

We found ways to shorten the turnaround time for diagnosing babies with HIV

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Credit: Josh Willink from Pexels

They say timing is everything. And in sub-Saharan Africa, where roughly a third of untreated HIV infected babies die before they reach the [age of one](#), a timely diagnosis is everything.

According to the latest [UNAIDS data](#), 150 000 children are infected with HIV in sub-Saharan Africa, annually. Due to the high number of children dying, diagnosing babies with HIV as early as possible is critical.

Public health officials have been grappling with this for many years. How can they reduce the time it takes to get newborns' blood samples to the diagnostic lab and the test results back? This matters because it determines how soon babies can start medical treatment. The average [turnaround](#) time in sub-Saharan Africa often range [from one to three months](#).

In general, shorter turnaround times can be achieved by improving the clinic-to-lab supply chain. This can happen through increasing the number of vehicles equipped to transport samples, hiring enough drivers, training enough medical personnel, buying the right type of diagnostic equipment, and improving communication systems.

African countries like [Malawi](#) and [Nigeria](#) have done this, with impressive results.

But as we show in our new [study](#) improving the day-to-day operations of clinic-to-lab supply chains is simply not enough. Sometimes the opportunities lie in the structure of the supply chain itself.

We came to this conclusion after evaluating the early infant diagnosis network in Mozambique. It's one of many sub-Saharan African nations struggling to improve its turnaround time for HIV testing.

We examined tens of thousands of cases in Mozambique right down to the original time stamps on samples and the return dates of test results. Then we developed a tool to streamline this [supply chain](#) system. We found that some simple changes could improve the turnaround time and

increase the number of infants starting treatment.

An inefficient system

One of the biggest barriers to faster test turnaround times in Mozambique has to do with the network structure of laboratories and clinics. There are about 400 clinics in the country. These are assigned to laboratories based on governmental administrative districts. But these boundaries are drawn for political reasons instead of [public health](#) reasons.

As a result one administrative district may be densely populated while another is sparsely populated. And this means that the workload at the various diagnostic laboratories differs according to the size of their surrounding populations.

If too many clinics send their samples to the same lab, they become congested and results are delayed. But if too few clinics send their samples to a given lab, the technicians have to wait longer to gather enough samples to justify conducting tests. This is because it costs just as much to test 100 samples as it does one sample – and the materials are expensive.

Changing the system

For [our study](#) we developed two models which captured the operational, medical, and behavioural factors affecting an early infant diagnosis network's effectiveness.

In the first model we re-assigned clinics to labs to maximize the number of infants who start treatment, by minimizing the turnaround time of results.

It showed us two important things. Firstly, a relatively minor modification reassigning some clinics to different labs could decrease the average sample turnaround time by 11% compared with the current system.

Secondly, this increased the number of infected infants starting treatment by about 4%.

But we took our modelling one step further. In our second model we wanted to determine if relocating the existing diagnostic machinery between labs could have an even larger public health impact.

What we found was that consolidating all diagnostic capacity in one centralised lab is optimal. Based on our study we predict that consolidation could decrease the average turnaround times by an estimated 22% and increase the number of infected babies initiating treatment by 7%.

This result has implications, as consolidating [diagnostic laboratories](#) has been a much-debated issue in the field of public health in sub-Saharan Africa.

The bigger picture

Improving turnaround times between the diagnostic lab and the clinic and speeding up the initiation date for HIV positive babies to start treatment boils down to using operations management to improve global health.

By shaving precious days, weeks and even months off diagnostic turnaround times, infants infected with HIV are able to get treatment quicker.

Whether it's reassigning clinics among the existing labs, or optimally reallocating the diagnostic capacity to a centralised lab, improvements need to be made because timing truly is everything.

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