National HIV/AIDS Epidemiologic Profile
2003 to 2007
National TB, HIV/AIDS and Other STIs Programme
Epidemiology Unit
Ministry of Health, Belize
November, 2008
I. Introduction

Over the last decade, Belize has experienced an epidemiological transition from communicable to non-communicable diseases, a trend that is expected to continue. However, in addition to focusing on the non-communicable diseases, reducing communicable diseases such as HIV, other sexually transmitted infections (STIs) and tuberculosis (TB) remains a priority. HIV infection remains the single most infectious disease challenge to public health systems in the world.

Since 2001, the Ministry of Health has significantly improved its HIV and AIDS response. Numerous programs and services have been instituted to address the mandate of the Ministry, while at the same time strengthening the health system to effectively respond to this national epidemic. Hallmark achievements have included the introduction of the PMTCT programme in 2002 and introduction of free anti-retroviral therapy in 2003. While the advances have been tremendous, much remains to be achieved.

UNAIDS, at the end of 2007, estimated 33.2 million people were living with HIV/AIDS with an estimated 2.1 million dying of HIV/AIDS worldwide. Sub-Saharan Africa remains the geographical region most affected by this pandemic followed by the Caribbean region. Every day, an estimated 6,800 persons become infected with HIV, and 5,700 persons die from AIDS.¹

Belize currently has the highest prevalence rate of HIV in Central America and the third highest in the Caribbean, with an estimated prevalence of 2.1% [1.2%-3.1%] at the end of 2007. Other Caribbean countries with a higher estimated prevalence are Bahamas (3.0%) and Haiti (2.2%). Belize is considered to have a generalized epidemic. The estimated prevalence rate in pregnant women has been approximately 0.9% for the past 5 years allowing us to theorize that there are concentrated pockets of populations with a higher prevalence rate.

Globally, injection drug users, men who have sex with men and commercial sex workers are the populations most disproportionately affected by HIV outside of sub Saharan Africa. Likewise, youth (15-24years) continue to be a group at higher risk, accounting for an estimated 45% of new cases worldwide.² In Belize, other high risk groups include the prison population; the uniformed services and the migrant population although there is little epidemiological information to substantiate that these are in fact high risk groups.

In Latin America, the main modes of HIV transmission include men having sex with men (MSM), commercial sex work (CSW) and to a lesser extent injection drug use. In this region, high prevalence of HIV infection has been documented in these groups. Among sex workers prevalence ranges from 0.2% in Costa Rica to 26.6% in Guyana. While among MSM, prevalence ranges from 6.3% in Honduras to 21.5% in Bolivia. On the other hand, in the Caribbean the main mode of transmission remains heterosexual intercourse, including commercial sex work. However, same sex risk among men is recognized as a significant mode of transmission. Prevalence rates in this region range from 0.1% among sex workers in Cuba to 9.1% in Jamaica, while among MSM prevalence ranges from 0.9% in Cuba to 20.4% in Trinidad & Tobago.

The trend in newly diagnosed HIV cases in Belize has virtually remained unchanged since 2002 with more than 430 cases being reported annually and a peak in 2004 at 457 cases. Infection has affected males and females in the same proportion.

As the country moves toward achieving the targets of universal access and the millennium development goals, emphasis will be placed on expanding testing and counseling through public and private clinics which are an entry point for both curative and preventive services, provision of quality services to people living with or affected by HIV, strengthening supplies management, management of TB as a co-infection, and integrating management of other STIs in the health services package at all points of service.

The objective of this report is to present an analysis of routinely collected surveillance data from the National HIV/AIDS Program of the Ministry of Health. It aims to summarize the epidemiological patterns and trends in HIV, AIDS, and AIDS related deaths in the period 2003 to 2007, and to provide insight into the progress made in HIV prevention in Belize during that period, and the policy and planning implications. It aims to serve both as a reference document on the status of the epidemic in Belize in the past 5 years, as well as a document to guide planning and policy decisions.

II. Data Sources and Limitations

HIV cases are reported to the Epidemiology Unit, Ministry of Health in Belmopan on a quarterly basis from the Central Medical Laboratory (CML) in Belize City. The CML is the national referral laboratory and is responsible for confirmatory testing of all HIV positive specimens identified country-wide in both the public and private sectors. As such, the CML is the central source of data on HIV positive cases. Aggregated case data are
AIDS cases are reported directly from health facilities to the Epidemiology Unit, Ministry of Health in Belmopan on a quarterly basis. Individual case data are reported via telephone, email or fax. Data reported with each case include sex, age, date of diagnosis, and residence. Although strict confidentiality is observed in the management, storage and analysis of these data, there is underreporting by physicians in both the public and private sector due to concerns regarding patient privacy.

AIDS deaths are reported utilizing the National Health Information System (NHIS). The system includes a mortality module. Using International Classification of Diseases version 10 (ICD-10) methodology, underlying cause of death is coded from death certificates and entered into the NHIS. These data are collected, cleaned and analyzed by the Epidemiology Unit in Belmopan on an annual basis. As with AIDS cases, there is also under-reporting of AIDS related deaths. Some medical officers, both public and private, neglect to note AIDS as a condition on medical certificates of death due to concerns about confidentiality.

Data on pregnant women and infants born to HIV+ mothers are collected by the Maternal and Child Health (MCH) program of the Ministry of Health in Belmopan. These data are gathered from antenatal facilities country-wide and from the Central Medical Laboratory. These data are reported to the Epidemiology Unit on a quarterly basis. However, the data are only representative of persons tested in the public system. Few data on testing are available from the population served by the private sector.

III. Data Analysis

a. National Profile

The first case of HIV infection in Belize was documented in 1986. Since then, there has been an increasing trend in reported HIV cases, with a peak in 2004, but a general tendency to plateau from 2002 onwards. There was a notable escalation of cases in the latter part of the 1990’s and this could be partly explained by the wider testing options that were available to the general population. Since 2003, there were even more testing options available with the introduction of VCT services in the country.

Age Distribution

HIV/AIDS continues to affect the most productive age groups in terms of economic growth and contributions to labour. Most HIV cases in the period 2003 to 2007 were reported in the age group 15-49 years (83%), the majority of AIDS cases were also reported in this age group (75%), and considering the average life span of those infected, most deaths also occurred within this age group (73%). Also, annually from 2003-2007, HIV/AIDS has been the leading cause of death in the age group 40-49 and is among the leading causes of death in those 20-39 years of age. Generally, persons 15 years and older ac-

<table>
<thead>
<tr>
<th>Table 1: Cumulative HIV Cases, AIDS Cases, and AIDS Related Deaths Reported by Age Group and Sex, 2003-2007</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<tr>
<td>------------------</td>
</tr>
<tr>
<td>New HIV Cases</td>
</tr>
<tr>
<td>&lt;1 year</td>
</tr>
<tr>
<td>Male</td>
</tr>
<tr>
<td>Female</td>
</tr>
<tr>
<td>Both Sexes</td>
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<tr>
<td>AIDS Cases</td>
</tr>
<tr>
<td>0-14 years</td>
</tr>
<tr>
<td>Male</td>
</tr>
<tr>
<td>Female</td>
</tr>
<tr>
<td>Both Sexes</td>
</tr>
<tr>
<td>AIDS Related Deaths</td>
</tr>
<tr>
<td>15-49 years</td>
</tr>
<tr>
<td>Male</td>
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<tr>
<td>Female</td>
</tr>
<tr>
<td>Both Sexes</td>
</tr>
<tr>
<td>AIDS Related Deaths</td>
</tr>
<tr>
<td>≥15 years</td>
</tr>
<tr>
<td>Male</td>
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<tr>
<td>Female</td>
</tr>
<tr>
<td>Both Sexes</td>
</tr>
<tr>
<td>AIDS Related Deaths</td>
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<td>15-49 years</td>
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<tr>
<td>Male</td>
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<td>Female</td>
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<td>Both Sexes</td>
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<td>AIDS Related Deaths</td>
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<tr>
<td>Both Sexes</td>
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<td>AIDS Related Deaths</td>
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</tbody>
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Data on number of persons tested per year are gathered from the Voluntary Counseling and Testing (VCT) sites country-wide and from the Central Medical Laboratory. These data are reported to the Epidemiology Unit on a quarterly basis. However, the data are only representative of persons tested in the public system. Few data on testing are available from the population served by the private sector.
of testing per 100,000 population decreased by 44.3% from 2003 to 2007 with an average decrease of 611 fewer persons tested per 100,000 population per year. In general, the initial introduction of HIV rapid testing and VCT services in 2003 led to an increase in testing during that time, in particular in the Belize district, but these numbers gradually decreased in subsequent years.

The prevalence, however, amongst those tested has increased. In the 5 year period, the prevalence among persons tested grew by 61.2%, while the number of persons tested fell by 44.3% (Figure 1). Fewer persons were tested, but the number of persons who tested seropositive remained stable. The persons accessing VCT services are usually persons that have engaged in risky behavior and have significant risk factors. Thus the move towards provider initiated testing and counseling (PITC) will reach the wider population accessing health services.

Sex Distribution

Even though there is a global trend towards ‘feminization’ of the HIV epidemic, this trend needs to be carefully analyzed in Belize. As with many other health services, women access HIV testing in a greater
proportion than men. Cumulatively, 41% more women than men were tested in the 5 year period. The rate of persons tested was closest between men and women in 2007 when 7% more women were tested, otherwise the testing rate was between 36% and 44% greater in women each year. The higher rate of testing in women also results from the fact that several women are tested through the Prevention of Mother to Child Transmission (PMTCT) program, a component of PITC. (Figure 2.)

However, when sex specific HIV rates are compared, the rate in males has been consistently higher in the five years encompassed here. In 2003, there were 23% more HIV cases diagnosed among men. This gap closed gradually and reduced to 8% more cases among men in 2006. However, in 2007, the gap in newly diagnosed HIV cases between men and women again widened, with 35% more cases in men. (Figure 2.)

**Estimated Adult Prevalence**

Using the methodology proposed by the United Nations Joint Programme on HIV/AIDS (UNAIDS), see Box 1, the adult prevalence of HIV in Belize has been estimated at 2.1% (1.2%-3.1%). The estimates indicate that the adult prevalence remained virtually unchanged in the five years (2003-2007). However, the projected estimates also suggest a sustained, although small, increase in prevalence from 2007 through 2012 (7.0% increase). (Figure 3.) It is also important to note that prevalence is a cross sectional measure and refers to a total pooled number of cases. It is expected that the prevalence will continue to increase gradually, since with newer medications now available through public health facilities, the survival rate of HIV positive patients is greater than it was 5 years ago. Thus, with new cases contributing to the pool of persons infected, and less AIDS related deaths due to increased survival rates in persons on ARV, the prevalence is expected to increase.

**Estimated Adult Incidence**

However, based on Spectrum estimates, the HIV incidence rate showed a relative decrease of 18% from 2003 to 2007 and is projected to remain fairly stable through 2012. It is expected to stabilize to 0.19 new HIV cases per 100 population in the next 5 years. (Figure 3.) The incidence rate reflects the number of new HIV infections acquired on an annual basis, and despite a notable decrease between 2003 and 2007, this trend has remained fairly stable since 2003. (Figure 3.)

Using annual surveillance data on new HIV cases reported since 1986, a projection was done to estimate the number of expected cases of HIV per year up to 2012 (see Box 2). Additionally, the number of new HIV infections that occurred each year from 1986 to 2012 was estimated using Spectrum (see Box 1). Technically, these two estimates represent different aspects of the epidemic in Belize. The cases captured by the health system are actually the number of cases diagnosed or identified in a particular year, regardless of whether the case occurred in that year or in a previous year. These numbers are dependent on when individuals get tested, not on when they become infected. On the other hand, using the methodology and assumptions described in Box 1, Spectrum estimates the actual number of new infections that are acquired in each specific year.

In Figure 4, we compare the estimates put forth by Spectrum to the number of HIV infections captured by the health system annually. There were an average 316 new HIV infections acquired per year in 2003 to 2007 as estimated by Spectrum, as compared to an average 446 cases identified per year by the Ministry of Health. This represents a discrepancy of 40% in the average number of new infections occurring per year estimated by Spectrum versus the average number of cases diagnosed in the health system. The data from Spectrum also points to
Box 1: Estimating and Projecting National HIV Epidemics

Two steps are required to make estimates of HIV/AIDS. First, the year the epidemic began, and point prevalence estimates and epidemic curves are developed using HIV prevalence data. These estimates depend on what data are available and on the assumed stage of the epidemic. Secondly, the estimates of point prevalence (for three different years or more) and the assumed start date of the epidemic are used to estimate the epidemiologic curve that best describes the growth of the epidemic in Belize. These point prevalences and epidemic curve are estimated utilizing the UNAIDS Workbook and MS Excel Solver. Next, a set of assumptions about the survival time after HIV infection, sex ratio of infection and other factors, along with epidemiological curve are used to derive final estimates of HIV prevalence in the adult population, HIV incidence and AIDS mortality. This step is done in Spectrum, a program developed by UNAIDS.

Overview for low-level/concentrated epidemics

Surveillance data and size estimates for high risk groups and low risk populations → Workbook or EPP

- Adult HIV prevalence
- UN Population Division’s population estimates
- Epidemiology assumptions

Spectrum

- PLWHA
- New infections
- AIDS deaths
- Treatment needs


The following additional assumptions and data were utilized in making estimates for Belize.

- 2007 midyear population estimates were used to determine the adult population size (146,932) and the urban/rural distribution (52% urban).
- AIDS case distribution among men and women was used to determine the sex distribution of the epidemic (48.8% female).
- Annual seroprevalence in the ANC population has been approximately 1.0% since the start of the PMTCT program in 2001. Based on international standards and criteria, Belize’s epidemic may be considered as generalized. However, we agreed that higher risk groups such as MSM, CSW, mobile populations and others are still an important driving force in the epidemic in Belize.
- There is no evidence of a significant IDU population in Belize, so this high risk group was not taken into account in the estimation.
- In 2005, a seroprevalence survey was conducted in the prison population. In that study, 4.9% of the prison population was found to be HIV 1/2 antibody positive.
Data from MSM, FSW, and clients of FSW are not available for Belize, so data from Latin America and the Caribbean were used after lengthy discussions as to which estimates from the region were most applicable to Belize. Data from the Caribbean and Latin America indicate:

- 1.0% to 8.0% of adult males are MSM, with a prevalence of 12.0%-15.0%
- 0.3% to 0.4% of adult females are FSW with a prevalence of 6.0%-11.0%
- 5.0% to 10.0% of adult males are clients of FSW with a prevalence of 2.0% to 3.0%

Seroprevalence among male STI patients country-wide was estimated at 6.0% based on reported prevalence from the STI clinic in Belize City (2001)

10.0% of the adult population in Belize was estimated to be migrant. Data from the region indicate a 0.7% prevalence among truck drivers. Although mobile populations in Belize also include agricultural workers and construction workers, the 0.7% in truck drivers was used as the estimate for Belize.

It was estimated that 50.0% of MSM in Belize also have a regular female partner.

The population of partners of clients of FSW in Belize was estimated assuming that clients of female sex workers have at least 2 partners.

The first AIDS case in Belize was reported in 1986. 1980 was estimated as a reasonable time for the start of the epidemic in Belize.

Once imported into spectrum, the estimated adult HIV seroprevalence was 2.1 (1.2%-3.1%) for 2007.

All assumptions and estimates were decided based on a group discussion involving the National Epidemiologist, Belize; Director of the National HIV/AIDS Program, Belize; Biostatistician, Epidemiology Unit, Belize; Program Officer, National HIV/AIDS Program, Belize; PAHO/WHO, Belize Office; and where necessary Director of MCH, Belize; and Coordinator, PMTCT, Belize.

<table>
<thead>
<tr>
<th>Population Size Estimate</th>
<th>HIV prevalence Estimate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Low estimate</td>
</tr>
<tr>
<td>IDU</td>
<td>0</td>
</tr>
<tr>
<td>MSM</td>
<td>3000</td>
</tr>
<tr>
<td>Female sex workers</td>
<td>225</td>
</tr>
<tr>
<td>Male clients of female sex workers</td>
<td>3563</td>
</tr>
<tr>
<td>Prisoners</td>
<td>950</td>
</tr>
<tr>
<td>Male STI Patients</td>
<td>3500</td>
</tr>
<tr>
<td>Female STI Patients</td>
<td>3000</td>
</tr>
<tr>
<td>Migrant Workers</td>
<td>4000</td>
</tr>
<tr>
<td>Female partners of MSM</td>
<td>2100</td>
</tr>
<tr>
<td>Partners of clients of female sex workers</td>
<td>7126</td>
</tr>
</tbody>
</table>
a high number of HIV infections in the early 1990’s with an abrupt decrease in the latter part of the same decade and a plateau through this century. On the other hand, the number of documented HIV cases from the health system shows an increasing trend since the first case diagnosed in 1986 with a sudden documented increase at the turn of this century.

Additionally, the Spectrum estimates suggest a plateau in the number of new infections per year between 2009 and 2012, while the projection using surveillance data suggests a slight 9.0% decrease in cases detected in that time.

The discrepancy may be due to limitations with the Spectrum estimates (Box 1.) or double counting. It may also be due to late testing where the number of cases detected represents the “backlog” of new infections that occurred in previous years. Thus, we may be identifying cases later than they occur in the population, including those infections that occurred during the surge of infections in the 1990s that the Spectrum estimates suggest.

In support of this, Spectrum estimates a cumulative 5,604 new HIV infections from 1986 to present, while the health system has detected a cumulative 4,256 new cases in that time. This suggests that we are still catching up with the epidemic in Belize, hence the reason for detecting more cases per year than what is estimated to be the actual number of new cases per year in Spectrum. However, regardless of this, the two trends clearly depict the same yearly pattern in recent years with a plateau in the number of new cases starting in 2002 or 2003.

**Antiretroviral (ARV) Therapy Need**

Using Spectrum, estimates were made as to the number of person in need of antiretrovirals annually from 2003 to 2009. (Table 2.) Upon review of the estimates the numbers are fairly high when compared with the actual persons on ARV. The pediatric population in need of antiretroviral therapy since 2003 mimics the current pediatric population that is on therapy, which currently stands at 62. However, in the adult population, the estimates generated by spectrum suggest a consistent lack of coverage in the adult HIV population. ARVs were introduced in 2003. Since then there has been a growing demand for these medications. In the year 2007, 558 patients were on ARV therapy out of a possible 1,151 as estimated by spectrum (48.5% coverage). This total estimated number of patients will therefore serve as a baseline (in the absence of other data) for target setting under the National programme in an incremental fashion. Among the age group 14 years or less, the estimated need was equal among males and females. However, among the population 15 years and older, the projected ARV need was approximately 25% less in

**Box 2: Forecasting Methodology:**

A Loess linear regression model was used to determine the projected annual cases of HIV up to 2012, taking into consideration that resources remain constant. The prediction was based on the dependent variable (years) and the independent variable (cases). The regression model describes the relationship between years and cases. The equation utilized was:

\[ Y = B_0 + B_1X_1 + \ldots + B_nX_n + e \]

Where:
- \( X \) is different notation factors
- \( B_0 \) is the y-intercept
- \( B_{1-n} \) is the slope or change in cases per unit change in years;
- \( e \) is an error term describing the effects on \( Y \). This is always predicted as zero.
men. Additionally, Spectrum estimates suggest an increase of 20% in the number of persons in need of ARV in Belize for the next 2 years.

**Reported AIDS Cases**

Reported AIDS cases have shown a fluctuating trend in the past 5 years, ranging from 30 cases reported in 2005 to 120 case reported in 2007. As it pertains to the number of AIDS cases, the male to female ratio has been virtually 1:1 with a slightly higher proportion in males. This was particularly so in 2003 and 2007 when there were almost twice as many and almost 50% more AIDS cases reported among men in each year respectively (Figure 5). There has been an increasing trend in overall AIDS cases since 2005. The rate in 2007 was almost 4 times greater. This is a trend that can be expected to continue as the pool of persons infected with HIV increases, and there is a gradual progression into AIDS from these cases. However, with ongoing health promotion for more people to get tested, HIV cases can be diagnosed earlier, which may eventually lead to a plateau in the AIDS case rate. The introduction of ARV therapy for those meeting medical criteria in combination with increased testing and early identification of cases before they have progressed to AIDS can be expected to produce a gradual decline in AIDS rates and an increase in persons living with the virus.

Deaths associated with HIV infection continue to have an impact on the general health status of the country and AIDS has become one of the leading causes of death in the most productive age groups. As more and more people get tested it is expected that we will be detecting more HIV cases in the early stages of infection and thus we will be able to see a longer survival rate with earlier treatment and as patients adopt healthier lifestyles.

There were an average of 80 AIDS related deaths per year in the 2003 to 2007. AIDS related deaths, however, will continue to occur in a fluctuating pattern (Figure 6). Cases are still detected at a late stage with full blown AIDS. The issue of underreporting of AIDS related deaths also continues to be a setback in the national statistics.

**TB/HIV Co infection**

Spectrum estimates indicate an average incidence of 13.3 TB cases per 100 HIV cases in 2003 to 2005, while the health system detected an average 3 incidence TB cases per 100 HIV cases in that period. Although Spectrum estimates are subject to notable limitations (Box 1), the numbers suggest under detection of TB in HIV patients. The overall tuberculosis incidence rate in the gen-

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### Table 2: Persons in need of ARV (Spectrum Estimates), 2003-2009

<table>
<thead>
<tr>
<th>Adults needing ART (≥15years)</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>812</td>
<td>861</td>
<td>914</td>
<td>987</td>
<td>1,076</td>
<td>1,171</td>
<td>1,278</td>
</tr>
<tr>
<td>Female</td>
<td>358</td>
<td>377</td>
<td>397</td>
<td>426</td>
<td>463</td>
<td>503</td>
<td>548</td>
</tr>
<tr>
<td>Children needing ART (≤14years)</td>
<td>31</td>
<td>31</td>
<td>33</td>
<td>63</td>
<td>75</td>
<td>89</td>
<td>101</td>
</tr>
<tr>
<td>Male</td>
<td>16</td>
<td>15</td>
<td>17</td>
<td>32</td>
<td>38</td>
<td>45</td>
<td>51</td>
</tr>
<tr>
<td>Female</td>
<td>15</td>
<td>15</td>
<td>16</td>
<td>31</td>
<td>37</td>
<td>44</td>
<td>50</td>
</tr>
<tr>
<td>Total Need for ART (all age groups)</td>
<td>843</td>
<td>892</td>
<td>947</td>
<td>1,050</td>
<td>1,151</td>
<td>1,260</td>
<td>1,379</td>
</tr>
<tr>
<td>Total Persons Receiving ARV (all age groups)</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>558</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

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**Figure 5: AIDS Cases Reported per 100,000 population by Sex, 2003-2007**

![AIDS Cases Chart](chart.png)
eral population has not changed significantly over the course of the five years and has shown a tendency to decrease. As such, the overall co-infection rate with TB among HIV patients has not shown a dramatic increase and has remained fairly stable through the 5 year period. This is not the normal trend seen in other countries worldwide, but is not expected to change dramatically in the ensuing years since there are effective strategies being implemented to prevent TB/HIV co-infection and prophylactic measures are being given to HIV patients.

PMTCT

The PMTCT programme currently managed jointly between the National HIV/AIDS Programme and the Maternal and Child Health Programme has grown significantly since it was first launched in Belize in 2001.

The percent of women tested increased to as much as 94% in 2005, was 90% in 2007, and cumulatively was 88% for the 5 year period, although HIV testing is not mandatory for any group. (Figure 7.) Thus the program has shown positive outcomes in the past 5 years. Likewise, if the number of live births is used as a proxy for the number of pregnant women in the country during a given year, the percent of pregnant women tested for HIV can be estimated at 84.4% during the 5 year period, and 89.9% in 2007.

As evidenced in Figure 7, the prevalence amongst pregnant women tested has not changed significantly since 2004 with the highest prevalence reported in 2005 at 1.35%. The overall prevalence for the period 2003-2007 was 0.97%, of which 32% of cases were mothers who already knew they were HIV positive. This proportion of known HIV positive women becoming pregnant increased by 56% in the 5 year period, from 23% in 2003 to 36% in 2007. This suggests an urgent need for increased counseling and long term family planning services for HIV positive mothers.

With regard to those babies born to HIV positive mothers, there has been a gradual increase in percentage of babies tested. In 2007, one hundred percent of babies born to HIV positive mothers were tested. However, there was also a slight decrease in deliveries to HIV positive mothers in 2007 (16% relative reduction).

The new PMTCT plus guidelines are currently under review and the updated guidelines should be released soon. The average incidence of HIV among newborns...
tested for HIV was 15.4 per 100 live births in the 5 year period. In terms of prophylaxis, a cumulative 79.9% of mothers received prophylaxis in the period 2003-2007. This ranged from a low of 71.4% in 2003 to 91.8% in 2006. Overall there was a 23.5% relative increase from 2003 to 2007; while 87.5% of infants born to HIV positive mothers in that period received prophylaxis. This ranged from a low of 80% in 2005 to a high of 94.2% in 2004. It is noteworthy that in the latter part of 2006, the updated PMTCT plus guidelines were published in country with implementation starting late that same year. As the programme evolves, it is expected that more pregnant mothers will get tested and less babies will be born with HIV. (Figure 8.)

b. District Profiles

Age and Sex Distribution

Looking at the distribution of HIV cases per district during the 5 year period, the majority of cases were in the age group 15 years and older. (Table 3.) The notable exceptions were Orange Walk and Toledo with one case in the under 1 year age group, and Belize with 37 cases (2.0%). Likewise, the following districts showed the largest percentage of HIV cases in the age group 0-14 years, with 11.1% in Toledo (3 cases) 7.5% in Cayo (6 cases), and 5.4% in Belize (101) cases. The sex distribution of the cases in these age groups was virtually 1:1 in all districts.

In Belize, Cayo and Stann Creek the age group 15 years and older accounted for greater than 90.0% of all cases in the reporting period. The district with the lowest proportion of cases in this age group was Toledo (55.6%), Corozal (74.0%) and Orange Walk (87.3%). The sex distribution of cases in this age group varied by district, ranging from 60.0% less cases among men in Corozal to 30.0% more cases among men in Belize and Cayo.

The age and sex distribution of AIDS related deaths per district showed a slightly different pattern. The age
group <1 year accounted for the majority of AIDS related deaths in Stann Creek (5.0%, 5 deaths), with 4 times more deaths among females in this age group. Meanwhile, the age group 0-14 years accounted for 8.9% of all AIDS related deaths in Stann Creek, with a sex ratio of 1:1 in this age group.

The age group 15 years and older accounted for at least 65.0% of total AIDS related deaths in Corozal (66.7%), Orange Walk (65.0%) and Stann Creek (69.3%). Likewise, the sex distribution of deaths in this age group varied considerably between districts. The sex ratio ranged from 40.0% less AIDS related deaths among males in Corozal to two and three times as many cases among men in Orange Walk and Belize City.

**HIV Cases**

The HIV epidemic has seemingly changed little over the last five years with the rate of newly diagnosed HIV cases remaining fairly stable since 2003. However, there are stark differences between each district (Figure 9). The Belize district clearly had a much higher rate, with greater than 400 cases in each year. In 2007, the rate in the Belize district was 58 times greater than in the district with the lowest rate (Toledo), and was 3 times greater than the district with the next highest rate (Stann Creek). The Stann Creek district has shown a tendency to increase in the last three years with a relative increase of 84.1% between 2005 and 2007. The Toledo district on the other hand has shown a decreasing trend since 2004, whilst the other three districts have shown a fairly stable trend over the last five years.

**Testing**

In the Corozal and Toledo districts the testing rates have stabilized in the past three years (2005-2007), with an average of 663 persons tested per year in Corozal and an average of 348 persons tested per year in Toledo. (Figure 10.) It is expected, however, that those numbers will increase with time, especially as the Ministry of Health moves towards Provider Initiated Testing and Counseling (PITC) which will make testing more widely available and accessible.

The remaining districts have shown a gradual decrease in testing rates since 2004, in line with the trend seen at the national level. Declines in testing rates have been
37.0% in the Belize district, 60.0% in the Corozal district and 80.0% in Stann Creek. Only Cayo has shown a slight increase in testing rates, increasing by 69.0% between 2005 and 2007.

**Reported AIDS Cases**

The Toledo district, reported the lowest rates of AIDS, followed by Corozal and Orange Walk and showed a steady decrease in cases from 7.7 per 100,000 in 2003 to 0.0 cases reported in 2007. (Figure 11.) AIDS rates were fairly stable in Corozal with an average of 9.1 cases reported per 100,000 population per year. In Orange Walk, the AIDS case rate decreased by 61.5% in 2003 to 2005, followed by an 89% increased between 2005 and 2007.

Likewise in the Cayo district, the AIDS case rate was fairly stable with an average of 34.4 cases per 100,000 thousand in 2003 to 2005, after which the rate of reported cases doubled by the end of the period (2007).

In the remaining districts, Belize and Stann Creek, where the majority of HIV and AIDS cases are located, a similar pattern was seen in the AIDS rate. In the Belize district, between 2003 and 2006, the rate of AIDS cases decreased by 46.7%. However in 2007, the rate again increased 22 times. Likewise, in Stann Creek, AIDS cases decreased from 46.6 per 100,000 in 2003 to 0.0 in 2005. However, cases again increased to 37.2 per 100,000 in 2007.

With the advent of highly active antiretroviral therapy (HAART) now being more widely utilized, the number of AIDS cases may start to decrease over time.

**TB/HIV Co Infection**

By district, 53.1% (34/64) of cumulative TB/HIV co-infections reported in the 5 year period were in the Belize district. This was followed by Stann Creek with 28.1% of reported co-infections, Cayo with 9.4%, and the remaining districts with 3.1% each. The Belize dis-
district reported an incidence of TB/HIV that was two times greater than the district with the next highest incidence (Stann Creek). In terms of annual trends, the majority of co infections were reported in 2005 (21 cases). However, in that year 71% of cases were from the Belize district. There was no pattern in incidence evident per district or between districts. The remaining districts averaged 11 co infections a year. (Figure 12.)

AIDS Related Deaths

The Belize district had the highest rate of AIDS related deaths in the period 2003-2007. However, in that period the mortality rate decreased by 25.8% from 65.1 deaths per 100,000 (2003) to 48.3 per 100,000 (2007). The cumulative number of AIDS related deaths in this district was 40 times greater than the district with the least number of Deaths (Toledo), and almost 3 times greater than the number of deaths in the district with the next highest rate (Stann Creek). However, despite the decrease, in 2007, the Belize district still reported twice as many AIDS related deaths than would be expected if national death rates were applied to this district.

The Stann Creek District showed the second highest AIDS related death rate in the 5 year period. Excluding a 43.2% relative decrease in the rate in 2004, there were an average 56.2 deaths per 100,000 due to AIDS in Stann Creek in the period. The Cayo district also showed a stable trend in annual AIDS mortality, with an average 13.2 deaths per 100,00 in the period.

In the Toledo district, the AIDS mortality rate increased from 0 deaths to 3.7 per 100,000 in 2004, after which there were an average 3.5 deaths per 100,000 per year. In the north, Corozal averaged 5.7 deaths per 100,000 between 2003 and 2007. The only significant decrease was in 2006 when there were no AIDS related deaths reported. On the other hand, Orange Walk showed a 36.0% relative increase in mortality rates from 2003 to 2007, but rates averaged 5.7 deaths per 100,000 in that time.

PMTCT

During the period 2003 to 2007, the Belize and Stann Creek districts had the highest cumulative prevalence of HIV among pregnant women at 1.65% each. Overall, the Belize district showed a fairly stable annual trend. Stann Creek on the other hand showed a 60% relative increase from 2003 (1.78%) to 2006 (2.85%), followed by a 34% relative reduction in 2007 (1.88%). (Figure 13.)

In Toledo, with the exception of 2004 when there were no HIV positive cases among pregnant women tested, the median seroprevalence was 0.28% during that period. In the west, the Cayo district also showed a significant increase in prevalence from 0.52% (2003) to 1.73% (2007), tripling during that period.

In the north, Corozal and Orange Walk showed a very similar pattern in annual prevalence among pregnant women tested. In both districts there was a gradual decrease in prevalence between 2003 and 2006, followed by an increase in 2007. In Corozal there was a relative reduction of 79% between 2003 (0.57%) and 2006 (0.12%), followed by an increase of almost five times in 2007 (0.58%). In Orange Walk, there was a 100% decrease from 2003 (0.38%) to 2006 (0 cases), followed by an increase to 0.75% in 2007. However, Corozal and Orange Walk had a very small number of cases per year, which may partly explain the large degree of fluctuation in the rates.

In terms of HIV positive mothers having repeat pregnancies, the Stann Creek district had the highest percentage of old HIV cases among pregnant women with a cumulative percentage of 37.7%. This was followed by the Belize and Cayo districts where 35.7% and 24.7% of HIV positive mothers in the 5 year period already knew they had HIV. Additionally, in the Belize district, there has been a gradual increase in the number of known HIV+ pregnant mothers in the past 5 years. In 2003, 23% of mothers were known cases as compared to 50%
in 2006 and 45% in 2007. Likewise, in the Cayo district, an average 11% of pregnant mothers per year already knew they were HIV+. However, this proportion increased significantly in 2005 (45.5%) and 2006 (41.2%). Finally in the south, Stann Creek has also shown an increase in these figures. In 2003, 23% of HIV+ pregnant women already knew they had HIV, while in 2007, 50% of HIV+ mothers already knew they had HIV. (Figure 14.)

In terms of ARV prophylaxis, in the past 5 years the Toledo district showed the lowest rate of treatment of HIV+ pregnant mothers. The cumulative rate at which mothers were provided ARV during pregnancy was 50% in Toledo during that time. The Corozal district had the second lowest ARV prophylaxis coverage of pregnant mothers with a cumulative rate of 74% in the 5 years. The remaining districts report greater than 75% cumulative coverage during that time, with Cayo (92%) and Stann Creek (87.5%) reporting the greatest coverage. However, in each district there was been a significant amount of fluctuation in the number of pregnant women given prophylaxis. Although the small number of cases does partly explain these discrepancies, the numbers also suggest some degree of inconsistency in the implementation of national guidelines both between districts and within each district from year to year. (Table 4.)

In terms of ARV prophylaxis to infants born to HIV+ mothers in the past 5 years, Toledo and Corozal report less than 75% coverage in that time (67% and 71% respectively). Belize and Stann Creek reported the highest coverage rates with 94% and 90% respectively. With the exception of Corozal, Orange Walk and Toledo, ARV prophylaxis coverage rates among infants born to HIV Corozal (2 of 9). The lowest incidence among infants born to HIV+ mothers was in the Toledo district with zero incident cases. The remaining districts showed between 10% and 16% incidence during that time. In terms of annual trends, most districts showed large fluctuation in incidence rates, largely due to the small number of cases. However, the Belize district, where the largest number of cases were reported showed 33% relative increase between 2004 (17.4%) and 2007 (23.1%). While the Cayo and Stann Creek districts showed a decreasing trend. In Cayo the incidence decreased from 30% in 2004 to zero cases in 2007, while in Stann Creek incidence decreased from 28.6% in 2003 to 11.1% in 2007. (Table 5.)

V. National AIDS Program Resources

The National TB, HIV/AIDS and other STIs programme, is a preventive public health programme; it is the Ministry of Health's multisectoral response towards the prevention, treatment and care of Belizeans with TB, HIV/AIDS and other STIs. It is a planned programme aimed at making full and rational use of the technical knowledge and health resources available.

The National TB, HIV/AIDS and other STIs Program as the name now alludes tries to encompass specific diseases that are directly linked to HIV/AIDS and was previously known as the National AIDS Programme. Tuberculosis now falls under the same programme due to the relevant importance of TB as a co-infection in those HIV positive cases. Recognizing also the importance of other STIs in the transmission pathophysiology cycle of
### Table 4: Total Deliveries to HIV+ Mothers, and ARV Prophylaxis Coverage by District, 2003-2007

<table>
<thead>
<tr>
<th>District</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total Deliveries by HIV+ Mothers</td>
<td>Mother Received Nevirapine</td>
<td>Infant received Nevirapine</td>
<td>Total Deliveries by HIV+ Mothers</td>
<td>Mother Received Nevirapine</td>
</tr>
<tr>
<td>Corozal</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Orange Walk</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Belize</td>
<td>24</td>
<td>18</td>
<td>22</td>
<td>29</td>
<td>14</td>
</tr>
<tr>
<td>Cayo</td>
<td>7</td>
<td>7</td>
<td>7</td>
<td>10</td>
<td>9</td>
</tr>
<tr>
<td>Stann Creek</td>
<td>12</td>
<td>8</td>
<td>10</td>
<td>14</td>
<td>13</td>
</tr>
<tr>
<td>Toledo</td>
<td>2</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>49</td>
<td>35</td>
<td>42</td>
<td>60</td>
<td>38</td>
</tr>
</tbody>
</table>

### Table 5: Live Births to HIV+ Mothers, Infants tested for HIV 1/2 Antibody, and Incidence among Infants Tested by District, 2003-2007

<table>
<thead>
<tr>
<th>District</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Live Births to HIV+ Mothers</td>
<td>Infants HIV+</td>
<td>Infants Tested</td>
<td>Incidence among Infants born to HIV+ Mothers</td>
<td>Live Births to HIV+ Mothers</td>
</tr>
<tr>
<td>Corozal</td>
<td>3</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Orange Walk</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>Belize</td>
<td>24</td>
<td>0</td>
<td>14</td>
<td>31</td>
<td>4</td>
</tr>
<tr>
<td>Cayo</td>
<td>7</td>
<td>1</td>
<td>7</td>
<td>12</td>
<td>3</td>
</tr>
<tr>
<td>Stann Creek</td>
<td>12</td>
<td>2</td>
<td>7</td>
<td>11</td>
<td>1</td>
</tr>
<tr>
<td>Toledo</td>
<td>2</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>49</td>
<td>4</td>
<td>31</td>
<td>61</td>
<td>9</td>
</tr>
</tbody>
</table>
HIV as well as knowing that HIV is also sexually transmitted, other STIs are also included now under the same programme.

At the Ministry of Health headquarters in Belmopan there are two persons working directly for the programme, the Director of the program and a programs officer. These two persons fall directly under the supervision of the Epidemiology Unit. There are also additional staff in each district. Except for the Voluntary Counseling and Testing site in Belize City; these staff are all managed by the Regional Management Teams. The staff at the VCT Center in Belize City is made up of a receptionist, a driver, two nurses and a social worker. There are three other VCT sites across the country, one in each region (Dangriga, San Ignacio and Orange Walk) where a nurse is specifically assigned to each site. VCT services are offered through the public health nurses and the psychiatric nurse practitioners in the other major facilities (Corozal Community Hospital, Punta Gorda Community Hospital, the Western Regional Hospital, and San Pedro Polyclinic II).

The programme has four vehicles assigned for carrying out duties such as contact tracing and monitoring and evaluation. Since 2007, the programme has been allocated a cost centre for managing its’ own budget.

VI. Conclusions

There is evidence that the HIV/AIDS epidemic has grown through different processes since the first case was detected in 1986. In particular, since the beginning of the decade more and more resources and particular attention has been invested into the Ministry of Health’s response.

In the time frame enveloped in this report, many significant improvements have taken place in an effort to strengthen the health system to effectively respond to the growing epidemic, so as to sustain the apparent slowing in the rate at which the epidemic has been growing in the last five years.

In 2003, the Government of Belize through the Ministry of Health introduced free ARV therapy for all those requiring and meeting medical criteria for treatment. Since then, the number of patients on ARVs has been growing continuously thus impacting both the morbidity and mortality associated with HIV/AIDS, and it is expected that as more adherence to ARVs is observed, the number of patients living with HIV will increase. The impact of ARVs should decrease the costs associated with morbidity and mortality but it can carry an increasing burden on the health care system as more patients require medication.

The Prevention of Mother to Child Transmission (PMTCT) has particularly grown since its inception. In 2006 the PMTCT plus guidelines were introduced into the country and triple prophylactic therapy has now been established as the norm for treating those HIV positive cases. Thus, it is expected that as the programme becomes more cemented, less cases of mother to child transmission will be documented and with the availability of triple prophylactic therapy, it is also expected that less maternal mortality will be associated with HIV/AIDS.

While it may be acknowledged that the programme has grown and continues to keep up with the epidemic, the real challenge will continue to be in the realm of establishing and maintaining the commitment to the HIV epidemic from all sectors within health but more importantly from all the non-health sectors if any real significance is to be achieved. Belize is a signatory to the Millennium Development Goals set for 2015 and still has time to achieve such goals.

We can therefore conclude by noting that:

- The 2007 adult prevalence of HIV in Belize is estimated to be 2.1% [1.2%-3.1%]. Belize currently has the highest estimated prevalence of HIV in Central America and the third highest in the Caribbean.
- The data utilized to estimate the current burden of the epidemic in Belize was limited by sparse availability of in-country sources. More research is needed to determine the prevalence and characteristics of the epidemic in high risk groups, and to determine the size of those high risk groups in Belize for use in estimation, planning and resource allocation.
- HIV/AIDS continues to affect the most productive age groups in Belize. Most HIV cases (83%), AIDS cases (75%), and AIDS related deaths (73%) were reported within the age group 15 to 49 years.
- However, 5.0% of HIV cases were in children 0 to 14 years, as were 6.9% of AIDS cases and
6.0% of AIDS deaths. Also 3.0% of AIDS deaths still occur in infants less than 1 year of age.

- The rate of testing per 100,000 population decreased by 44.3% from 2003 to 2007.
- Cumulatively, 41% more women than men were tested in the 5 year period.
- However, when sex specific HIV rates are compared, the rate in males has been consistently higher in the five years encompassed here.
- Based on Spectrum estimates, the HIV incidence rate showed a relative decrease of 18% from 2003 to 2007. It is projected to stabilize to 0.19 new HIV cases per 100 population in the next 5 years.
- Spectrum estimates of new HIV infections per year also suggest that we are still catching up with the epidemic in terms of the number of HIV cases we have identified as a country.
- The estimated pediatric population in need of ARV mirrors the actual number of pediatric cases on ARV (62). However, in the adult population, the estimates generated by spectrum suggest only 48.5% coverage of those in need of ARV.
- Efforts to improve ARV coverage can have the effect of reducing AIDS related mortality, but increasing HIV prevalence by prolonging chronic HIV infection.
- Spectrum estimates also suggest under detection of TB cases in the HIV population.
- HIV testing coverage of pregnant women increased to as much as 94% in 2005, and cumulatively was 88% for the 5 year period.
- The overall HIV prevalence among pregnant women for the period 2003-2007 was 0.97%, of which 32% of cases were mothers who already knew they were HIV positive. This proportion of known HIV positive women becoming pregnant increased by 56% in the 5 year period.
- By 2007, one hundred percent of babies born to HIV positive mothers were being tested.

The average incidence of HIV among newborns tested for HIV was 15.4 per 100 live births in the 5 year period.

- Cumulatively 79.9% of mothers received prophylaxis in the period 2003-2007, ranging from a low of 71.4% to a high of 91.8%.
- Cumulatively 87.5% of infants born to HIV positive mothers in that period received prophylaxis, ranging from a low of 80% to a high of 94.2%.

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The following individuals contributed significantly to the conceptualization and preparation of this report.

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Notable differences in the epidemic exist between districts. These differences include number of HIV cases, AIDS cases and AIDS related deaths reported, TB/HIV co infection, testing rates, and the age and sex distribution of those cases. Belize and Stann Creek continue to be the districts most affected, with Stann Creek showing an actual increase in reported HIV cases since 2004.

Differences in PMTCT indicators suggest inconsistency in the way PMTCT guidelines are implemented across districts and from year to year. Although in many instances the PMTCT data reported by district represent very small numbers, the implications of these differences are worth noting.

VII. Policy and Planning Implications

HIV/AIDS continues to affect the Belizian Society as a whole and adequate planning and policy analysis needs to be derived from the current status and statistics of the epidemic.

The highest rates of infection continues to be the most productive sectors of society, those between 20 -39 yrs and it is therefore very evident that adequate mechanisms and strategies tailored towards prevention are key.

It is imperative that adequate behavior change strategies be implemented from a wide cross section of society as this seems to be a key driving factor in the current epidemic.

The sustainability of financing ARVs for an ever increasing number of patients requiring medical treatment will need to be seriously analyzed since with years passing by, the pool of patients on treatment will only be expected to increase.

The human resource component needs to be properly addressed and strengthened at both the national and local levels if the country, through the National Programme, is to achieve the multiple targets the country is a signatory to.

The areas of tuberculosis and other sexually transmitted infections also merit the same Public Health interest and resources in an ever changing and dynamic HIV environment.

The prevention of mother to child transmission programme needs to be better streamlined with the National Programme in order for advocacy and proper implementation to be achieved at all levels.

The issue of underreporting will continue to be a problem but the country stands at a critical juncture in the implementation of the Belize Health Information System which if properly addressed can solve the many issues that may be associated to the surveillance component.

A genuine multi sectorial response from all ministries and all sectors of society is needed in order for genuine and sustainable results to be attained.

VII. References

