What Is the Cost of Providing Outpatient HIV Counseling and Testing and Antiretroviral Therapy Services in Selected Public Health Facilities in Nigeria?

Husaina Bello Aliyu, MSc, Nkata Nwani Chuku, MBBS, MSc,**
*Abimbola Kola-Jebutu, MBBS, MPH, FMCPH, FRSPH,**
Zubaida Abubakar, MB, BCh, BAO (NUI), LRCP, SI, MSc, Kwasi Torpey, MD, PhD, MPH,†*
and Otto Nzapfurundi Chabikuli, MBChB, MMed, MSc‡

Background: Limited data on actual cost of providing HIV/AIDS services in Nigeria makes planning difficult. A study was conducted in 9 public health facilities supported by the Global HIV/AIDS Initiative Nigeria. The objective was to determine the cost of outpatient HIV Testing and Counseling (HTC) and antiretroviral therapy (ART) services per patient.

Methods: Two tertiary and 7 secondary facilities were purposively selected across the six geopolitical regions. Facilities were distributed in urban and rural settings. Utilization and cost data for a 12-month period (January to December 2010) were analyzed. Cost elements included consumables, human resources, infrastructure, trainings, facility management, and Global HIV/AIDS Initiative Nigeria technical support. Total costs were apportioned based on percentage utilization by services, and unit costs were derived by dividing resource inputs by service outputs. Data were analyzed using Microsoft Excel 2003. A sensitivity analysis was also conducted for key assumptions.

Results: Mean costs for HTC and ART were US $7.4 and US $209.0, respectively. Costs were higher in Northern facilities (US $6.9, US $250.8), compared with Southern ones (US $6.7, US $194.7); and in tertiary facilities ($18.5, $338.4), compared with secondary ones ($6.3, $204.9). Major cost drivers for HTC and ART were human resources—ranging from 62% to 50%, and ARV drugs—ranging from 54% to 31%, respectively.

Conclusions: Governments' ability to negotiate lower priced antiretroviral drugs will be central to reducing the cost of ART. Additionally, use of lower cadre staff to provide HTC will reduce costs and improves efficiency.

Key Words: cost, HTC, ART, HIV/AIDS, Nigeria

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INTRODUCTION

The concerted effort of several international and national organizations/institutions, notably the U.S. President's Emergency Plan for AIDS Relief (PEPFAR) and Global Fund for HIV/AIDS, TB, and Malaria, has provided life-prolonging antiretroviral therapy (ART) to 6 million people living with HIV globally. This represents about 36% of those in need.[1] Funding of HIV/AIDS in developing countries is largely borne by international donors. Increasingly, the donor community is seeking ways of transferring funding responsibility to host countries.

Nigeria bears the third highest HIV/AIDS burden in the world—3.3 million people living with HIV; of these, only 359,181 (21%) are on ART.[2] The Government of Nigeria (GoN) contribution toward ART programs is small, estimated at about 5% in the country.[3] Recently, however, GoN signed the partnership framework with the United States Government, whereby it committed to increase its funding by 50% by 2015.[4] Country-level cost information is therefore needed to guide choices in programming for future resource investment.

The Global HIV/AIDS initiative in Nigeria (GHAIN), implemented from 2004 to 2011, was one of the largest HIV/AIDS projects funded through PEPFAR and supporting HIV/AIDS and TB prevention, treatment, care, and support services in health facilities across Nigeria. A costing study was carried out in 9 GHAIN-supported comprehensive sites to calculate the cost of outpatient services per client for HIV testing and counseling (HTC) and ART per year.

METHODS

Study Design and Perspective

This was a retrospective costing study from the provider perspective, covering a 12-month period from January

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From the *Health Policy and Systems Management Department, Family Health International, Abuja, Nigeria; †Technical, Family Health, International, Abuja, Nigeria; and ‡Family Health International, Abuja, Nigeria.
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Correspondence to: Husaina Bello Aliyu, MSc, Family Health International, Plot 1073, J. S. Tarka Street, Garki, Area 3| P.M.B. 44, Abuja, Nigeria (e-mail: haliyu@ghain.org).

to December 2010. This study was "facility" based; taking into account site level costs including the cost of GHAIN technical support. GHAIN technical support was considered because government is expected to provide the same level of support if they are to sustain the quality of care. The impact of government technical assistance through existing government mechanisms at no additional cost was tested through sensitivity analysis. GHAIN central programmatic costs were excluded from the study as it has no relevance for GoN programming.

The study sought to identify cost drivers and compare costs by (1) type of health facility, (2) geographical location, (3) with findings in other resource-constrained settings.

Components of a HIV/AIDS Service Delivery Site

A typical comprehensive site provided a package of HIV testing, prevention, treatment, care, and support. The HTC and ART service delivery points (SDPs) were used as cost centers for this study because each was an operational unit, contributing toward the overall cost of HIV/AIDs services in the facilities.

Study Sites

In 2010, GHAIN supported 125 comprehensive sites across the 6 geopolitical regions in Nigeria. The sites were grouped into 6 geopolitical regions and further grouped by facility type (tertiary and secondary) and location (urban and rural). Sixteen sites were randomly selected to ensure representation across regions, type, and location. Nine sites were eventually analyzed as sites in 2 regions (North East and South East) could not be accessed due to health workers' strike. The regions and their HIV prevalence rates were as follows: North West (2.1%), South West (2.9%), South South (6.5%), and North Central (7.5%).[5]

Calculation of Costs

A top down approach to cost estimation was adopted.[6] Only financial costs were considered, whereas economic costs were omitted. Recurrent and capital costs were taken into account, and the latter were annualized. Costs were traced by activity and apportioned to cost centers. These included:

1. Rapid test kits (RTKs) and other medical consumables for HTC
2. Health commodities, that is, ARV and opportunistic infections (OIs), drugs, laboratory reagents, and other medical consumables for ART
3. Infrastructure (structure, furniture and equipment)
4. Human resources
5. Trainings
6. GHAIN technical support

Costs were also categorized into fixed and variable costs. Total costs measured were divided by the total service output to derive the cost per unit per SDP. In a typical site, clients passed through several SDPs, namely the Heart 2 Heart centre (HTC unit)—which is the entry point in the ART program, the antenatal clinic—which is the entry point for HIV-positive pregnant women, the ART patient monitoring and management unit, the ART clinic, the ART laboratory, the ART pharmacy, and the ART adherence counseling. As sites used RTKs, 1 HTC encounter was classified as 1 HIV test, including precounseling and postcounseling. For ART, the unit costs per ART SDP were aggregated to arrive at a total cost per ART consultation. To estimate ART costs per year, the unit costs per consultation in each SDP were multiplied by the expected annual frequency per consultation type, as per national guidelines. Costs for these SDPs were subsequently aggregated to get a total estimated cost per year for ART.

Services design and schedule varied across the different sites. Inputs completely dedicated to HIV were apportioned entirely to HIV services. Where inputs were shared, costs were apportioned based on percentage utilization of these inputs, that is, staff salaries were apportioned using the percentage of time (derived using clinic days) staff spent providing HIV services.

Data Collection

Data collection took place at GHAIN offices, selected sites, and state authorities. Data collected from GHAIN offices included actual data on patient utilization from the District Health Information Systems, actual consumption of consumables, inventory of facility assets, staff schedule for providing technical support, and costs of RTKs and drugs.[7] Market value costs at the time of the study were used for capital assets. The facilities and states provided data on service design and staff skill mix, including actual staff salaries. Microsoft Excel 2003–based tools were designed and used for data collection. Data were collected between September and October 2011.

Analysis

A Microsoft Excel 2003–based model was designed for data analysis for each facility. The model comprised of data input and calculation worksheets, categorized into different cost elements per SDPs. A summary page gave a breakdown of costs per patient for each cost element and the total estimated cost per consultation and year. Weighted averages were calculated to give an accurate representation of costs across sites. GHAIN technical support was excluded from costs, and drug regimens altered to conduct 1-way sensitivity analyses. Final costs were adjusted for Inflation using year average inflation rates.[8]

RESULTS

The study costed the services of 2 tertiary and 7 secondary hospitals. Together, these hospitals conducted 24,124 HIV tests and provided 288,386 ART consultations during the study period. One facility was found to be an outlier in the distribution of costs for HTC due to its unusually high HR cost; it was therefore excluded from the analysis.

Cost of HTC

The weighted average cost across 8 facilities was US $7.4 and $6.4 when GHAIN technical support was excluded.

TABLE 1. Mean Cost of HTC

Cost Category	Cost Element	All Facilities (n = 8)	Tertiary (n = 1)	Secondary (n = 7)	Northern (n = 4)	Southern (n = 4)	Urban (n = 4)	Rural (n = 4)
Mean cost in US $—n (%)								
Variable	Test kits	0.82 (11)	0.82 (4)	0.82 (13)	0.82 (12)	0.82 (12)	0.82 (14)	0.82 (9)
Variable	Materials and supplies	0.19 (3)	1.13 (6)	0.15 (2)	0.26 (4)	0.14 (2)	0.21 (4)	0.15 (2)
Variable	Data collection tools	0.12 (2)	0.07 (0)	0.13 (2)	0.07 (1)	0.17 (2)	0.09 (2)	0.23 (2)
Fixed	HR	3.58 (49)	11.45 (62)	3.28 (52)	3.99 (57%)	3.30 (50)	3.10 (53)	5.04 (52)
Fixed	Space	0.0 (1)	0.14 (1)	0.03 (1)	0.05 (1)	0.03 (0)	0.04 (1)	0.04 (0)
Fixed	Furniture	0.69 (9)	0.7 (4)	0.69 (11)	0.57 (8)	0.78 (12)	0.53 (9)	1.17 (12)
Fixed	Training	1.0 (13)	0 (0)	0.06 (1)	0.02	0.09 (1)	0.05 (1)	0.09 (1)
Fixed	GHAIN technical support	1.0 (13)	4.18 (23)	1.15 (18)	1.17 (17)	1.34 (20)	0.97 (17)	2.14 (22)
	Mean cost	7.46 (100)	18.5 (100)	6.32 (100)	6.96 (100)	6.67 (100)	5.81 (100)	9.67 (100)
	Variable costs	1.14 (15)	2.02 (11)	1.11 (18)	1.16 (17)	1.13 (17)	1.12 (19)	1.20 (12)
	Fixed costs	6.32 (85)	16.48 (89)	5.22 (82)	5.80 (83)	5.54 (83)	4.69 (81)	8.48 (88)

The cost was 4% (US $6.9) higher in the North than in the South (US $6.7), 40% higher in rural (US $9.7) compared with urban facilities (US$5.8), and 66% higher in tertiary (US$18.5) compared with secondary facilities (US $6.3) (Table 1).

HRs contributed the highest proportion to costs, ranging from 50% (secondary) to 62% (tertiary). GHAIN technical support contributed 23% of total costs in tertiary sites and 17% northern and urban sites. Commodities (test kits) contributed 14% of total costs in (urban) and 4% in (tertiary) sites. Variable costs accounted for less than 19% across all facilities (Table 1).

Cost of ART Per Patient Per Year (in US $)

The weighted average cost of ART across the 9 sites was US $209 (assuming 78% of patients are in first-line regimen lamivudine/zidovudine + nevirapine 150/300 + 200 mg, whereas 22% are on tenofovir/lamivudine 300/300mg + nevirapine 200 mg) and US $205.5 when GHAIN technical assistance was excluded. This cost was 22% higher in the Northern facilities (US $250.8) compared with Southern facilities (US $194.8), 39% higher in tertiary facilities (US $338.4) compared with secondary facilities (US $204.8), and 11% higher in urban facilities (US $227.7) compared with rural facilities (US $201.7) (Table 2).

On average, ARV drugs contributed 54% to total costs in southern and 31% in tertiary facilities. HR contributed 26% to total costs in tertiary facilities and 12% in southern facilities. Facility management contributed 12% in tertiary, southern and rural facilities and 11% in secondary, northern and urban facilities. Laboratory costs contributed 17% in

TABLE 2. Mean Cost of ART

Cost Category	Cost Element	All Facilities (n = 8)	Tertiary (n = 2)	Secondary (n = 7)	Northern (n = 4)	Southern (n = 4)	Urban (n = 4)	Rural (n = 4)
Mean cost in US $—n (%)								
Variable	ARV drugs	106.00 (51)	106.30 (31)	106.00 (52)	106.00 (42)	106.00 (54)	10.006 (47)	106.00 (53)
Variable	OI drugs (CTX)	9.52 (5)	9.52 (3)	9.52 (5)	9.52 (4)	9.52 (5)	9.52 (4)	9.52 (5)
Variable	Materials and supplies	0.44 (0)	1.07 (0)	0.38 (0)	0.70 (0)	0.27 (0)	0.49 (0)	0.36 (0)
Variable	Data collection tools	1.86 (1)	3.12 (1)	1.74 (1)	2.39 (1)	1.53 (1)	2.00 (1)	1.67 (1)
Fixed	HR	33.28 (16)	88.69 (26)	27.9 (14)	48.79 (19)	23.43 (12)	36.89 (16)	28.49 (14)
Fixed	Space	7.92 (4)	1.82 (1)	8.50 (4)	10.92 (4)	6.01 (3)	10.62 (5)	4.33 (2)
Fixed	Major laboratory equipment	9.18 (4)	45.92 (14)	5.67 (3)	14.48 (6)	5.82 (3)	10.22 (4)	7.80 (4)
Variable	Laboratory reagents and consumables	1 (0)	10.53 (3)	8.36 (4)	9.62 (4)	7.86 (4)	10.58 (5)	5.85 (3)
Variable	Furniture and equipment	10.88 (5)	17.53 (3)	10.24 (5)	15.32 (6)	8.06 (4)	12.64 (6)	8.54 (4)
Variable	Training	0.51 (0)	0.49 (0)	0.51 (0)	0.35 (0)	0.61 (0)	0.43 (0)	0.61 (0)
Fixed	GHAIN technical support	3.5 (2)	11.52 (3)	2.73 (1)	4.55 (2)	2.84 (1)	3.11 (1)	4.01 (2)
Variable	Facility management	24.92 (12)	42.22 (12)	23.27 (11)	28.19 (11)	22.85 (12)	25.24 (11)	24.51 (12)
	Mean cost	209.01 (100)	338.42 (100)	204.8 (100)	250.8 (100)	194.7 (100)	227.74 (100)	201.70 (11)
	Variable costs	155.13 (74)	190.47 (56)	160.0 (78)	172.08 (69)	156.70 (80)	166.90 (73)	157.06 (100)
	Fixed costs	53.88 (26)	147.95 (44)	44.88 (22)	78.73 (31)	38.09 (20)	60.84 (23)	44.64 (22)

tertiary facilities and 7% in secondary, southern and rural facilities. Variable costs contributed 56% to total costs in tertiary facilities and 80% to southern facilities (Table 2).

DISCUSSION

The study found the average mean cost per patient for HTC and ART to be $7.4 and $209.0, respectively, with variability in costs across region, facility type, and location.

Costs were higher in the tertiary sites than in secondary facilities possibly because of higher operational costs and higher staff cadre involved in service provision. The higher rural cost was likely due to higher costs of providing technical support as a result of greater distances from GHAIN administrative offices resulting in higher staff travel expenses.

Cost drivers for HTC were HR, GHAIN technical support, and test kits. HR costs were particularly high in the North and in the facilities providing fulltime and/or standalone services. Results suggest inefficient allocation of resources given low levels of utilization in some facilities and reinforce the case for task shifting to lower cadres of health care workers and increasing demand for services. Furthermore, integration with other clinical services would lead to reduction in costs, as excess resources would be absorbed. GoN is supported to provide HIV services in public facilities by implementing partners. It is therefore difficult to assess what would be the performance of GoN in oversight of these services in the absence of empirical evidence; it is however unlikely that GoN would bear the high technical support cost. Total costs reduced by 13% once this cost was removed.

The average estimate of ART across all sites was $209.0. A study carried out in 5 GoN supported treatment sites reported an average cost of US $742.[9] However the time lapse since that study (2004) and decreases in cost of ARVs[10] make comparison difficult. Results are lower than reported costs from other PEPFAR-supported sites. A study conducted in 43 PEPFAR-supported sites estimated mean costs to be US $880 across all sites and US$988 across Nigerian sites.[11] The study highlighted that in the second year post start up, costs reduced by about 76%, bringing costs to an estimated US $208 and US $238 across all sites and Nigerian sites, respectively. A Zambian study of 12 PEPFAR-supported facilities,[12] reported costs ranging from US $282 to US $523, depending on the ARV regimen. Other studies generally reported higher costs.[13–15] Our study found that on average, ARV drugs accounted for half of the cost of ART while HR, facility management, and laboratory were important contributors.

Exclusion of GHAIN technical support reduced costs by 2%, whereas costs increased by 4% with adjustments in regimens (adjusting for an increase of percentage of patients on tenofovir/lamivudine 300/300mg + nevirapine 200 mg to 50% as per national guidelines increased costs to US $214.0). With ARV drugs being the main cost driver behind costs, GoN will need to develop better drug procurement procedures to reduce the high cost of ARVs.

This study has some limitations. The study focused on the cost of outpatient care excluding inpatient care, which would increase average ART costs. The sample facilities may not be fully representative due to the exclusion of 2 geographical zones from the study. Finally, the method of apportioning annual operational costs by using a 25% ratio of outpatients to inpatient[16] was based on total volume of patients rather than inpatient bed days; information on inpatient bed days was however unavailable.

In conclusion, this study adds to the available evidence base on cost of HIV services in Nigeria. As evidenced by this and cited studies, costs vary across and within countries, it is therefore imperative to have contemporary data for strategic purposes. The study highlighted the high costs of HR and nongovernment technical support, and ARVs, facility management, and laboratory as the main cost drivers for both services, respectively. It is anticipated that continuous reductions in ARV prices will impact positively on the cost of providing ART treatment. Additionally, better allocation of resources, further integration of HIV services into secondary and primary health care, and increased governance of these services by GoN should reduce the cost of HIV services.

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