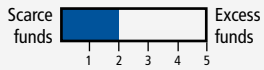
Bangladesh
Country Profile

Results from the Asia PGI Landscape Assessment (2023)

This report profiles the status of genomic surveillance through next-generation sequencing (NGS) in Bangladesh as of March 2023. Data are based on a systematic assessment accompanied by interviews with country experts working across the following partner organizations - Institute of Epidemiology, Disease Control and Research (IEDCR), Ministry of Health, Child Health Research Foundation (CHRF), and International Centre for Diarrhoeal Disease Research (icddr,b). Findings below are presented through five overarching themes ranging from financing to bioinformatics and data sharing, including 16 key indicators covering major barriers in pathogen genomics sequencing and surveillance. The data captured below is as of March 2023.

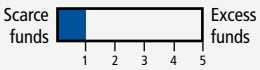
Financing

Sufficient funding for NGS



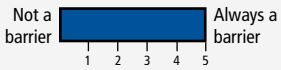
A ranking of perceived sufficiency of funding to support pathogen genomic surveillance over the next 5-year period.

Sustainable funding for NGS



A ranking of perceived sustainability of funding to support pathogen genomic surveillance over the next 5-year period.

Reliance on external support



Country reliance on external support for conducting adequate and effective NGS.

Policy and guidelines

Strategic plan

In progress

Status of national strategic plan which includes pathogen genomic surveillance.

National expert panel

Well integrated

Formation of national expert panel or technical advisory group mandated to advise government on pathogen genomic surveillance.

NGS guidelines for public health surveillance

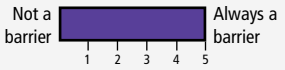
In progress

Development of national guidelines for infectious disease surveillance using NGS.

NGS = Next Generation Sequencing

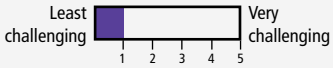
Supply chain

Equipment repair lead time



A ranking of perceived challenges with equipment repair lead time in the last 6 months.

Stock availability – reagents and consumables



A ranking of perceived challenges with reagents/consumables stock-outs for sequencing in the last 6 months.

Resupply time length

9
weeks

Average re-supply time between order and receipt at the laboratory for reagents and consumables.

Laboratory infrastructure

Laboratory capacity

15
1 per **10,000,000** population

Total number of laboratories in country performing NGS for infectious disease surveillance.

Sequencing output

550
32.5 per **10,000,000** population

Average monthly sequencing output within the past year.

Sequencing utilization

79%

Proportion of average actual monthly sequencing output over maximum monthly sequencing capacity for the past 12 months.

External quality assurance

In progress

Laboratories participating in any proficiency testing or external quality assurance audits for NGS.

Bioinformatics and data sharing

Bioinformatics pipelines for NGS

In use

Containerized, locally installed or in-house pipelines/workflows.

In use

Tools provided by NGS manufacturer or proprietary software.

Data sharing

> 75%

Estimated monthly proportion of sequences shared on public databases (eg. NCBI, GISAID) compared to total sequences.

Reporting frequency

Reporting frequency of pathogen genomic surveillance results to relevant government ministries.

NGS = Next Generation Sequencing

Summary

- The majority of NGS is conducted in the private sector (40%), with the remaining capacity split between the public sector (30%) and academic institutions (30%). This breakdown is the same for NGS conducted for pathogen genomic surveillance.
- Bangladesh has recently moved to sequence nearly all its priority pathogens (including influenza and TB) in the country and not out of the country.
- 100% of spending on NGS capacity comes from private, external partner-based funding.
- Funding is secured for a limited time (1 – 2 years) from BMGF, USAID, Wellcome Trust, and GAC, to support sample pre-processing and wet lab sequencing.
- Discussions are underway with external partners (Wellcome Trust, UK; BMGF, USAID, Foreign, Commonwealth & Development Office (FCDO), Centers for Disease Control and Prevention (CDC) in Atlanta, the Wellcome Sanger Institute (UK), and Washington University in St. Louis) for future support in all areas of genomic surveillance.
- Over the past year, the major direct cost drivers were identified to be laboratory supplies & consumables (reagents, PPE, etc.), labor costs, and staff training.
- The cost of machines is very high due to vendors, low distribution, and high taxes.
- The major indirect cost drivers were regulatory requirements (inspection, proficiency testing, quality assurance processes) and supply chain and procurement. Maintenance costs and administrative expenses were also highly ranked.
- Bangladesh has 22 NGS machines across a combination of platforms, including ONT (n=10, 45%), Illumina (n=8, 36%), and Thermo Fisher (n=4, 18%).
- Bangladesh also maintains Sanger sequencing machines (n=10). All are marked as performing at full capacity.
- The main process barrier faced by laboratories conducting NGS is computing power and storage, followed by reagents and consumables and human resources (availability of trained personnel).
- It is important to note that all financing barriers for NGS were ranked as "always a barrier". This indicates that financing in general, from inadequate national budgets to over-reliance on external funders, is perceived as the major barrier to conducting adequate and effective NGS for pathogen genomic surveillance.
- The main training priorities for enhancing NGS capacity were identified as data processing, quality assurance and storage (bioinformatics), as well as data analysis. The main areas for infrastructure support were concentrated around laboratory and sequencing equipment (especially calibration, services