Service Placement Optimisation
Methods & tools to meaningfully inform service delivery

Distance to services is an important factor determining how much the service is used by the population. To maximise the use of public and private services, such as schools, health facilities and financial services, decision makers need detailed information of the distribution of the population and access to user friendly analytics tools that can support the placement of these services.

About the service placement optimisation method & decision-making support tools

Flowminder has developed **data-driven methodologies to inform service delivery** by providing robust estimates of the coverage provided by existing service sites and by guiding the selection of locations for new or expanded sites. Two different methodologies have been developed for two different types of services: services that are best placed in the most visited locations, and services that need to be close to where people live (residential services).
Methods can be encapsulated in tools for specific application domains (e.g. health, education) and users (e.g. policy makers, data analysts).

How does placement optimisation work?

Method 1 - For the placement of non-residential services (using mobile data)

The placement optimisation method for non-residential or event-based services relies on **data related to population mobility patterns and population mixing** (whether groups of people stay on their territory or whether they sometimes meet at a common place). The method uses Call Detail Records (CDR) data to **place service sites and capture the largest number of people in a minimum number of sites**. Examples of services that can make use of this method are sites for distributions of drugs or supplies, mobile vaccination stations or environmental surveillance sites, testing for the presence of enteric pathogens in sewage water.
Call Detail Records (CDR data) contain information related to the phone activity (whether a call, text or data session is made), such as the origin, destination and duration of the activity. Flowminder uses location information from mobile phone data (location of cell towers, not the exact coordinates of users) and does not use (and never has access to) the content of calls, text messages or data sessions.
The method generates two outputs: the **list of selected locations**, in order of priority, and the **number of people captured by a given number of sites**, enabling target setting, population coverage and the number of sites necessary to achieve the set targets.

Method 2 - For the placement of residential services (using static gridded population estimates)

The second method utilises **static gridded population data** to place services based on the location of residence of the users. Gridded population data are population estimates at a resolution of 100m x 100m squares, called 'grid cells'. These population estimates are combined with existing data on the facilities for which to optimise future placement (coordinates and capacity of each facility). The method produces **service coverage indicators** and simulates the **placement of new sites and the enlargement of existing ones**, with geo-coordinates and a priority order.

Areas of application

Health. Environmental surveillance sites for monitoring poliovirus *[using CDR data]*

Education. School placement optimisation *[using gridded population data]*

Financial inclusion. Optimal coverage of mobile money agents *[using both methods]*

Health. Vaccination site placement optimisation *[using gridded population data]*

Case study. Providing opportunities for girls and boys left behind in Nigeria. School placement optimisation tool, using static gridded population estimates (Method 2)

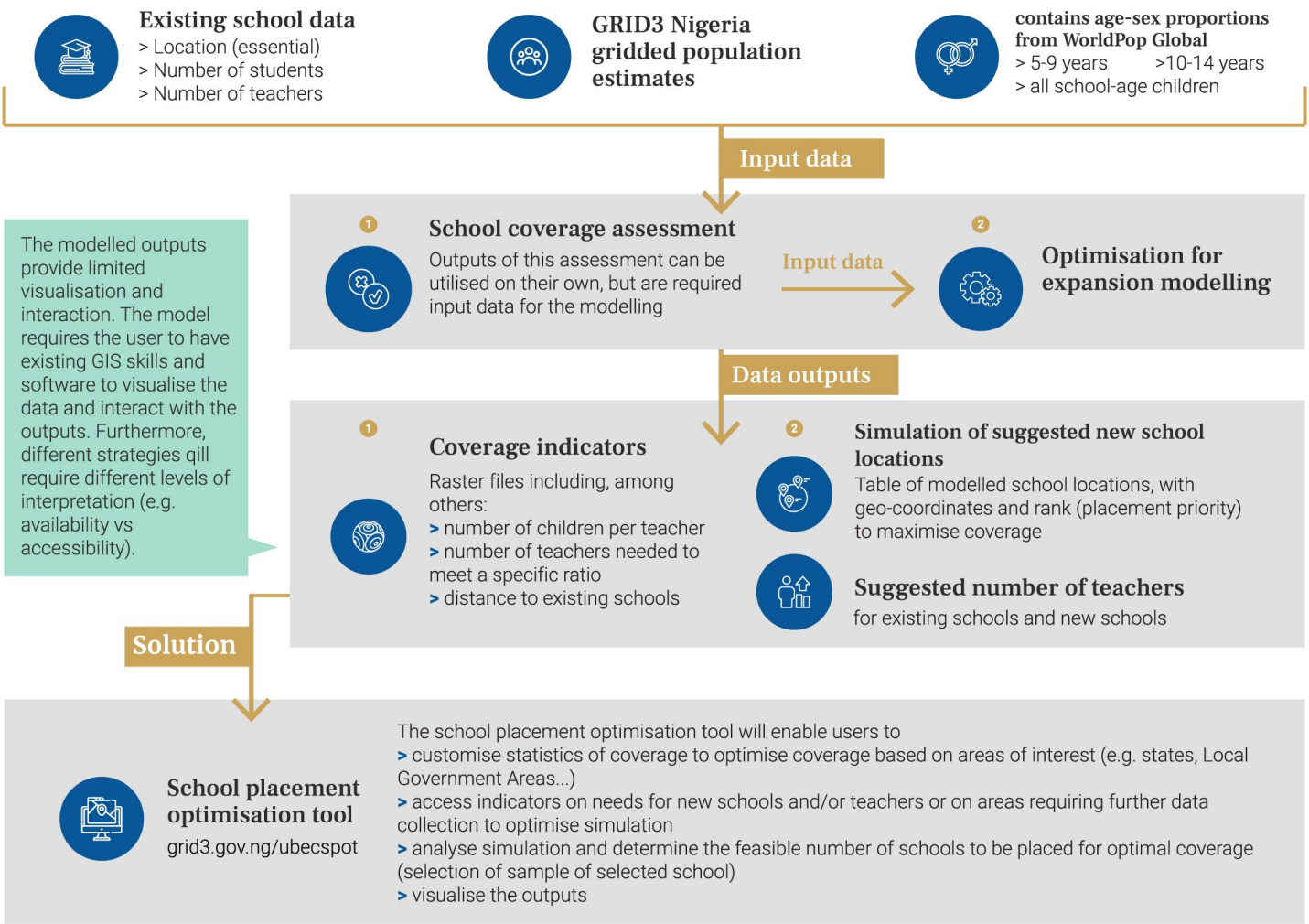
Nigeria struggles with the world's largest out of school population with 10.5 million children aged 5-14 out of school. While there are a range of socio-cultural and economic factors which result in non-attendance of school children, proximity to education facilities in rural areas and insufficient schools capacity in urban areas are often flagged as a key issue.

The Nigerian Universal Basic Educational Commission (UBEC) has established a range of policies which aim to address the issues of school non-attendance, and advises that schools should be within a two-kilometre walk of school age children, highlighting the importance of spatial access within the future development of schools in the country.

To support the development of their education targets, the Nigerian government has undertaken a comprehensive collection of school data in most of the country, under the National Personnel Audit (NPA). The NPA data contains geo-located school data at the national scale. It includes information on each school such as type, equipment available, number of teachers and attendance figures which are broken down by age group.

To harness the power of geospatial data and support the Nigerian government in measuring school access for children of target age groups, and planning the expansion of the school network, Flowminder is currently developing a **school placement optimisation tool.** This work is happening under the GRID3 (Geo-Referenced Infrastructure and Demographic Data for Development) programme, for which Flowminder is an implementing partner. The tool enables data-driven decision-making for placing new schools or increasing capacity of existing schools. With this tool, end-users will be able to analyse detailed data on coverage indicators or placement of new schools without having to rely on GIS software to visualise, interact with, and interpret the analytical outputs.

How the school placement optimisation tool works



Key references

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Flowminder Foundation, Setting Proximity Indicators and Targets for Financial Inclusion: Case studies from Bangladesh and Tanzania, 2019.
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