



# **Paediatric and Adolescent Antiretroviral Treatment in Zambia: Estimating the Cost of Universal Access 2014-2018**

September 2014



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# ABOUT

This exercise was led by the Finance and Economics Working Group (FEWG) of the *Interagency Task Team on the Prevention and Treatment of HIV Infection in Pregnant Women, Mothers and Children* ([www.emtct-iatt.org](http://www.emtct-iatt.org)) in partnership with the Zambian Ministry of Health and other partners, and was generously supported by a grant from Johnson & Johnson.

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# ACRONYMS

|              |  |
|--------------|--|
| <b>ART</b>   | Antiretroviral Therapy   |
| <b>ARV</b>   | Antiretroviral   |
| <b>CTX</b>   | Cotrimoxazole  |
| <b>EID</b>   | Early infant diagnosis   |
| <b>EMTCT</b> | Elimination of Mother-to-Child Transmission of HIV   |
| <b>FEWG</b>  | Finance & Economics Working Group  |
| <b>IATT</b>  | Interagency Task Team on the Prevention and Treatment of HIV Infection in Pregnant Women, Mothers and Children |
| <b>PMTCT</b> | Prevention of mother-to-child transmission of HIV  |
| <b>UA</b>    | Universal Access   |



# REPORT SUMMARY: PRINCIPAL FINDINGS

The newly revised Zambian antiretroviral therapy (ART) guidelines call for treatment for all children living with HIV (<15 years of age) starting at the time of diagnosis irrespective of CD4 count or clinical stage. The new guidelines are being rolled out against a backdrop of renewed momentum to reach UN Millennium Development Goal 6b (universal access to ART by 2015), and come at a time when children's access to treatment significantly lags adult access in Zambia.

This analysis provides an estimate of the cost of implementing the *2013 Zambia Consolidated Guidelines* for Treatment and Prevention of HIV Infection specific to paediatrics and adolescents. The analysis also provides estimates of the numbers of children and adolescents receiving ART in the period between 2014 and 2018 under the 2013 guidelines. Cost estimates are high-level and comprise the cost of medicines (antiretrovirals and cotrimoxazole), as well as laboratory reagents and consumables, and facility-level human resource costs.

The total estimated cost of providing universal access to ART among children (age 0-14) between 2014 and 2018 (5 years) under the *Zambia 2013 HIV Consolidated Guidelines* is US\$297 million, with an average cost per patient per year of US\$453. A projected 131,908 children would be receiving ART at the end of 2018 under the new guidelines and programmatic scale-up.

The total estimated cost of providing universal access to ART among adolescents (age 15-19) between 2014 and 2018 under the *Zambia 2013 HIV Consolidated Guidelines* is US\$40 million with an average cost per patient per year of US\$249. A projected 37,754 adolescents would be receiving ART at the end of 2018 under this scenario.

Antiretroviral medicines are the most significant cost driver in this analysis, making up 81% of total costs in the 0-14 age group, and 67% of total costs in the 15-19 age group. Laboratory commodities were the second largest contributor to total cost, followed by human resources and then CTX.

Five alternative scenarios were modelled for the purpose of comparison. Of the six scenarios, the *Zambia 2013 HIV Consolidated Guidelines* resulted in the highest total and average cost per patient per year, and yielded the largest number of children and adolescents on treatment at the end of 2018.



# INTRODUCTION

The Zambian Ministry of Health (ZMOH) recently published revised paediatric and adolescent HIV treatment guidelines prompted by the release of the World Health Organization (WHO) 2013 consolidated ART guidelines, but differing in a few key aspects. The *2013 Zambia Consolidated Guidelines for Treatment and Prevention of HIV Infection* call for antiretroviral therapy (ART) for all children living with HIV (<15 years of age) starting at the time of diagnosis irrespective of CD4 count or clinical stage, and to all older adolescents with CD4<500. The revised guidelines also include changes to recommended treatment regimens and laboratory diagnosis and monitoring. A summary of the new regimens can be found in Appendix II of this report. By comparison, the 2013 WHO guidelines call for ART eligibility for all children under 5 years of age and for older children with CD4<500. There are regimen differences as well; most notably, preferred use of tenofovir-containing regimens for children down to 5 years of age is included in the *Zambia 2013 HIV Consolidated Guidelines*. WHO gives preference to abacavir-containing regimens in these young children due to current lack of pediatric fixed-dose combinations that contain tenofovir, which can complicate patient adherence and supply chain management.

The new guidelines are being rolled out in 2014 against a backdrop of renewed momentum to reach UN Millennium Development Goal 6b (universal access to ART by 2015), and come at a time when access to paediatric treatment significantly lags adult treatment access in Zambia. According to the most recent data, 86% of adult treatment need has been met, compared to just 38% of the estimated need among children living with HIV in the country (under the 2010 eligibility criteria)<sup>1</sup>. This is unfortunately consistent with global trends in access to treatment among children living with HIV, where 64% of adult ART need has been met compared to 34% among children in low- and middle-income countries<sup>1</sup>.

This lag is particularly concerning given that several studies conducted in resource-limited settings in sub-Saharan Africa have shown a dramatic improvement in clinical outcomes among children initiated on ART, and conversely, that delayed ART initiation results in comparatively higher mortality rates<sup>2,3,4</sup>. Moreover, early initiation of HIV-infected children on ART is linked to positive outcomes: a study conducted in sub-Saharan Africa showed ART reduced incidence of diarrhoea and pneumonia by 64%, and reduced hospital admissions by up to 71%<sup>5</sup>.

Estimation of costs associated with paediatric and adolescent ART provision is essential to planning, budgeting and resource mobilization, and yet there is a dearth of published literature on the subject<sup>6</sup>. Previous paediatric costing studies done in Zambia have looked at average annual outpatient costs associated with ART<sup>6</sup> and total paediatric ART program costs<sup>7</sup>, but these analyses were conducted using the 2010 Zambia guidelines. This analysis aims to provide the ZMOH with a high-level estimate of costs associated with reaching universal ART access (UA) under the *Zambia 2013 HIV Consolidated Guidelines* in order to plan and finance the national response.

1 UNAIDS report on the global AIDS epidemic 2013; Zambian HMIS accessed February 2014;

2 Outcomes of the South African National Antiretroviral Treatment programme for children. The leDEA Southern African Collaboration South African Medical Journal. 2009 October;99(10):730-737

3 Scaling up antiretroviral therapy for HIV-infected children in Côte d'Ivoire: Determinants of survival and loss to programme. M-F Anaky et al. Bull World Health Organisation 2010;88:490-499 I

4 Successful paediatric HIV treatment in rural primary care in Africa. N Jansenn et al. Arch Dis Child 2010; 95:414-421.

5 Effectiveness of Antiretroviral treatment among HIV positive children in sub Saharan Africa: Lancet Infect Diseases 2008;8: 477-89

6 Scott CA et al., (2013) Retention in care and outpatient costs for children receiving antiretroviral therapy in Zambia: a retrospective cohort analysis. PLoS ONE 8(6): e67910

7 Clinton Health Access Initiative (2013) Estimating the cost of providing treatment to all Pediatric HIV+ patients in Zambia



This cost analysis estimates the total annual and per patient annual costs associated with achieving UA (95% coverage) in Zambia among infants, children and adolescents between 2014 and 2018. The analysis was conducted with emphasis on the projected costs of the *2013 Zambia Consolidated Guidelines for Treatment and Prevention of HIV Infection*, but additional scenarios were costed for the purpose of differentiation and comparison as described in Figure 2.

More broadly, this study aims to pilot a straightforward costing methodology that can be easily adapted for use in other countries - particularly Global Plan priority countries - to estimate costs associated with improving access to paediatric ART, expanding ART eligibility in children, and transitioning to newer ART regimens.

# METHODS

## Purpose

The main purpose of this analysis is to estimate the costs associated with scaling-up pediatric and adolescent ART to 95% access under the 2013 Zambia Consolidated Guidelines for Treatment and Prevention of HIV Infection between 2014 and 2018. Figure 1 provides a summary of the major elements of Zambia's ART guidelines.

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**FIGURE 1:** Overview of Zambia 2013 HIV Consolidated Guidelines – Pediatrics and Adolescents Focus

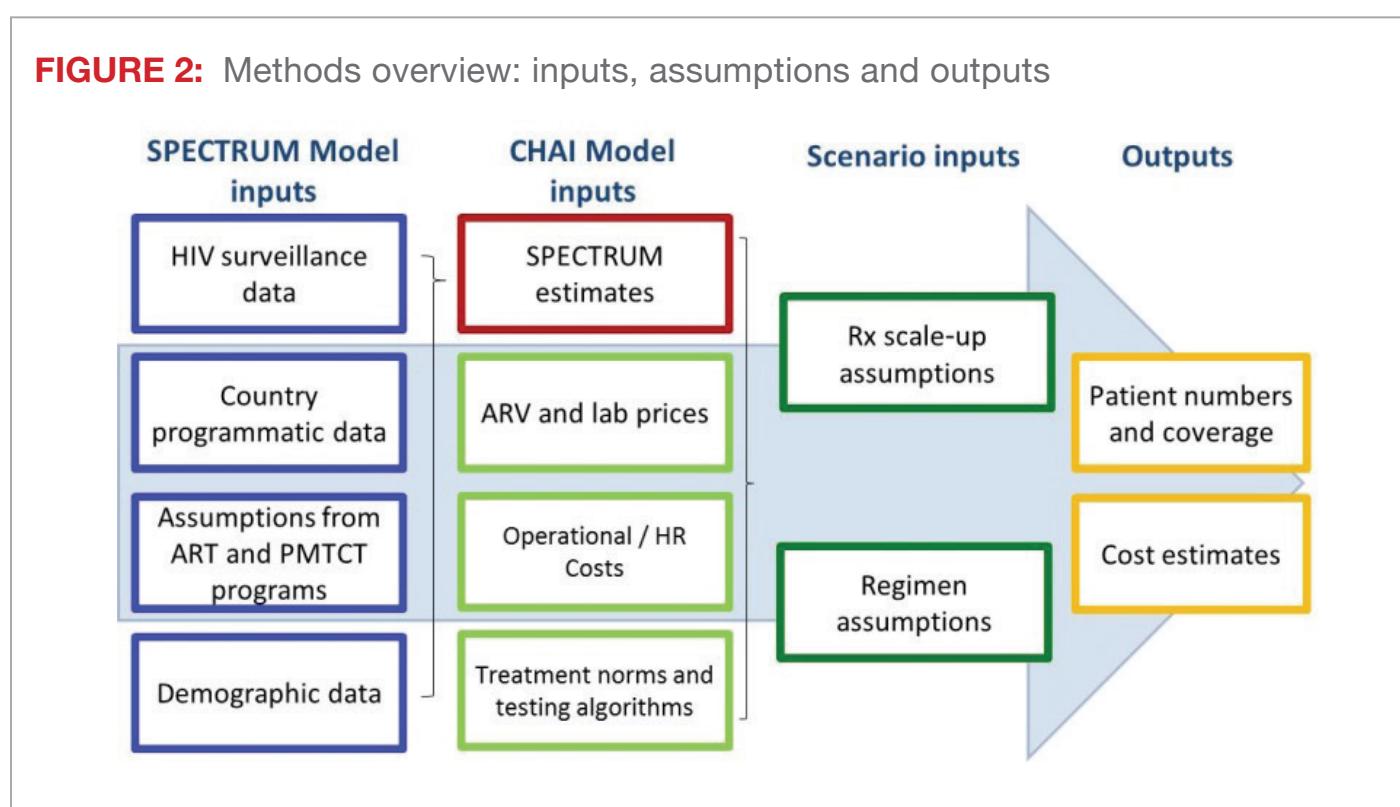
|             |   |                                      |
|-------------|---|--------------------------------------|
| Eligibility | 0-14<br>15-19   | All children<br>CD4 <500             |
| ARV         | 0-4<br>5-19   | 1L: ABC-3TC-LPV/r<br>1L: TDF-3TC-EFV |
| HR          | Clinical officers provide majority of care                |                                      |
| Lab         | Gradual shift towards an equal distribution of CD4 and VL |                                      |
| Timeframe   | 95% access by 2015  |                                      |



This is a macro-level cost analysis conducted from the payer perspective – in this case, government – for the 5-year period between 2014 and 2018. Variable costs considered include medicines (ARV's and CTX), laboratory costs (CD4 and viral load), and human resources. EID is not included as part of diagnostic costs. The analysis did not include fixed costs (e.g., infrastructure, equipment, etc.) or programmatic costs such as training, printing or monitoring. Additional costs associated with wastage and storage, as well as shipping and distribution were included and are detailed in the appendices. Patient attrition was estimated at 10% per annum. Finally, an annual inflation rate of 3% was applied across all scenarios. Costs were calculated in US dollars.

The number of children receiving treatment during the study period were projected using the Spectrum model, Version 5.03<sup>8</sup> using Zambia's national HIV surveillance, programmatic, ART and PMTCT coverage and demographic data last updated March 2014 with actual patient numbers as of December 2013 and changes to eligibility criteria based on the Zambia 2013 HIV Consolidated Guidelines. Detailed eligibility criteria, coverage rates and resulting population estimates for all scenarios can be found in Appendix I. The resulting projections of ART eligibility from each scenario were then entered into the Clinton Health Access Initiative (CHAI) PMTCT and Pediatric Impact and Costing Model<sup>9</sup> in order to generate cost estimates. Figure 2 provides an overview of the modeling inputs and outputs.

**FIGURE 2:** Methods overview: inputs, assumptions and outputs



8 Spectrum/EPP 2013 software is available for download here: <http://www.futuresinstitute.org/spectrum.aspx>

9 Contact Elizabeth McCarthy at CHAI regarding the model: [emccarthy@clintonhealthaccess.org](mailto:emccarthy@clintonhealthaccess.org)



## Antiretroviral (ARV) Medicines

Antiretroviral regimens are based on the *2013 Zambia Consolidated Guidelines for Treatment and Prevention of HIV Infection* and include ABC+3TC+LPV/r for children <5 years, and TDF+3TC+EFV for children ≥5 years and adolescents. The model assumes that children on non-conforming regimens prior to the guideline revision will be proactively switched to the regimens recommended in the new guidelines. We assume that 4% of those 5 years and older will be on a second line regimen. Regimens costed as part of scenarios that are not included in the 2013 consolidated guidelines are listed along with all medicine-related unit costs in Appendix II. Unit costs for medicines were taken from the CHAI drug price list for 2013 that the Ministry of Health uses as a guide for drug purchase; all MOH drug purchases match the CHAI prices or are less than the CHAI prices 2013 drug formulary.

## Cotrimoxazole

We modeled all patients receiving CTX for the duration of their treatment in all scenarios.

## Laboratory

Based on the 2013 guidelines, new ART patients were assumed to receive two CD4 tests and two viral load tests during the first year of treatment, and one CD4 and one viral load in each subsequent year across all scenarios. The model assumes that 100% of active patients receive these. Finally, laboratory commodity wastage was estimated at 8% each year<sup>10</sup>. Laboratory commodities and unit costs are further detailed in Appendix III.

## Human Resources

Direct, facility-level human resource costs were calculated based on salaries provided by the ZMOH for clinical officers, nurses, counselors, and laboratory technicians. Activities included direct facility-level human resource costs such as clinical exams and diagnostic tests. Salaries were averaged by cadre and pro-rated to the average number of minutes per patient visit. Average minutes spent per visit were derived from time-motion studies conducted in Zambia by CHAI in the National Facility-based Antiretroviral Treatment Costing Study in Zambia<sup>11</sup>. Detailed salary and visit length estimates are provided in Appendix III. Not included in these estimates are costs to hire and train human resources, or any non-direct facility-level costs.

## Shipping, Storage and Wastage

The model assumed a 5% annual wastage rate for tablets and 20% for syrups. Commodity shipping and distribution costs were calculated at 10% of total commodity cost, and an additional 5% was added to LPV/r syrup for cold chain costs.

<sup>10</sup> CHAI Drug Access Team

<sup>11</sup> Published 20 September 2012



## Age Group

The paediatric population was analyzed according to the following strata: <2; 2-4; 5-9; and 10-14. Adolescents were considered as one cohort aged 15-19.

## Scenario Analysis

For the purpose of differentiation and comparison, the costs and numbers on treatment associated with five additional scenarios were also calculated. In all, six scenarios were modeled (as illustrated in Figure 3):

1. 2010 Zambia guidelines and holding current coverage rates constant over the period of analysis. This serves as the baseline for comparison.
2. 2010 Zambia guidelines and reaching UA by 2018. This scenario allows for a comparison between the 2010 and 2013 guidelines, with patient numbers representing scale-up that is slower than planned.
3. 2013 ART guidelines recommended by the World Health Organization and reaching UA by 2018. This scenario allows for a comparison between the guidelines specifically adopted for Zambia to the 2013 ART guidelines that have been recommended by the WHO, but in the timeframe of UA by 2018.
4. 2013 Zambia guidelines, where UA is reached by 2015. This scenario represents the current plans of the MOH, and is what is widely reported in this document.
5. 2013 Zambia guidelines, where UA is reached by 2018, rather than 2015. This represents a more conservative rate of scale-up and provides estimates of what would happen if the scale-up goes slower than planned.
6. 2013 Zambia guidelines, where UA is reached by 2015, but using the WHO-recommended drug regimens. This allows for cost comparison specifically focused on the ARV regimen choice.

Average costs were delineated by age group with total costs and average cost per patient year presented for:

1. Pediatric population aged 0-14
2. Adolescent population aged 15-19

Appendices V - X provide a detailed picture of the costs and assumptions by scenario.



**FIGURE 3:** Treatment scenarios

| Scenario   | Guidelines                    | Eligibility               | Coverage Rate         |
|------------|-------------------------------|---------------------------|-----------------------|
| Scenario 1 | 2010 Zambian Guidelines       | <2 yrs or CD4 <25% / <350 | No change in coverage |
| Scenario 2 | 2010 Zambian Guidelines       | <2 yrs or CD4 <25% / <350 | UA by 2018            |
| Scenario 3 | 2013 WHO Guidelines           | <5 yrs or CD4 <500        | UA by 2018            |
| Scenario 4 | 2013 Zambian Guidelines       | <15 yrs                   | UA by 2015            |
| Scenario 5 | 2013 Zambian Guidelines       | <15 yrs                   | UA by 2018            |
| Scenario 6 | 2013 Zambian Guidelines w/WHO | <15 yrs                   | UA by 2015            |



# RESULTS

## The 2013 Zambia Consolidated Guidelines for Treatment and Prevention of HIV Infection for Paediatrics and Adolescents

### *Estimates of Patient Population*

Assuming the pediatric population on ART in 2013 was 82,280 (or about 54% of the HIV+ population), we start with an estimated 110,828 children 0-14 on ART in 2014, scale-up reaching universal access of 95% by 2015 with the *Zambia 2013 HIV Consolidated Guidelines* resulted in an estimated 131,908 children 0-14 years on ART by 2018 (illustrated in Table 1). The adolescent population on ART would grow from about 22,000 in 2013 to just under 25,000 in 2014 to almost 38,000 in 2018.

**TABLE 1:** Pediatric and Adolescent Patient Population

|   | 2014    | 2015    | 2016    | 2017    | 2018    |
|---|---------|---------|---------|---------|---------|
| HIV-positive children (0-14 years)                      | 148,468 | 145,888 | 144,617 | 142,178 | 138,851 |
| HIV-positive (0-14 years) on ART                        | 110,828 | 138,593 | 137,386 | 135,068 | 131,908 |
| Percent coverage (0-14 years) on ART of those eligible  | 75%     | 95%     | 95%     | 95%     | 95%     |
| HIV-positive adolescents (15-19 years)                  | 38,449  | 39,442  | 41,346  | 43,763  | 46,683  |
| HIV-positive adolescents (15-19 years) on ART           | 24,678  | 30,522  | 32,783  | 35,040  | 37,754  |
| Percent coverage (15-19 years) on ART of those eligible | 82%     | 95%     | 95%     | 95%     | 95%     |

### *Total Cost*

The total cost of treating all children (0 – 14) with UA achieved by 2015 using the *Zambia 2013 HIV Consolidated Guidelines* for the five-year period between 2014 and 2018 is estimated to be approximately US\$297 million. Total cost of treating adolescents (15 – 19) is estimated to be approximately US\$40.2 million.

**TABLE 2:** Total Cost (\$US Millions)

|              | 2014 | 2015 | 2016 | 2017 | 2018 | Total |
|--------------|------|------|------|------|------|-------|
| 0-14         | 48.8 | 62.2 | 62.5 | 62.3 | 61.3 | 297.0 |
| 15-19        | 5.8  | 7.4  | 8.1  | 8.9  | 9.9  | 40.2  |
| Total (0-19) | 54.6 | 69.6 | 70.6 | 71.2 | 71.2 | 337.3 |



### Average Cost

The average cost per person per year (PPPY) for children (0-14) is US\$453.9. As children age, the average cost decreases from US\$506.7 PPPY among children aged 0-9, to US\$345.3 PPY among those aged 10-14. Average cost for adolescents aged 15-19 is estimated at US\$248.9 PPPY (Table 3). Average cost among younger cohorts is higher and attributable to more expensive paediatric drug regimens and formulations.

**TABLE 3:** Average Cost Per Patient Per Year (US\$)

|       | 2014  | 2015  | 2016  | 2017  | 2018  | Average |
|-------|-------|-------|-------|-------|-------|---------|
| 0-9   | 480.7 | 495.7 | 507.3 | 519.2 | 530.7 | 506.7   |
| 10-14 | 337.3 | 342.0 | 345.5 | 350.0 | 351.5 | 345.3   |
| 15-19 | 236.4 | 242.9 | 248.3 | 255.1 | 261.9 | 248.9   |
| 0-14  | 440.0 | 448.9 | 455.0 | 460.9 | 464.7 | 453.9   |
| 0-19  | 402.9 | 411.7 | 415.2 | 418.5 | 419.6 | 413.6   |

### Cost per Category

ARVs are responsible for 81% of total pediatric costs. ARVs are also the major cost driver of adolescent ART and constitute 67% of the total cost. Costs in each category per year are outlined below in Tables 4 and 5.

**TABLE 4:** Costs 0-14 (US\$ Millions)

|                 | 2014        | 2015        | 2016        | 2017        | 2018        | Total        |
|-----------------|-------------|-------------|-------------|-------------|-------------|--------------|
| ARVs            | 39.3        | 50.2        | 50.6        | 50.5        | 49.9        | 240.5        |
| CTX             | 1.2         | 1.5         | 1.5         | 1.4         | 1.4         | 7.0          |
| Direct HR       | 2.4         | 3.0         | 2.8         | 2.8         | 2.7         | 13.8         |
| Lab Commodities | 5.9         | 7.5         | 7.5         | 7.5         | 7.3         | 35.7         |
| <b>Total</b>    | <b>48.8</b> | <b>62.2</b> | <b>62.5</b> | <b>62.3</b> | <b>61.3</b> | <b>297.0</b> |

**TABLE 5:** Costs 15-19 (US\$ Millions)

|                 | 2014       | 2015       | 2016       | 2017       | 2018       | Total       |
|-----------------|------------|------------|------------|------------|------------|-------------|
| ARVs            | 3.9        | 5.0        | 5.5        | 6.0        | 6.6        | 27.0        |
| CTX             | 0.2        | 0.3        | 0.3        | 0.3        | 0.4        | 1.5         |
| Direct HR       | 0.5        | 0.7        | 0.7        | 0.8        | 0.8        | 3.5         |
| Lab Commodities | 1.2        | 1.5        | 1.7        | 1.8        | 2.0        | 8.3         |
| <b>Total</b>    | <b>5.8</b> | <b>7.4</b> | <b>8.1</b> | <b>8.9</b> | <b>9.9</b> | <b>40.2</b> |



## Comparison Scenarios (See Table 6 for detailed information)

The *Zambia 2013 HIV Consolidated Guidelines* with 95% UA achieved by 2015 (scenario 4) has the highest total cost at US\$297 million over five years. This is followed by scenario 6 at US\$272 million. Scenario 6 has the same eligibility criteria and therefore the number of patients on treatment each year as scenario 4; the only difference is that scenario 6 adopts the WHO-recommended regimens. Patient volume has the greatest bearing on cost. Therefore we can infer that the savings from substituting WHO-recommended regimens for the same patient population is US\$15 million. The 2013 WHO Guidelines recommends regimens with lower costs per patient than what ZMOH has decided to include in the national guidelines (e.g. WHO recommends use of ABC instead of TDF for those under 35kg as there is no generic formulation of paediatric TDF). The cost PPPY in scenario 6, US\$414.6, is roughly \$39 lower than the average of US\$453.9 seen in scenario 4.

The incremental cost of the *Zambia 2013 HIV Consolidated Guidelines* with UA by 2018 (Scenario 5) over the period 2014-2018 compared to the WHO 2013 guidelines with UA by 2018 (Scenario 3) is roughly US\$67 million for children 0-14. This is due to two main factors: 1) the difference between coverage rates – all under 15 in the Zambian guidelines compared to all under 5 in the WHO guidelines – and 2) the drug regimen choices made in Zambia.

Implementing the 2013 WHO guidelines in Zambia (scenario 3) with UA reached by 2018 would cost approximately US\$179.9 million, and yield 106,251 children on ART by 2018. This is approximately US\$117 million less expensive over the five-year period than the *Zambia 2013 HIV Consolidated Guidelines* (scenario 4). It results in slower expansion of treatment access, with almost 26,000 fewer children on ART in 2018.

**TABLE 6:** Overview of Outputs per Scenario (0-14)

| Scenario | Scenario Description                                       | Number on ART in 2018 | Total Cost 2014-2018 (US\$ million) | Cost Per Patient Year 2014-2018 (US\$) |
|----------|--|-----------------------|-------------------------------------|--|
| 1        | Base case: 2010 Zambia Guidelines [without scale-up to UA] | 45,750                | 63.7                                | 268.3                                  |
| 2        | 2010 Zambia Guidelines [2018]                              | 87,578                | 158.2                               | 443.1                                  |
| 3        | 2013 WHO Guidelines [2018]                                 | 106,251               | 179.9                               | 417.3                                  |
| 4        | 2013 Zambia Guidelines [2015]                              | 131,908               | 297.0                               | 453.9                                  |
| 5        | 2013 Zambia Guidelines [2018]                              | 127,063               | 246.9                               | 447.6                                  |
| 6        | 2013 Zambia Guidelines with WHO Regimens [2015]            | 131,908               | 272.0                               | 414.6                                  |



The third most expensive scenario overall was scenario 5, where UA was reached by 2018 under the *Zambia 2013 HIV Consolidated Guidelines*. This scenario cost approximately US\$246.9 million, or US\$50 million less than scenario 4, and yields 127,063 children (0-14) on treatment at the end of 2018. This slower rate of scale up results in approximately 5,000 fewer children on ART in 2018 compared to scenario 4.

The two scenarios that conferred the lowest estimate of children and adolescents on ART were the baseline scenario where the status quo (2010 Zambian guidelines) is maintained with no scale-up (scenario 1), and scenario 2 where we continue to implement the 2010 Zambia guidelines and reach UA by 2018.

By comparing different scenarios, the variables leading to varying costs and numbers of patients on ART can be distinguished. Programmatic scale-up, to increase ART coverage from the current level (38%) to UA (95%), resulted in the largest increase in number on ART with almost 41,828 additional patients on treatment by 2018 (scenario 1 versus scenario 2). Expanding eligibility from the current 2010 Zambian guidelines to 2013 WHO guidelines increases treatment by another almost 18,673 patients (scenario 2 versus scenario 3). Expansion of eligibility from 2013 WHO guidelines to the *Zambia 2013 HIV Consolidated Guidelines*, with UA by 2018 (scenario 3 versus scenario 5) increases treatment numbers by over 20,000 patients. Similarly, a more rapid scale-up to UA of the Zambia guidelines increases the total on ART in 2018 by nearly another 5,000 patients (scenario 4 versus scenario 5).

Table 6 provides a summary of total costs and numbers on ART by scenario for children by the end of 2018. The complete summary tables with total and average costs by year can be found in Appendix IV. Age-stratified results for each of the scenarios, including costs broken down by cost category, total costs, costs PPY and numbers receiving and eligible for ART, can be found in Appendices V – XI.

## DISCUSSION AND CONSIDERATIONS

This study presents high-level estimates intended to provide a reasonable estimate of what can be expected in terms of costs and outputs (numbers on ART) following implementation of the *Zambia 2013 HIV Consolidated Guidelines* and programmatic expansion. Although we take into account the major cost components (medicines, laboratory commodities and human resources), not all costs are included, such as fixed costs (e.g. infrastructure, equipment, etc.). These estimates of direct costs are therefore likely an underestimate of the true cost of providing universal access to children and adolescents in Zambia.

However, it is also important to note that the roll out of the new guidelines and scale-up will likely result in fewer clinic visits, hospitalizations and deaths among children. This analysis does not take into account these potentially significant savings to the health system achieved by having greater numbers of children and adolescents on ART. It also does not consider the wider societal benefits of having them attend school and ultimately become healthy, productive members of their families and society.

It is worth noting that scenario 6 (*Zambia 2013 HIV Consolidated Guidelines with WHO regimens*) confers the same estimate on treatment (just under 131,908 on ART) as scenario 4 (*Zambia 2013 HIV Consolidated Guidelines by 2015*) at a somewhat lower cost (approximately US\$272 million over 5 years) during the period



of analysis. This difference in cost can be attributed to more expensive regimens selected for use in the Zambia 2013 HIV Consolidated Guidelines, specifically the use of tenofovir in children between the ages 5 and 9, as well as the implementation of proactive switching for children on previously-recommended regimens. Outcomes, such as better viral suppression, fewer side effects and, consequently, fewer clinic visits between the two sets of regimens should be evaluated to better understand if the difference in cost is justified. Finally, it is important to point out that costs may decrease over time if less-expensive paediatric fixed-dose combinations (particularly for TDF-containing regimens) become available.

We have included numerous scale-up scenarios so that the factors contributing to cost increases and coverage expansion can be distinguished and compared, not for the purpose of questioning or second-guessing the new guidelines. Zambia's commitment to improving coverage from its current low level (38%) to UA is responsible for the majority of new patients, even without any expansion of ART eligibility. The different choices for eligibility expansion add to that patient volume, as well as to cost, in measured amounts. While a more rapid scale-up to UA contributes a relatively small number of total children and adolescents on ART by 2018, it does contribute greatly to the 5-year costs since so many new patients are on ART for the years between 2015 and 2018. All of these factors should be considered as the national ART program plans and allocates resources on the path to improved treatment coverage for children and adolescents living with HIV.



## APPENDIX I: Eligibility Criteria, Coverage Rates and Estimated Eligible Population by Scenario

| Scenario   | Eligibility |                    |                    |                    |                    | Coverage Rates |                     |            |            |            |            |            |
|--|-------------|--------------------|--------------------|--------------------|--------------------|----------------|---------------------|------------|------------|------------|------------|------------|
|  | 2014        | 2015               | 2016               | 2017               | 2018               |                | 2014                | 2015       | 2016       | 2017       | 2018       |            |
| 1 - Base Case  | Age<br>CD4  | <2<br><25%<br><350 | <2<br><25%<br><350 | <2<br><25%<br><350 | <2<br><25%<br><350 |                | 0-14 yr<br>15-19 yr | 54%<br>80% | 54%<br>80% | 54%<br>80% | 54%<br>80% |            |
| 2 - 2010 Zambia Guidelines                           | Age<br>CD4  | <2<br><25%<br><350 | <2<br><25%<br><350 | <2<br><25%<br><350 | <2<br><25%<br><350 |                | 0-14 yr<br>15-19 yr | 62%<br>90% | 71%<br>91% | 79%<br>93% | 87%<br>94% | 95%<br>95% |
| 3 - 2013 WHO Guidelines                              | Age<br>CD4  | <5<br><500         | <5<br><500         | <5<br><500         | <5<br><500         |                | 0-14 yr<br>15-19 yr | 62%<br>74% | 71%<br>79% | 79%<br>84% | 87%<br>90% | 95%<br>95% |
| 4 - 2013 Zambia Guidelines [2015]                    | Age<br>CD4  | <15<br><500        | <15<br><500        | <15<br><500        | <15<br><500        |                | 0-14 yr<br>15-19 yr | 75%<br>82% | 95%<br>95% | 95%<br>95% | 95%<br>95% | 95%<br>95% |
| 5 - 2013 Zambia Guidelines [2018]                    | Age<br>CD4  | <15<br><500        | <15<br><500        | <15<br><500        | <15<br><500        |                | 0-14 yr<br>15-19 yr | 62%<br>74% | 71%<br>79% | 79%<br>84% | 87%<br>90% | 95%<br>95% |
| 6 - 2013 Zambia Guidelines [2015] w/<br>WHO Regimens | Age<br>CD4  | <15<br><500        | <15<br><500        | <15<br><500        | <15<br><500        |                | 0-14 yr<br>15-19 yr | 75%<br>82% | 95%<br>95% | 95%<br>95% | 95%<br>95% | 95%<br>95% |



## APPENDIX II: Medicines

### Regimen Assumptions

- Regimens used are based on the proposed 2013 Zambian Guidelines and the Preliminary Forecasting and Quantification Report

#### ZAMBIA GUIDELINES REGIMENS

##### <5 years

|  |               |
|--|---------------|
| <3 mos: Preferred 1L regimen           | ABC+3TC+LPV/r |
| 3 mos – 5 years: Preferred 1L regimen  | ABC+3TC+LPV/r |
| Proactive switch of existing patients? | Yes           |
| % that will be proactively switched    | 100%          |
| % with TB co-infection                 | 6.4%          |
| Regimen for TB co-infected (<3 years)  | AZT+3TC+ABC   |
| Regimen for TB co-infected (>3 years)  | ABC+3TC+EFV   |

##### >5 years

|  |               |
|--|---------------|
| Preferred 1L regimen                   | TDF+XTC+EFV   |
| Proactive switch of existing patients? | Yes           |
| % that will be proactively switched    | 100%          |
| Percentage with renal complications    | 2%            |
| Regimen for renal complications        | ABC+3TC+EFV   |
| Percentage on 2L                       | 4%            |
| 2L: Existing patients >5 years         | AZT+3TC+LPV/r |

- Assumes children on other regimens will be proactively switched to recommended regimens

- Regimens used are based on the 2013 WHO Guidelines

#### WHO 2013 GUIDELINES REGIMENS

##### <3 years

|                                       |               |
|---------------------------------------|---------------|
| Preferred 1L regimen                  | ABC+3TC+LPV/r |
| Proactive switch of existing patients | No            |
| % with TB co-infection                | 6.4%          |
| Regimen for TB co-infected            | AZT+3TC+ABC   |

##### 3-9 years (<35 kg)

|                      |               |
|----------------------|---------------|
| Preferred 1L regimen | ABC+3TC+EFV   |
| Percentage on 2L     | 4%            |
| Preferred 2L regimen | AZT+3TC+LPV/r |

##### >=10 years (>35 kg)

|                                 |               |
|---------------------------------|---------------|
| Preferred 1L regimen            | TDF+3TC+EFV   |
| % with renal complications      | 2%            |
| Regimen for renal complications | ABC+3TC+EFV   |
| Percentage on 2L                | 4%            |
| Preferred 2L regimen            | AZT+3TC+LPV/r |

- Assumes only new initiations will be placed on preferred regimens

### Cotrimoxazole costs

- All patients will be on CTX for duration of ART
- Pricing and schedule as follows:

| Formulation                   | Price per unit |
|-------------------------------|----------------|
| SMX 200 mg + TMP 40 mg / 5 ml | \$ 0.01        |
| SMX 400 mg / TMP 80 mg        | \$ 0.01        |

| 3.0-5.9 kg | 6.0-9.9 kg | 10.0-10.9 kg | 11.0-13.9 kg | 14.0-24.9 kg | 25.0kg - adult |
|------------|------------|--------------|--------------|--------------|----------------|
| 0.25       | 5          | 5            | 5            | 0            | 0              |
| 0          | 0          | 0            | 0            | 1            | 2              |

- Other miscellaneous:

| Assumption                                     | Value |
|--|-------|
| ARVs & CTX - % wastage for tablets             | 5%    |
| ARVs & CTX - % wastage for syrups              | 20%   |
| % shipping & distr. costs of drugs/commodities | 10%   |
| % Additional cost for keeping LPV/r syrup cold | 5%    |
| Annual inflation rate applied to cost outputs  | 3%    |
| Rate of patient attrition                      | 10%   |



## APPENDIX III: Laboratory Commodities and Human Resources

### Lab Commodity Costs, CD4 & VL testing

- Lab commodity costs:

| Commodity                     | Price per test |
|-------------------------------|----------------|
| HIV Rapid Test                | \$ 6.07        |
| EID Test                      | \$ 18.70       |
| CD4 Test                      | \$ 6.07        |
| Anemia Test                   | \$ 0.25        |
| BS (Blood slide)              | \$ 1.00        |
| Urine dipstick (protein test) | \$ 0.50        |
| ALT Test                      | \$ 1.95        |
| FBC Test                      | \$ 4.32        |
| Viral Load Test               | \$ 25.00       |

- 8% wastage on lab commodities

### CD4 & VL testing assumptions

- All new patients will get 2 CD4 tests and 2 VL tests in their first year
- All existing patients will get 1 CD4 and 1 VL test per year
- 100% of children on ART will get both CD4 and VL testing

### Salary & HR Productivity

| Cadre                         | Annual Salaries | Clinical hours worked/day | Days worked/week | Weeks worked/year |
|-------------------------------|-----------------|---------------------------|------------------|-------------------|
| Doctor                        | \$ 52,901       | 6                         | 5                | 45                |
| Nurse                         | \$ 12,263       | 6                         | 5                | 45                |
| Counselor                     | \$ 8,974        | 6                         | 5                | 45                |
| Lab Technician                | \$ 12,263       | 6                         | 5                | 45                |
| Pharmacist                    | \$ 12,263       | 6                         | 5                | 45                |
| Data clerk                    | \$ 7,028        | 6                         | 5                | 45                |
| Clinical Officer              | \$ 12,263       | 6                         | 5                | 45                |
| Comm. Health Assistants (CHA) | \$ 3,396        | 6                         | 5                | 45                |

| Cadre Type       | Avg Min/Visit | Avg. Visits/ Year |
|------------------|---------------|-------------------|
| Clinical Officer | 17            | 4                 |
| Nurse            | 14            | 12                |
| Counselor        | 19            | 12                |
| Lab Technician   | 8             | 2                 |
| Pharmacist       | 9             | 12                |
| Data clerks      | 11            | 12                |



## APPENDIX IV: Summary of Outputs by Scenario

### Summary of ARV, Cotrim, Lab, & HR Costs: 0-19 years

|                                    | 2014          | 2015          | 2016          | 2017          | 2018          | Total          |
|------------------------------------|---------------|---------------|---------------|---------------|---------------|----------------|
| Base case                          | \$ 18,138,859 | \$ 19,089,347 | \$ 19,969,359 | \$ 20,603,813 | \$ 21,116,229 | \$ 98,917,608  |
| 2010 Zambian GL                    | \$ 28,956,387 | \$ 33,090,587 | \$ 37,822,338 | \$ 43,105,104 | \$ 49,024,331 | \$ 191,998,747 |
| 2013 WHO Guidelines                | \$ 29,991,478 | \$ 35,678,326 | \$ 42,489,395 | \$ 49,763,663 | \$ 57,627,971 | \$ 215,550,833 |
| 2013 Zambian Guidelines [2015]     | \$ 54,600,255 | \$ 69,626,054 | \$ 70,645,781 | \$ 71,197,676 | \$ 71,189,933 | \$ 337,259,699 |
| 2013 Zambian Guidelines [2018]     | \$ 45,195,773 | \$ 50,835,210 | \$ 56,555,075 | \$ 62,035,589 | \$ 67,644,942 | \$ 282,266,589 |
| 2013 Zam GL [2015] w/ WHO Regimens | \$ 47,314,135 | \$ 64,654,766 | \$ 66,275,397 | \$ 67,360,254 | \$ 68,229,457 | \$ 313,834,010 |

### Summary of total costs per patient per year (PPPY): 0-19 years

|                                    | 2014      | 2015      | 2016      | 2017      | 2018      | Average   |
|------------------------------------|-----------|-----------|-----------|-----------|-----------|-----------|
| Base case                          | \$ 252.90 | \$ 261.78 | \$ 269.45 | \$ 277.17 | \$ 285.65 | \$ 269.39 |
| 2010 Zambian GL                    | \$ 364.97 | \$ 375.33 | \$ 386.19 | \$ 398.20 | \$ 410.76 | \$ 387.09 |
| 2013 WHO Guidelines                | \$ 339.43 | \$ 359.13 | \$ 379.72 | \$ 398.09 | \$ 412.74 | \$ 377.82 |
| 2013 Zambian Guidelines [2015]     | \$ 402.94 | \$ 411.71 | \$ 415.15 | \$ 418.54 | \$ 419.60 | \$ 413.59 |
| 2013 Zambian Guidelines [2018]     | \$ 394.21 | \$ 401.76 | \$ 407.35 | \$ 411.05 | \$ 414.17 | \$ 405.71 |
| 2013 Zam GL [2015] w/ WHO Regimens | \$ 349.17 | \$ 382.31 | \$ 389.47 | \$ 395.99 | \$ 402.15 | \$ 383.82 |

### Summary of ARV, Cotrim, Lab, & HR Costs: 0-14 years

|   | 2014          | 2015          | 2016          | 2017          | 2018          | Total          |
|---|---------------|---------------|---------------|---------------|---------------|----------------|
| Base case: 2010 Zam GL w/o Increased Coverage | \$ 12,189,365 | \$ 12,511,370 | \$ 12,868,971 | \$ 13,062,265 | \$ 13,073,701 | \$ 63,705,673  |
| 2010 Zambian Guidelines                       | \$ 23,554,993 | \$ 26,988,016 | \$ 31,062,737 | \$ 35,693,708 | \$ 40,849,543 | \$ 158,148,998 |
| 2013 WHO Guidelines                           | \$ 24,336,074 | \$ 29,311,040 | \$ 35,421,735 | \$ 41,944,517 | \$ 48,840,243 | \$ 179,853,608 |
| 2013 Zambian Guidelines [2015]                | \$ 54,600,255 | \$ 69,626,054 | \$ 70,645,781 | \$ 71,197,676 | \$ 71,189,933 | \$ 337,259,699 |
| 2013 Zambian Guidelines [2018]                | \$ 45,195,773 | \$ 50,835,210 | \$ 56,555,075 | \$ 62,035,589 | \$ 67,644,942 | \$ 282,266,589 |
| 2013 Zam GL [2015] with WHO Regimens          | \$ 47,314,135 | \$ 64,654,766 | \$ 66,275,397 | \$ 67,360,254 | \$ 68,229,457 | \$ 313,834,010 |

### Summary of total costs per patient per year (PPPY): 0-14 years

|   | 2014      | 2015      | 2016      | 2017      | 2018      | Average   |
|---|-----------|-----------|-----------|-----------|-----------|-----------|
| Base case: 2010 Zam GL w/o Increased Coverage | \$ 250.57 | \$ 260.35 | \$ 268.37 | \$ 276.43 | \$ 285.77 | \$ 268.30 |
| 2010 Zambian Guidelines                       | \$ 421.06 | \$ 432.02 | \$ 442.22 | \$ 453.63 | \$ 466.44 | \$ 443.07 |
| 2013 WHO Guidelines                           | \$ 368.40 | \$ 394.46 | \$ 420.67 | \$ 443.39 | \$ 459.67 | \$ 417.32 |
| 2013 Zambian Guidelines [2015]                | \$ 402.94 | \$ 411.71 | \$ 415.15 | \$ 418.54 | \$ 419.60 | \$ 413.59 |
| 2013 Zambian Guidelines [2018]                | \$ 394.21 | \$ 401.76 | \$ 407.35 | \$ 411.05 | \$ 414.17 | \$ 405.71 |
| 2013 Zam GL [2015] with WHO Regimens          | \$ 349.17 | \$ 382.31 | \$ 389.47 | \$ 395.99 | \$ 402.15 | \$ 383.82 |



### **Patients on ART: 0-19 years**

|                                    | 2014    | 2015    | 2016    | 2017    | 2018    |
|------------------------------------|---------|---------|---------|---------|---------|
| Base case                          | 71,722  | 72,921  | 74,111  | 74,338  | 73,924  |
| 2010 Zambian GL                    | 79,340  | 88,164  | 97,937  | 108,251 | 119,351 |
| 2013 WHO Guidelines                | 88,358  | 99,345  | 111,897 | 125,007 | 139,624 |
| 2013 Zambian Guidelines [2015]     | 135,506 | 169,114 | 170,169 | 170,108 | 169,662 |
| 2013 Zambian Guidelines [2018]     | 114,649 | 126,531 | 138,837 | 150,919 | 163,325 |
| 2013 Zam GL [2015] w/ WHO Regimens | 135,506 | 169,114 | 170,169 | 170,108 | 169,662 |

### **Patients eligible for treatment: 0-19 years**

|                                    | 2014    | 2015    | 2016    | 2017    | 2018    |
|------------------------------------|---------|---------|---------|---------|---------|
| Base case                          | 115,584 | 116,510 | 117,777 | 117,532 | 115,990 |
| 2010 Zambian GL                    | 115,585 | 116,662 | 119,167 | 122,123 | 125,633 |
| 2013 WHO Guidelines                | 135,952 | 136,891 | 139,749 | 142,795 | 146,973 |
| 2013 Zambian Guidelines [2015]     | 178,618 | 178,015 | 179,125 | 179,061 | 178,592 |
| 2013 Zambian Guidelines [2018]     | 178,062 | 175,392 | 173,925 | 172,575 | 171,921 |
| 2013 Zam GL [2015] w/ WHO Regimens | 178,618 | 178,015 | 179,125 | 179,061 | 178,592 |

### **Patients on ART: 0-14 years**

|   | 2014    | 2015    | 2016    | 2017    | 2018    |
|---|---------|---------|---------|---------|---------|
| Base case: 2010 Zam GL w/o Increased Coverage | 48,647  | 48,056  | 47,952  | 47,254  | 45,750  |
| 2010 Zambian Guidelines                       | 55,942  | 62,470  | 70,243  | 78,684  | 87,578  |
| 2013 WHO Guidelines                           | 66,059  | 74,306  | 84,202  | 94,600  | 106,251 |
| 2013 Zambian Guidelines [2015]                | 135,506 | 169,114 | 170,169 | 170,108 | 169,662 |
| 2013 Zambian Guidelines [2018]                | 114,649 | 126,531 | 138,837 | 150,919 | 163,325 |
| 2013 Zam GL [2015] with WHO Regimens          | 135,506 | 169,114 | 170,169 | 170,108 | 169,662 |

### **Patients eligible for treatment: 0-14 years**

|   | 2014    | 2015    | 2016    | 2017    | 2018    |
|---|---------|---------|---------|---------|---------|
| Base case: 2010 Zam GL w/o Increased Coverage | 89,598  | 88,508  | 88,318  | 87,032  | 84,261  |
| 2010 Zambian Guidelines                       | 89,599  | 88,513  | 89,234  | 90,588  | 92,187  |
| 2013 WHO Guidelines                           | 105,802 | 105,284 | 106,967 | 108,912 | 111,843 |
| 2013 Zambian Guidelines [2015]                | 178,618 | 178,015 | 179,125 | 179,061 | 178,592 |
| 2013 Zambian Guidelines [2018]                | 178,062 | 175,392 | 173,925 | 172,575 | 171,921 |
| 2013 Zam GL [2015] with WHO Regimens          | 178,618 | 178,015 | 179,125 | 179,061 | 178,592 |



## APPENDIX V: Outputs from Scenario 1: Base Case

### Costs for ARVs by Age Range (USD)

|                 | 2014         | 2015         | 2016         | 2017         | 2018         | Total         |
|-----------------|--------------|--------------|--------------|--------------|--------------|---------------|
| 0 to <2 years   | \$ 834,324   | \$ 664,240   | \$ 687,463   | \$ 722,761   | \$ 689,399   | \$ 3,598,187  |
| 2 to <5 years   | \$ 1,518,394 | \$ 1,630,431 | \$ 1,515,731 | \$ 1,309,624 | \$ 1,070,207 | \$ 7,044,388  |
| 5 to <10 years  | \$ 2,522,528 | \$ 2,649,370 | \$ 2,804,735 | \$ 2,956,559 | \$ 3,112,811 | \$ 14,046,002 |
| 10 to <15 years | \$ 2,686,221 | \$ 2,866,372 | \$ 3,045,933 | \$ 3,208,155 | \$ 3,364,948 | \$ 15,171,629 |
| 15 to <20 years | \$ 4,110,291 | \$ 4,558,173 | \$ 4,931,061 | \$ 5,245,824 | \$ 5,603,381 | \$ 24,448,730 |

|                 |              |              |              |              |              |               |
|-----------------|--------------|--------------|--------------|--------------|--------------|---------------|
| 0 to <10 years  | \$ 4,875,245 | \$ 4,944,040 | \$ 5,007,929 | \$ 4,988,944 | \$ 4,872,417 | \$ 24,688,576 |
| 10 to <15 years | \$ 2,686,221 | \$ 2,866,372 | \$ 3,045,933 | \$ 3,208,155 | \$ 3,364,948 | \$ 15,171,629 |
| 15 to <20 years | \$ 4,110,291 | \$ 4,558,173 | \$ 4,931,061 | \$ 5,245,824 | \$ 5,603,381 | \$ 24,448,730 |

|                |               |               |               |               |               |               |
|----------------|---------------|---------------|---------------|---------------|---------------|---------------|
| 0 to <15 years | \$ 7,561,466  | \$ 7,810,412  | \$ 8,053,862  | \$ 8,197,100  | \$ 8,237,365  | \$ 39,860,205 |
| 0 to <20 years | \$ 11,671,757 | \$ 12,368,585 | \$ 12,984,923 | \$ 13,442,924 | \$ 13,840,746 | \$ 64,308,935 |

### Costs for ARVs, Cotrim, Lab Commodities, HR (USD, including shipping)

| 0 to <10 years  | 2014         | 2015         | 2016         | 2017         | 2018         | Total         |
|-----------------|--------------|--------------|--------------|--------------|--------------|---------------|
| ARV Costs       | \$ 5,362,770 | \$ 5,438,444 | \$ 5,508,722 | \$ 5,487,839 | \$ 5,359,659 | \$ 27,157,434 |
| Cotrim Costs    | \$ 467,473   | \$ 462,429   | \$ 455,717   | \$ 437,170   | \$ 402,886   | \$ 2,225,674  |
| Direct HR Costs | \$ 694,197   | \$ 692,418   | \$ 703,592   | \$ 698,587   | \$ 675,392   | \$ 3,464,186  |
| Lab Commodities | \$ 1,573,989 | \$ 1,575,221 | \$ 1,594,823 | \$ 1,593,410 | \$ 1,557,578 | \$ 7,895,020  |
|                 | \$ 8,098,428 | \$ 8,168,511 | \$ 8,262,854 | \$ 8,217,005 | \$ 7,995,515 | \$ 40,742,313 |

| 10 to <15 years | 2014         | 2015         | 2016         | 2017         | 2018         | Total         |
|-----------------|--------------|--------------|--------------|--------------|--------------|---------------|
| ARV Costs       | \$ 2,954,843 | \$ 3,153,009 | \$ 3,350,526 | \$ 3,528,971 | \$ 3,701,443 | \$ 16,688,792 |
| Cotrim Costs    | \$ 78,432    | \$ 83,692    | \$ 88,935    | \$ 93,672    | \$ 98,250    | \$ 442,981    |
| Direct HR Costs | \$ 323,087   | \$ 337,687   | \$ 357,608   | \$ 373,822   | \$ 388,912   | \$ 1,781,115  |
| Lab Commodities | \$ 734,575   | \$ 768,471   | \$ 809,048   | \$ 848,796   | \$ 889,581   | \$ 4,050,472  |
|                 | \$ 4,090,937 | \$ 4,342,859 | \$ 4,606,117 | \$ 4,845,260 | \$ 5,078,186 | \$ 22,963,359 |

| 15 to <20 years | 2014         | 2015         | 2016         | 2017         | 2018         | Total         |
|-----------------|--------------|--------------|--------------|--------------|--------------|---------------|
| ARV Costs       | \$ 4,110,291 | \$ 4,558,173 | \$ 4,931,061 | \$ 5,245,824 | \$ 5,603,381 | \$ 24,448,730 |
| Cotrim Costs    | \$ 200,394   | \$ 222,230   | \$ 240,410   | \$ 255,756   | \$ 273,189   | \$ 1,191,980  |
| Direct HR Costs | \$ 528,174   | \$ 581,910   | \$ 624,834   | \$ 660,338   | \$ 701,306   | \$ 3,096,562  |
| Lab Commodities | \$ 1,110,635 | \$ 1,215,664 | \$ 1,304,083 | \$ 1,379,629 | \$ 1,464,653 | \$ 6,474,664  |
|                 | \$ 5,949,494 | \$ 6,577,977 | \$ 7,100,388 | \$ 7,541,548 | \$ 8,042,528 | \$ 35,211,935 |



### Summary of Costs for ARVs, Cotrim, Lab Commodities, HR (USD, including shipping)

| 0 to <15 years  | 2014          | 2015          | 2016          | 2017          | 2018          | Total         |
|-----------------|---------------|---------------|---------------|---------------|---------------|---------------|
| ARV Costs       | \$ 8,317,613  | \$ 8,591,453  | \$ 8,859,248  | \$ 9,016,810  | \$ 9,061,102  | \$ 43,846,226 |
| Cotrim Costs    | \$ 545,905    | \$ 546,121    | \$ 544,652    | \$ 530,841    | \$ 501,136    | \$ 2,668,655  |
| Direct HR Costs | \$ 1,017,283  | \$ 1,030,104  | \$ 1,061,199  | \$ 1,072,409  | \$ 1,064,305  | \$ 5,245,300  |
| Lab Commodities | \$ 2,308,564  | \$ 2,343,692  | \$ 2,403,871  | \$ 2,442,206  | \$ 2,447,159  | \$ 11,945,492 |
|                 | \$ 12,189,365 | \$ 12,511,370 | \$ 12,868,971 | \$ 13,062,265 | \$ 13,073,701 | \$ 63,705,673 |

| 0 to <20 years  | 2014          | 2015          | 2016          | 2017          | 2018          | Total         |
|-----------------|---------------|---------------|---------------|---------------|---------------|---------------|
| ARV Costs       | \$ 12,427,904 | \$ 13,149,626 | \$ 13,790,310 | \$ 14,262,634 | \$ 14,664,482 | \$ 68,294,956 |
| Cotrim Costs    | \$ 746,299    | \$ 768,351    | \$ 785,062    | \$ 786,598    | \$ 774,325    | \$ 3,860,635  |
| Direct HR Costs | \$ 1,545,457  | \$ 1,612,014  | \$ 1,686,033  | \$ 1,732,747  | \$ 1,765,611  | \$ 8,341,862  |
| Lab Commodities | \$ 3,419,199  | \$ 3,559,356  | \$ 3,707,954  | \$ 3,821,835  | \$ 3,911,812  | \$ 18,420,155 |
|                 | \$ 18,138,859 | \$ 19,089,347 | \$ 19,969,359 | \$ 20,603,813 | \$ 21,116,229 | \$ 98,917,608 |

### Costs for ARV, Labs, and HRH Per Patient Per Year (USD)

| 0 to <10 years    | 2014      | 2015      | 2016      | 2017      | 2018      | Average   |
|-------------------|-----------|-----------|-----------|-----------|-----------|-----------|
| ARV Costs PPPY    | \$ 159.63 | \$ 167.60 | \$ 173.10 | \$ 178.63 | \$ 185.70 | \$ 172.93 |
| Cotrim Costs PPPY | \$ 13.91  | \$ 14.25  | \$ 14.32  | \$ 14.23  | \$ 13.96  | \$ 14.14  |
| HR Costs PPPY     | \$ 20.66  | \$ 21.34  | \$ 22.11  | \$ 22.74  | \$ 23.40  | \$ 22.05  |
| Lab Costs PPPY    | \$ 46.85  | \$ 48.55  | \$ 50.11  | \$ 51.87  | \$ 53.97  | \$ 50.27  |
|                   | \$ 241.06 | \$ 251.74 | \$ 259.64 | \$ 267.46 | \$ 277.03 | \$ 259.39 |

| 10 to <15 years   | 2014      | 2015      | 2016      | 2017      | 2018      | Average   |
|-------------------|-----------|-----------|-----------|-----------|-----------|-----------|
| ARV Costs PPPY    | \$ 196.31 | \$ 202.02 | \$ 207.74 | \$ 213.46 | \$ 219.18 | \$ 207.74 |
| Cotrim Costs PPPY | \$ 5.21   | \$ 5.36   | \$ 5.51   | \$ 5.67   | \$ 5.82   | \$ 5.51   |
| HR Costs PPPY     | \$ 21.46  | \$ 21.64  | \$ 22.17  | \$ 22.61  | \$ 23.03  | \$ 22.18  |
| Lab Costs PPPY    | \$ 48.80  | \$ 49.24  | \$ 50.16  | \$ 51.34  | \$ 52.68  | \$ 50.44  |
|                   | \$ 271.78 | \$ 278.26 | \$ 285.59 | \$ 293.08 | \$ 300.70 | \$ 285.88 |

| 15 to <20 years   | 2014      | 2015      | 2016      | 2017      | 2018      | Average   |
|-------------------|-----------|-----------|-----------|-----------|-----------|-----------|
| ARV Costs PPPY    | \$ 178.13 | \$ 183.31 | \$ 188.50 | \$ 193.69 | \$ 198.88 | \$ 188.50 |
| Cotrim Costs PPPY | \$ 8.68   | \$ 8.94   | \$ 9.19   | \$ 9.44   | \$ 9.70   | \$ 9.19   |
| HR Costs PPPY     | \$ 22.89  | \$ 23.40  | \$ 23.89  | \$ 24.38  | \$ 24.89  | \$ 23.89  |
| Lab Costs PPPY    | \$ 48.13  | \$ 48.89  | \$ 49.85  | \$ 50.94  | \$ 51.98  | \$ 49.96  |
|                   | \$ 257.83 | \$ 264.54 | \$ 271.43 | \$ 278.46 | \$ 285.45 | \$ 271.54 |

### Summary of Costs for ARV, Labs, HRH Per Patient Per Year (USD)

| 0 to <15 years    | 2014      | 2015      | 2016      | 2017      | 2018      | Average   |
|-------------------|-----------|-----------|-----------|-----------|-----------|-----------|
| ARV Costs PPPY    | \$ 170.98 | \$ 178.78 | \$ 184.75 | \$ 190.82 | \$ 198.06 | \$ 184.68 |
| Cotrim Costs PPPY | \$ 11.22  | \$ 11.36  | \$ 11.36  | \$ 11.23  | \$ 10.95  | \$ 11.23  |
| HR Costs PPPY     | \$ 20.91  | \$ 21.44  | \$ 22.13  | \$ 22.69  | \$ 23.26  | \$ 22.09  |
| Lab Costs PPPY    | \$ 47.46  | \$ 48.77  | \$ 50.13  | \$ 51.68  | \$ 53.49  | \$ 50.31  |
|                   | \$ 250.57 | \$ 260.35 | \$ 268.37 | \$ 276.43 | \$ 285.77 | \$ 268.30 |

| 0 to <20 years    | 2014      | 2015      | 2016      | 2017      | 2018      | Average   |
|-------------------|-----------|-----------|-----------|-----------|-----------|-----------|
| ARV Costs PPPY    | \$ 173.28 | \$ 180.33 | \$ 186.08 | \$ 191.86 | \$ 198.37 | \$ 185.98 |
| Cotrim Costs PPPY | \$ 10.41  | \$ 10.54  | \$ 10.59  | \$ 10.58  | \$ 10.47  | \$ 10.52  |
| HR Costs PPPY     | \$ 21.55  | \$ 22.11  | \$ 22.75  | \$ 23.31  | \$ 23.88  | \$ 22.72  |
| Lab Costs PPPY    | \$ 47.67  | \$ 48.81  | \$ 50.03  | \$ 51.41  | \$ 52.92  | \$ 50.17  |
|                   | \$ 252.90 | \$ 261.78 | \$ 269.45 | \$ 277.17 | \$ 285.65 | \$ 269.39 |



### Patients on Treatment and Eligible by Age Group

| Patients on ART | 2014   | 2015   | 2016   | 2017   | 2018   |
|-----------------|--------|--------|--------|--------|--------|
| 0 to <2 years   | 8,452  | 6,538  | 6,581  | 6,733  | 6,255  |
| 2 to <5 years   | 10,935 | 11,410 | 10,315 | 8,674  | 6,903  |
| 5 to <10 years  | 14,208 | 14,501 | 14,928 | 15,315 | 15,704 |
| 10 to <15 years | 15,052 | 15,607 | 16,128 | 16,532 | 16,888 |
| 15 to <20 years | 23,075 | 24,865 | 26,159 | 27,083 | 28,175 |

#### 0 to <10 years

|                        |        |        |        |        |        |
|------------------------|--------|--------|--------|--------|--------|
| Total ART Patients     | 33,595 | 32,448 | 31,824 | 30,722 | 28,862 |
| Total Eligible for ART | 61,875 | 59,763 | 58,613 | 56,583 | 53,157 |

#### 10 to <15 years

|                        |        |        |        |        |        |
|------------------------|--------|--------|--------|--------|--------|
| Total ART Patients     | 15,052 | 15,607 | 16,128 | 16,532 | 16,888 |
| Total Eligible for ART | 27,723 | 28,745 | 29,705 | 30,449 | 31,104 |

#### 15 to <20 years

|                        |        |        |        |        |        |
|------------------------|--------|--------|--------|--------|--------|
| Total ART Patients     | 23,075 | 24,865 | 26,159 | 27,083 | 28,175 |
| Total Eligible for ART | 25,986 | 28,002 | 29,459 | 30,500 | 31,729 |

#### 0 to <15 years

|                        |        |        |        |        |        |
|------------------------|--------|--------|--------|--------|--------|
| Total ART Patients     | 48,647 | 48,056 | 47,952 | 47,254 | 45,750 |
| Total Eligible for ART | 89,598 | 88,508 | 88,318 | 87,032 | 84,261 |

#### 0 to <20 years

|                        |         |         |         |         |         |
|------------------------|---------|---------|---------|---------|---------|
| Total ART Patients     | 71,722  | 72,921  | 74,111  | 74,338  | 73,924  |
| Total Eligible for ART | 115,584 | 116,510 | 117,777 | 117,532 | 115,990 |



## APPENDIX VI: Outputs from Scenario 2: 2010 Zambian Guidelines

### Costs for ARVs by Age Range (USD)

|                 | 2014          | 2015          | 2016          | 2017          | 2018          | Total          |
|-----------------|---------------|---------------|---------------|---------------|---------------|----------------|
| 0 to <2 years   | \$ 3,188,761  | \$ 2,870,731  | \$ 3,265,428  | \$ 3,685,263  | \$ 3,776,029  | \$ 16,786,213  |
| 2 to <5 years   | \$ 5,082,846  | \$ 6,169,540  | \$ 6,767,836  | \$ 7,547,693  | \$ 8,727,043  | \$ 34,294,957  |
| 5 to <10 years  | \$ 5,740,045  | \$ 6,814,748  | \$ 8,060,598  | \$ 9,475,471  | \$ 11,145,707 | \$ 41,236,569  |
| 10 to <15 years | \$ 3,696,308  | \$ 4,458,480  | \$ 5,273,424  | \$ 6,124,974  | \$ 7,037,490  | \$ 26,590,676  |
| 15 to <20 years | \$ 3,689,362  | \$ 4,169,515  | \$ 4,621,205  | \$ 5,069,593  | \$ 5,593,866  | \$ 23,143,541  |
|                 |               |               |               |               |               |                |
| 0 to <10 years  | \$ 14,011,651 | \$ 15,855,019 | \$ 18,093,862 | \$ 20,708,427 | \$ 23,648,780 | \$ 92,317,739  |
| 10 to <15 years | \$ 3,696,308  | \$ 4,458,480  | \$ 5,273,424  | \$ 6,124,974  | \$ 7,037,490  | \$ 26,590,676  |
| 15 to <20 years | \$ 3,689,362  | \$ 4,169,515  | \$ 4,621,205  | \$ 5,069,593  | \$ 5,593,866  | \$ 23,143,541  |
|                 |               |               |               |               |               |                |
| 0 to <15 years  | \$ 17,707,960 | \$ 20,313,499 | \$ 23,367,286 | \$ 26,833,400 | \$ 30,686,270 | \$ 118,908,415 |
| 0 to <20 years  | \$ 21,397,322 | \$ 24,483,014 | \$ 27,988,491 | \$ 31,902,993 | \$ 36,280,135 | \$ 142,051,956 |

### Costs for ARVs, Cotrim, Lab Commodities, HR (USD, including shipping)

| 0 to <10 years  | 2014          | 2015          | 2016          | 2017          | 2018          | Total          |
|-----------------|---------------|---------------|---------------|---------------|---------------|----------------|
| ARV Costs       | \$ 15,412,816 | \$ 17,440,521 | \$ 19,903,249 | \$ 22,779,269 | \$ 26,013,658 | \$ 101,549,513 |
| Cotrim Costs    | \$ 537,576    | \$ 601,159    | \$ 677,716    | \$ 768,430    | \$ 869,297    | \$ 3,454,178   |
| Direct HR Costs | \$ 713,382    | \$ 795,819    | \$ 914,512    | \$ 1,048,212  | \$ 1,192,671  | \$ 4,664,596   |
| Lab Commodities | \$ 1,639,812  | \$ 1,841,196  | \$ 2,103,615  | \$ 2,408,380  | \$ 2,743,095  | \$ 10,736,098  |
|                 | \$ 18,303,585 | \$ 20,678,695 | \$ 23,599,092 | \$ 27,004,291 | \$ 30,818,722 | \$ 120,404,384 |
| 10 to <15 years | 2014          | 2015          | 2016          | 2017          | 2018          | Total          |
| ARV Costs       | \$ 4,065,939  | \$ 4,904,328  | \$ 5,800,766  | \$ 6,737,471  | \$ 7,741,239  | \$ 29,249,743  |
| Cotrim Costs    | \$ 90,192     | \$ 108,790    | \$ 128,675    | \$ 149,453    | \$ 171,719    | \$ 648,829     |
| Direct HR Costs | \$ 331,980    | \$ 391,175    | \$ 464,907    | \$ 546,670    | \$ 641,889    | \$ 2,376,620   |
| Lab Commodities | \$ 763,296    | \$ 905,029    | \$ 1,069,298  | \$ 1,255,823  | \$ 1,475,975  | \$ 5,469,421   |
|                 | \$ 5,251,408  | \$ 6,309,322  | \$ 7,463,646  | \$ 8,689,417  | \$ 10,030,821 | \$ 37,744,614  |
| 15 to <20 years | 2014          | 2015          | 2016          | 2017          | 2018          | Total          |
| ARV Costs       | \$ 3,689,362  | \$ 4,169,515  | \$ 4,621,205  | \$ 5,069,593  | \$ 5,593,866  | \$ 23,143,541  |
| Cotrim Costs    | \$ 203,193    | \$ 229,638    | \$ 254,515    | \$ 279,210    | \$ 308,085    | \$ 1,274,642   |
| Direct HR Costs | \$ 482,203    | \$ 544,096    | \$ 599,723    | \$ 654,509    | \$ 719,901    | \$ 3,000,432   |
| Lab Commodities | \$ 1,026,635  | \$ 1,159,321  | \$ 1,284,157  | \$ 1,408,083  | \$ 1,552,937  | \$ 6,431,133   |
|                 | \$ 5,401,394  | \$ 6,102,570  | \$ 6,759,601  | \$ 7,411,396  | \$ 8,174,788  | \$ 33,849,749  |



### Summary of Costs for ARVs, Cotrim, Lab Commodities, HR (USD, including shipping)

| 0 to <15 years  | 2014          | 2015          | 2016          | 2017          | 2018          | Total          |
|-----------------|---------------|---------------|---------------|---------------|---------------|----------------|
| ARV Costs       | \$ 19,478,756 | \$ 22,344,849 | \$ 25,704,015 | \$ 29,516,740 | \$ 33,754,897 | \$ 130,799,256 |
| Cotrim Costs    | \$ 627,768    | \$ 709,948    | \$ 806,391    | \$ 917,883    | \$ 1,041,016  | \$ 4,103,007   |
| Direct HR Costs | \$ 1,045,362  | \$ 1,186,994  | \$ 1,379,419  | \$ 1,594,882  | \$ 1,834,560  | \$ 7,041,216   |
| Lab Commodities | \$ 2,403,108  | \$ 2,746,225  | \$ 3,172,913  | \$ 3,664,203  | \$ 4,219,070  | \$ 16,205,519  |
|                 | \$ 23,554,993 | \$ 26,988,016 | \$ 31,062,737 | \$ 35,693,708 | \$ 40,849,543 | \$ 158,148,998 |

| 0 to <20 years  | 2014          | 2015          | 2016          | 2017          | 2018          | Total          |
|-----------------|---------------|---------------|---------------|---------------|---------------|----------------|
| ARV Costs       | \$ 23,168,118 | \$ 26,514,364 | \$ 30,325,220 | \$ 34,586,333 | \$ 39,348,762 | \$ 153,942,797 |
| Cotrim Costs    | \$ 830,961    | \$ 939,586    | \$ 1,060,906  | \$ 1,197,094  | \$ 1,349,101  | \$ 5,377,649   |
| Direct HR Costs | \$ 1,527,565  | \$ 1,731,091  | \$ 1,979,142  | \$ 2,249,390  | \$ 2,554,461  | \$ 10,041,648  |
| Lab Commodities | \$ 3,429,743  | \$ 3,905,546  | \$ 4,457,070  | \$ 5,072,286  | \$ 5,772,007  | \$ 22,636,652  |
|                 | \$ 28,956,387 | \$ 33,090,587 | \$ 37,822,338 | \$ 43,105,104 | \$ 49,024,331 | \$ 191,998,747 |

### Costs for ARV, Labs, and HRH Per Patient Per Year (USD)

| 0 to <10 years    | 2014      | 2015      | 2016      | 2017      | 2018      | Average   |
|-------------------|-----------|-----------|-----------|-----------|-----------|-----------|
| ARV Costs PPPY    | \$ 398.96 | \$ 413.45 | \$ 424.30 | \$ 435.50 | \$ 448.04 | \$ 424.05 |
| Cotrim Costs PPPY | \$ 13.91  | \$ 14.25  | \$ 14.45  | \$ 14.69  | \$ 14.97  | \$ 14.46  |
| HR Costs PPPY     | \$ 18.47  | \$ 18.87  | \$ 19.50  | \$ 20.04  | \$ 20.54  | \$ 19.48  |
| Lab Costs PPPY    | \$ 42.45  | \$ 43.65  | \$ 44.85  | \$ 46.04  | \$ 47.24  | \$ 44.85  |
|                   | \$ 473.78 | \$ 490.22 | \$ 503.09 | \$ 516.27 | \$ 530.80 | \$ 502.83 |

| 10 to <15 years   | 2014      | 2015      | 2016      | 2017      | 2018      | Average   |
|-------------------|-----------|-----------|-----------|-----------|-----------|-----------|
| ARV Costs PPPY    | \$ 234.90 | \$ 241.74 | \$ 248.58 | \$ 255.43 | \$ 262.27 | \$ 248.58 |
| Cotrim Costs PPPY | \$ 5.21   | \$ 5.36   | \$ 5.51   | \$ 5.67   | \$ 5.82   | \$ 5.51   |
| HR Costs PPPY     | \$ 19.18  | \$ 19.28  | \$ 19.92  | \$ 20.72  | \$ 21.75  | \$ 20.17  |
| Lab Costs PPPY    | \$ 44.10  | \$ 44.61  | \$ 45.82  | \$ 47.61  | \$ 50.01  | \$ 46.43  |
|                   | \$ 303.39 | \$ 311.00 | \$ 319.85 | \$ 329.43 | \$ 339.84 | \$ 320.70 |

| 15 to <20 years   | 2014      | 2015      | 2016      | 2017      | 2018      | Average   |
|-------------------|-----------|-----------|-----------|-----------|-----------|-----------|
| ARV Costs PPPY    | \$ 157.68 | \$ 162.28 | \$ 166.87 | \$ 171.46 | \$ 176.05 | \$ 166.87 |
| Cotrim Costs PPPY | \$ 8.68   | \$ 8.94   | \$ 9.19   | \$ 9.44   | \$ 9.70   | \$ 9.19   |
| HR Costs PPPY     | \$ 20.61  | \$ 21.18  | \$ 21.66  | \$ 22.14  | \$ 22.66  | \$ 21.65  |
| Lab Costs PPPY    | \$ 43.88  | \$ 45.12  | \$ 46.37  | \$ 47.62  | \$ 48.87  | \$ 46.37  |
|                   | \$ 230.85 | \$ 237.51 | \$ 244.08 | \$ 250.66 | \$ 257.28 | \$ 244.08 |

### Summary of Costs for ARV, Labs, HRH Per Patient Per Year (USD)

| 0 to <15 years    | 2014      | 2015      | 2016      | 2017      | 2018      | Average   |
|-------------------|-----------|-----------|-----------|-----------|-----------|-----------|
| ARV Costs PPPY    | \$ 348.19 | \$ 357.69 | \$ 365.93 | \$ 375.13 | \$ 385.43 | \$ 366.47 |
| Cotrim Costs PPPY | \$ 11.22  | \$ 11.36  | \$ 11.48  | \$ 11.67  | \$ 11.89  | \$ 11.52  |
| HR Costs PPPY     | \$ 18.69  | \$ 19.00  | \$ 19.64  | \$ 20.27  | \$ 20.95  | \$ 19.71  |
| Lab Costs PPPY    | \$ 42.96  | \$ 43.96  | \$ 45.17  | \$ 46.57  | \$ 48.18  | \$ 45.37  |
|                   | \$ 421.06 | \$ 432.02 | \$ 442.22 | \$ 453.63 | \$ 466.44 | \$ 443.07 |

| 0 to <20 years    | 2014      | 2015      | 2016      | 2017      | 2018      | Average   |
|-------------------|-----------|-----------|-----------|-----------|-----------|-----------|
| ARV Costs PPPY    | \$ 292.01 | \$ 300.74 | \$ 309.64 | \$ 319.50 | \$ 329.69 | \$ 310.32 |
| Cotrim Costs PPPY | \$ 10.47  | \$ 10.66  | \$ 10.83  | \$ 11.06  | \$ 11.30  | \$ 10.87  |
| HR Costs PPPY     | \$ 19.25  | \$ 19.63  | \$ 20.21  | \$ 20.78  | \$ 21.40  | \$ 20.26  |
| Lab Costs PPPY    | \$ 43.23  | \$ 44.30  | \$ 45.51  | \$ 46.86  | \$ 48.36  | \$ 45.65  |
|                   | \$ 364.97 | \$ 375.33 | \$ 386.19 | \$ 398.20 | \$ 410.76 | \$ 387.09 |



### Patients on Treatment and Eligible by Age Group

| Patients on ART | 2014   | 2015   | 2016   | 2017   | 2018   |
|-----------------|--------|--------|--------|--------|--------|
| 0 to <2 years   | 9,719  | 8,502  | 9,405  | 10,330 | 10,308 |
| 2 to <5 years   | 12,575 | 14,831 | 15,822 | 17,172 | 19,337 |
| 5 to <10 years  | 16,339 | 18,849 | 21,681 | 24,804 | 28,415 |
| 10 to <15 years | 17,309 | 20,287 | 23,335 | 26,377 | 29,517 |
| 15 to <20 years | 23,397 | 25,694 | 27,694 | 29,567 | 31,774 |

#### 0 to <10 years

|                        |        |        |        |        |        |
|------------------------|--------|--------|--------|--------|--------|
| Total ART Patients     | 38,633 | 42,182 | 46,908 | 52,307 | 58,061 |
| Total Eligible for ART | 61,876 | 59,768 | 59,590 | 60,220 | 61,117 |

#### 10 to <15 years

|                        |        |        |        |        |        |
|------------------------|--------|--------|--------|--------|--------|
| Total ART Patients     | 17,309 | 20,287 | 23,335 | 26,377 | 29,517 |
| Total Eligible for ART | 27,723 | 28,745 | 29,644 | 30,368 | 31,070 |

#### 15 to <20 years

|                        |        |        |        |        |        |
|------------------------|--------|--------|--------|--------|--------|
| Total ART Patients     | 23,397 | 25,694 | 27,694 | 29,567 | 31,774 |
| Total Eligible for ART | 25,986 | 28,149 | 29,933 | 31,535 | 33,446 |

#### 0 to <15 years

|                        |        |        |        |        |        |
|------------------------|--------|--------|--------|--------|--------|
| Total ART Patients     | 55,942 | 62,470 | 70,243 | 78,684 | 87,578 |
| Total Eligible for ART | 89,599 | 88,513 | 89,234 | 90,588 | 92,187 |

#### 0 to <20 years

|                        |         |         |         |         |         |
|------------------------|---------|---------|---------|---------|---------|
| Total ART Patients     | 79,340  | 88,164  | 97,937  | 108,251 | 119,351 |
| Total Eligible for ART | 115,585 | 116,662 | 119,167 | 122,123 | 125,633 |



## APPENDIX VII: Outputs from Scenario 3: 2013 WHO Guidelines

### Costs for ARVs by Age Range (USD)

|                 | 2014          | 2015          | 2016          | 2017          | 2018          | Total          |
|-----------------|---------------|---------------|---------------|---------------|---------------|----------------|
| 0 to <2 years   | \$ 2,388,961  | \$ 2,284,944  | \$ 2,965,844  | \$ 3,621,740  | \$ 3,722,787  | \$ 14,984,277  |
| 2 to <5 years   | \$ 5,871,336  | \$ 7,353,013  | \$ 8,314,091  | \$ 8,687,687  | \$ 9,370,488  | \$ 39,596,615  |
| 5 to <10 years  | \$ 5,073,892  | \$ 6,808,443  | \$ 8,900,306  | \$ 11,758,716 | \$ 14,965,443 | \$ 47,506,800  |
| 10 to <15 years | \$ 3,754,818  | \$ 4,416,028  | \$ 5,139,479  | \$ 5,888,951  | \$ 6,654,563  | \$ 25,853,840  |
| 15 to <20 years | \$ 3,839,003  | \$ 4,296,341  | \$ 4,737,023  | \$ 5,213,536  | \$ 5,875,516  | \$ 23,961,418  |
|                 |               |               |               |               |               |                |
| 0 to <10 years  | \$ 13,334,189 | \$ 16,446,400 | \$ 20,180,242 | \$ 24,068,143 | \$ 28,058,718 | \$ 102,087,692 |
| 10 to <15 years | \$ 3,754,818  | \$ 4,416,028  | \$ 5,139,479  | \$ 5,888,951  | \$ 6,654,563  | \$ 25,853,840  |
| 15 to <20 years | \$ 3,839,003  | \$ 4,296,341  | \$ 4,737,023  | \$ 5,213,536  | \$ 5,875,516  | \$ 23,961,418  |
|                 |               |               |               |               |               |                |
| 0 to <15 years  | \$ 17,089,007 | \$ 20,862,428 | \$ 25,319,721 | \$ 29,957,094 | \$ 34,713,282 | \$ 127,941,531 |
| 0 to <20 years  | \$ 20,928,010 | \$ 25,158,769 | \$ 30,056,744 | \$ 35,170,629 | \$ 40,588,798 | \$ 151,902,950 |

### Costs for ARVs, Cotrim, Lab Commodities, HR (USD, including shipping)

| 0 to <10 years  | 2014          | 2015          | 2016          | 2017          | 2018          | Total          |
|-----------------|---------------|---------------|---------------|---------------|---------------|----------------|
| ARV Costs       | \$ 14,667,608 | \$ 18,091,040 | \$ 22,198,266 | \$ 26,474,957 | \$ 30,864,590 | \$ 112,296,461 |
| Cotrim Costs    | \$ 746,993    | \$ 849,226    | \$ 953,525    | \$ 1,047,618  | \$ 1,173,129  | \$ 4,770,493   |
| Direct HR Costs | \$ 991,956    | \$ 1,071,394  | \$ 1,248,554  | \$ 1,436,913  | \$ 1,664,978  | \$ 6,413,794   |
| Lab Commodities | \$ 2,472,900  | \$ 2,823,277  | \$ 3,272,061  | \$ 3,768,836  | \$ 4,358,141  | \$ 16,695,214  |
|                 | \$ 18,879,457 | \$ 22,834,937 | \$ 27,672,406 | \$ 32,728,324 | \$ 38,060,838 | \$ 140,175,962 |
| 10 to <15 years | 2014          | 2015          | 2016          | 2017          | 2018          | Total          |
| ARV Costs       | \$ 4,130,300  | \$ 4,857,630  | \$ 5,653,427  | \$ 6,477,846  | \$ 7,320,020  | \$ 28,439,224  |
| Cotrim Costs    | \$ 90,192     | \$ 106,791    | \$ 124,286    | \$ 142,411    | \$ 160,925    | \$ 624,606     |
| Direct HR Costs | \$ 355,629    | \$ 417,387    | \$ 546,534    | \$ 719,057    | \$ 914,794    | \$ 2,953,401   |
| Lab Commodities | \$ 880,495    | \$ 1,094,294  | \$ 1,425,081  | \$ 1,876,879  | \$ 2,383,666  | \$ 7,660,416   |
|                 | \$ 5,456,616  | \$ 6,476,103  | \$ 7,749,329  | \$ 9,216,193  | \$ 10,779,405 | \$ 39,677,646  |
| 15 to <20 years | 2014          | 2015          | 2016          | 2017          | 2018          | Total          |
| ARV Costs       | \$ 3,839,003  | \$ 4,296,341  | \$ 4,737,023  | \$ 5,213,536  | \$ 5,875,516  | \$ 23,961,418  |
| Cotrim Costs    | \$ 193,654    | \$ 223,784    | \$ 254,519    | \$ 287,138    | \$ 323,597    | \$ 1,282,692   |
| Direct HR Costs | \$ 508,095    | \$ 577,414    | \$ 648,243    | \$ 723,041    | \$ 806,397    | \$ 3,263,191   |
| Lab Commodities | \$ 1,114,652  | \$ 1,269,747  | \$ 1,427,874  | \$ 1,595,431  | \$ 1,782,218  | \$ 7,189,923   |
|                 | \$ 5,655,404  | \$ 6,367,286  | \$ 7,067,660  | \$ 7,819,146  | \$ 8,787,728  | \$ 35,697,225  |



### Summary of Costs for ARVs, Cotrim, Lab Commodities, HR (USD, including shipping)

| 0 to <15 years  | 2014          | 2015          | 2016          | 2017          | 2018          | Total          |
|-----------------|---------------|---------------|---------------|---------------|---------------|----------------|
| ARV Costs       | \$ 18,797,908 | \$ 22,948,671 | \$ 27,851,693 | \$ 32,952,803 | \$ 38,184,610 | \$ 140,735,685 |
| Cotrim Costs    | \$ 837,186    | \$ 956,018    | \$ 1,077,812  | \$ 1,190,029  | \$ 1,334,055  | \$ 5,395,099   |
| Direct HR Costs | \$ 1,347,585  | \$ 1,488,780  | \$ 1,795,088  | \$ 2,155,969  | \$ 2,579,772  | \$ 9,367,195   |
| Lab Commodities | \$ 3,353,395  | \$ 3,917,571  | \$ 4,697,141  | \$ 5,645,715  | \$ 6,741,807  | \$ 24,355,630  |
|                 | \$ 24,336,074 | \$ 29,311,040 | \$ 35,421,735 | \$ 41,944,517 | \$ 48,840,243 | \$ 179,853,608 |

| 0 to <20 years  | 2014          | 2015          | 2016          | 2017          | 2018          | Total          |
|-----------------|---------------|---------------|---------------|---------------|---------------|----------------|
| ARV Costs       | \$ 22,636,910 | \$ 27,245,012 | \$ 32,588,717 | \$ 38,166,339 | \$ 44,060,126 | \$ 164,697,103 |
| Cotrim Costs    | \$ 1,030,840  | \$ 1,179,802  | \$ 1,332,331  | \$ 1,477,167  | \$ 1,657,652  | \$ 6,677,791   |
| Direct HR Costs | \$ 1,855,681  | \$ 2,066,194  | \$ 2,443,331  | \$ 2,879,010  | \$ 3,386,170  | \$ 12,630,386  |
| Lab Commodities | \$ 4,468,048  | \$ 5,187,319  | \$ 6,125,015  | \$ 7,241,147  | \$ 8,524,024  | \$ 31,545,553  |
|                 | \$ 29,991,478 | \$ 35,678,326 | \$ 42,489,395 | \$ 49,763,663 | \$ 57,627,971 | \$ 215,550,833 |

### Costs for ARV, Labs, and HRH Per Patient Per Year (USD)

| 0 to <10 years    | 2014      | 2015      | 2016      | 2017      | 2018      | Average   |
|-------------------|-----------|-----------|-----------|-----------|-----------|-----------|
| ARV Costs PPPY    | \$ 300.88 | \$ 332.61 | \$ 359.99 | \$ 381.12 | \$ 392.73 | \$ 353.47 |
| Cotrim Costs PPPY | \$ 15.32  | \$ 15.61  | \$ 15.46  | \$ 15.08  | \$ 14.93  | \$ 15.28  |
| HR Costs PPPY     | \$ 20.35  | \$ 19.70  | \$ 20.25  | \$ 20.69  | \$ 21.19  | \$ 20.43  |
| Lab Costs PPPY    | \$ 50.73  | \$ 51.91  | \$ 53.06  | \$ 54.25  | \$ 55.45  | \$ 53.08  |
|                   | \$ 387.28 | \$ 419.82 | \$ 448.77 | \$ 471.14 | \$ 484.30 | \$ 442.26 |

| 10 to <15 years   | 2014      | 2015      | 2016      | 2017      | 2018      | Average   |
|-------------------|-----------|-----------|-----------|-----------|-----------|-----------|
| ARV Costs PPPY    | \$ 238.62 | \$ 243.92 | \$ 250.82 | \$ 257.73 | \$ 264.63 | \$ 251.15 |
| Cotrim Costs PPPY | \$ 5.21   | \$ 5.36   | \$ 5.51   | \$ 5.67   | \$ 5.82   | \$ 5.51   |
| HR Costs PPPY     | \$ 20.55  | \$ 20.96  | \$ 24.25  | \$ 28.61  | \$ 33.07  | \$ 25.49  |
| Lab Costs PPPY    | \$ 50.87  | \$ 54.95  | \$ 63.23  | \$ 74.67  | \$ 86.17  | \$ 65.98  |
|                   | \$ 315.24 | \$ 325.19 | \$ 343.81 | \$ 366.68 | \$ 389.69 | \$ 348.12 |

| 15 to <20 years   | 2014      | 2015      | 2016      | 2017      | 2018      | Average   |
|-------------------|-----------|-----------|-----------|-----------|-----------|-----------|
| ARV Costs PPPY    | \$ 172.16 | \$ 171.59 | \$ 171.05 | \$ 171.46 | \$ 176.05 | \$ 172.46 |
| Cotrim Costs PPPY | \$ 8.68   | \$ 8.94   | \$ 9.19   | \$ 9.44   | \$ 9.70   | \$ 9.19   |
| HR Costs PPPY     | \$ 22.79  | \$ 23.06  | \$ 23.41  | \$ 23.78  | \$ 24.16  | \$ 23.44  |
| Lab Costs PPPY    | \$ 49.99  | \$ 50.71  | \$ 51.56  | \$ 52.47  | \$ 53.40  | \$ 51.63  |
|                   | \$ 253.62 | \$ 254.29 | \$ 255.20 | \$ 257.15 | \$ 263.31 | \$ 256.72 |

### Summary of Costs for ARV, Labs, HRH Per Patient Per Year (USD)

| 0 to <15 years    | 2014      | 2015      | 2016      | 2017      | 2018      | Average   |
|-------------------|-----------|-----------|-----------|-----------|-----------|-----------|
| ARV Costs PPPY    | \$ 284.56 | \$ 308.84 | \$ 330.77 | \$ 348.34 | \$ 359.38 | \$ 326.38 |
| Cotrim Costs PPPY | \$ 12.67  | \$ 12.87  | \$ 12.80  | \$ 12.58  | \$ 12.56  | \$ 12.69  |
| HR Costs PPPY     | \$ 20.40  | \$ 20.04  | \$ 21.32  | \$ 22.79  | \$ 24.28  | \$ 21.76  |
| Lab Costs PPPY    | \$ 50.76  | \$ 52.72  | \$ 55.78  | \$ 59.68  | \$ 63.45  | \$ 56.48  |
|                   | \$ 368.40 | \$ 394.46 | \$ 420.67 | \$ 443.39 | \$ 459.67 | \$ 417.32 |

| 0 to <20 years    | 2014      | 2015      | 2016      | 2017      | 2018      | Average   |
|-------------------|-----------|-----------|-----------|-----------|-----------|-----------|
| ARV Costs PPPY    | \$ 256.20 | \$ 274.25 | \$ 291.24 | \$ 305.31 | \$ 315.56 | \$ 288.51 |
| Cotrim Costs PPPY | \$ 11.67  | \$ 11.88  | \$ 11.91  | \$ 11.82  | \$ 11.87  | \$ 11.83  |
| HR Costs PPPY     | \$ 21.00  | \$ 20.80  | \$ 21.84  | \$ 23.03  | \$ 24.25  | \$ 22.18  |
| Lab Costs PPPY    | \$ 50.57  | \$ 52.21  | \$ 54.74  | \$ 57.93  | \$ 61.05  | \$ 55.30  |
|                   | \$ 339.43 | \$ 359.13 | \$ 379.72 | \$ 398.09 | \$ 412.74 | \$ 377.82 |



### Patients on Treatment and Eligible by Age Group

| Patients on ART | 2014   | 2015   | 2016   | 2017   | 2018   |
|-----------------|--------|--------|--------|--------|--------|
| 0 to <2 years   | 9,671  | 8,278  | 9,153  | 10,152 | 10,163 |
| 2 to <5 years   | 22,739 | 26,308 | 27,332 | 26,939 | 28,299 |
| 5 to <10 years  | 16,339 | 19,806 | 25,179 | 32,374 | 40,128 |
| 10 to <15 years | 17,309 | 19,915 | 22,539 | 25,134 | 27,661 |
| 15 to <20 years | 22,299 | 25,039 | 27,694 | 30,407 | 33,374 |

#### 0 to <10 years

|                        |        |        |        |        |        |
|------------------------|--------|--------|--------|--------|--------|
| Total ART Patients     | 48,749 | 54,392 | 61,663 | 69,466 | 78,590 |
| Total Eligible for ART | 78,079 | 77,067 | 78,334 | 79,975 | 82,726 |

#### 10 to <15 years

|                        |        |        |        |        |        |
|------------------------|--------|--------|--------|--------|--------|
| Total ART Patients     | 17,309 | 19,915 | 22,539 | 25,134 | 27,661 |
| Total Eligible for ART | 27,723 | 28,217 | 28,633 | 28,937 | 29,117 |

#### 15 to <20 years

|                        |        |        |        |        |        |
|------------------------|--------|--------|--------|--------|--------|
| Total ART Patients     | 22,299 | 25,039 | 27,694 | 30,407 | 33,374 |
| Total Eligible for ART | 30,150 | 31,607 | 32,782 | 33,883 | 35,130 |

#### 0 to <15 years

|                        |         |         |         |         |         |
|------------------------|---------|---------|---------|---------|---------|
| Total ART Patients     | 66,059  | 74,306  | 84,202  | 94,600  | 106,251 |
| Total Eligible for ART | 105,802 | 105,284 | 106,967 | 108,912 | 111,843 |

#### 0 to <20 years

|                        |         |         |         |         |         |
|------------------------|---------|---------|---------|---------|---------|
| Total ART Patients     | 88,358  | 99,345  | 111,897 | 125,007 | 139,624 |
| Total Eligible for ART | 135,952 | 136,891 | 139,749 | 142,795 | 146,973 |



## APPENDIX VIII: Outputs from Scenario 4: 2013 Zambian Guidelines, UA by 2015

### Costs for ARVs by Age Range (USD)

|                 | 2014          | 2015          | 2016          | 2017          | 2018          | Total          |
|-----------------|---------------|---------------|---------------|---------------|---------------|----------------|
| 0 to <2 years   | \$ 3,798,960  | \$ 3,394,231  | \$ 3,148,917  | \$ 3,100,359  | \$ 3,480,935  | \$ 16,923,401  |
| 2 to <5 years   | \$ 10,397,225 | \$ 13,420,594 | \$ 12,652,012 | \$ 11,413,932 | \$ 10,061,288 | \$ 57,945,052  |
| 5 to <10 years  | \$ 14,791,433 | \$ 19,543,603 | \$ 20,192,437 | \$ 20,588,150 | \$ 20,211,772 | \$ 95,327,395  |
| 10 to <15 years | \$ 6,710,245  | \$ 9,278,925  | \$ 10,039,610 | \$ 10,801,019 | \$ 11,583,432 | \$ 48,413,231  |
| 15 to <20 years | \$ 3,891,254  | \$ 4,952,900  | \$ 5,470,365  | \$ 6,007,946  | \$ 6,646,709  | \$ 26,969,174  |
|                 |               |               |               |               |               |                |
| 0 to <10 years  | \$ 28,987,619 | \$ 36,358,427 | \$ 35,993,366 | \$ 35,102,441 | \$ 33,753,995 | \$ 170,195,848 |
| 10 to <15 years | \$ 6,710,245  | \$ 9,278,925  | \$ 10,039,610 | \$ 10,801,019 | \$ 11,583,432 | \$ 48,413,231  |
| 15 to <20 years | \$ 3,891,254  | \$ 4,952,900  | \$ 5,470,365  | \$ 6,007,946  | \$ 6,646,709  | \$ 26,969,174  |
|                 |               |               |               |               |               |                |
| 0 to <15 years  | \$ 35,697,864 | \$ 45,637,353 | \$ 46,032,976 | \$ 45,903,460 | \$ 45,337,427 | \$ 218,609,079 |
| 0 to <20 years  | \$ 39,589,118 | \$ 50,590,253 | \$ 51,503,341 | \$ 51,911,406 | \$ 51,984,135 | \$ 245,578,253 |

### Costs for ARVs, Cotrim, Lab Commodities, HR (USD, including shipping)

| 0 to <10 years  | 2014          | 2015          | 2016          | 2017          | 2018          | Total          |
|-----------------|---------------|---------------|---------------|---------------|---------------|----------------|
| ARV Costs       | \$ 31,886,380 | \$ 39,994,270 | \$ 39,592,703 | \$ 38,612,685 | \$ 37,129,394 | \$ 187,215,433 |
| Cotrim Costs    | \$ 1,034,801  | \$ 1,272,938  | \$ 1,235,886  | \$ 1,178,791  | \$ 1,119,735  | \$ 5,842,151   |
| Direct HR Costs | \$ 1,530,966  | \$ 1,871,258  | \$ 1,731,368  | \$ 1,687,516  | \$ 1,623,673  | \$ 8,444,781   |
| Lab Commodities | \$ 3,714,117  | \$ 4,632,584  | \$ 4,596,201  | \$ 4,500,309  | \$ 4,349,975  | \$ 21,793,186  |
|                 | \$ 38,166,265 | \$ 47,771,050 | \$ 47,156,158 | \$ 45,979,301 | \$ 44,222,776 | \$ 223,295,550 |
| 10 to <15 years | 2014          | 2015          | 2016          | 2017          | 2018          | Total          |
| ARV Costs       | \$ 7,381,270  | \$ 10,206,818 | \$ 11,043,571 | \$ 11,881,121 | \$ 12,741,775 | \$ 53,254,554  |
| Cotrim Costs    | \$ 163,734    | \$ 226,412    | \$ 244,973    | \$ 263,552    | \$ 282,643    | \$ 1,181,313   |
| Direct HR Costs | \$ 892,131    | \$ 1,153,492  | \$ 1,111,426  | \$ 1,128,197  | \$ 1,102,827  | \$ 5,388,074   |
| Lab Commodities | \$ 2,162,857  | \$ 2,853,782  | \$ 2,948,458  | \$ 3,006,352  | \$ 2,952,056  | \$ 13,923,505  |
|                 | \$ 10,599,992 | \$ 14,440,504 | \$ 15,348,427 | \$ 16,279,222 | \$ 17,079,300 | \$ 73,747,446  |
| 15 to <20 years | 2014          | 2015          | 2016          | 2017          | 2018          | Total          |
| ARV Costs       | \$ 3,891,254  | \$ 4,952,900  | \$ 5,470,365  | \$ 6,007,946  | \$ 6,646,709  | \$ 26,969,174  |
| Cotrim Costs    | \$ 214,313    | \$ 272,783    | \$ 301,283    | \$ 330,891    | \$ 366,071    | \$ 1,485,341   |
| Direct HR Costs | \$ 532,128    | \$ 668,483    | \$ 691,131    | \$ 757,683    | \$ 837,371    | \$ 3,486,796   |
| Lab Commodities | \$ 1,196,303  | \$ 1,520,334  | \$ 1,678,416  | \$ 1,842,633  | \$ 2,037,706  | \$ 8,275,392   |
|                 | \$ 5,833,998  | \$ 7,414,500  | \$ 8,141,195  | \$ 8,939,153  | \$ 9,887,856  | \$ 40,216,703  |



### Summary of Costs for ARVs, Cotrim, Lab Commodities, HR (USD, including shipping)

| 0 to <15 years  | 2014          | 2015          | 2016          | 2017          | 2018          | Total          |
|-----------------|---------------|---------------|---------------|---------------|---------------|----------------|
| ARV Costs       | \$ 39,267,650 | \$ 50,201,088 | \$ 50,636,274 | \$ 50,493,805 | \$ 49,871,169 | \$ 240,469,987 |
| Cotrim Costs    | \$ 1,198,535  | \$ 1,499,350  | \$ 1,480,859  | \$ 1,442,343  | \$ 1,402,378  | \$ 7,023,464   |
| Direct HR Costs | \$ 2,423,098  | \$ 3,024,750  | \$ 2,842,794  | \$ 2,815,713  | \$ 2,726,499  | \$ 13,832,855  |
| Lab Commodities | \$ 5,876,974  | \$ 7,486,366  | \$ 7,544,659  | \$ 7,506,662  | \$ 7,302,030  | \$ 35,716,691  |
|                 | \$ 48,766,257 | \$ 62,211,554 | \$ 62,504,586 | \$ 62,258,523 | \$ 61,302,077 | \$ 297,042,996 |

| 0 to <20 years  | 2014          | 2015          | 2016          | 2017          | 2018          | Total          |
|-----------------|---------------|---------------|---------------|---------------|---------------|----------------|
| ARV Costs       | \$ 43,158,905 | \$ 55,153,988 | \$ 56,106,639 | \$ 56,501,752 | \$ 56,517,878 | \$ 267,439,161 |
| Cotrim Costs    | \$ 1,412,847  | \$ 1,772,133  | \$ 1,782,142  | \$ 1,773,233  | \$ 1,768,448  | \$ 8,508,805   |
| Direct HR Costs | \$ 2,955,225  | \$ 3,693,233  | \$ 3,533,925  | \$ 3,573,396  | \$ 3,563,871  | \$ 17,319,651  |
| Lab Commodities | \$ 7,073,277  | \$ 9,006,700  | \$ 9,223,075  | \$ 9,349,295  | \$ 9,339,736  | \$ 43,992,083  |
|                 | \$ 54,600,255 | \$ 69,626,054 | \$ 70,645,781 | \$ 71,197,676 | \$ 71,189,933 | \$ 337,259,699 |

### Costs for ARV, Labs, and HRH Per Patient Per Year (USD)

| 0 to <10 years    | 2014      | 2015      | 2016      | 2017      | 2018      | Average   |
|-------------------|-----------|-----------|-----------|-----------|-----------|-----------|
| ARV Costs PPPY    | \$ 401.57 | \$ 415.00 | \$ 425.91 | \$ 436.04 | \$ 445.59 | \$ 424.82 |
| Cotrim Costs PPPY | \$ 13.03  | \$ 13.21  | \$ 13.29  | \$ 13.31  | \$ 13.44  | \$ 13.26  |
| HR Costs PPPY     | \$ 19.28  | \$ 19.42  | \$ 18.62  | \$ 19.06  | \$ 19.49  | \$ 19.17  |
| Lab Costs PPPY    | \$ 46.77  | \$ 48.07  | \$ 49.44  | \$ 50.82  | \$ 52.20  | \$ 49.46  |
|                   | \$ 480.65 | \$ 495.70 | \$ 507.27 | \$ 519.23 | \$ 530.72 | \$ 506.72 |

| 10 to <15 years   | 2014      | 2015      | 2016      | 2017      | 2018      | Average   |
|-------------------|-----------|-----------|-----------|-----------|-----------|-----------|
| ARV Costs PPPY    | \$ 234.90 | \$ 241.74 | \$ 248.58 | \$ 255.43 | \$ 262.27 | \$ 248.58 |
| Cotrim Costs PPPY | \$ 5.21   | \$ 5.36   | \$ 5.51   | \$ 5.67   | \$ 5.82   | \$ 5.51   |
| HR Costs PPPY     | \$ 28.39  | \$ 27.32  | \$ 25.02  | \$ 24.25  | \$ 22.70  | \$ 25.54  |
| Lab Costs PPPY    | \$ 68.83  | \$ 67.59  | \$ 66.37  | \$ 64.63  | \$ 60.76  | \$ 65.64  |
|                   | \$ 337.33 | \$ 342.02 | \$ 345.48 | \$ 349.98 | \$ 351.55 | \$ 345.27 |

| 15 to <20 years   | 2014      | 2015      | 2016      | 2017      | 2018      | Average   |
|-------------------|-----------|-----------|-----------|-----------|-----------|-----------|
| ARV Costs PPPY    | \$ 157.68 | \$ 162.28 | \$ 166.87 | \$ 171.46 | \$ 176.05 | \$ 166.87 |
| Cotrim Costs PPPY | \$ 8.68   | \$ 8.94   | \$ 9.19   | \$ 9.44   | \$ 9.70   | \$ 9.19   |
| HR Costs PPPY     | \$ 21.56  | \$ 21.90  | \$ 21.08  | \$ 21.62  | \$ 22.18  | \$ 21.67  |
| Lab Costs PPPY    | \$ 48.48  | \$ 49.81  | \$ 51.20  | \$ 52.59  | \$ 53.97  | \$ 51.21  |
|                   | \$ 236.41 | \$ 242.93 | \$ 248.34 | \$ 255.11 | \$ 261.90 | \$ 248.94 |

### Summary of Costs for ARV, Labs, HRH Per Patient Per Year (USD)

| 0 to <15 years    | 2014      | 2015      | 2016      | 2017      | 2018      | Average   |
|-------------------|-----------|-----------|-----------|-----------|-----------|-----------|
| ARV Costs PPPY    | \$ 354.31 | \$ 362.22 | \$ 368.57 | \$ 373.84 | \$ 378.07 | \$ 367.40 |
| Cotrim Costs PPPY | \$ 10.81  | \$ 10.82  | \$ 10.78  | \$ 10.68  | \$ 10.63  | \$ 10.74  |
| HR Costs PPPY     | \$ 21.86  | \$ 21.82  | \$ 20.69  | \$ 20.85  | \$ 20.67  | \$ 21.18  |
| Lab Costs PPPY    | \$ 53.03  | \$ 54.02  | \$ 54.92  | \$ 55.58  | \$ 55.36  | \$ 54.58  |
|                   | \$ 440.02 | \$ 448.88 | \$ 454.96 | \$ 460.94 | \$ 464.73 | \$ 453.91 |

| 0 to <20 years    | 2014      | 2015      | 2016      | 2017      | 2018      | Average   |
|-------------------|-----------|-----------|-----------|-----------|-----------|-----------|
| ARV Costs PPPY    | \$ 318.50 | \$ 326.13 | \$ 329.71 | \$ 332.15 | \$ 333.12 | \$ 327.92 |
| Cotrim Costs PPPY | \$ 10.43  | \$ 10.48  | \$ 10.47  | \$ 10.42  | \$ 10.42  | \$ 10.45  |
| HR Costs PPPY     | \$ 21.81  | \$ 21.84  | \$ 20.77  | \$ 21.01  | \$ 21.01  | \$ 21.29  |
| Lab Costs PPPY    | \$ 52.20  | \$ 53.26  | \$ 54.20  | \$ 54.96  | \$ 55.05  | \$ 53.93  |
|                   | \$ 402.94 | \$ 411.71 | \$ 415.15 | \$ 418.54 | \$ 419.60 | \$ 413.59 |



### Patients on Treatment and Eligible by Age Group

| Patients on ART | 2014   | 2015   | 2016   | 2017   | 2018   |
|-----------------|--------|--------|--------|--------|--------|
| 0 to <2 years   | 11,579 | 10,053 | 9,070  | 8,691  | 9,503  |
| 2 to <5 years   | 25,722 | 32,262 | 29,577 | 25,968 | 22,294 |
| 5 to <10 years  | 42,103 | 54,056 | 54,313 | 53,894 | 51,529 |
| 10 to <15 years | 31,423 | 42,222 | 44,426 | 46,515 | 48,583 |
| 15 to <20 years | 24,678 | 30,522 | 32,783 | 35,040 | 37,754 |

#### 0 to <10 years

|                        |         |         |        |        |        |
|------------------------|---------|---------|--------|--------|--------|
| Total ART Patients     | 79,405  | 96,371  | 92,960 | 88,553 | 83,325 |
| Total Eligible for ART | 106,373 | 101,443 | 97,853 | 93,214 | 87,711 |

#### 10 to <15 years

|                        |        |        |        |        |        |
|------------------------|--------|--------|--------|--------|--------|
| Total ART Patients     | 31,423 | 42,222 | 44,426 | 46,515 | 48,583 |
| Total Eligible for ART | 42,095 | 44,444 | 46,764 | 48,963 | 51,140 |

#### 15 to <20 years

|                        |        |        |        |        |        |
|------------------------|--------|--------|--------|--------|--------|
| Total ART Patients     | 24,678 | 30,522 | 32,783 | 35,040 | 37,754 |
| Total Eligible for ART | 30,150 | 32,128 | 34,508 | 36,884 | 39,741 |

#### 0 to <15 years

|                        |         |         |         |         |         |
|------------------------|---------|---------|---------|---------|---------|
| Total ART Patients     | 110,828 | 138,593 | 137,386 | 135,068 | 131,908 |
| Total Eligible for ART | 148,468 | 145,887 | 144,617 | 142,177 | 138,851 |

#### 0 to <20 years

|                        |         |         |         |         |         |
|------------------------|---------|---------|---------|---------|---------|
| Total ART Patients     | 135,506 | 169,114 | 170,169 | 170,108 | 169,662 |
| Total Eligible for ART | 178,618 | 178,015 | 179,125 | 179,061 | 178,592 |



## APPENDIX IX: Outputs from Scenario 5: 2013 Zambian Guidelines, UA by 2018

### Costs for ARVs by Age Range (USD)

|                 | 2014          | 2015          | 2016          | 2017          | 2018          | Total          |
|-----------------|---------------|---------------|---------------|---------------|---------------|----------------|
| 0 to <2 years   | \$ 3,172,988  | \$ 2,589,067  | \$ 2,921,886  | \$ 3,464,327  | \$ 3,465,275  | \$ 15,613,544  |
| 2 to <5 years   | \$ 8,651,438  | \$ 9,621,886  | \$ 9,465,340  | \$ 8,729,286  | \$ 9,042,597  | \$ 45,510,548  |
| 5 to <10 years  | \$ 12,337,729 | \$ 14,373,308 | \$ 16,463,896 | \$ 18,488,731 | \$ 19,843,614 | \$ 81,507,279  |
| 10 to <15 years | \$ 5,585,728  | \$ 6,773,726  | \$ 8,081,267  | \$ 9,545,261  | \$ 11,200,186 | \$ 41,186,169  |
| 15 to <20 years | \$ 3,516,154  | \$ 4,081,989  | \$ 4,713,897  | \$ 5,459,726  | \$ 6,384,125  | \$ 24,155,891  |
|                 |               |               |               |               |               |                |
| 0 to <10 years  | \$ 24,162,155 | \$ 26,584,262 | \$ 28,851,121 | \$ 30,682,345 | \$ 32,351,487 | \$ 142,631,370 |
| 10 to <15 years | \$ 5,585,728  | \$ 6,773,726  | \$ 8,081,267  | \$ 9,545,261  | \$ 11,200,186 | \$ 41,186,169  |
| 15 to <20 years | \$ 3,516,154  | \$ 4,081,989  | \$ 4,713,897  | \$ 5,459,726  | \$ 6,384,125  | \$ 24,155,891  |
|                 |               |               |               |               |               |                |
| 0 to <15 years  | \$ 29,747,883 | \$ 33,357,988 | \$ 36,932,389 | \$ 40,227,606 | \$ 43,551,673 | \$ 183,817,539 |
| 0 to <20 years  | \$ 33,264,036 | \$ 37,439,977 | \$ 41,646,286 | \$ 45,687,332 | \$ 49,935,798 | \$ 207,973,430 |

### Costs for ARVs, Cotrim, Lab Commodities, HR (USD, including shipping)

| 0 to <10 years  | 2014          | 2015          | 2016          | 2017          | 2018          | Total          |
|-----------------|---------------|---------------|---------------|---------------|---------------|----------------|
| ARV Costs       | \$ 26,578,370 | \$ 29,242,688 | \$ 31,736,234 | \$ 33,750,579 | \$ 35,586,636 | \$ 156,894,507 |
| Cotrim Costs    | \$ 862,268    | \$ 927,939    | \$ 981,206    | \$ 1,013,479  | \$ 1,058,898  | \$ 4,843,790   |
| Direct HR Costs | \$ 1,216,473  | \$ 1,321,137  | \$ 1,438,239  | \$ 1,531,095  | \$ 1,607,211  | \$ 7,114,155   |
| Lab Commodities | \$ 2,779,145  | \$ 3,046,844  | \$ 3,321,316  | \$ 3,554,922  | \$ 3,748,516  | \$ 16,450,742  |
|                 | \$ 31,436,256 | \$ 34,538,609 | \$ 37,476,994 | \$ 39,850,075 | \$ 42,001,260 | \$ 185,303,195 |
| 10 to <15 years | 2014          | 2015          | 2016          | 2017          | 2018          | Total          |
| ARV Costs       | \$ 6,144,301  | \$ 7,451,098  | \$ 8,889,394  | \$ 10,499,788 | \$ 12,320,205 | \$ 45,304,786  |
| Cotrim Costs    | \$ 136,295    | \$ 165,283    | \$ 197,188    | \$ 232,910    | \$ 273,292    | \$ 1,004,968   |
| Direct HR Costs | \$ 709,248    | \$ 817,943    | \$ 935,145    | \$ 1,044,068  | \$ 1,115,297  | \$ 4,621,701   |
| Lab Commodities | \$ 1,619,024  | \$ 1,884,613  | \$ 2,157,370  | \$ 2,421,559  | \$ 2,598,445  | \$ 10,681,010  |
|                 | \$ 8,608,868  | \$ 10,318,937 | \$ 12,179,097 | \$ 14,198,324 | \$ 16,307,238 | \$ 61,612,465  |
| 15 to <20 years | 2014          | 2015          | 2016          | 2017          | 2018          | Total          |
| ARV Costs       | \$ 3,516,154  | \$ 4,081,989  | \$ 4,713,897  | \$ 5,459,726  | \$ 6,384,125  | \$ 24,155,891  |
| Cotrim Costs    | \$ 193,654    | \$ 224,818    | \$ 259,620    | \$ 300,697    | \$ 351,609    | \$ 1,330,398   |
| Direct HR Costs | \$ 460,052    | \$ 533,387    | \$ 613,048    | \$ 707,906    | \$ 826,040    | \$ 3,140,433   |
| Lab Commodities | \$ 980,788    | \$ 1,137,470  | \$ 1,312,419  | \$ 1,518,861  | \$ 1,774,669  | \$ 6,724,207   |
|                 | \$ 5,150,648  | \$ 5,977,664  | \$ 6,898,984  | \$ 7,987,189  | \$ 9,336,443  | \$ 35,350,929  |



### Summary of Costs for ARVs, Cotrim, Lab Commodities, HR (USD, including shipping)

| 0 to <15 years  | 2014          | 2015          | 2016          | 2017          | 2018          | Total          |
|-----------------|---------------|---------------|---------------|---------------|---------------|----------------|
| ARV Costs       | \$ 32,722,671 | \$ 36,693,787 | \$ 40,625,628 | \$ 44,250,367 | \$ 47,906,841 | \$ 202,199,293 |
| Cotrim Costs    | \$ 998,564    | \$ 1,093,222  | \$ 1,178,394  | \$ 1,246,389  | \$ 1,332,189  | \$ 5,848,759   |
| Direct HR Costs | \$ 1,925,721  | \$ 2,139,080  | \$ 2,373,384  | \$ 2,575,163  | \$ 2,722,508  | \$ 11,735,856  |
| Lab Commodities | \$ 4,398,168  | \$ 4,931,457  | \$ 5,478,685  | \$ 5,976,481  | \$ 6,346,960  | \$ 27,131,752  |
|                 | \$ 40,045,124 | \$ 44,857,546 | \$ 49,656,092 | \$ 54,048,400 | \$ 58,308,498 | \$ 246,915,660 |

| 0 to <20 years  | 2014          | 2015          | 2016          | 2017          | 2018          | Total          |
|-----------------|---------------|---------------|---------------|---------------|---------------|----------------|
| ARV Costs       | \$ 36,238,825 | \$ 40,775,776 | \$ 45,339,525 | \$ 49,710,093 | \$ 54,290,966 | \$ 226,355,184 |
| Cotrim Costs    | \$ 1,192,217  | \$ 1,318,040  | \$ 1,438,015  | \$ 1,547,086  | \$ 1,683,798  | \$ 7,179,156   |
| Direct HR Costs | \$ 2,385,774  | \$ 2,672,467  | \$ 2,986,432  | \$ 3,283,069  | \$ 3,548,548  | \$ 14,876,289  |
| Lab Commodities | \$ 5,378,957  | \$ 6,068,927  | \$ 6,791,104  | \$ 7,495,342  | \$ 8,121,630  | \$ 33,855,959  |
|                 | \$ 45,195,773 | \$ 50,835,210 | \$ 56,555,075 | \$ 62,035,589 | \$ 67,644,942 | \$ 282,266,589 |

### Costs for ARV, Labs, and HRH Per Patient Per Year (USD)

| 0 to <10 years    | 2014      | 2015      | 2016      | 2017      | 2018      | Average   |
|-------------------|-----------|-----------|-----------|-----------|-----------|-----------|
| ARV Costs PPPY    | \$ 401.53 | \$ 414.47 | \$ 424.12 | \$ 432.87 | \$ 444.35 | \$ 423.47 |
| Cotrim Costs PPPY | \$ 13.03  | \$ 13.15  | \$ 13.11  | \$ 13.00  | \$ 13.22  | \$ 13.10  |
| HR Costs PPPY     | \$ 18.38  | \$ 18.73  | \$ 19.22  | \$ 19.64  | \$ 20.07  | \$ 19.21  |
| Lab Costs PPPY    | \$ 41.99  | \$ 43.18  | \$ 44.39  | \$ 45.59  | \$ 46.81  | \$ 44.39  |
|                   | \$ 474.91 | \$ 489.54 | \$ 500.84 | \$ 511.10 | \$ 524.45 | \$ 500.17 |

| 10 to <15 years   | 2014      | 2015      | 2016      | 2017      | 2018      | Average   |
|-------------------|-----------|-----------|-----------|-----------|-----------|-----------|
| ARV Costs PPPY    | \$ 234.90 | \$ 241.74 | \$ 248.58 | \$ 255.43 | \$ 262.27 | \$ 248.58 |
| Cotrim Costs PPPY | \$ 5.21   | \$ 5.36   | \$ 5.51   | \$ 5.67   | \$ 5.82   | \$ 5.51   |
| HR Costs PPPY     | \$ 27.12  | \$ 26.54  | \$ 26.15  | \$ 25.40  | \$ 23.74  | \$ 25.79  |
| Lab Costs PPPY    | \$ 61.90  | \$ 61.14  | \$ 60.33  | \$ 58.91  | \$ 55.31  | \$ 59.52  |
|                   | \$ 329.12 | \$ 334.79 | \$ 340.58 | \$ 345.40 | \$ 347.14 | \$ 339.41 |

| 15 to <20 years   | 2014      | 2015      | 2016      | 2017      | 2018      | Average   |
|-------------------|-----------|-----------|-----------|-----------|-----------|-----------|
| ARV Costs PPPY    | \$ 157.68 | \$ 162.28 | \$ 166.87 | \$ 171.46 | \$ 176.05 | \$ 166.87 |
| Cotrim Costs PPPY | \$ 8.68   | \$ 8.94   | \$ 9.19   | \$ 9.44   | \$ 9.70   | \$ 9.19   |
| HR Costs PPPY     | \$ 20.63  | \$ 21.20  | \$ 21.70  | \$ 22.23  | \$ 22.78  | \$ 21.71  |
| Lab Costs PPPY    | \$ 43.98  | \$ 45.22  | \$ 46.46  | \$ 47.70  | \$ 48.94  | \$ 46.46  |
|                   | \$ 230.98 | \$ 237.64 | \$ 244.22 | \$ 250.83 | \$ 257.47 | \$ 244.23 |

### Summary of Costs for ARV, Labs, HRH Per Patient Per Year (USD)

| 0 to <15 years    | 2014      | 2015      | 2016      | 2017      | 2018      | Average   |
|-------------------|-----------|-----------|-----------|-----------|-----------|-----------|
| ARV Costs PPPY    | \$ 354.33 | \$ 361.96 | \$ 367.36 | \$ 371.61 | \$ 377.03 | \$ 366.46 |
| Cotrim Costs PPPY | \$ 10.81  | \$ 10.78  | \$ 10.66  | \$ 10.47  | \$ 10.48  | \$ 10.64  |
| HR Costs PPPY     | \$ 20.85  | \$ 21.10  | \$ 21.46  | \$ 21.63  | \$ 21.43  | \$ 21.29  |
| Lab Costs PPPY    | \$ 47.62  | \$ 48.65  | \$ 49.54  | \$ 50.19  | \$ 49.95  | \$ 49.19  |
|                   | \$ 433.62 | \$ 442.49 | \$ 449.02 | \$ 453.90 | \$ 458.90 | \$ 447.58 |

| 0 to <20 years    | 2014      | 2015      | 2016      | 2017      | 2018      | Average   |
|-------------------|-----------|-----------|-----------|-----------|-----------|-----------|
| ARV Costs PPPY    | \$ 316.08 | \$ 322.26 | \$ 326.57 | \$ 329.38 | \$ 332.41 | \$ 325.34 |
| Cotrim Costs PPPY | \$ 10.40  | \$ 10.42  | \$ 10.36  | \$ 10.25  | \$ 10.31  | \$ 10.35  |
| HR Costs PPPY     | \$ 20.81  | \$ 21.12  | \$ 21.51  | \$ 21.75  | \$ 21.73  | \$ 21.38  |
| Lab Costs PPPY    | \$ 46.92  | \$ 47.96  | \$ 48.91  | \$ 49.66  | \$ 49.73  | \$ 48.64  |
|                   | \$ 394.21 | \$ 401.76 | \$ 407.35 | \$ 411.05 | \$ 414.17 | \$ 405.71 |



### Patients on Treatment and Eligible by Age Group

| Patients on ART | 2014   | 2015   | 2016   | 2017   | 2018   |
|-----------------|--------|--------|--------|--------|--------|
| 0 to <2 years   | 9,671  | 7,668  | 8,416  | 9,711  | 9,460  |
| 2 to <5 years   | 21,403 | 23,130 | 22,128 | 19,860 | 20,036 |
| 5 to <10 years  | 35,119 | 39,755 | 44,284 | 48,399 | 50,590 |
| 10 to <15 years | 26,157 | 30,822 | 35,760 | 41,107 | 46,976 |
| 15 to <20 years | 22,299 | 25,155 | 28,249 | 31,842 | 36,262 |

#### 0 to <10 years

|                        |         |        |        |        |        |
|------------------------|---------|--------|--------|--------|--------|
| Total ART Patients     | 66,193  | 70,554 | 74,828 | 77,970 | 80,087 |
| Total Eligible for ART | 106,018 | 99,967 | 95,058 | 89,766 | 84,302 |

#### 10 to <15 years

|                        |        |        |        |        |        |
|------------------------|--------|--------|--------|--------|--------|
| Total ART Patients     | 26,157 | 30,822 | 35,760 | 41,107 | 46,976 |
| Total Eligible for ART | 41,894 | 43,672 | 45,428 | 47,326 | 49,448 |

#### 15 to <20 years

|                        |        |        |        |        |        |
|------------------------|--------|--------|--------|--------|--------|
| Total ART Patients     | 22,299 | 25,155 | 28,249 | 31,842 | 36,262 |
| Total Eligible for ART | 30,150 | 31,753 | 33,439 | 35,483 | 38,171 |

#### 0 to <15 years

|                        |         |         |         |         |         |
|------------------------|---------|---------|---------|---------|---------|
| Total ART Patients     | 92,350  | 101,376 | 110,588 | 119,077 | 127,063 |
| Total Eligible for ART | 147,912 | 143,639 | 140,486 | 137,092 | 133,750 |

#### 0 to <20 years

|                        |         |         |         |         |         |
|------------------------|---------|---------|---------|---------|---------|
| Total ART Patients     | 114,649 | 126,531 | 138,837 | 150,919 | 163,325 |
| Total Eligible for ART | 178,062 | 175,392 | 173,925 | 172,575 | 171,921 |



## APPENDIX X: Outputs from Scenario 6: 2013 Zambian Guidelines with WHO Regimens, UA by 2018

### Costs for ARVs by Age Range (USD)

|                 | 2014          | 2015          | 2016          | 2017          | 2018          | Total          |
|-----------------|---------------|---------------|---------------|---------------|---------------|----------------|
| 0 to <2 years   | \$ 2,760,846  | \$ 2,781,991  | \$ 2,605,325  | \$ 2,605,376  | \$ 3,121,986  | \$ 13,875,525  |
| 2 to <5 years   | \$ 6,132,208  | \$ 8,886,395  | \$ 8,444,223  | \$ 7,668,068  | \$ 6,952,020  | \$ 38,082,914  |
| 5 to <10 years  | \$ 12,445,934 | \$ 19,294,913 | \$ 20,192,437 | \$ 20,588,150 | \$ 20,211,772 | \$ 92,733,206  |
| 10 to <15 years | \$ 6,830,281  | \$ 9,362,549  | \$ 10,130,089 | \$ 10,898,360 | \$ 11,687,824 | \$ 48,909,103  |
| 15 to <20 years | \$ 4,224,047  | \$ 5,142,427  | \$ 5,525,836  | \$ 6,007,946  | \$ 6,646,709  | \$ 27,546,965  |
|                 |               |               |               |               |               |                |
| 0 to <10 years  | \$ 21,338,989 | \$ 30,963,299 | \$ 31,241,985 | \$ 30,861,594 | \$ 30,285,778 | \$ 144,691,645 |
| 10 to <15 years | \$ 6,830,281  | \$ 9,362,549  | \$ 10,130,089 | \$ 10,898,360 | \$ 11,687,824 | \$ 48,909,103  |
| 15 to <20 years | \$ 4,224,047  | \$ 5,142,427  | \$ 5,525,836  | \$ 6,007,946  | \$ 6,646,709  | \$ 27,546,965  |
|                 |               |               |               |               |               |                |
| 0 to <15 years  | \$ 28,169,270 | \$ 40,325,848 | \$ 41,372,074 | \$ 41,759,954 | \$ 41,973,602 | \$ 193,600,748 |
| 0 to <20 years  | \$ 32,393,316 | \$ 45,468,275 | \$ 46,897,910 | \$ 47,767,900 | \$ 48,620,311 | \$ 221,147,712 |

### Costs for ARVs, Cotrim, Lab Commodities, HR (USD, including shipping)

| 0 to <10 years  | 2014          | 2015          | 2016          | 2017          | 2018          | Total          |
|-----------------|---------------|---------------|---------------|---------------|---------------|----------------|
| ARV Costs       | \$ 23,472,888 | \$ 34,059,629 | \$ 34,366,184 | \$ 33,947,753 | \$ 33,314,356 | \$ 159,160,809 |
| Cotrim Costs    | \$ 1,034,801  | \$ 1,272,938  | \$ 1,235,886  | \$ 1,178,791  | \$ 1,119,735  | \$ 5,842,151   |
| Direct HR Costs | \$ 1,637,437  | \$ 1,980,830  | \$ 1,844,041  | \$ 1,803,290  | \$ 1,742,548  | \$ 9,008,146   |
| Lab Commodities | \$ 4,043,883  | \$ 4,971,955  | \$ 4,945,177  | \$ 4,858,890  | \$ 4,718,160  | \$ 23,538,065  |
|                 | \$ 30,189,009 | \$ 42,285,351 | \$ 42,391,288 | \$ 41,788,724 | \$ 40,894,798 | \$ 197,549,170 |
| 10 to <15 years | 2014          | 2015          | 2016          | 2017          | 2018          | Total          |
| ARV Costs       | \$ 7,513,309  | \$ 10,298,804 | \$ 11,143,098 | \$ 11,988,196 | \$ 12,856,607 | \$ 53,800,013  |
| Cotrim Costs    | \$ 163,734    | \$ 226,412    | \$ 244,973    | \$ 263,552    | \$ 282,643    | \$ 1,181,313   |
| Direct HR Costs | \$ 900,907    | \$ 1,162,523  | \$ 1,120,713  | \$ 1,137,739  | \$ 1,112,624  | \$ 5,434,506   |
| Lab Commodities | \$ 2,189,950  | \$ 2,881,664  | \$ 2,977,129  | \$ 3,035,813  | \$ 2,982,305  | \$ 14,066,861  |
|                 | \$ 10,767,900 | \$ 14,569,403 | \$ 15,485,912 | \$ 16,425,300 | \$ 17,234,179 | \$ 74,482,694  |
| 15 to <20 years | 2014          | 2015          | 2016          | 2017          | 2018          | Total          |
| ARV Costs       | \$ 4,224,047  | \$ 5,142,427  | \$ 5,525,836  | \$ 6,007,946  | \$ 6,646,709  | \$ 27,546,965  |
| Cotrim Costs    | \$ 214,313    | \$ 272,783    | \$ 301,283    | \$ 330,891    | \$ 366,071    | \$ 1,485,341   |
| Direct HR Costs | \$ 582,153    | \$ 719,966    | \$ 744,071    | \$ 812,080    | \$ 893,225    | \$ 3,751,495   |
| Lab Commodities | \$ 1,336,714  | \$ 1,664,835  | \$ 1,827,007  | \$ 1,995,314  | \$ 2,194,476  | \$ 9,018,346   |
|                 | \$ 6,357,227  | \$ 7,800,011  | \$ 8,398,197  | \$ 9,146,230  | \$ 10,100,480 | \$ 41,802,146  |



### Summary of Costs for ARVs, Cotrim, Lab Commodities, HR (USD, including shipping)

| 0 to <15 years  | 2014          | 2015          | 2016          | 2017          | 2018          | Total          |
|-----------------|---------------|---------------|---------------|---------------|---------------|----------------|
| ARV Costs       | \$ 30,986,197 | \$ 44,358,433 | \$ 45,509,281 | \$ 45,935,949 | \$ 46,170,962 | \$ 212,960,822 |
| Cotrim Costs    | \$ 1,198,535  | \$ 1,499,350  | \$ 1,480,859  | \$ 1,442,343  | \$ 1,402,378  | \$ 7,023,464   |
| Direct HR Costs | \$ 2,538,344  | \$ 3,143,353  | \$ 2,964,754  | \$ 2,941,029  | \$ 2,855,172  | \$ 14,442,651  |
| Lab Commodities | \$ 6,233,834  | \$ 7,853,619  | \$ 7,922,306  | \$ 7,894,703  | \$ 7,700,465  | \$ 37,604,926  |
|                 | \$ 40,956,908 | \$ 56,854,754 | \$ 57,877,200 | \$ 58,214,024 | \$ 58,128,977 | \$ 272,031,864 |

| 0 to <20 years  | 2014          | 2015          | 2016          | 2017          | 2018          | Total          |
|-----------------|---------------|---------------|---------------|---------------|---------------|----------------|
| ARV Costs       | \$ 35,210,243 | \$ 49,500,860 | \$ 51,035,118 | \$ 51,943,896 | \$ 52,817,671 | \$ 240,507,787 |
| Cotrim Costs    | \$ 1,412,847  | \$ 1,772,133  | \$ 1,782,142  | \$ 1,773,233  | \$ 1,768,448  | \$ 8,508,805   |
| Direct HR Costs | \$ 3,120,497  | \$ 3,863,319  | \$ 3,708,824  | \$ 3,753,109  | \$ 3,748,397  | \$ 18,194,146  |
| Lab Commodities | \$ 7,570,548  | \$ 9,518,454  | \$ 9,749,313  | \$ 9,890,017  | \$ 9,894,941  | \$ 46,623,272  |
|                 | \$ 47,314,135 | \$ 64,654,766 | \$ 66,275,397 | \$ 67,360,254 | \$ 68,229,457 | \$ 313,834,010 |

### Costs for ARV, Labs, and HRH Per Patient Per Year (USD)

| 0 to <10 years    | 2014      | 2015      | 2016      | 2017      | 2018      | Average   |
|-------------------|-----------|-----------|-----------|-----------|-----------|-----------|
| ARV Costs PPPY    | \$ 295.61 | \$ 353.42 | \$ 369.69 | \$ 383.36 | \$ 399.81 | \$ 360.38 |
| Cotrim Costs PPPY | \$ 13.03  | \$ 13.21  | \$ 13.29  | \$ 13.31  | \$ 13.44  | \$ 13.26  |
| HR Costs PPPY     | \$ 20.62  | \$ 20.55  | \$ 19.84  | \$ 20.36  | \$ 20.91  | \$ 20.46  |
| Lab Costs PPPY    | \$ 50.93  | \$ 51.59  | \$ 53.20  | \$ 54.87  | \$ 56.62  | \$ 53.44  |
|                   | \$ 380.19 | \$ 438.78 | \$ 456.01 | \$ 471.90 | \$ 490.78 | \$ 447.53 |

| 10 to <15 years   | 2014      | 2015      | 2016      | 2017      | 2018      | Average   |
|-------------------|-----------|-----------|-----------|-----------|-----------|-----------|
| ARV Costs PPPY    | \$ 239.10 | \$ 243.92 | \$ 250.82 | \$ 257.73 | \$ 264.63 | \$ 251.24 |
| Cotrim Costs PPPY | \$ 5.21   | \$ 5.36   | \$ 5.51   | \$ 5.67   | \$ 5.82   | \$ 5.51   |
| HR Costs PPPY     | \$ 28.67  | \$ 27.53  | \$ 25.23  | \$ 24.46  | \$ 22.90  | \$ 25.76  |
| Lab Costs PPPY    | \$ 69.69  | \$ 68.25  | \$ 67.01  | \$ 65.27  | \$ 61.39  | \$ 66.32  |
|                   | \$ 342.68 | \$ 345.07 | \$ 348.58 | \$ 353.12 | \$ 354.74 | \$ 348.84 |

| 15 to <20 years   | 2014      | 2015      | 2016      | 2017      | 2018      | Average   |
|-------------------|-----------|-----------|-----------|-----------|-----------|-----------|
| ARV Costs PPPY    | \$ 171.17 | \$ 168.48 | \$ 168.56 | \$ 171.46 | \$ 176.05 | \$ 171.15 |
| Cotrim Costs PPPY | \$ 8.68   | \$ 8.94   | \$ 9.19   | \$ 9.44   | \$ 9.70   | \$ 9.19   |
| HR Costs PPPY     | \$ 23.59  | \$ 23.59  | \$ 22.70  | \$ 23.18  | \$ 23.66  | \$ 23.34  |
| Lab Costs PPPY    | \$ 54.17  | \$ 54.55  | \$ 55.73  | \$ 56.94  | \$ 58.13  | \$ 55.90  |
|                   | \$ 257.61 | \$ 255.56 | \$ 256.18 | \$ 261.02 | \$ 267.53 | \$ 259.58 |

### Summary of Costs for ARV, Labs, HRH Per Patient Per Year (USD)

| 0 to <15 years    | 2014      | 2015      | 2016      | 2017      | 2018      | Average   |
|-------------------|-----------|-----------|-----------|-----------|-----------|-----------|
| ARV Costs PPPY    | \$ 279.59 | \$ 320.06 | \$ 331.25 | \$ 340.09 | \$ 350.02 | \$ 324.20 |
| Cotrim Costs PPPY | \$ 10.81  | \$ 10.82  | \$ 10.78  | \$ 10.68  | \$ 10.63  | \$ 10.74  |
| HR Costs PPPY     | \$ 22.90  | \$ 22.68  | \$ 21.58  | \$ 21.77  | \$ 21.65  | \$ 22.12  |
| Lab Costs PPPY    | \$ 56.25  | \$ 56.67  | \$ 57.66  | \$ 58.45  | \$ 58.38  | \$ 57.48  |
|                   | \$ 369.55 | \$ 410.23 | \$ 421.27 | \$ 431.00 | \$ 440.68 | \$ 414.55 |

| 0 to <20 years    | 2014      | 2015      | 2016      | 2017      | 2018      | Average   |
|-------------------|-----------|-----------|-----------|-----------|-----------|-----------|
| ARV Costs PPPY    | \$ 259.84 | \$ 292.71 | \$ 299.91 | \$ 305.36 | \$ 311.31 | \$ 293.83 |
| Cotrim Costs PPPY | \$ 10.43  | \$ 10.48  | \$ 10.47  | \$ 10.42  | \$ 10.42  | \$ 10.45  |
| HR Costs PPPY     | \$ 23.03  | \$ 22.84  | \$ 21.79  | \$ 22.06  | \$ 22.09  | \$ 22.36  |
| Lab Costs PPPY    | \$ 55.87  | \$ 56.28  | \$ 57.29  | \$ 58.14  | \$ 58.32  | \$ 57.18  |
|                   | \$ 349.17 | \$ 382.31 | \$ 389.47 | \$ 395.99 | \$ 402.15 | \$ 383.82 |



### Patients on Treatment and Eligible by Age Group

| Patients on ART | 2014   | 2015   | 2016   | 2017   | 2018   |
|-----------------|--------|--------|--------|--------|--------|
| 0 to <2 years   | 11,579 | 10,053 | 9,070  | 8,691  | 9,503  |
| 2 to <5 years   | 25,722 | 32,262 | 29,577 | 25,968 | 22,294 |
| 5 to <10 years  | 42,103 | 54,056 | 54,313 | 53,894 | 51,529 |
| 10 to <15 years | 31,423 | 42,222 | 44,426 | 46,515 | 48,583 |
| 15 to <20 years | 24,678 | 30,522 | 32,783 | 35,040 | 37,754 |

#### 0 to <10 years

|                        |         |         |        |        |        |
|------------------------|---------|---------|--------|--------|--------|
| Total ART Patients     | 79,405  | 96,371  | 92,960 | 88,553 | 83,325 |
| Total Eligible for ART | 106,373 | 101,443 | 97,853 | 93,214 | 87,711 |

#### 10 to <15 years

|                        |        |        |        |        |        |
|------------------------|--------|--------|--------|--------|--------|
| Total ART Patients     | 31,423 | 42,222 | 44,426 | 46,515 | 48,583 |
| Total Eligible for ART | 42,095 | 44,444 | 46,764 | 48,963 | 51,140 |

#### 15 to <20 years

|                        |        |        |        |        |        |
|------------------------|--------|--------|--------|--------|--------|
| Total ART Patients     | 24,678 | 30,522 | 32,783 | 35,040 | 37,754 |
| Total Eligible for ART | 30,150 | 32,128 | 34,508 | 36,884 | 39,741 |

#### 0 to <15 years

|                        |         |         |         |         |         |
|------------------------|---------|---------|---------|---------|---------|
| Total ART Patients     | 110,828 | 138,593 | 137,386 | 135,068 | 131,908 |
| Total Eligible for ART | 148,468 | 145,887 | 144,617 | 142,177 | 138,851 |

#### 0 to <20 years

|                        |         |         |         |         |         |
|------------------------|---------|---------|---------|---------|---------|
| Total ART Patients     | 135,506 | 169,114 | 170,169 | 170,108 | 169,662 |
| Total Eligible for ART | 178,618 | 178,015 | 179,125 | 179,061 | 178,592 |