Improving Spatial Accessibility to Antiretroviral Treatments for HIV/AIDS

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EXECUTIVE SUMMARY

There are 5 million people in the world in need of and without access to antiretroviral (ARV) treatment for HIV/AIDS. An estimated 63% of people with HIV/AIDS live in Sub-Saharan Africa (a region with 10% of the world's population). It is estimated that the virus is directly responsible for reducing the life expectancy of the sub-region to 47 years (from an estimated 62 years without the impact of HIV/AIDS) and for reducing the sub-region's GDP year-to-year growth rate to 1% per year.

Over the past decade, organizations such as PEPFAR, The World Bank, and The Global Fund have made grants - totaling billions of US dollars - directly available to the countries most directly affected by the HIV pandemic. Organizations such as the Clinton Foundation have also made treatment more economically feasible by providing generic ARV drugs. The United Nations has responded to the HIV/AIDS crisis by including the halt and reversal of the spread of the epidemic as one of its *Millennium Development Goals* and aiming to have 3 million people in developing countries on ARV treatment by 2005 as its "3 by 5" goal. Despite all of these commitments, only 2 million of the 7 million people needing treatment in developing countries were receiving it as of the end of 2007.

In the resource-constrained environments, where HIV/AIDS is most prevalent, the optimal placement of treatment facilities has a direct effect on the number of people willing to seek and remain adherent to ARV therapy. In order to successfully treat a patient for HIV/AIDS, two conditions are necessary:

- **Patients must attend:** Clinics must be placed in locations that patients are aware of and willing and able to travel to for an initial consultation. A direct correlation between the distance travelled and attendance has been observed by past studies in different environments.

- **Patients must adhere:** Because of the mutating nature of the HIV virus, patients must be at least 95% adherent to their treatment, which has to be vigilantly monitored by health providers. Monitoring is often enforced by having patients travel to their facility to receive their prescription. The location of a patient's clinic is one of many factors that directly correlate to the patient's successful treatment.

Traditional methods of optimal site location, such as Maximum Capture (MaxCap), fail to take into account population-specific factors and thus lead to significant sub-optimal results. By taking into account factors such as non-homogenous HIV prevalence rates, the correlation of distance travelled to attendance rates, and the correlation of distance travelled to adherence rates, one can locate future clinics at sites that will be able to *get* more patients on treatment and *keep* these patients on treatment.

Using new methods of site placement in conjunction with distance travelled to attendance and adherence correlation data from a Tuberculosis treatment center, two trends are shown:

- **A larger "catchment zone" has negative effects:** The larger the "catchment zone" considered for future ARV treatment centers, the smaller the number of patients that are predicted to start and adhere to treatment.

- **Data significantly optimizes location:** Using the data to optimize location has dramatic effects on the results. From similar studies, 3% more patients were predicted to start and adhere to therapy using optimal site location of twenty sites over traditional MaxCap placement of twenty sites.

Clearly, ARV treatment facilities must be rolled out in a way in which patients will be successfully treated. Non-adherent treatment is non-successful treatment and will not help stop the scourge of HIV/AIDS in developing nations. By further studying the effects of distance on attendance and adherence - and taking into account other factors such as prevalence rates - countries will be able to more quickly roll out HIV/AIDS treatment centers that are truly effective.