18,000,000	18,000,000	18,000,000	18,000,000
Met by non-GF	2,000,000	2,500,000	3,000,000	3,500,000	4,000,000
Service gap	13,000,000	15,500,000	15,000,000	14,500,000	14,000,000
GF R8	307,200	1,286,400	2,126,400	4,634,400	4,634,400
ART	**2009**	**2010**	**2011**	**2012**	**2013**
ART: Persons on treament (all ages)	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000
Met by non-GF	320,000	417,460	497,709	431,061	433,269
Service gap	680,000	582,540	502,291	568,939	566,731
GF R8	203,524	282,160	362,409	436,361	438,569
BCC	**2009**	**2010**	**2011**	**2012**	**2013**
BCC: Family Life Education to Students	3,364,800	3,533,200	3,710,000	3,895,400	4,071,000
Met by non-GF	1,450,000	1,600,000	1,780,000	1,850,000	2,200,000
Service gap	1,914,800	1,933,200	1,930,000	2,045,400	1,871,000
GF R8	300,000	480,000	600,000	840,000	0
OVC	**2009**	**2010**	**2011**	**2012**	**2013**
OVC: CSS to OVC	1,134,717	1,134,717	1,134,717	1,134,717	1,134,717
Met by non-GF	118,000	142,000	166,000	166,000	166,000
Service gap	1,016,717	992,717	968,717	968,717	968,717
GF R8	1,250	3,250	5,750	925	925

The scale-up scenario assumes that the HCT testing volume will be maintained at 1.5 million tests per year and that 80 percent of all new cases found will be put on treatment. This policy reaches 530,000 on ART by 2014. PMTCT was scaled up by 10 percent per year to reach 355,000 pregnancies tested and 109,000 HIV-positive pregnancies treated in 2014. We also assumed that all first-line treatment failures would have access to second-line ART. Second-line represented about 23 percent of the total ART population by 2014. We assumed that pre-ART services and care and support for those eligible for, but not receiving, ART would scale up in proportion to the scale-up of ART. HBC remained at 10 percent of all known HIV cases as in the maintain scenario. The scale-up of non-PMTCT prevention activities in Table 18 was assumed to increase by 10 percent per year. The scale-up of OVC services was assumed to follow the trends in the NPA-OVC, but shifted four years. In other words, in the maintain scenario, we assumed OVC services were maintained at the level projected for 2006 in the NPA-OVC. In the scale-up scenario, we assume the scale-up from 1 percent of OVC coverage to 10 percent OVC coverage projected for 2006-2010 will occur over the period 2010-2014.

Universal Policy

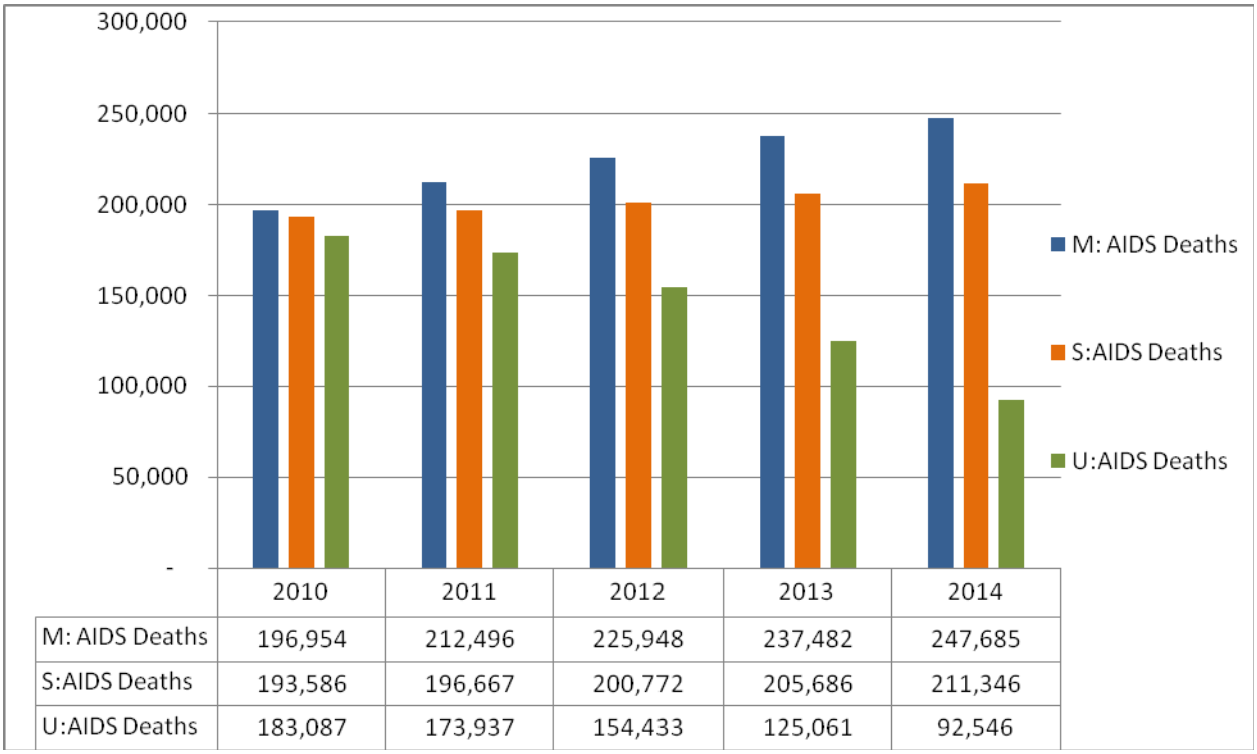
The universal scale-up policy is more aggressive. ART, PMTCT, and biomedical care and support were scaled up faster so that universal coverage, defined as 80 percent coverage of estimated need, was achieved in 2010. We assumed that scale-up would be governed by a constant rate of increase over the time horizon. PMTCT testing was increased from 2010 levels by 225 percent per year, reaching 98 percent of all pregnancies of unknown HIV-status being HIV tested. As before, we also assumed that all first-line treatment failures would have access to second-line ART. And, we assumed that pre-ART services and care and support for those eligible for, but not receiving, ART would scale up in proportion to the scale-up of ART. To achieve 80 percent ART coverage (number on ART divided by number of ART-eligible), it was necessary to assume that the annual treatment dropout rate could be reduced from 10 percent to 3 percent and that HIV testing would nearly double each year, reaching 19.5 million tested per year in 2014. By 2014, 1.2 million people were on ART. We did not attempt to model a scenario of universal coverage of OVC services or prevention activities (with the exception of PMTCT) because data were not available on need for these services and metrics for universal coverage in these areas were not clearly defined.

4. RESULTS

4.1 KEY PROGRAM IMPACTS

Figure 6 shows the projected number of AIDS deaths occurring under each policy scenario. Compared with maintaining current services levels, the scale-up scenario would reduce cumulative AIDS deaths over the five-year period by 113,000 and reaching universal coverage of biomedical services is expected to reduce cumulative AIDS deaths by 391,000. These estimated may be biased upward because the effect of prevention programs (other than PMTCT), ART, and CSS on HIV incidence is not explicitly modeled.

FIGURE 6. AIDS DEATHS*

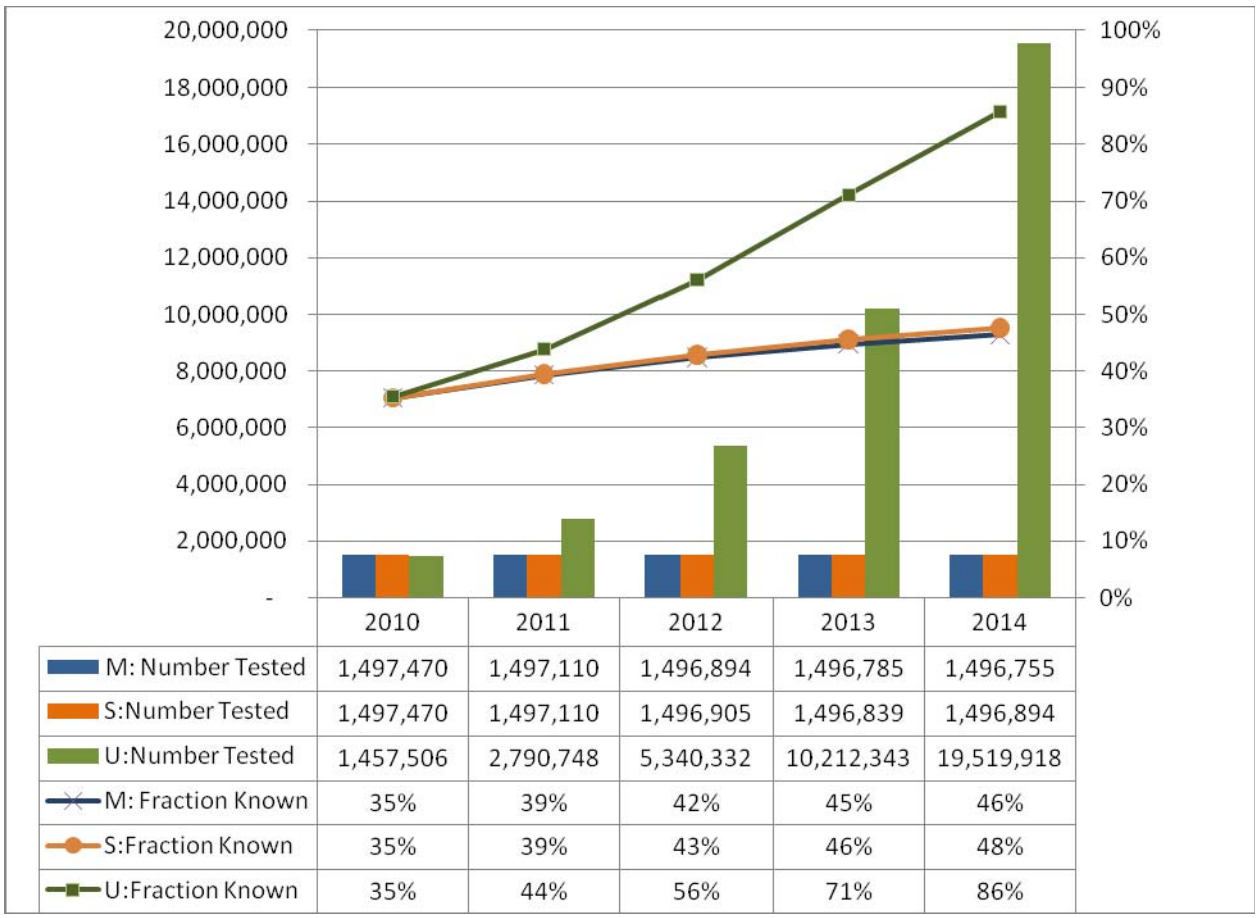


	2010	2011	2012	2013	2014
M: AIDS Deaths	196,954	212,496	225,948	237,482	247,685
S:AIDS Deaths	193,586	196,667	200,772	205,686	211,346
U:AIDS Deaths	183,087	173,937	154,433	125,061	92,546

Note: M=maintain; S=scale-up; U=universal

Figure 7 shows HCT under the three policy scenarios. The maintain and scale-up scenarios have HCT programs of the same size, testing about 1.5 million per year, and detecting about 170,000 cases per year. The scenarios differ in how the detected cases are handled. Under the maintain scenario, treatment capacity is limited to 300,000, so many newly detected eligible cases are not put on ART. In the scale-up scenario, 80 percent of all detected eligible cases are put on ART. In the universal scenario, HCT must be scaled up in order to find a sufficient number of ART-eligible cases to meet the target of treating 80 percent of all cases in need (including both detected and undetected clinically eligible cases).

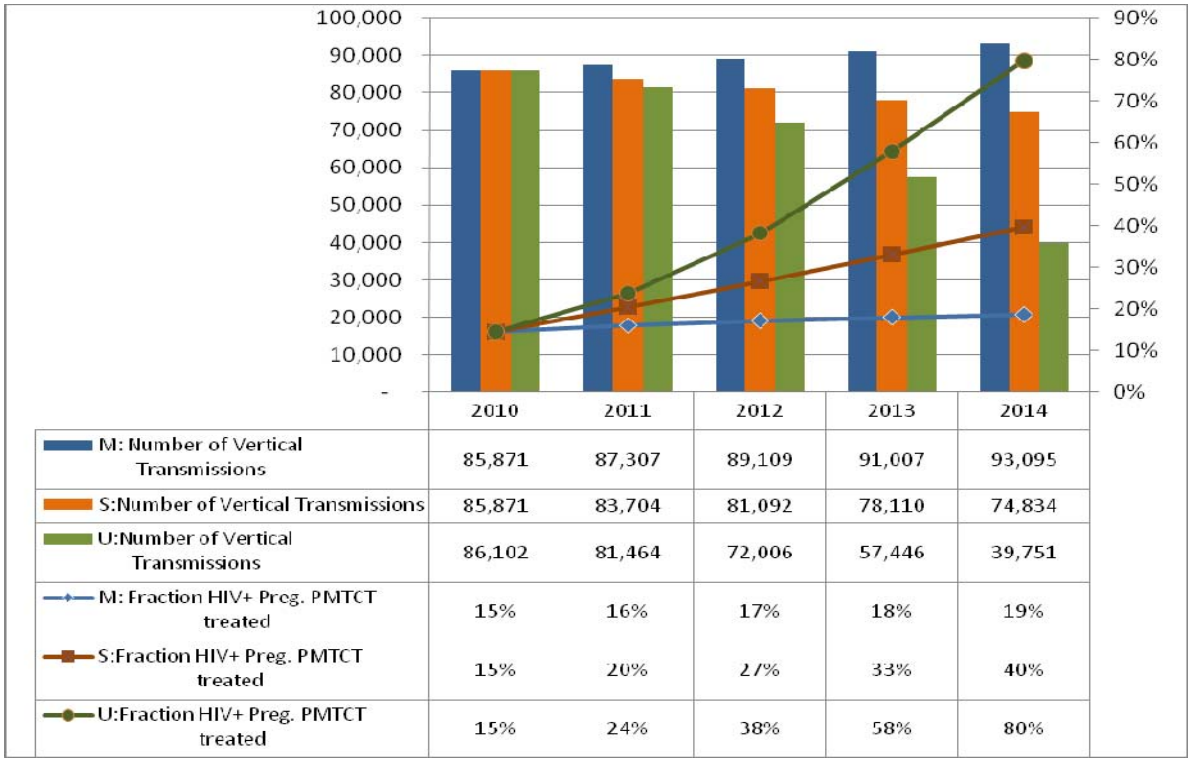
FIGURE 7. HCT IMPACT



	2010	2011	2012	2013	2014
M: Number Tested	1,497,470	1,497,110	1,496,894	1,496,785	1,496,755
S:Number Tested	1,497,470	1,497,110	1,496,905	1,496,839	1,496,894
U:Number Tested	1,457,506	2,790,748	5,340,332	10,212,343	19,519,918
M: Fraction Known	35%	39%	42%	45%	46%
S:Fraction Known	35%	39%	43%	46%	48%
U:Fraction Known	35%	44%	56%	71%	86%

Figure 8 shows the PMTCT impact under the three policy scenarios. Under the maintain scenario, there are about 85,000 vertical transmissions per year. Under the scale-up scenario, 42,000 of these vertical transmissions are averted over five years. In the universal access scenario, by 2014, 80 percent of HIV-positive pregnancies are PMTCT treated, but this requires high levels of HIV testing among pregnant women, as well as high acceptance of treatment. Under the universal scenario which reaches 80 percent coverage of PMTCT by 2014, an additional 67,000 vertical transmissions are averted compared to the current level of PMTCT in Nigeria.

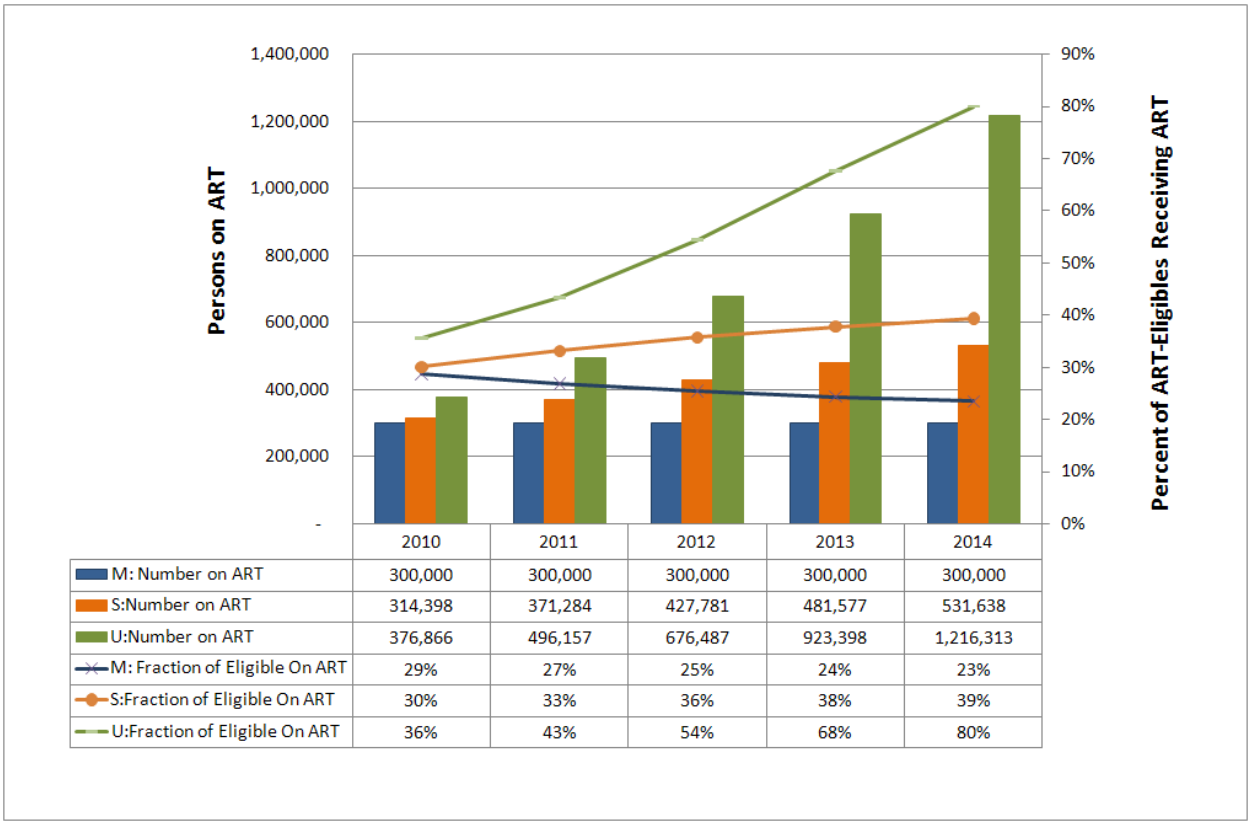
FIGURE 8. PMTCT IMPACT



	2010	2011	2012	2013	2014
M: Number of Vertical Transmissions	85,871	87,307	89,109	91,007	93,095
S:Number of Vertical Transmissions	85,871	83,704	81,092	78,110	74,834
U:Number of Vertical Transmissions	86,102	81,464	72,006	57,446	39,751
M: Fraction HIV+ Preg. PMTCT treated	15%	16%	17%	18%	19%
S:Fraction HIV+ Preg. PMTCT treated	15%	20%	27%	33%	40%
U:Fraction HIV+ Preg. PMTCT treated	15%	24%	38%	58%	80%

Figure 9 shows the HIV-infected population under the three policy scenarios. In the maintain scenario, slightly more than half of the ART-eligible population known their status, almost 30 percent are receiving ART in 2010. However, the fraction covered declines over time because the number on treatment is fixed at 300,000 while the pool of eligibles grows. In the scale-up scenario, it is observed that if testing volumes were unchanged from the maintain scenario, but 80 percent of the detected eligibles were put on treatment, ART coverage would reach 39 percent by 2014. The universal access scenario increases the numbers on ART even further to reach the 80 percent target, with 1.2 million on treatment by 2014.

FIGURE 9. ART ELIGIBILITY AND COVERAGE



	2010	2011	2012	2013	2014
M: Number on ART	300,000	300,000	300,000	300,000	300,000
S:Number on ART	314,398	371,284	427,781	481,577	531,638
U:Number on ART	376,866	496,157	676,487	923,398	1,216,313
M: Fraction of Eligible On ART	29%	27%	25%	24%	23%
S:Fraction of Eligible On ART	30%	33%	36%	38%	39%
U:Fraction of Eligible On ART	36%	43%	54%	68%	80%

4.2 FINANCIAL REQUIREMENTS

The total costs of the maintain policy scenario are shown in Figure 10 (with detailed breakdown in Table 21). The total costs of the scale-up policy scenario are shown in Figure 11 (detailed breakdown in Table 22). The total costs of the universal access policy scenario are shown in Figure 12 (detailed breakdown in Table 23).

Given the expected financing for the HIV program, sustaining the service levels in the maintain scenario will require US$533 in 2010 and increase to US$627 million per year (as more patients move to second-line regimens. There is a resource shortfall of about US$75 million for years 2012-2014 combined. No resource shortfall is projected for 2010 and 2011. However, there is considerable uncertainty in the financial projections since (1) they are based on assumptions about the size of PEPFAR's commitment and the availability of domestic resources for HIV in future years, (2) new funding streams may arise that were not foreseen in this analysis, (3) the resource envelope projected in this analysis may involve considerable earmarks for activities that are not direct service provision (e.g., trainings, publications, meetings, overheads, etc.).

Policymakers can use HAPSAT sub-analyses to explore policy options and estimate the impact of efficiency gains (e.g., task shifting, reductions in drug prices) in order to close the resource gap. If the resource envelope cannot be expanded, policymakers may have to consider a reallocation across programs to meet priorities under these constraints and explore policies for rationing services.

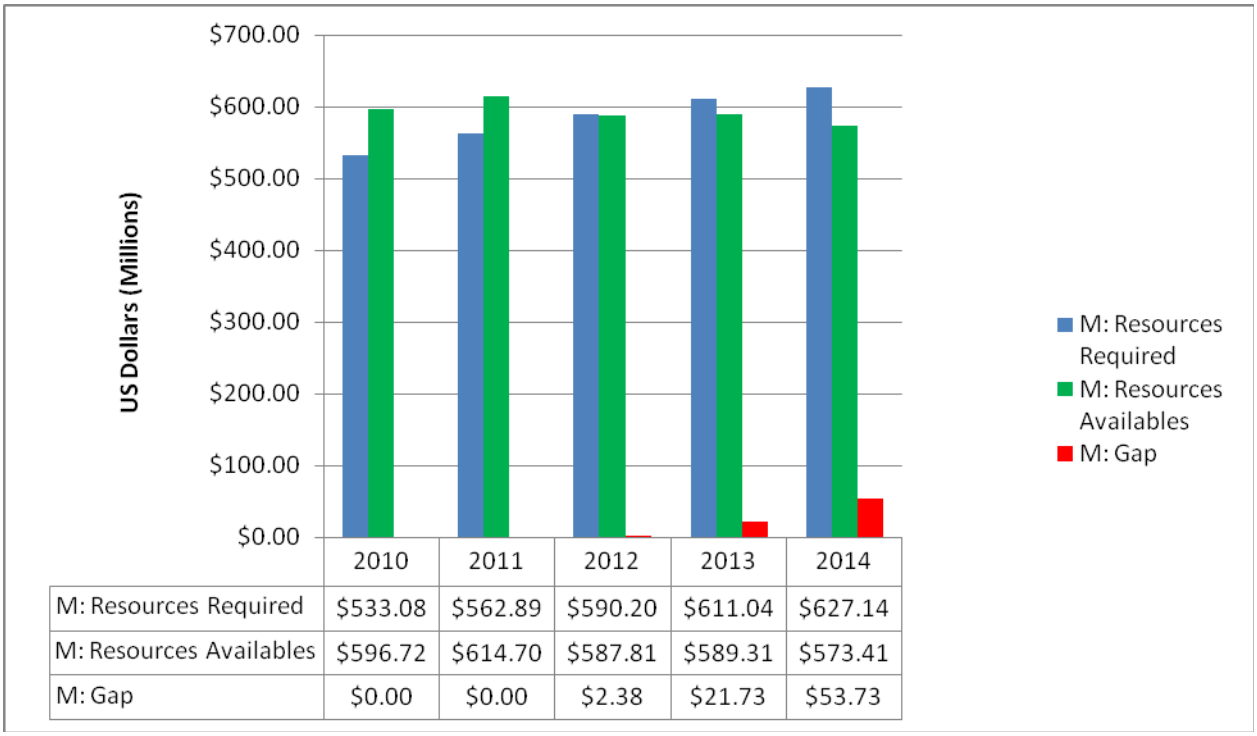
The scale-up scenario shows that dramatic increases in financial resources would be required to achieve continued scale-up of Nigeria's HIV response. The financial gap over five years is over US$1 billion. The

universal coverage scenario demonstrates further the significant gap in resources that remains despite sizable donor involvement in Nigeria. It is estimated that Nigeria would need an additional US$3.5 billion over five years to reach all the targets in the universal policy scenario including 80 percent on ART and 80 percent of PMTCT need met. This gap would be even greater if the cost of scaling up OVC and non-PMTCT prevention activities to universal levels had been included.

TABLE 21. FINANCIAL RESOURCES REQUIRED TO ACHIEVE POLICY GOALS OF THE MAINTAIN SCENARIO (US$ MILLIONS)

Maintain Scenario	2010	2011	2012	2013	2014
Prevention					
M: PMTCT	$5.0	$5.4	$5.7	$6.0	$6.2
M: HCT	$16.8	$16.8	$16.9	$16.9	$16.9
M: Other prevention	$180.0	$180.0	$180.0	$180.0	$180.0
Treatment					
M: ART	$237.9	$256.3	$272.9	$285.1	$293.7
M: CSS - Pre-ART	$12.0	$13.5	$14.8	$15.8	$16.7
Care					
M: CSS - Non-ART	$54.0	$62.7	$70.5	$76.9	$82.3
M: CSS - TB-HIV	$10.7	$11.2	$11.9	$12.6	$13.3
Mitigation					
M: OVC	$16.7	$17.1	$17.4	$17.8	$18.2
M: Grand Total	**$533.1**	**$562.9**	**$590.2**	**$611.0**	**$627.1**
M: Resources available	596.7	614.7	587.8	589.3	573.4
M: Gap	0.0	0.0	2.4	21.7	53.7

FIGURE 10. FINANCIAL RESOURCES REQUIRED AND EXPECTED ANNUAL FUNDING GAPS FOR MAINTAIN SCENARIO

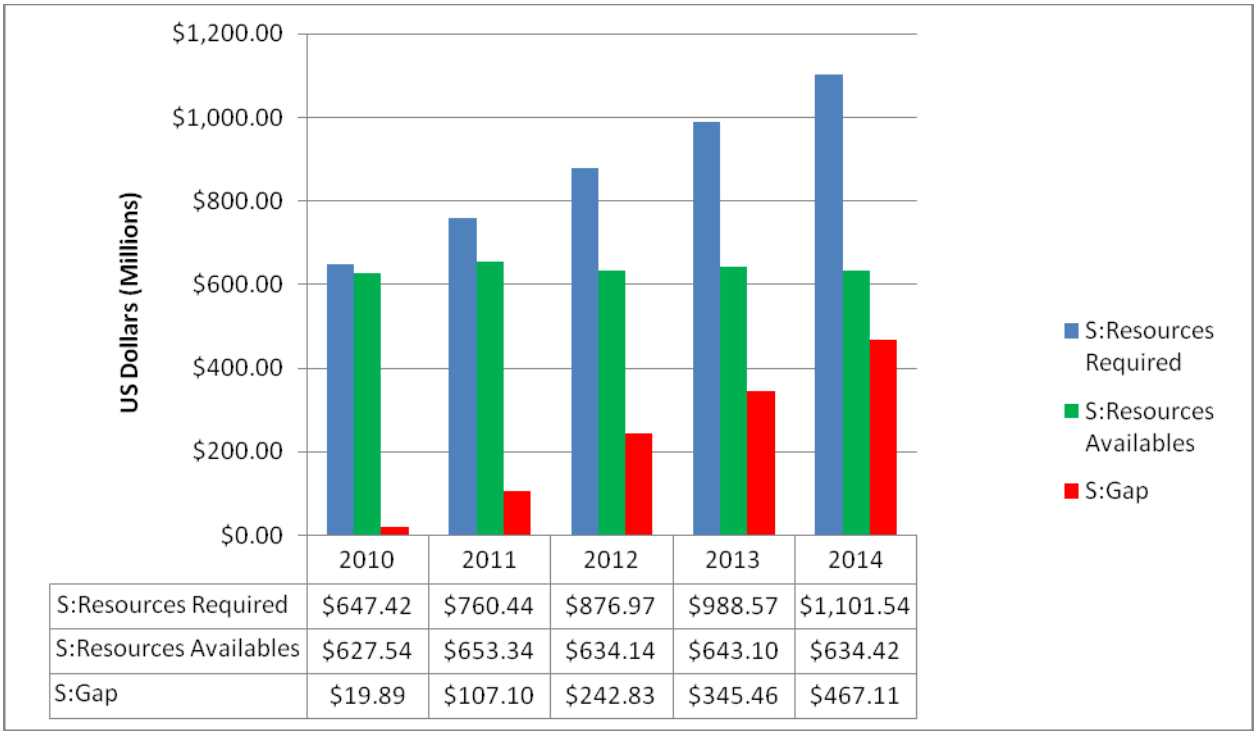


	2010	2011	2012	2013	2014
M: Resources Required	$533.08	$562.89	$590.20	$611.04	$627.14
M: Resources Availables	$596.72	$614.70	$587.81	$589.31	$573.41
M: Gap	$0.00	$0.00	$2.38	$21.73	$53.73

TABLE 22. FINANCIAL RESOURCES REQUIRED TO ACHIEVE POLICY GOALS OF THE SCALE-UP SCENARIO (US$ MILLIONS)

Scale-up Scenario	2010	2011	2012	2013	2014
Prevention					
S:PMTCT	$5.0	$6.4	$8.0	$9.7	$11.6
S:HCT	$16.7	$16.7	$16.7	$16.7	$16.7
S:Other prevention	$180.0	$198.0	$217.8	$239.6	$263.5
Treatment					
S:ART	$246.1	$303.3	$363.9	$422.6	$477.8
S:CSS - Pre-ART	$95.5	$106.6	$116.2	$123.3	$128.7
Care					
S:CSS - Non-ART	$76.9	$88.9	$101.1	$112.2	$122.5
S:CSS - TB-HIV	$10.6	$11.2	$11.8	$12.4	$13.1
Mitigation					
S:OVC	$16.7	$29.4	$41.5	$52.2	$67.8
S:Grand Total	$647.4	$760.4	$877.0	$988.6	$1,101.5
S:Resources available	627.5	653.3	634.1	643.1	634.4
S:Gap	19.9	107.1	242.8	345.5	467.1

FIGURE 11. FINANCIAL RESOURCES REQUIRED AND EXPECTED ANNUAL FUNDING GAPS FOR SCALE-UP SCENARIO

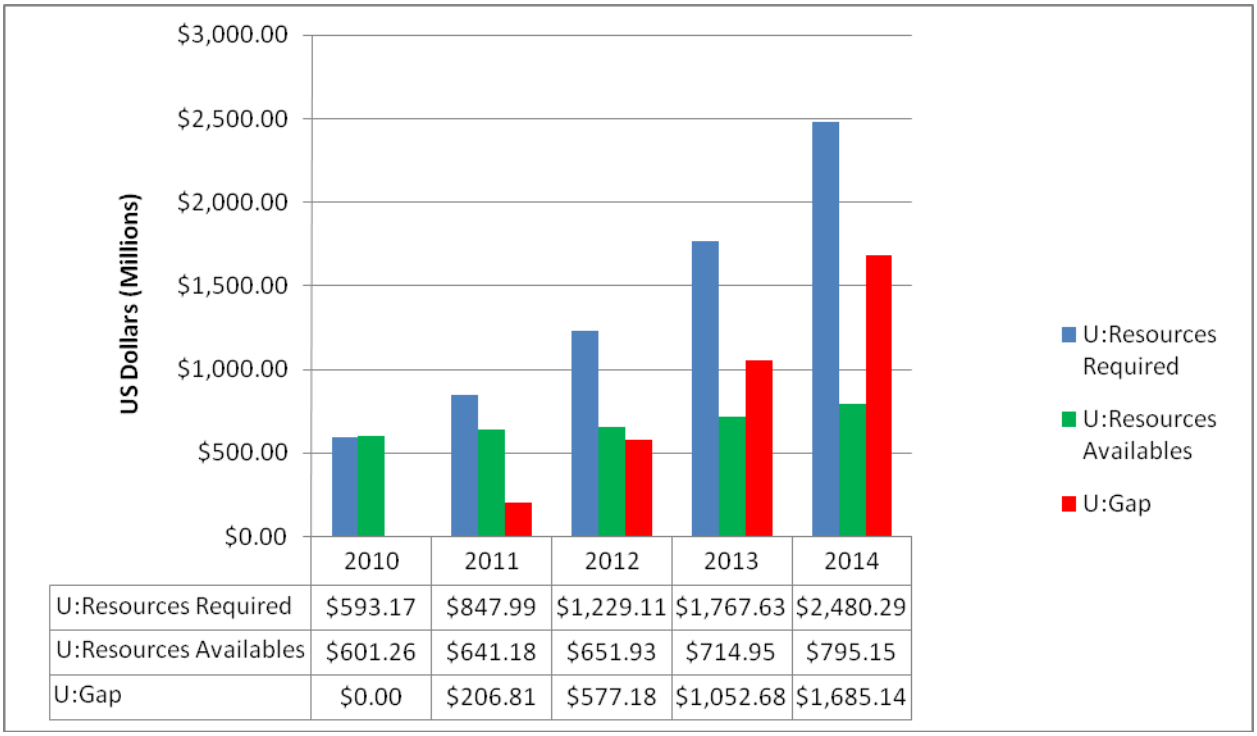


	2010	2011	2012	2013	2014
S:Resources Required	$647.42	$760.44	$876.97	$988.57	$1,101.54
S:Resources Availables	$627.54	$653.34	$634.14	$643.10	$634.42
S:Gap	$19.89	$107.10	$242.83	$345.46	$467.11

TABLE 23. FINANCIAL RESOURCES REQUIRED TO ACHIEVE POLICY GOALS OF THE UNIVERSAL SCENARIO (US$ MILLIONS)

Universal Scenario	2010	2011	2012	2013	2014
Prevention					
U:PMTCT	$5.0	$10.1	$21.1	$43.9	$92.1
U:HCT	$16.4	$31.2	$59.5	$112.5	$211.4
U:Other prevention	$180.0	$198.0	$217.8	$239.6	$263.5
Treatment					
U:ART	$299.2	$405.7	$561.5	$768.9	$1,014.6
U:CSS - Pre-ART	$12.0	$30.1	$59.3	$102.5	$157.0
Care					
U:CSS - Non-ART	$53.3	$132.4	$256.6	$435.8	$661.1
U:CSS - TB-HIV	$10.7	$11.2	$11.8	$12.3	$12.8
Mitigation					
U:OVC	$16.7	$29.4	$41.5	$52.2	$67.8
U:Grand Total	$593.2	$848.0	$1,229.1	$1,767.6	$2,480.3
U:Resources available	601.3	641.2	651.9	715.0	795.1
U:Gap	0.0	206.8	577.2	1,052.7	1,685.1

FIGURE 12. FINANCIAL RESOURCES REQUIRED AND EXPECTED ANNUAL FUNDING GAPS FOR 'UNIVERSAL' SCENARIO



	2010	2011	2012	2013	2014
U:Resources Required	$593.17	$847.99	$1,229.11	$1,767.63	$2,480.29
U:Resources Availables	$601.26	$641.18	$651.93	$714.95	$795.15
U:Gap	$0.00	$206.81	$577.18	$1,052.68	$1,685.14

Over one-third of the total costs were for purchase of ARV drugs (Figure 13). The cost of ARVs could be considerably lower if treatment policy were restricted to first-line regimens. In all scenarios modeled, use of second-line regimens grew over the time horizon. Laboratory accounted for 19 percent of total costs. For ART patients the most expensive laboratory tests were Viral Load and Liver Function Tests (LFT). Every ART patient was assumed to get two LFTs per year at a cost of US$47.01 per test. However, only one in five ART patients was assumed to get a Viral Load test each year (at a cost of US$47.92). Health worker labor represented 10 percent of program costs, and it was assumed that these costs were paid from domestic resources. Facility- and program-level overhead and central-level costs (including training) combined represented 20 percent of the total costs. Additionally, it was estimated that 13.7 percent of the costs were allocated to implementing partner and donor overheads. It was extremely challenging to collect data for 'overhead' cost categories. Most facilities and organizations participating did not have or could not share financial tracking or accounting data that are necessary to measure and allocate shared costs. Central-level costs, such as the portion of the cost of operating the FMoH and other government agencies (e.g., NASCP, NACA) allocated to the HIV/AIDS response and the portion of donor funds spend on program management are largely unknown. Therefore, the analysis relies on rules-of-thumb for 'marking up' direct costs to account for shared costs and central-level costs. For example, all ARVs are marked up 15 percent to account for supply chain expenses. It is important to note that the cost of non-clinical labor (M&E officers, secretaries, data specialists, etc.) was not micro-costed and is assumed to be captured in overhead costs.

ART represents about 50 percent of the total program. In the scale-up scenario, OVC and prevention services grow at a faster rate than other programmatic areas. PMTCT, as a proportion of the whole program, decreases, despite an increasing number of women treated intrapartum. In part, this is because case-finding becomes more efficient (HIV-positive pregnant women are more likely to know their status when HCT is scaled up and due to the cumulative effect of testing).

FIGURE 13. FINANCIAL BREAKDOWN OF HIV/AIDS PROGRAM COSTS BY COST CATEGORY (MAINTAIN SCENARIO)

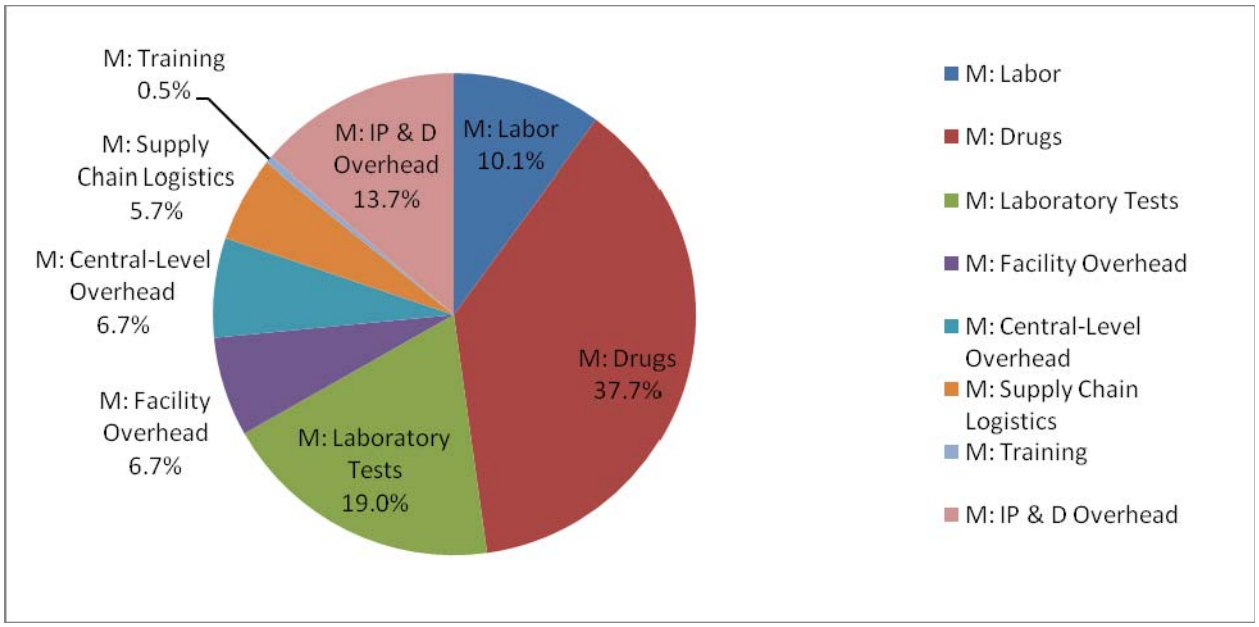


Table 24 shows the breakdown of ART costs by category. Average per-patient-year ART costs ranged between US$790 and US$980 per patient-year. Per patient-year costs are higher in future years due to the growth in second-line regimen use. In fact, per patient-year costs are highest under the maintain scenario, because the number of new patients starting on first-line regimen is very small since new patients can only enroll when an existing patient leaves treatment. Simultaneously, existing patients are migrating to second-line regimens over time, and by 2014 would 30 percent of patients would be on second-line regimens in the maintain scenario (Table 25).

TABLE 24. BREAKDOWN OF ART COST BY CATEGORY (YEAR 2010)

Cost Category	Cost (Percent)
Labor	$64.35 (8.1)
Drugs	$284.84 (35.9)
Laboratory tests	$184.07 (23.2)
Facility overhead	$53.33 (6.7)
Central-level overhead	$53.33 (6.7)
Supply chain logistics	$42.73 (5.4)
Training	$3.22 (0.4)
Implementing partner and donor overhead	$107.25 (13.5)
Total	$793.11 (100)

TABLE 25. RESOURCE ALLOCATION ACROSS HIV/AIDS SERVICES

	2010	2014
Maintain		
Total patients	300,000	300,000
Fraction of patients on 2nd line	12%	32%
Total cost for ART	238 M	294 M
Per-patient cost of ART	$793	$979
Universal		
Total patients	376,866	1,216,313
Fraction of patients on 2nd line	12%	19%
Total cost for ART	299 M	1015 M
Per-patient cost of ART	$794	$834

4.3 HEALTH WORKERS NEEDED FOR SERVICE DELIVERY

In many settings, service delivery is constrained by the availability of health workers. However, Nigeria has more health workers per capita than most countries in Africa. Table 26 shows the expected number of health workers required to deliver the HIV program under each policy scenario. Even under the scale-up scenario, there are no expected gaps in human resources. There are projected gaps in pharmacy worker FTEs under the universal scenario. However, these results should be interpreted with caution.

TABLE 26. HEALTH WORKERS NEEDED FOR HIV PROGRAM.

Doctors and medical interns (House officers)	2010	2011	2012	2013	2014
Maintain	671	683	693	701	709
Scale-up	988	1147	1299	1442	1573
Universal	818	1139	1621	2283	3064
Nurses and midwives	**2010**	**2011**	**2012**	**2013**	**2014**
Maintain	1580	1628	1671	1708	1741
Scale-up	2321	2568	2808	3040	3263
Universal	1649	2810	4876	8551	15,121
Laboratory	**2010**	**2011**	**2012**	**2013**	**2014**
Maintain	829	842	854	864	873
Scale-up	1184	1320	1450	1571	1683
Universal	920	1438	2347	3922	6642
Pharmacy	**2010**	**2011**	**2012**	**2013**	**2014**
Maintain	620	621	623	624	625
Scale-up	648	762	876	984	1086
Universal	770	1007	1365	1856	2438
Community health extension workers (J-CHEW)	**2010**	**2011**	**2012**	**2013**	**2014**
Maintain	506	555	599	637	670
Scale-up	1660	1856	2029	2184	2323
Universal	493	851	1379	2105	2951

Full-Time Equivalent Staff

An FTE staff member for a given service (e.g., ART) is a health professional who spends all his/her working time allocated for patient visits to provide that service.

For example, a doctor has 220 working days per year and is assumed to spend 6.5 hours each working day attending to patients. If a doctor spends, on average, 24 minutes per ART patient visit and each ART patient sees a doctor four times a year, then an FTE doctor for ART can see 894 ART patients per year.

First, the number of needed workers is reported as FTEs. For example, in the maintain scenario, 1,580 FTE nurses are required in 2010. However, 1,580 unique individual doctors may not be sufficient to cover the entire geography of Nigeria, even if they were working full-time delivering HIV care and treatment. It is likely a much greater number of nurses is needed to achieve geographical coverage, but each of these nurses would not be required to work full-time on HIV care and treatment. The current HAPSAT analysis could be supplemented with additional human resource data regarding the distribution of health workers and patient population across facilities in order to estimate how many unique individuals in each health worker cadres would be required and how they need to be distributed geographically (across health facilities in different locations). This more detailed human resources data collection and analysis was beyond the scope of the current activity.

Second, the estimated number of health workers required depends on the assumed frequency and duration of outpatient visits, as well as what type of tests are ordered during those visits. Practice patterns may vary significantly across facilities depending on the technical capacity of health workers, patient volumes, and available equipment and financial resources. The current scenarios are based on a combination of data reported from sample facilities and care and treatment guidelines. The data collection relied on interview of clinicians and managers at facilities and did not employ any empirical or observational methods such as time-motion studies, medical chart review, or analysis of facility labor records (e.g., timecards).

Third, the costs and human resources associated with inpatient hospital care for HIV patients were not considered in this analysis. The estimates are limited to outpatient program delivery. Additionally, the human resource needs for OVC and BCC prevention activities was not assessed.

5. CONCLUSIONS

Several conclusions can be drawn from this sustainability analysis. First, current data suggest that Nigeria is heavily dependent on donor funding for implementing the majority of the HIV/AIDS services. Data obtained to measure the FGN contribution to HIV through the line ministries indicate that the FGN supports about 8 percent of the total cost of the HIV response in Nigeria. However, the data excluded the cost of human resources for health, which are generally believed to be paid for through domestic resources. Including the estimated cost of labor expands the fraction of HIV response supported by the FGN to 14 percent. Additionally, the cost of inpatient care was outside the scope of this analysis. Finally, the portion of HIV care paid for out-of-pocket by patients and their families was not measured. These limitations notwithstanding, bilateral aid from the USG accounts for over 70 percent of the total resources for HIV that are expected to be available through 2014.

To scale up HIV/AIDS services over the long-term, significant financial and human resources need to be mobilized. The current HIV/AIDS budget appears to be adequate to achieve the maintain scenario service coverage levels, but this scenario would only allow for fewer and fewer cases to be enrolled each month in order to maintain no more than 300,000 on treatment. By 2014, about 1,000 new cases per month can be enrolled. At the same time, an increasing portion of the treatment slots will be filled by patients on second-line regimens, increasing the average patient-year cost.

To scale up services, strategies need to be considered for (1) resource mobilization and (2) efficiency gains in service delivery. Because the feasibility of additional resource mobilization in the short term and the potential for efficiency gains may be limited, policymakers should also consider plans for increasing demand for service in the context of supply constraints. Messages regarding the availability of services, plans for recruiting new patients or expanding to new sites should be considered carefully so that they are balanced with the availability of services. Finally, policymakers should consider planning for a situation in which public demand for services may exceed capacity. For example, the establishment of clear, transparent policies regarding the allocation of limited ART treatment slots using a method that is fair and just may minimize frustration among the target population. Additionally, program managers should anticipate side-effect to a situation of unmet demand, such as medication sharing, and develop policies to minimize these negative impacts.

Fortunately, it does not appear that health worker availability poses a major constraint in sustaining or expanding services in the coming years. The country will need to provide HIV training to additional health workers, especially laboratory technicians and pharmacists, in order to scale up services beyond the current coverage levels. But the aggregate number of health workers in Nigeria appears sufficient to support an expansion of HIV services. Two major caveats accompany this conclusion. First, the scope of the analysis stopped short of identifying whether local gaps in health worker availability constrain scale-up in specific areas of Nigeria. For example, if Nigerian health workers are not dispersed geographically in proportion to the distribution of HIV patients, or if the health workers are not available for HIV service delivery because of competing demands to deliver other services, then scale-up may be constrained.

The results presented in this report focus on three specific scenarios to illustrate the use of HAPSAT and examine the general outlook for the sustainability of Nigeria's HIV program in the medium term. The HAPSAT-Nigeria model can readily be reused frequently to rapidly model other scenarios to inform the process of national strategic planning and PEPFAR Country Operational Plan planning. For example, several 'cascade' scenarios in which HCT and PMTCT drive demand for ART were explored recently by USAID in preparation for the Partnership Framework meetings.

To remain useful, the HAPSAT-Nigeria model may need to be updated regularly (e.g., annually) because the context in which HIV/AIDS services are being implemented is changing rapidly. For example, donor funding continues to be unpredictable, drug costs are falling, and the state-of-the-art for HIV/AIDS diagnosis treatment continues to evolve. Moreover, as more complete data becomes available on actual HIV/AIDS expenditures and program outputs, estimates of unit costs can be refined and validated, and the output of OVC, STI, and prevention services can be refined. Further refinements might also consider the impact of the geographical distribution of health care workers, earmarks on donor funds, efficiency gains from scale-up (economies of scale) and the impact of prevention activities on incidence.

ANNEX. REPORT ON VALIDATION MEETING

INTRODUCTION

HIV/AIDS Program Sustainability Analysis (HAPSAT) is a study that was started in Nigeria in October 2008 with the collection of data at the Federal, state and facility level. The National Agency for the Control of AIDS (NACA) in collaboration with USAID-funded Health Systems 20/20 team in implementing this analysis. The HAPSAT tool is used in projecting necessary resources needed to sustain HIV/AIDS response in Nigeria. The first draft of the report was submitted in the 1st quarter of 2009. It was disseminated to all stakeholders for comments and input after which the final draft was prepared. For the outcomes of this assessment to be accepted by the stakeholders and policymakers, a one-day report validation meeting was held thus establishing consensus among all stakeholders.

This was followed by a two-day workshop on capacity building for staff of some key stakeholders on use of the HAPSAT model.

Participants for both events were sourced from six states, ministries, departments, agencies, donors, and implementing partners in HIV/AIDS. There was a total 51 participants including the lead consultant, facilitators, and other workshop officials.

Essentially the objective of HAPSAT is to:

1. Estimate the total human and financial resources required to sustain HIV/AIDS service provision in the health sector in Nigeria.
2. Support current and future policy decisions, program planning, and budgeting for rational and sustainable scaling-up of HIV services.

The report of the study will serve as an important tool in mobilizing local resources for sustenance of the national response to HIV/AIDS.

The overall goals of the validation process are for stakeholder to:

1. Better understand the HAPSAT Nigeria study: methodology, model, and key outputs
2. Review key data input into the model
3. Concur with major assumptions
4. Critique scenario projections
5. Fill in known data gaps and/or identify new ones.

The validation process started with a presentation of results, key data input, and assumptions by the lead consultant on HAPSAT Nigeria, Dr. Stephen Resch. This was followed by a page-by-page review of the key elements. Participants all had notepads and "post-it" notes to jot their comments/observations during the initial presentation. A summary of the comments is found below.

TABLE A-1. ATTENDANCE LIST FOR HAPSAT VALIDATION MEETING

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*Names transcribed from handwritten attendance register.

SUMMARY OF COMMENTS FROM VALIDATION MEETING SEPTEMBER 2, 2009

COMPREHENSIVENESS OF PROGRAMMATIC AREAS INCLUDED IN ANALYSIS

- Several people commented on the omission of some activities under the programmatic areas of prevention and mitigation.
    - Under categorization of prevention, skill-based activities were not captured. The curriculum-/school-based approach to HIV/AIDS intervention, the main intervention in the education sector, is completely missing. The education sector has in- and out-of-school interventions through co-curricular based strategy. The in-school activities should be costed.
    - The costing for the training of teachers in primary school should be extended to secondary and tertiary levels of education since the intervention covers all three levels.
    - There is need to develop a detailed costing for prevention other than PMTCT in the tool.
    - The psychosocial support for the OVC was not costed.
    - Under impact mitigation, socio-economic support to PLWHAs and people affected by AIDS (PABAs) is not captured.
    - There are seven areas of service to OVC; why are only two areas (education and health) covered by this report, and not food security and nutrition, shelter, child protection, and psychosocial support?
    - There is need to capture social protection package for the OVC.
- The overhead costs should include management and coordination cost, field-level operation tools, guidelines, programme communication, community mobilisation, facility assessments, etc.
- We would appreciate if all assumptions for this study are highlighted in this report.
- For OVC there is a baseline of 166,000 but universal starts from 246,521, why?

  Reply: The HAPSAT model took into account that OVC are not due to HIV alone and using an assumption estimated how many of the OVC can be attributed to HIV alone. It is these OVC due to HIV who are used for cost projections; this might account for why the number of OVC is not so large.

- Why is HAPSAT limited to public sector activities? The private sector contribution is increasing and it will be useful to capture the resources from the private sector. How does HAPSAT handle out-of-pocket expenditure and drug donations? There is omission of local government area (LGA) and community in HAPSAT data collection. These categories need to be considered as the reporting system in the country is parallel.

  Reply: Out-of-pocket expenses can be in subsequent HAPSAT studies as a resource envelope but they were not included in the first study. Findings on out-of-pocket expenses from National AIDS Funding Assessment (NASA) can also be used to update subsequent HAPSAT studies. It is important to note that any out-of-pocket expenses included in HAPSAT must be adjusted to only account for out-of-pocket expenses that can be attributed to the public sector only. Additionally, expenditures at the LGA level were omitted, but could be quantified at a later date to improve the accuracy of estimated of the resource envelope.

- The moderate scale-up scenario of PMTCT has little impact. Why? Is it because of regimen or advocacy?

  Reply: These figures for moderate scale-up are not very appealing because of the assumption that even with PMTCT treatment there is a 10 percent chance of vertical transmission. This assumption might be slightly pessimistic because there are more intensive treatments than NVP now available.

- The figure provided for costing agricultural sector in 2006 is not correct.

  Reply: Actual figure will be provided on September 3 or 4, 2009. [Note: Has been corrected for this report]

- The scale-up criteria should be revised when the National Strategic Framework objectives are known so as to better inform the NSP workshop.

  Reply: HAPSAT is now planned to be used as a tool during the NSF process to produce cost and impact estimates for proposed policies.

- The exchange rate fluctuations should be taking into consideration as it relates to projections.

  Reply: The exchange rate is not very relevant when a foreign currency is first used to pay for goods and service. The exchange rate becomes important when the budget is made in Naira and has to be converted to a foreign currency to pay for goods and services. The first scenario is the prevailing situation in Nigeria and not the second.

- I would have expected that as the program matures there will be more patients on second-line and that per patient cost would increase more than US$17 due to higher cost of second-line ARVs and possibly more monitoring lab tests.

- Please capture Global Fund (GF) Round 5 grants currently in phase 2 till year 2011 and the Millennium Development Goal support for the state and federal governments. I will appreciate if the year 4 and year 5 of GF HIV Program are included in GF Round 9 in year 2010 and 2011.

  Reply: [Note: Has been corrected for this report]

- Have we included the most recent updated UNAIDS projections?

  Reply: Yes. The FMoH's 2008 surveillance report was the source of projected HIV incidence

- Does the program allow for upward adjustments in salaries (i.e., inflation, salary review)?

  Reply: Yes, there is room for adjustment in the case of inflation and salary review.

- How did we come about the figures in OVC? There is need to review them as HAPSAT is concerned with OVC who are positive and those orphaned by AIDS.

  Reply: The figure is from OVC document of the Federal Ministry of Women's Affairs, the National Plan of Action for OVC.

- Salary increment at 4 percent, is it entrenched in the model?

  Reply: The inflation-adjusted 4 percent salary escalation is not hard-coded into the model; you can put any percentage that is realistic in the Nigerian context.

- The attrition rate is not applied to new health care workers within the year.

  Reply: That is correct. The model has an annual timestep. Attrition within the first year could be captured by simply assuming a slightly smaller number of people entering the workforce (a half-cycle correction).

- How was the eligible person for first- and second-line regimen arrived at?

  Reply: The model was initially calibrated to estimated number in need of treatment from UNAIDS/SPECTRUM, but for the future projection, the model includes a transition rate from ineligible to ART-eligible in order to capture HIV progression. This progression rate for untreated HIV is informed by natural history studies, such as the Rakai cohort.

- If you have a funding source that is cross-cutting or applies to non HIV programming, how do you input this funding?

  Reply: Allocating cross-cutting resources to particular activities is a challenge in all costing studies. Generally, we would attempt to find a proxy for the level of the various activities drawing on a source of funds. For example, if laboratory costs are known at the laboratory level, but the specific allocation to HIV-related patient tests is unknown, one might take a sample of patients and get an estimate of the fraction of patients that are HIV patients and apply that percentage to the overall lab costs as a way to estimate the portion going to HIV care.

- Are the cost inputs for the burn-in period or as of the start of the analytical period?

  Reply The cost inputs are needed only for the analytical period, but could be input into the model for the burn-in period if desired.

- Why is there no data for the burn-in years for OVC?

  Reply: The burn-in period is only needed to calibrate the distribution of HIV patients across health states. OVCs are not explicitly tracked in discrete health states, so no burn-in information for OVC is needed.

- Could the relationship between ART program and number of OVC produced be modelled in HAPSAT?

  Reply: There is a relationship between ART and the number of orphans. Currently, this is not endogenously modeled in HAPSAT. The number of OVC is an exogenous input to HAPSAT.