Optimising HIV testing in South Africa

The South African government has a priority programme to improve HIV testing and treatment. This requires a major reorganisation of the clinical testing throughout the whole of South Africa.

Selective Analytics and its academic partners were asked to optimise laboratory locations against multiple criteria. Our modelling allowed different test arrangements to be compared against coverage, access, quality and cost.

> "I am absolutely delighted with the work that has been done. There is huge organisational interest in optimising clinical testing across South Africa."
>
> **Prof Wendy Stevens, Priority Programme Director, NHLS, South Africa**

Examples of items produced during this project
Left: 3000+ clinics and 200+ labs in South Africa.
Right: One of the many maps from the project.

Stages in the project

- The goal was to provide HIV testing for 3,266 hospitals & clinics using the best combination of laboratory or clinic-based testing.

- Our team needed to develop a new location optimisation algorithm due to the size and complexity of the problem.

- We developed four scenarios using different clinical criteria to allow each scenario to be compared by effectiveness and cost.

- Our results were presented to the Client's executive team and are now being used in regional pilots throughout South Africa.

The scope of the issue

An estimated 5.6 million people were living with HIV and AIDS in South Africa in 2009. Therefore HIV testing arrangements in South Africa are extensive and use large, laboratory based test instruments run by the National Health Laboratory Service (NHLS).

Recently small-scale testing instruments, called Point of Care (PoC), have become available, which allow clinic-based testing. This, plus the large number of existing laboratories, make the location optimisation problem very challenging.

The work done

NHLS approached us through our academic partners at Southampton University. The need was to optimise clinical testing against four criteria:

- **Equity of coverage,**
  i.e. cover 100% of the population.
- **Meet certain access time rules,**
  i.e. all clinics must be within x hrs of test
- **Efficiency of coverage,**
  i.e. enough test sites to meet demand.
- **Capacity estimation and control,**
  i.e. select device type based on demand.

The size of the problem, plus the inclusion of the PoC, required us to develop a new location optimisation algorithm.
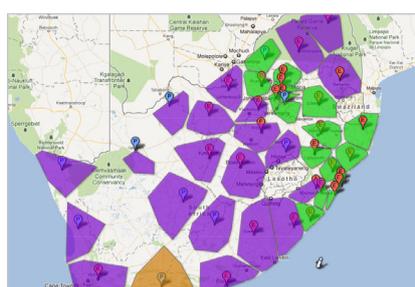
With such a multifaceted problem there are a number of different ways to arrange the clinical testing. We therefore developed four scenarios, each with different criteria, to model some of the options. We could then compare each option against certain measures such as test quality, accessibility and cost.

We visited South Africa to present our findings to the Executive Committee of the NHLS. We also worked with the local team to develop specific solutions for four regional pilot schemes across South Africa.

The benefits to the client

The main benefit was an independent, mathematically-based review of the possible arrangements for their HIV testing. The findings suggested ways to rearrange the testing that would improve coverage without major cost increases.

At executive level our ability to present the information clearly and concisely helped the stakeholders understood the findings, which was key to gaining their support.

We also were pleased to find that our algorithm produced results close to the NHLS team's own local optimisations. This verified our own work and provided the NHLS team with a more global view of the possible reorganisation opportunities.

Would you like us to help you with a location optimisation problem, capacity planning or data visualisation issue?

Contact us today for a free, no-obligation meeting to discuss your specific requirements.