

Laboratory Landscapes:

GIS for Laboratory System Strengthening in the BD-PEPFAR Labs for Life Program



EHNRI

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Ethiopian Health & Nutrition Research Institute



U.S. President's Emergency Plan for AIDS Relief



SUPPORT *for* COUNTRIES

Activities will be implemented through three primary means:

- **Country-specific laboratory strengthening programs** that offer PEPFAR and BD opportunities to share their respective strengths, experience, methodologies, and resources, in collaboration with other implementing partners

New Public-Private Partnership to Strengthen Laboratory Systems

In a pioneering public-private partnership, the U.S. President's Emergency Plan for AIDS Relief (Emergency Plan/PEPFAR) and BD (Becton, Dickinson and Company) will support the improvement of overall laboratory systems and services in African countries severely affected by HIV/AIDS and tuberculosis (TB).

Through this five-year, public-private partnership, valued at up to \$18 million, the Emergency Plan and BD will work on the ground with national reference laboratories, Ministries of Health, and implementing partners to provide direct support to countries to assist with their efforts to strengthen laboratories. This collaboration will initially target Côte d'Ivoire, Ethiopia, Kenya, Tanzania, Uganda, Malawi, Mozambique, and South Africa and will potentially extend to additional countries.

What's the problem that lab GIS tries to solve?

High disease burdens

High poverty and inequality

Growing populations

Large but inefficient and under-funded systems

**Uneven distribution of
diseases, people and systems.**

Lots of laboratories*

** Depending on the definition of "laboratory"*

Lots of diagnostic technology*

**Much of which is past its useful life and frequently broken*

But fragmented information

Limited strategic views

Difficulty responding quickly and accurately

In other words, we need an integrated picture

What's happening in lab systems overall?

Plan, measure and adjust

In near-real time

And in multiple dimensions

Test results

Health records

Material Inventory

Quality Indicators

**Training and
Human
Resources**

**Repair and
Maintenance**

Uganda Lab GIS

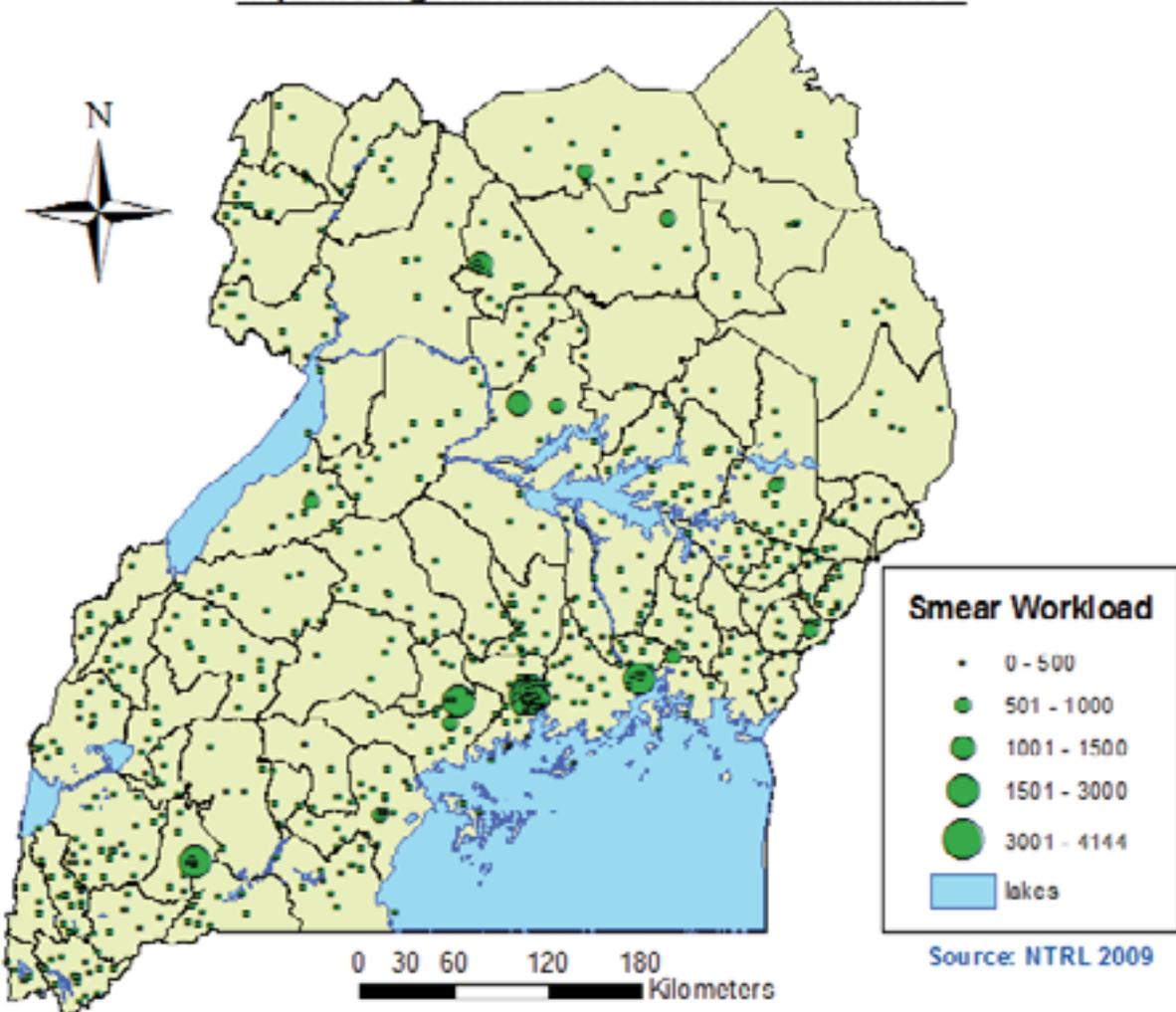


*Thanks to Moses Joloba
and Uganda's National
TB Reference Lab, who
produced all the work
below for Uganda.*

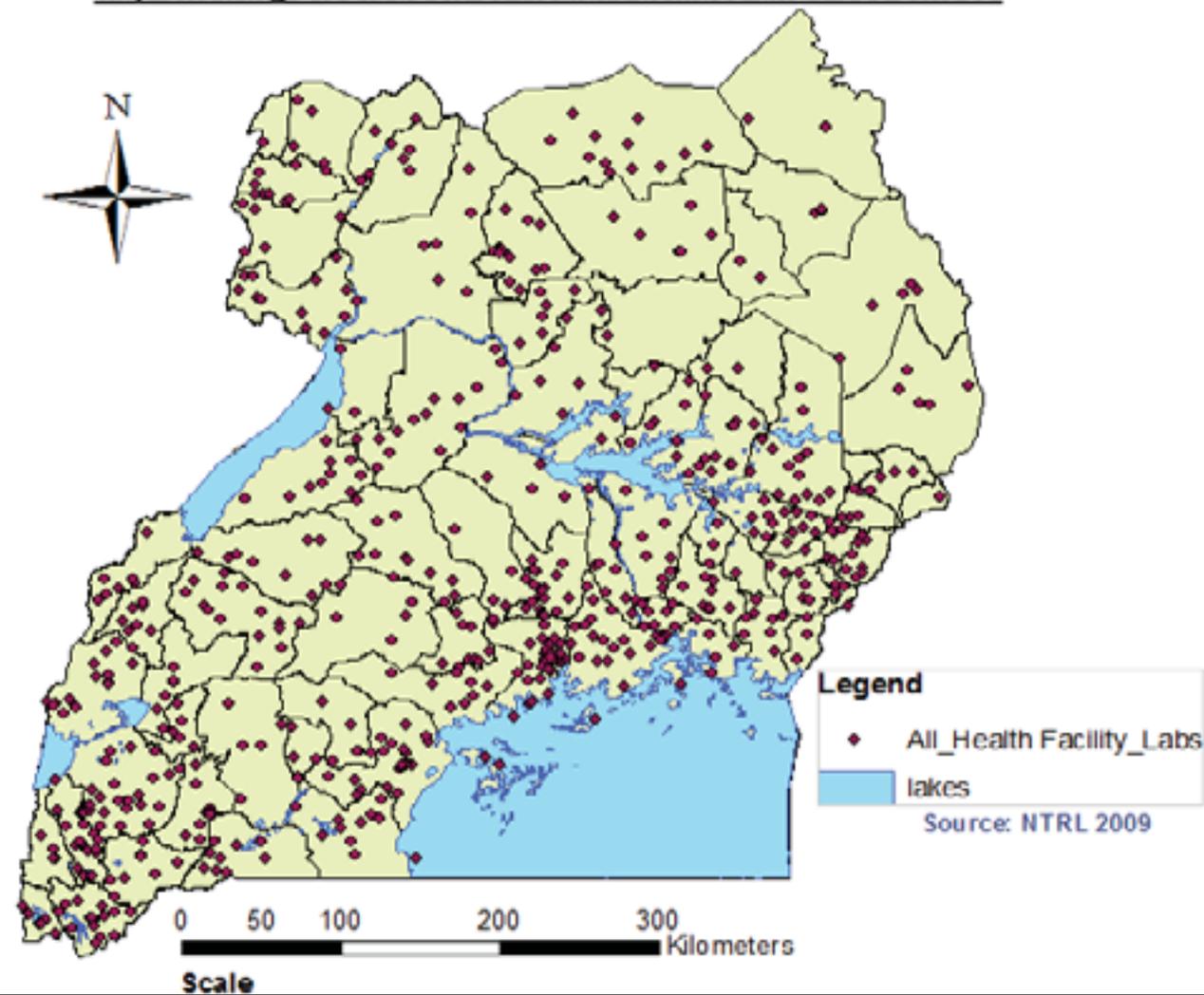
Key Areas of Lab GIS Innovation in Uganda

- Geocoding public health laboratories to understand national network
- Tracking spatial distribution of quality improvement activities
- Tracking specimen referral system for network enhancements
- Tracking MDR-TB cases for rapid intervention

Map Showing Smear Workload Of Health Facilities



Map Showing Distribution Of Health Facilities and Post Offices



Tracking Specimen Referral

Legend

 lakes

Health Centers

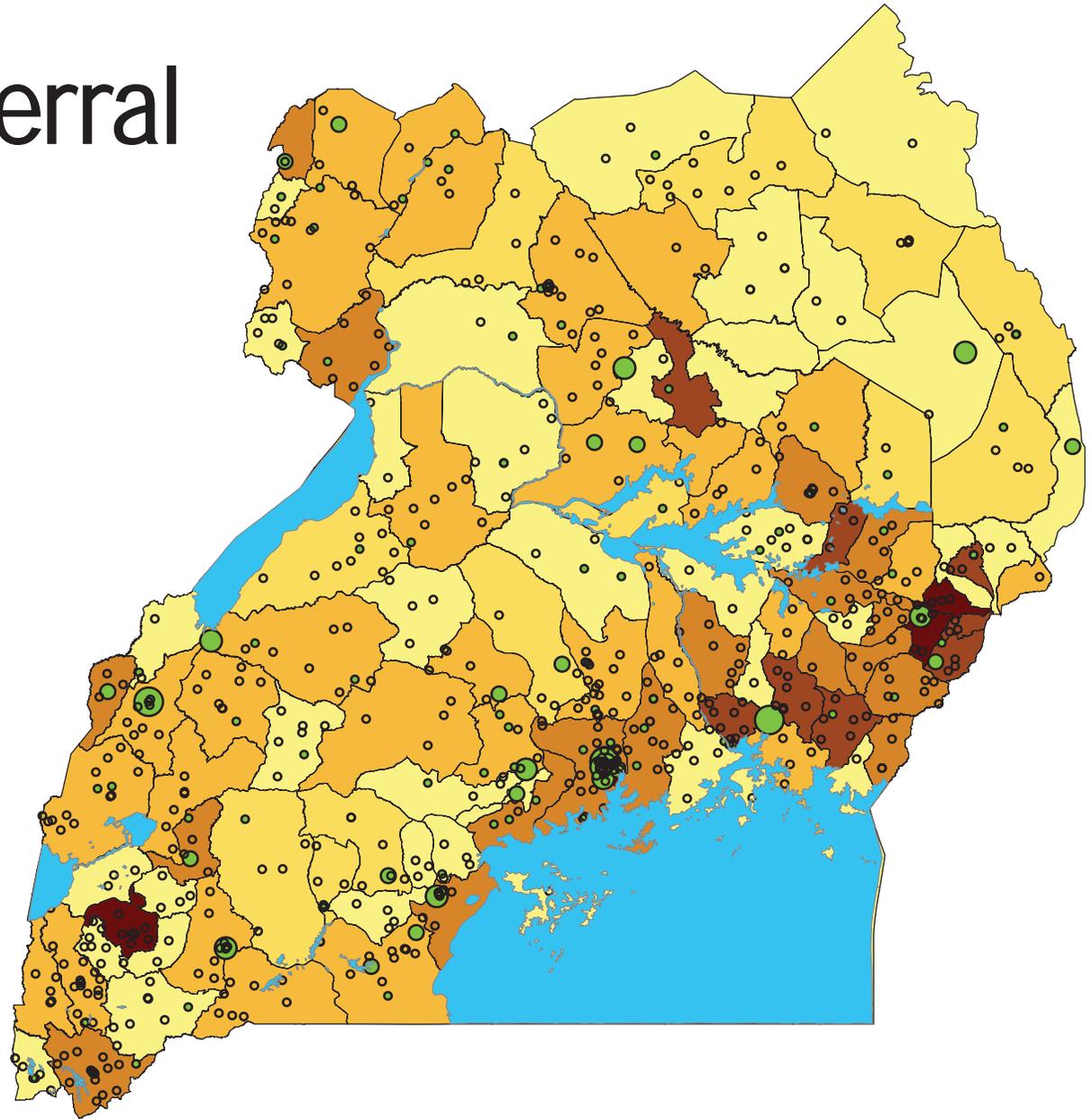
Number of samples sent

-  0
-  1 - 3
-  4 - 8
-  9 - 20
-  21 - 250

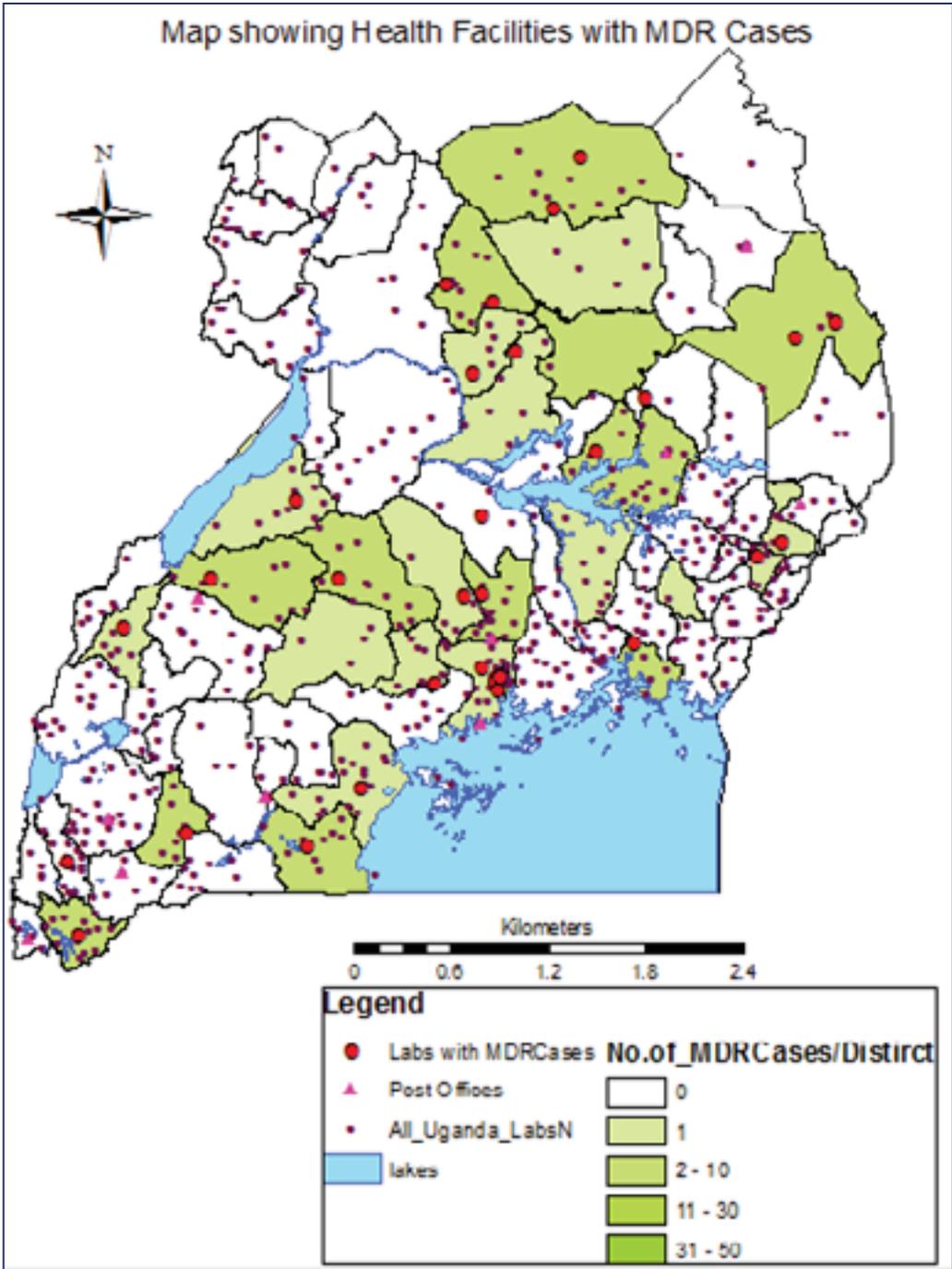
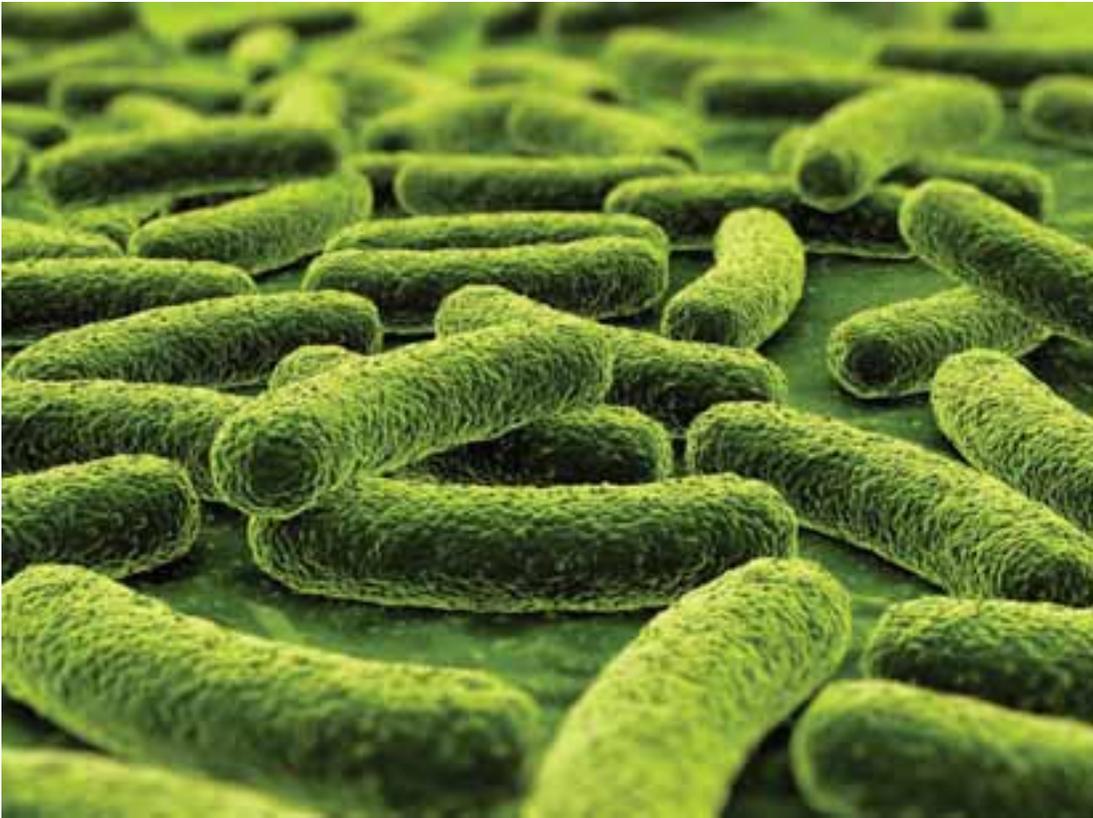
 Districts 2010

Population densities 2010

-  0 - 50
-  51 - 100
-  101 - 250
-  251 - 500
-  501 - 800
-  801 - 8224



Tracking MDR-TB



Ethiopia Lab GIS



*Thanks to Gonfa Ayana
and the Ethiopian
Health and Nutrition
Research Institute
(EHNRI)*

Partnership: Public – Private – Non-Profit - Academic



Direct Relief – EHNRI – BD Lab GIS Team

February, 2012



Where are the labs?

Where is the equipment?

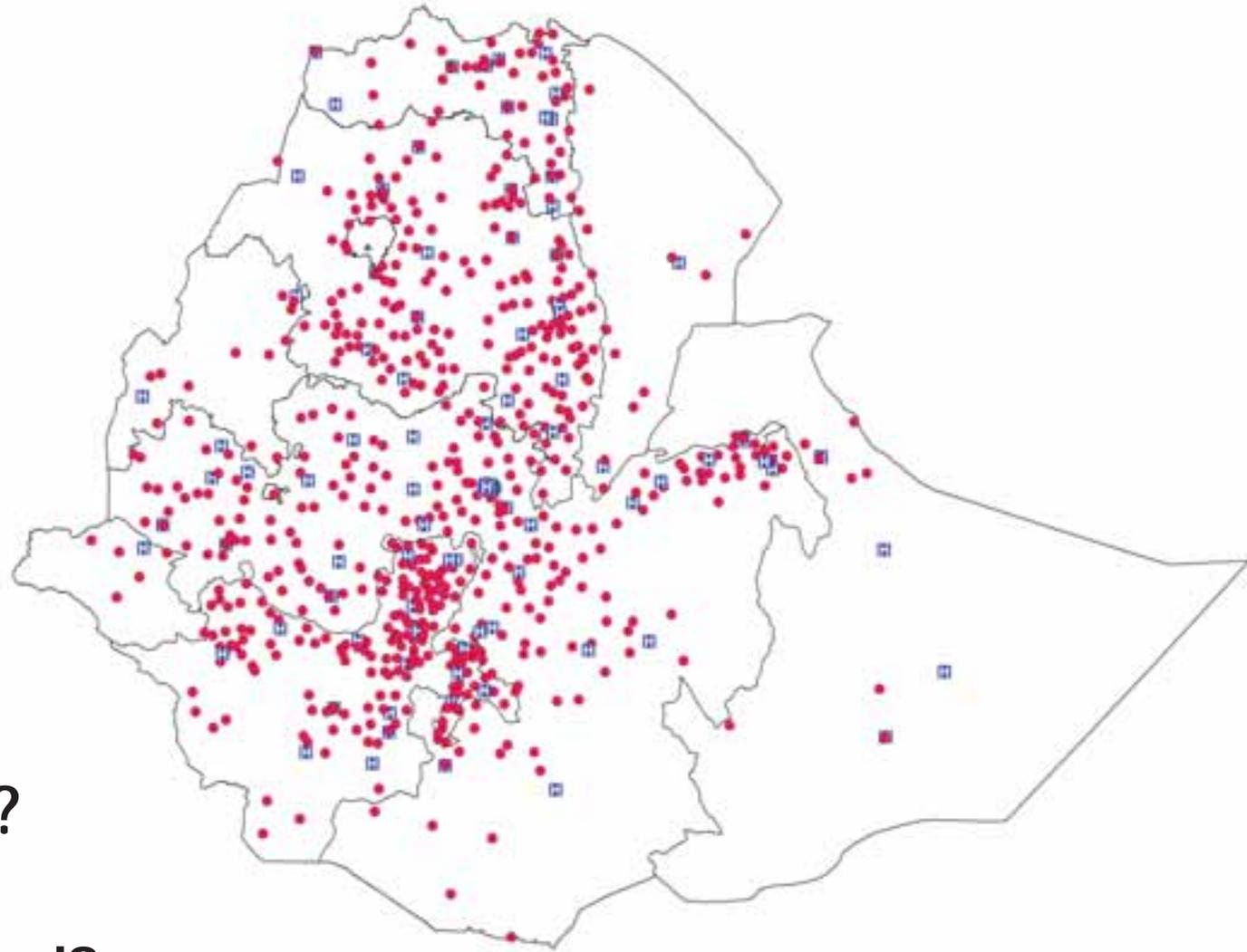
How are results distributed?

How are results transported?

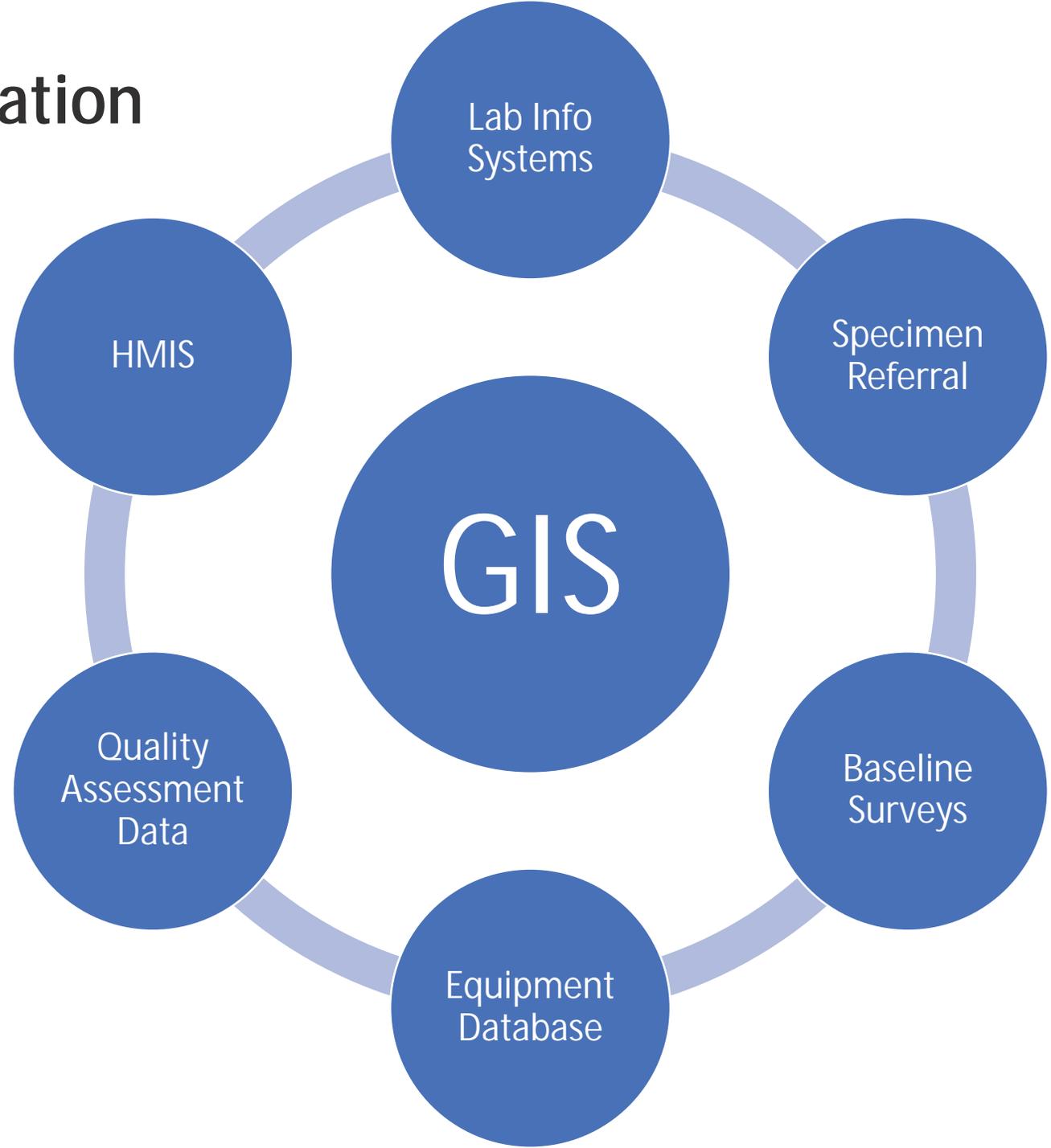
What is most in need of repair?

Where are supplies most needed?

Which facilities are in greatest need?



System-wide Data Integration



Key Challenges

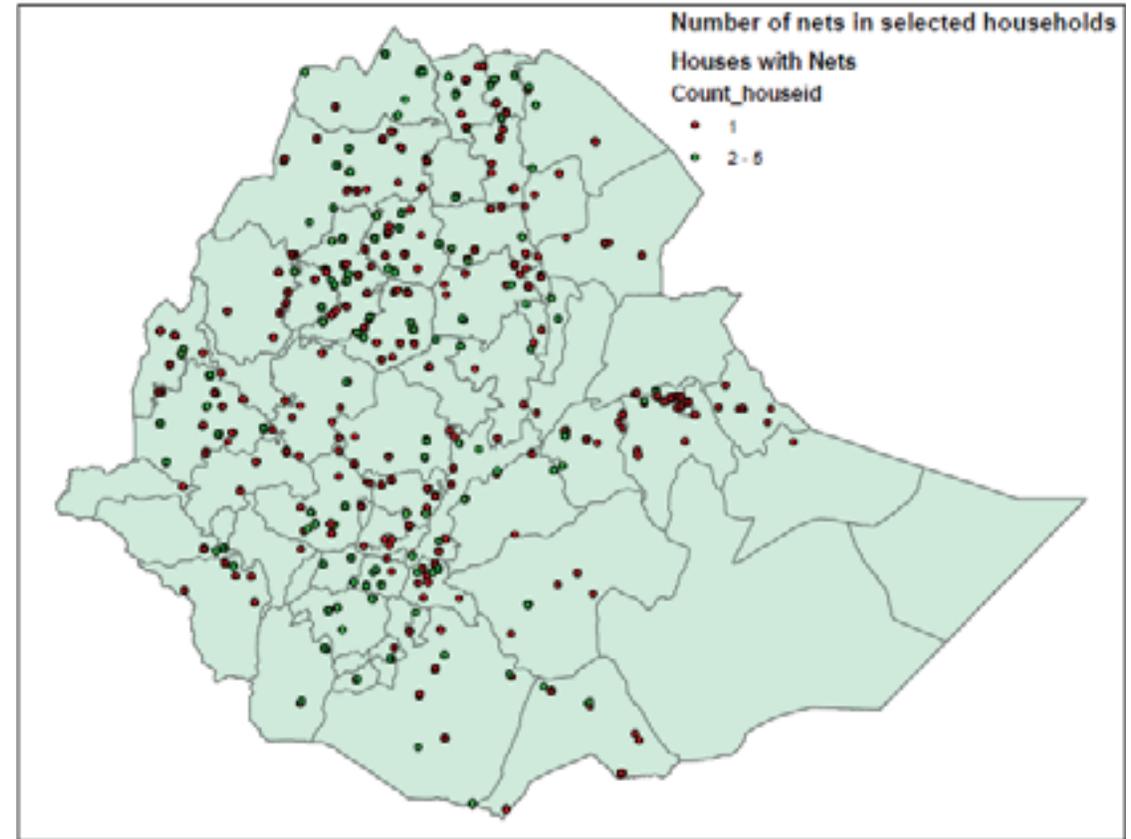
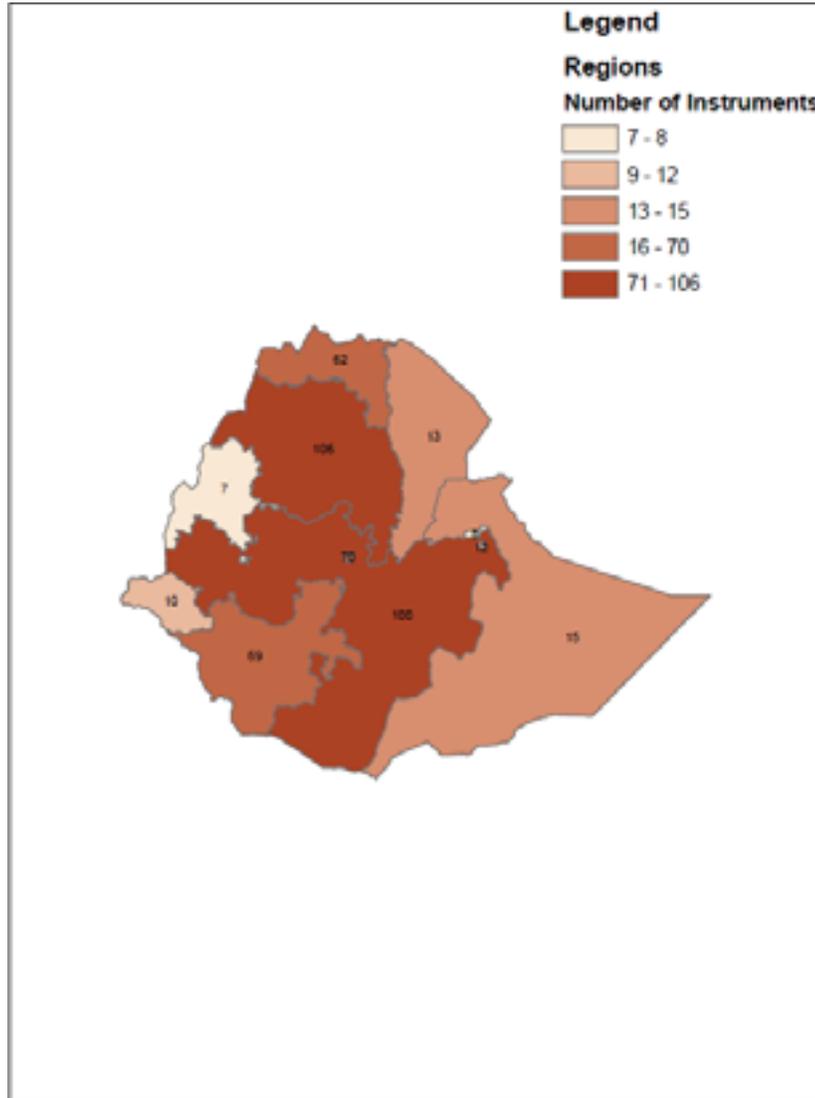
- Ubiquitous paper forms
- Regional semi-autonomy
- Sporadic communications network coverage
- Vendor competition among information systems
- Low-level data science / GIS training

Provisional Responses

- Use existing LIS-installations and track referrals through regional systems
- Use flexible query system rather than direct system integration
- Use combination of outreach and SMS reporting
- Lowest common denominator data integration
- Build training resources at national and regional levels

Preliminary Ethiopia Maps:

Lab Equipment / Malaria Survey / Measles Cases



How are essential healthcare resources distributed?

Measles Data by Year

