Using Predictive Models & Risk Assessment tools to Find Unreported TB Cases.

SAVICS
Everyone matters

Global Digital Health Forum
08/12/2020

Agenda

Objectives of the lab session

At the end of today's presentation;

- Learn how to interpret the incidence predictive maps
- understand different factors that can be used to predict TB incidence.
- design disease screening missions.
- create a risk assessment questionnaire, and automate results
- understand how to review analytics and interpret results from the field

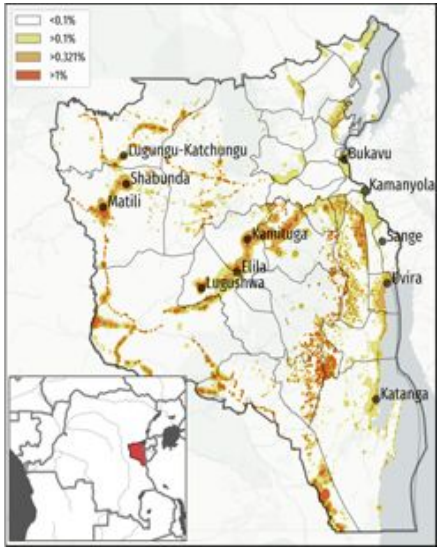
Context

3.6 million cases of Tuberculosis are missing yearly.

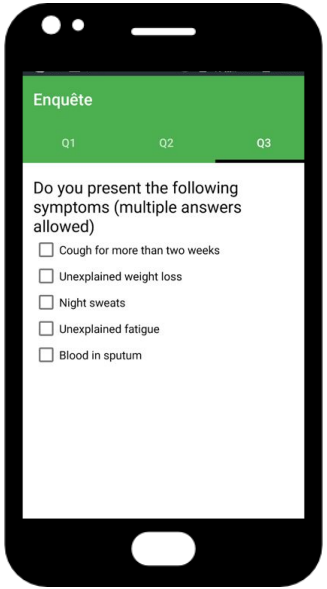
Health workers have difficulty identifying communities to focus surveillance efforts such as active case finding.

MediScout supports **timely detection, reporting, & referrals of missing cases** to diagnostic & treatment services.

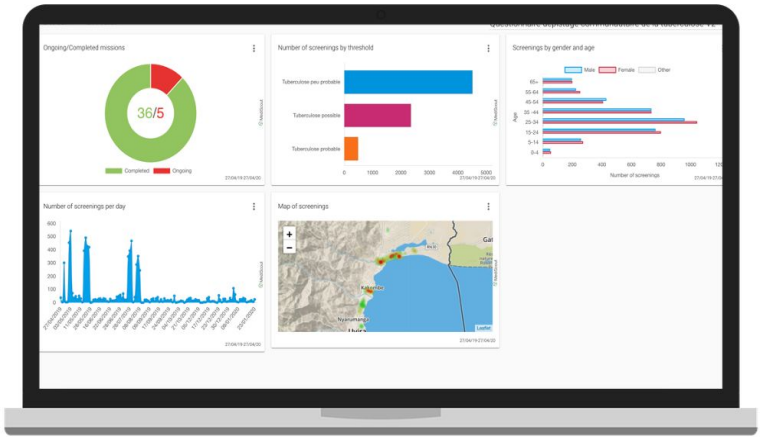
Solution Suite



Local TB incidence rate predictions
(to determine communities to focus interventions)



With Triage capabilities to enable referrals of only the at-risk people.



GIS enabled monitoring of CHWs activities & real-time data analytics


Use Case...

DRC Pilot

More missing TB cases detected for treatments
(10X more than previous year)

High-risk communities accurately identified
4X more cases found in at-risk communities identified.

High-risk persons identified & referred
Mobile app risk assessment correlated well with TB positivity rate.

CHWs performance improved
screened 3X more patients

The Incidence Maps

Estimation of local disease risk

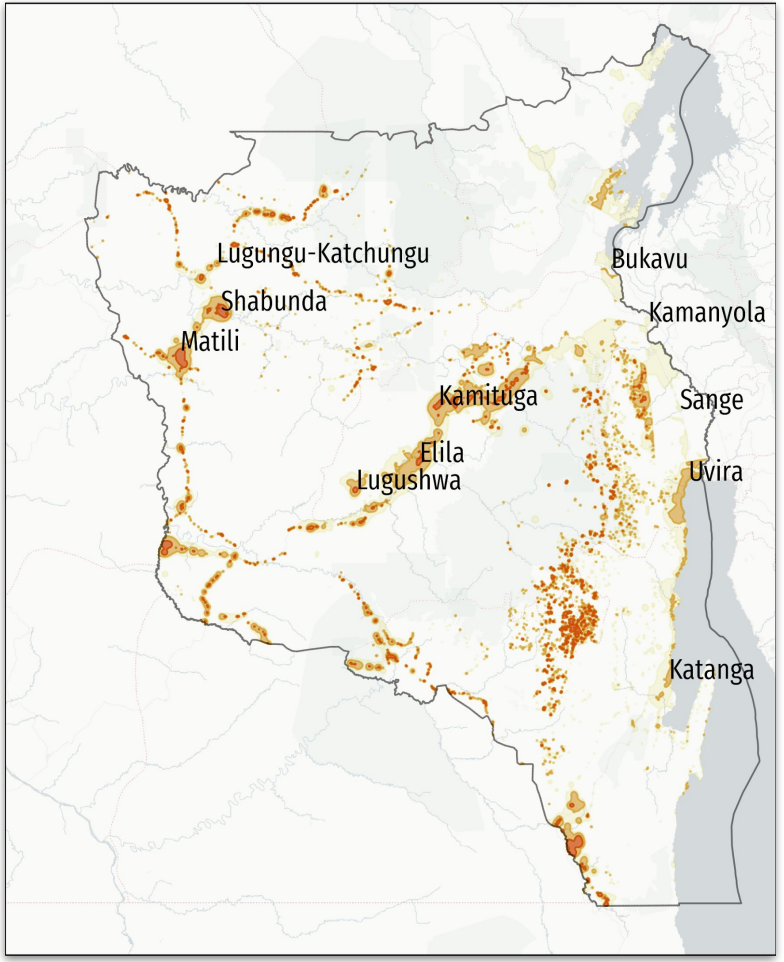
Data used

Openly available datasets:

- Population distribution
- Amministrative and health borders
- Location of mines and health facilities
- Satellite images

(Woldpop, WHO, Openstreetmap, IPIS, other)

Local (*aggregated*) reports from the **local health system**.



Models

Epidemiology inspired model to estimate the distribution of cases on the area of interest;

Satellite images analysis to reveal highly populated neighbourhoods in cities.

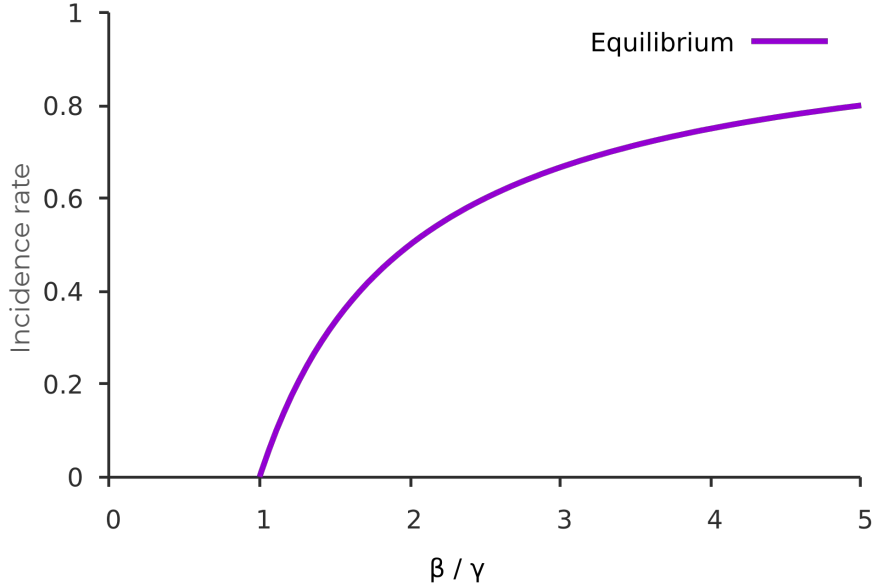
Self training model from **Bayesian statistical inference** to learn from collected data

Compartmental inspired model

Disaggregate local health system reports.

Model assumption: *highly populated areas have higher incidence rate*.

Compartmental models (e.g. SIS) in epidemiology show a dependency of the **incidence rate** at the equilibrium on the **density of population** (average number of contacts per time).



The model parameters depend on the population density.
Below a certain threshold the disease is expected to extinguish.

Satellite imagery

Computer vision techniques

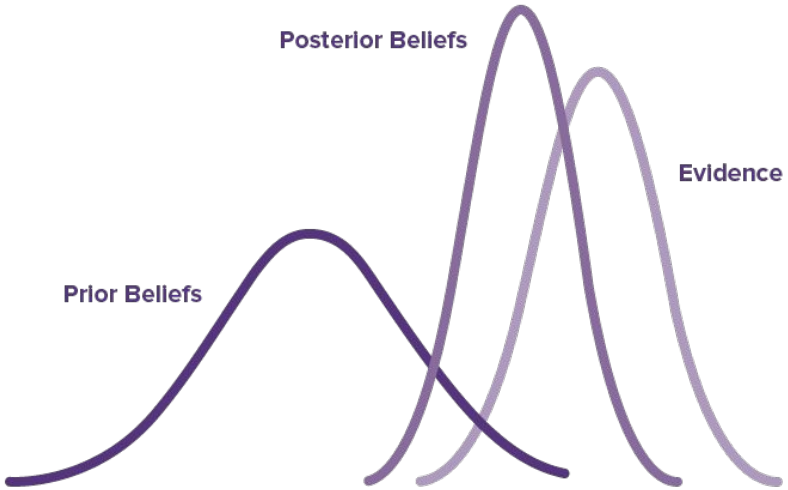
Edge detection on highly detailed satellite imagery within cities.

Detection of **highly populated** (high density of buildings) **neighborhoods**.

Automatic learning from collected data

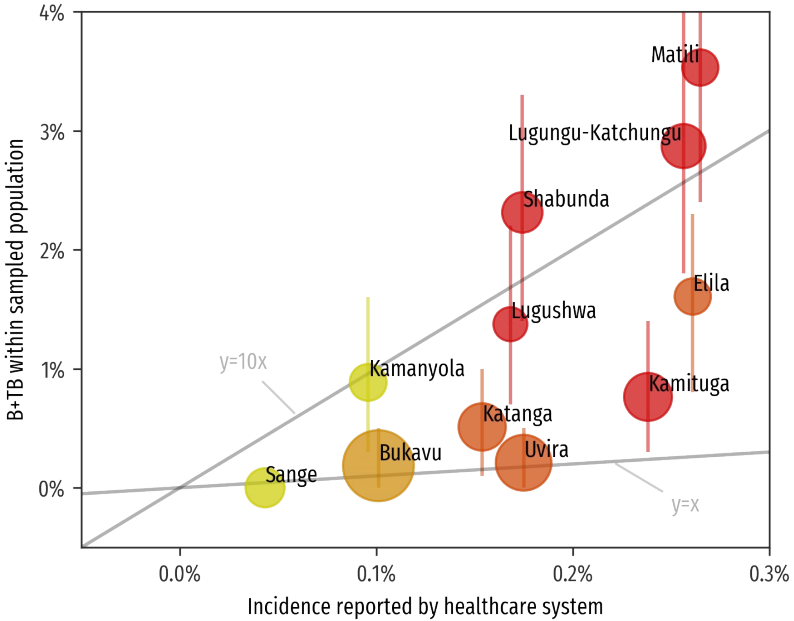
Bayesian (statistical) inference:

- Estimated rate as **prior** (our beliefs);
- Mediscout collected data represents the **evidence**;
- **Posterior** distribution (beliefs corrected by the evidence).

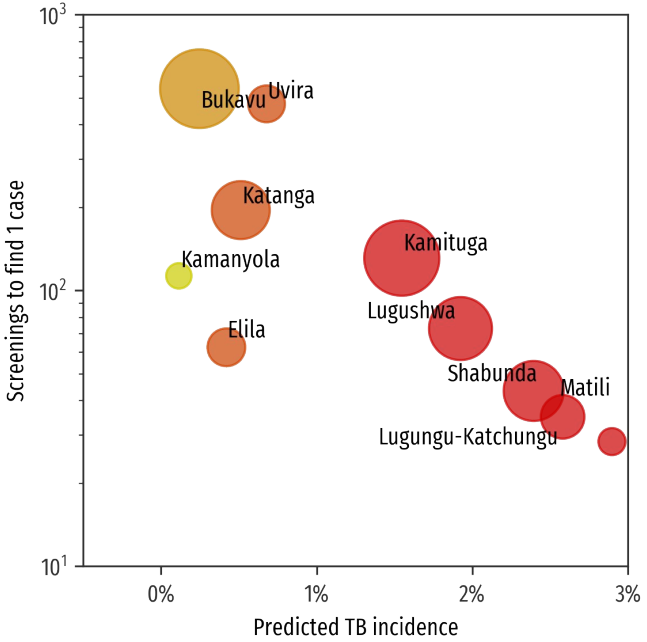


South Kivu Pilot case

Comparison to local reports, we could find up to 10 folds the reported cases



Need Number to Screen to find one positive case



Let’s have a look

Follow the links to the map tests:

- The South Kivu pilot case
- A Worldwide didactical example

Questions?

Lab session instructions

Get Started

Prediction maps

Identify hotspot areas for missing cases

Url to worldmap : https://maurofaccin.github.io/cartotb/en/worldmap/

Program manager

Design, plan & monitor missions

Url = https://mediscout.org/sign

Username = mediscoutgdhf@gmail.com

Password = labsession

Please add your **city** using the **zoom poll**

Community health worker

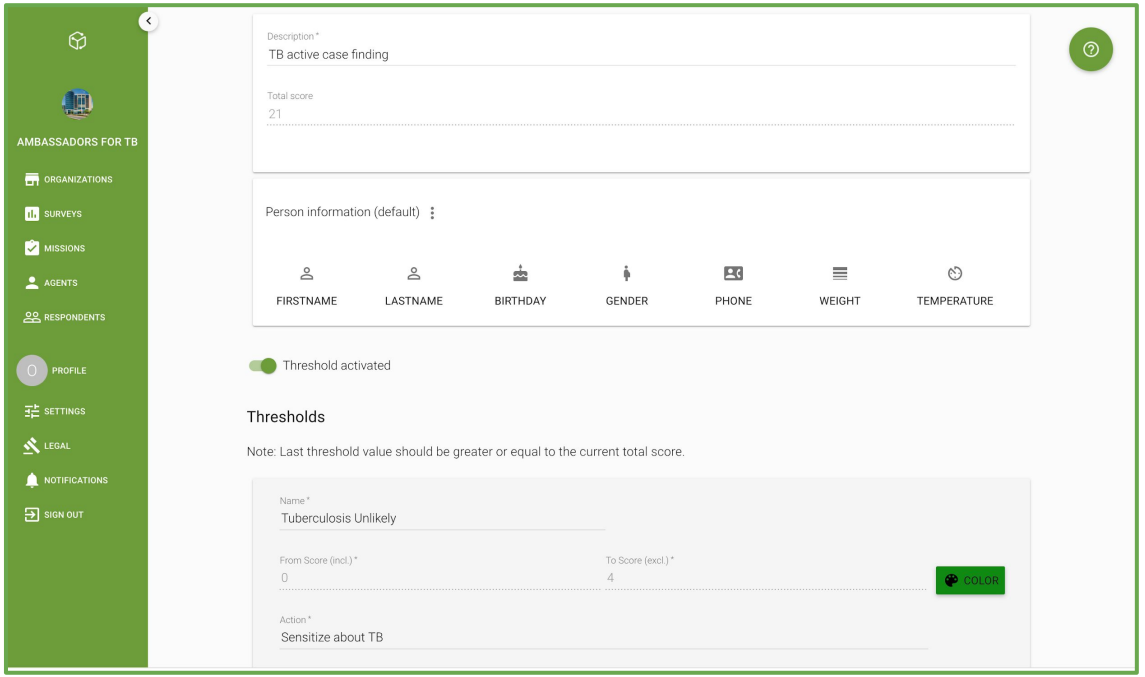
Perform screenings in the field

Search for "**MediScout**" on the PlayStore: Play Store

Design a screening mission

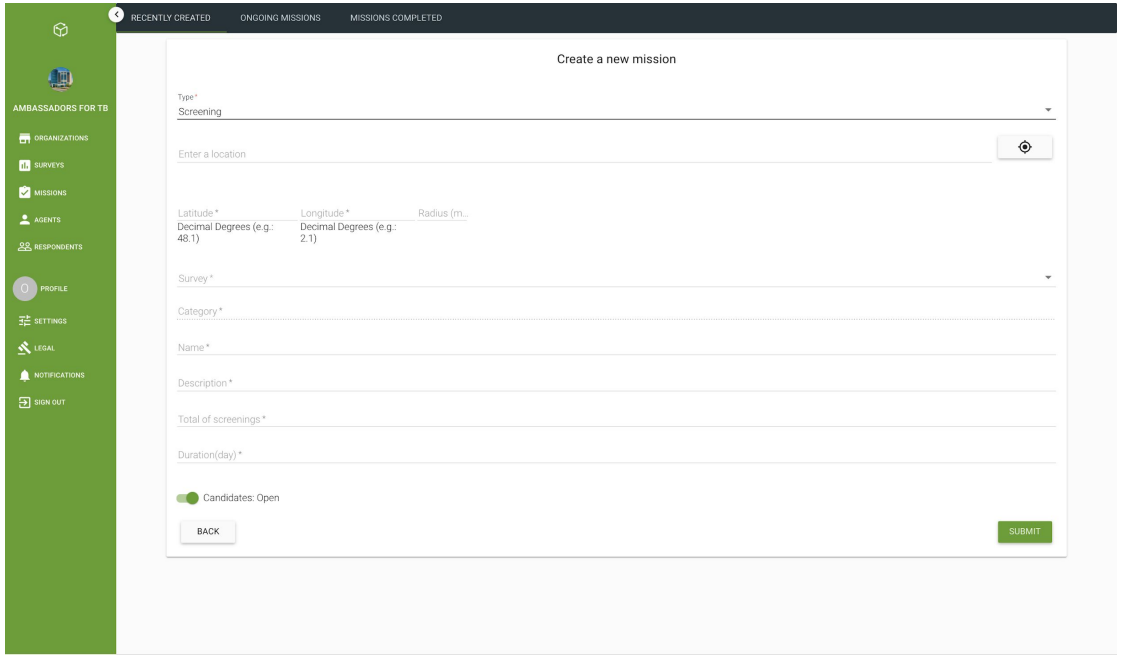
Design Questionnaire

1. Select “**Surveys**” to create a new screening tool
2. **“Activate thresholds”** for auto-scoring
3. Select question type e.g. **“Multiple choice”** questions
4. “**Save**” Form



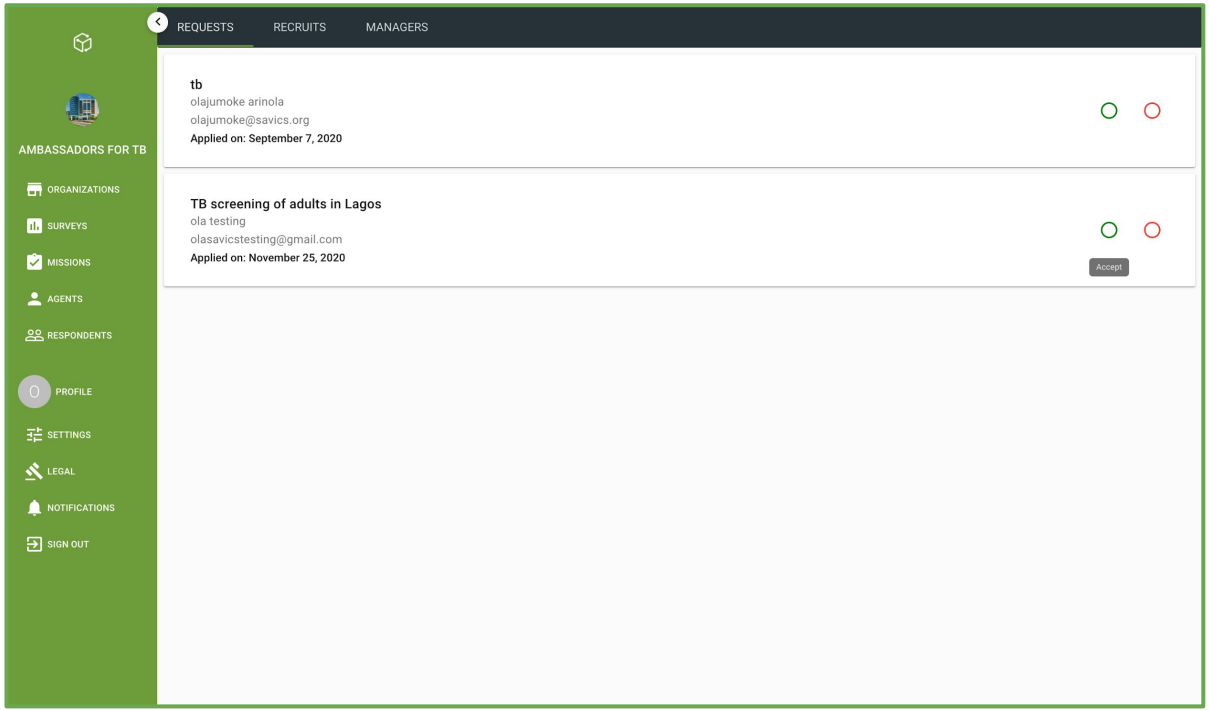
Design a Screening Mission

1. Select “**Missions**” from the Menu bar
2. Select “**Screening**” as type
3. Type in **location** and select **radius** to get the GIS coordinates
4. “**Name**” the mission and add a **description**
5. Input the “**total no of screenings**”
6. Input the “**duration**”
7. “**Submit**” form



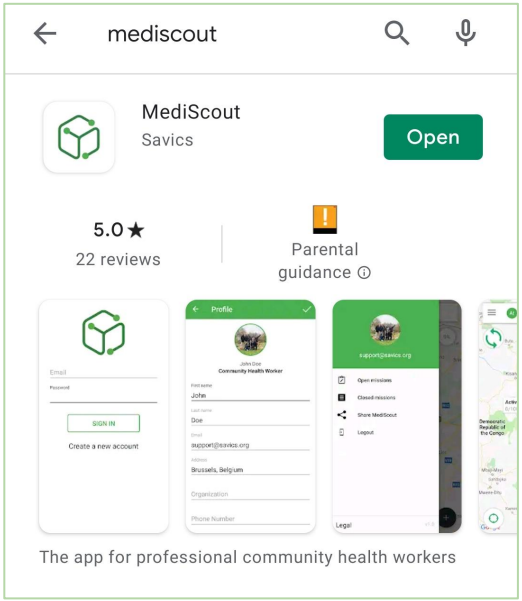
Approve CHWs

1. Select “**Agents**” from menu bar
2. Click on the “**green icon**” to approve CHWs



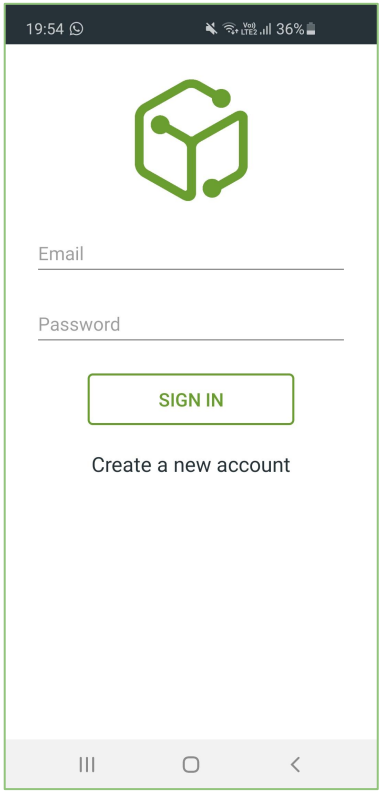
TB Screening

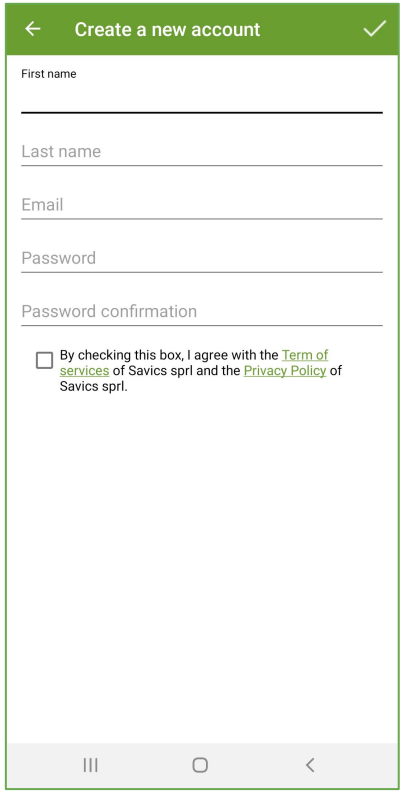
Create an account



Search and download “**MediScout**” on the Google Playstore

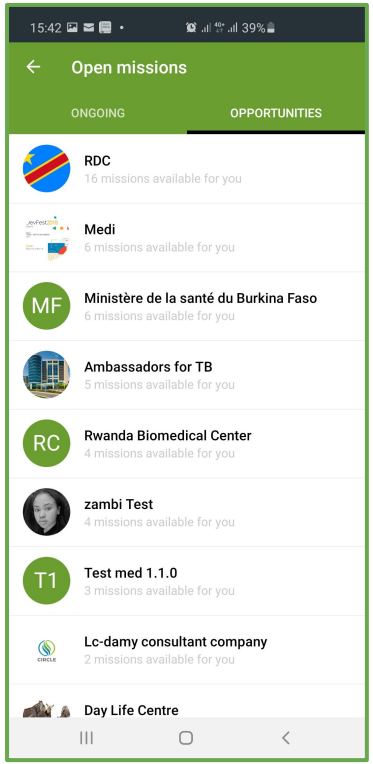
Link

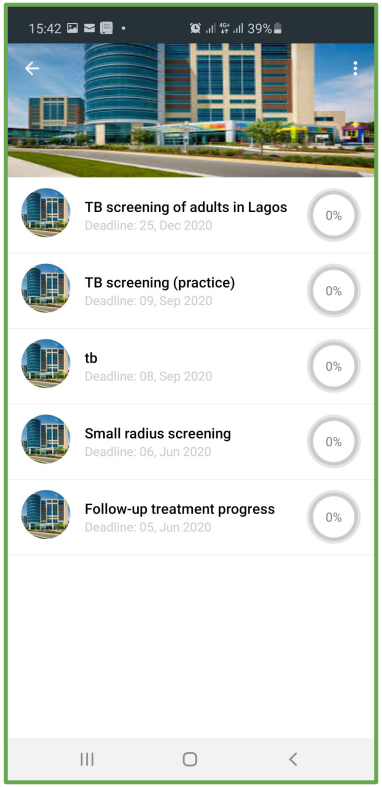


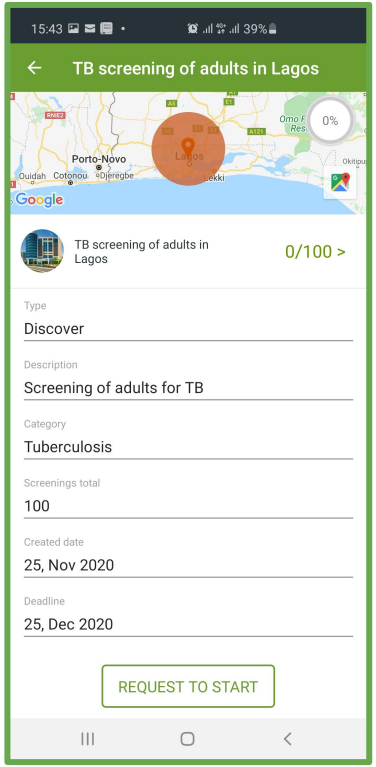


“**Create an account**” to log in to the app

Find Open Missions



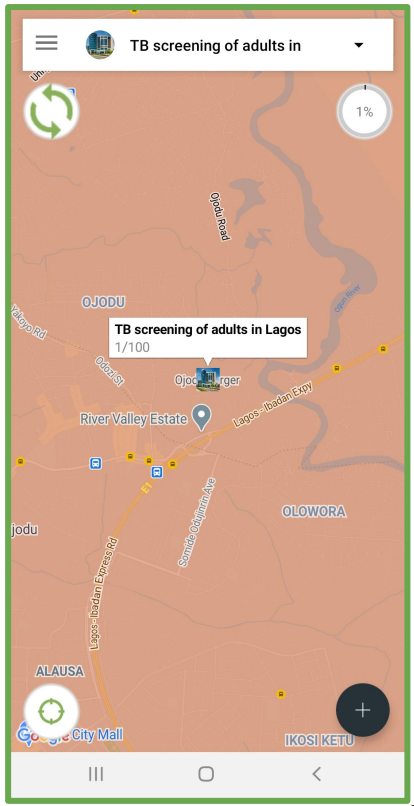




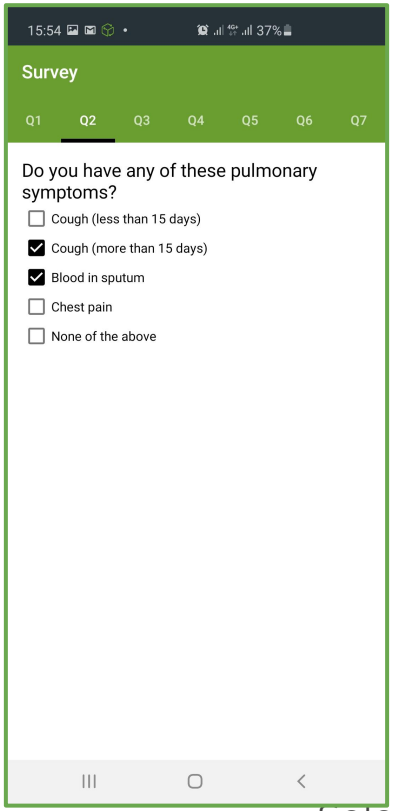
From the **Menu bar**; select "**Open Missions**" to view organizations & available missions

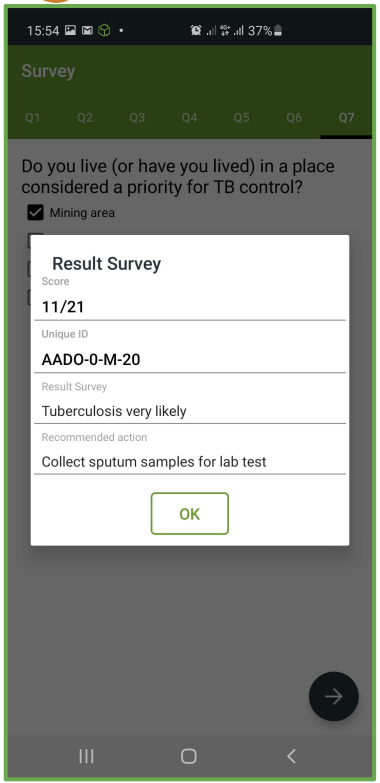
"**Request to Start**" mission and await approval by an Admin

Report a Screening



Once you are approved; click on “+” button beneath to start screening



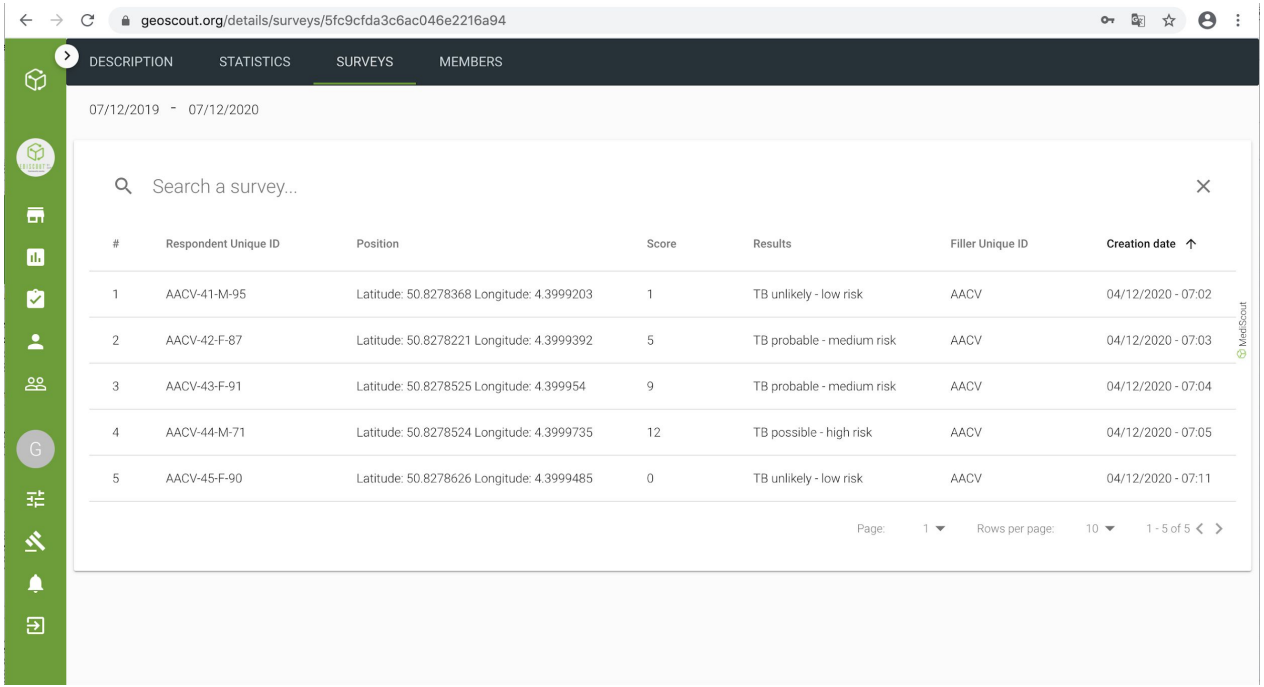


Select responses to all questions and submit

Review Results

Review screening reports

1. Go to “**Mission”** from the menu bar
2. Select a mission from “**Ongoing missions**” or “**completed missions**”
3. Click on “**Surveys**”. To see the line list of screening reports
4. Select any report to view detailed responses.

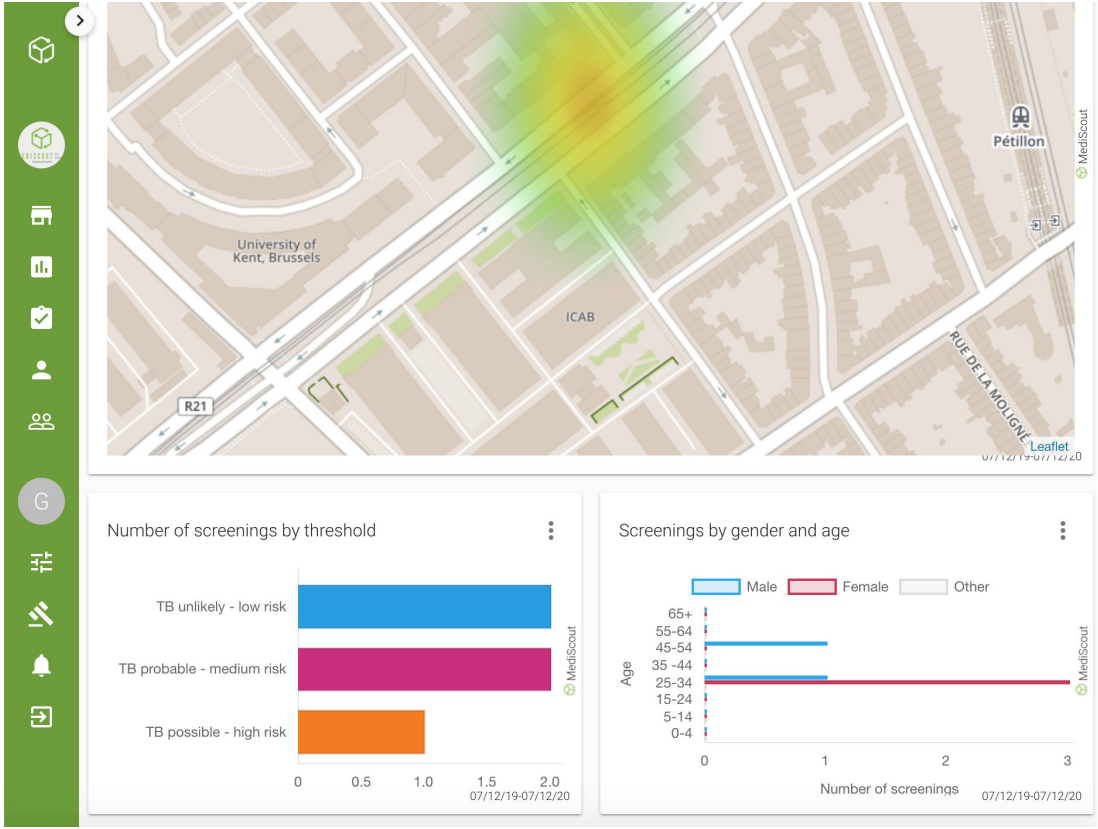


Check stats

1. Go to “**Mission”** from the menu bar

2. Select the mission you would like to review

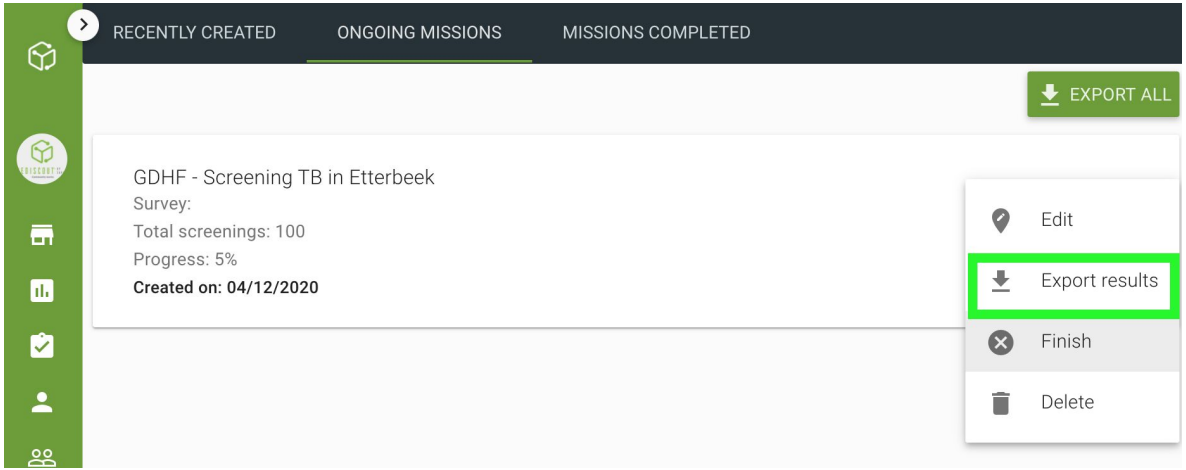
3. Click on **“Statistics”.** This displays different charts computing data from screenings e.g
   a. No of screenings by threshold
   b. Screenings by gender/age

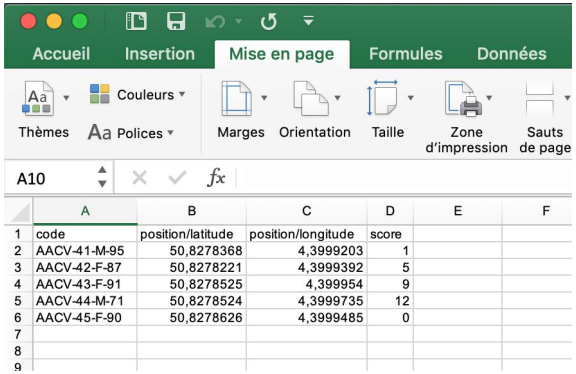


Export data

You can export or view field reports of ongoing missions & Completed missions

1. Go to “**Mission”** from the menu bar
2. Select the mission you would like to review
3. Click on **“Export results”.**





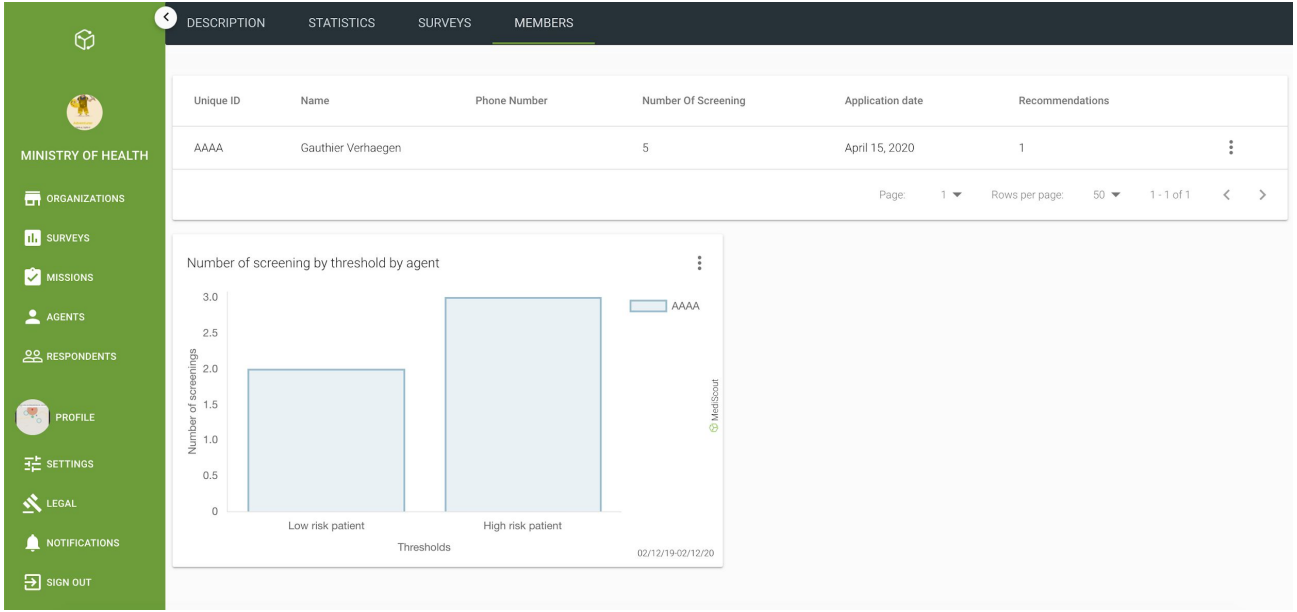
Review CHW progress

To review progress of a CHW;

1. Go to “**Mission”** from the menu bar

2. Select the mission you would like to review

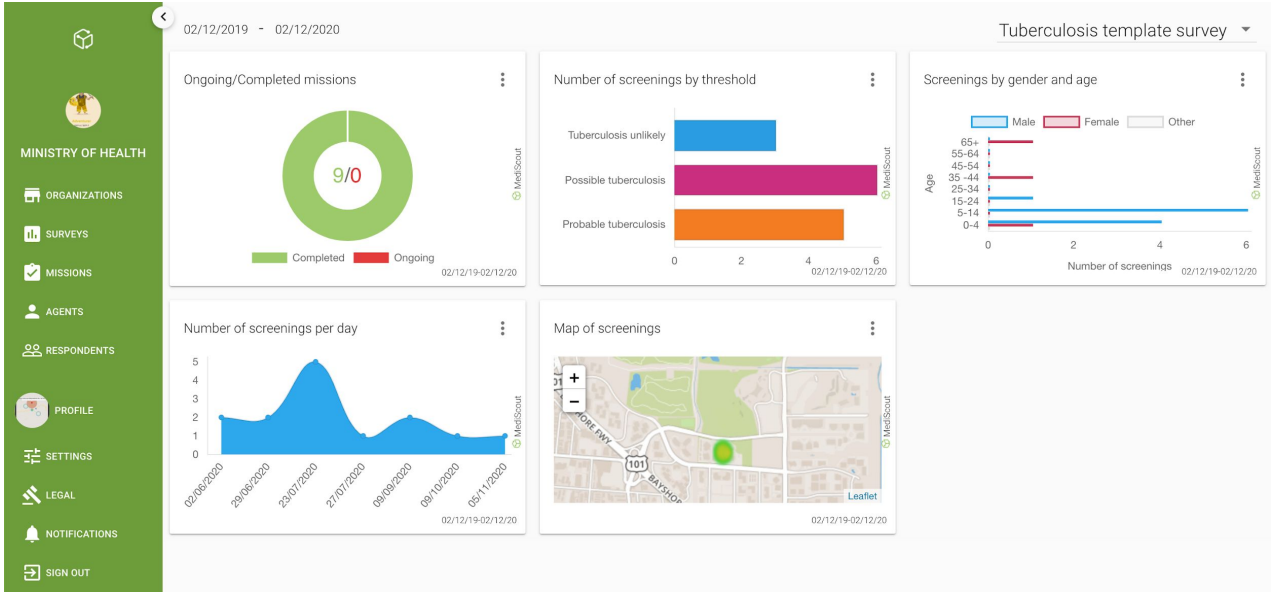
3. Click on **“Members”.** You will see
   a. no. of screenings
   b. recommendation received,
   c. risk levels of patients s/he screened.



Review all missions report

1. By checking the overall **dashboard**, you can have access to the results linked to a specific survey

2. If you would like to go more into detail, you can access the “**Mission”** from the menu bar



Any questions?

Thank you for your time!

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