

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



Global Digital Health Forum
08/12/2020



Agenda

❖ Objectives.....	3
❖ Context.....	4
❖ Solution suite	5
❖ Use case	6
❖ Lab session instruction.....	8
❖ The incidence maps	10
❖ Design a screening mission.....	18
❖ TB screening.....	22
❖ Review Results.....	26

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

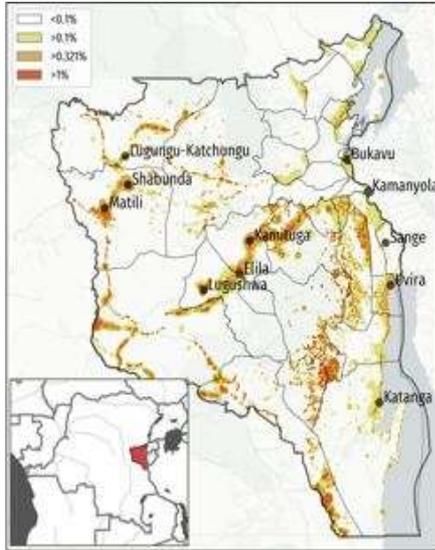
Context

3.6 million cases of Tuberculosis are missing yearly.

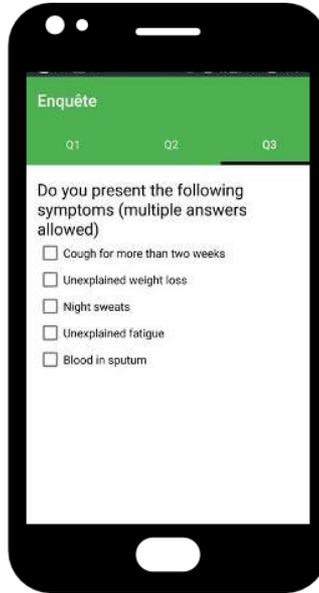
Health workers have difficulty identifying communities to focus surveillance efforts such as active case finding.

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

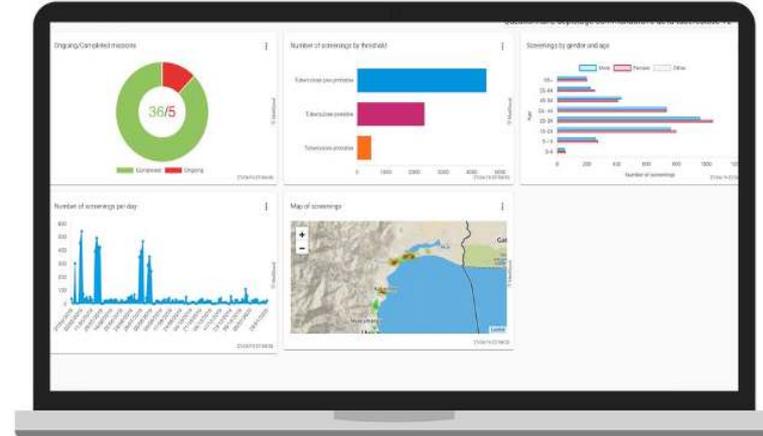
Solution Suite



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

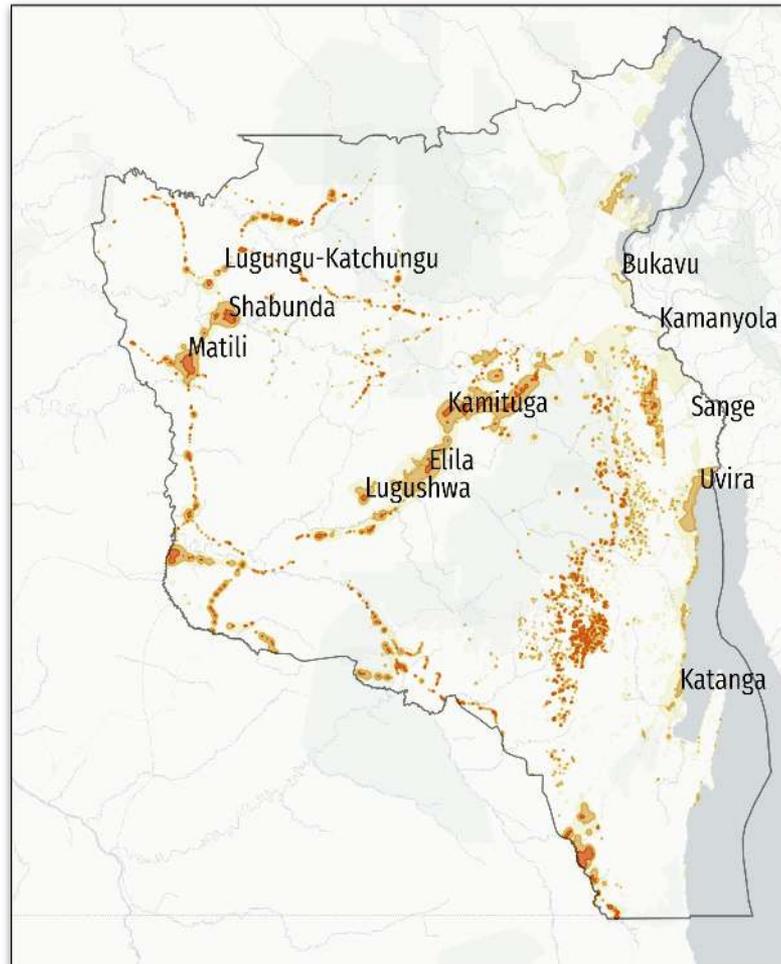
Data used

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.

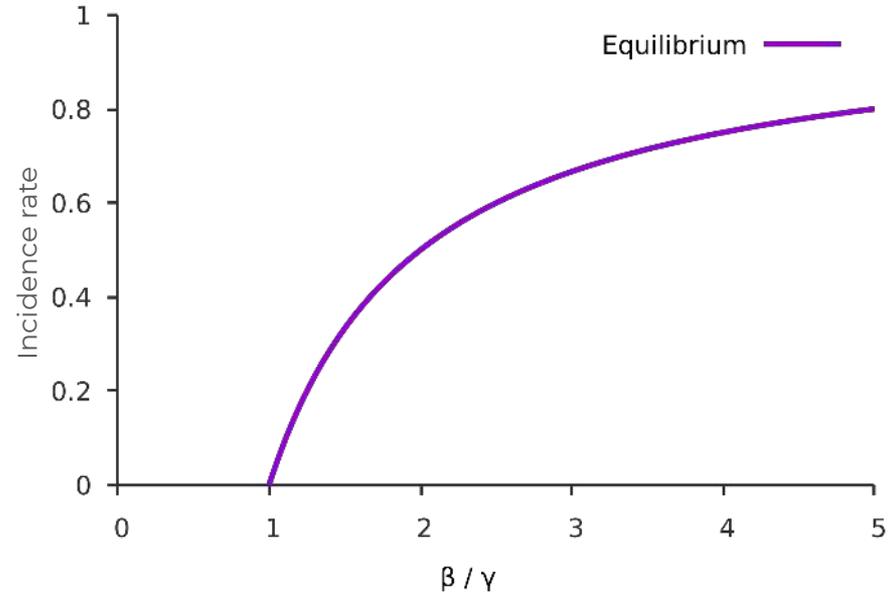
Self training model from **Bayesian statistical inference** to learn from collected data

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).



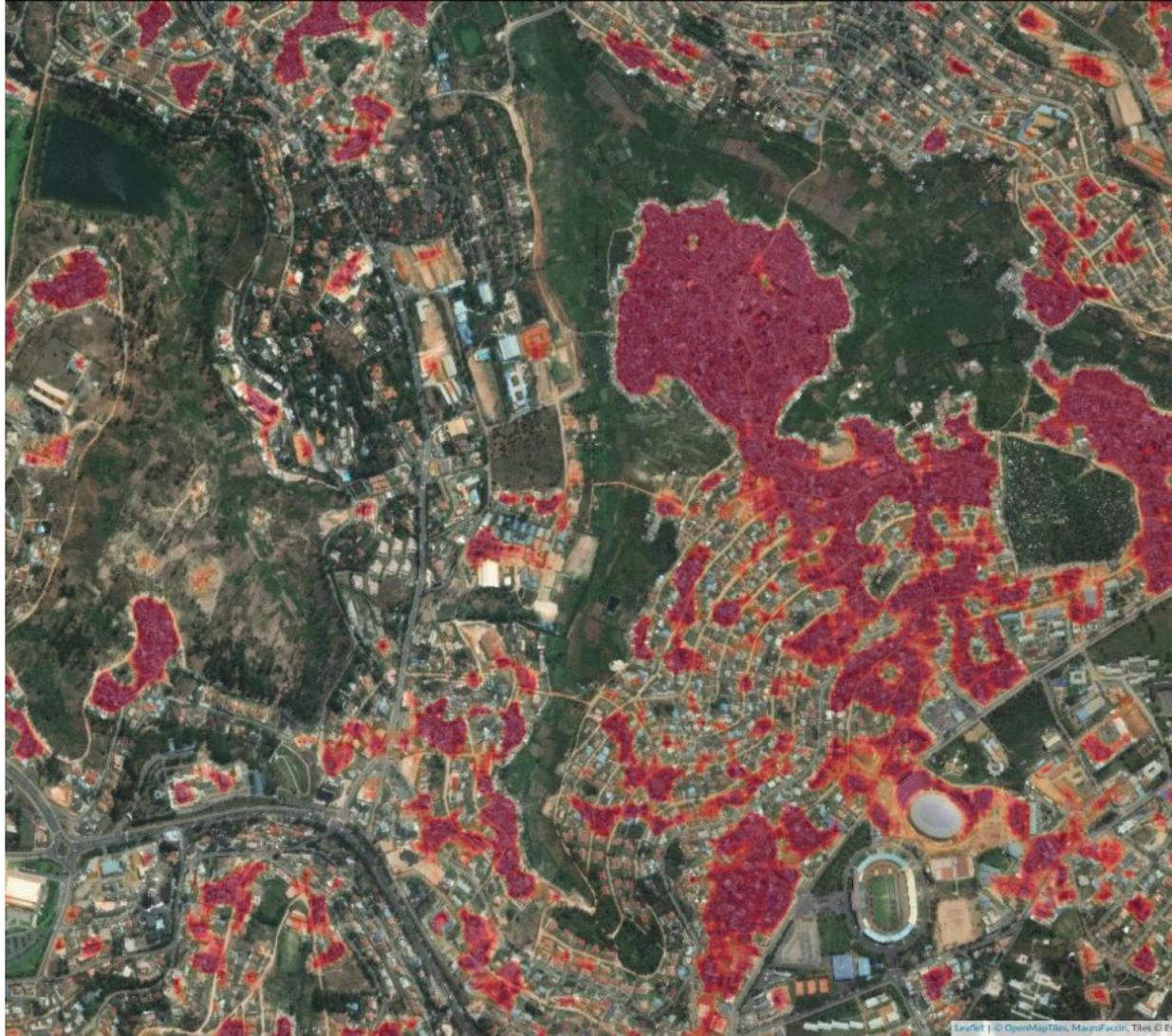
The model parameters depend on the population density. Below a certain threshold the disease is expected to extinguish.

Satellite imagery

Computer vision techniques

Edge detection on highly detailed satellite imagery within cities.

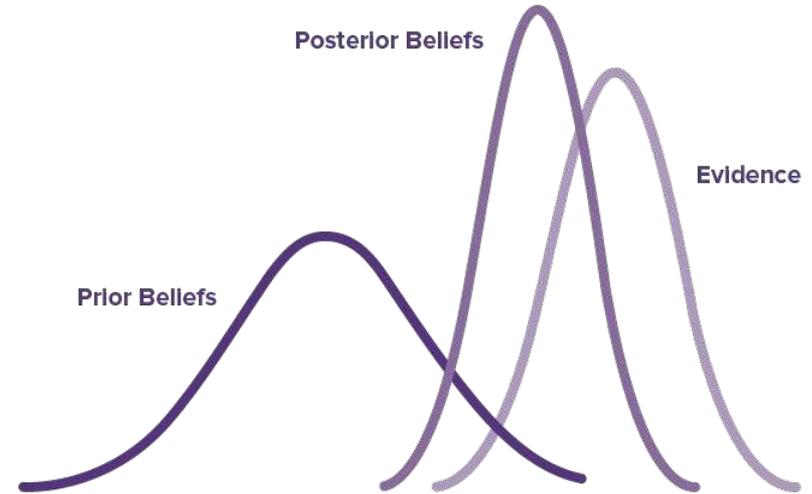
Detection of **highly populated** (high density of buildings) **neighborhoods**.



Automatic learning from collected data

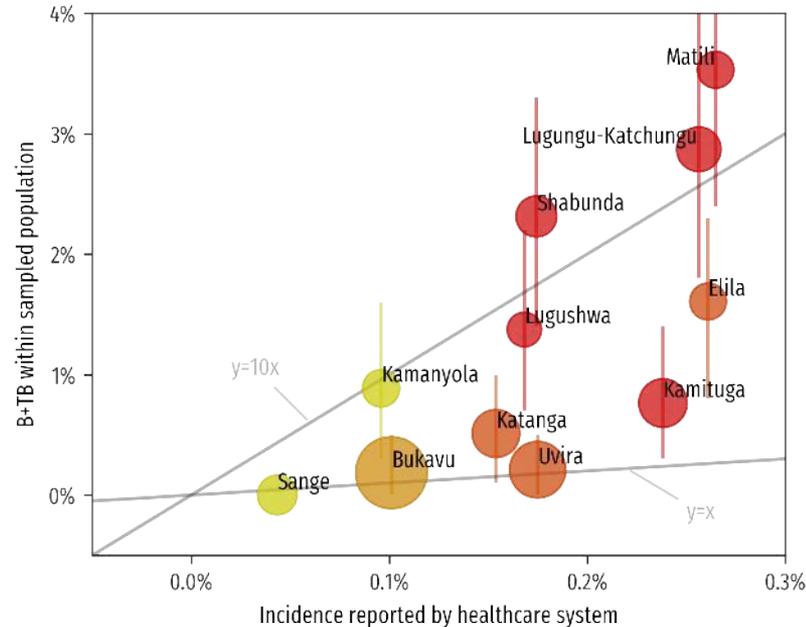
Bayesian (statistical) inference:

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

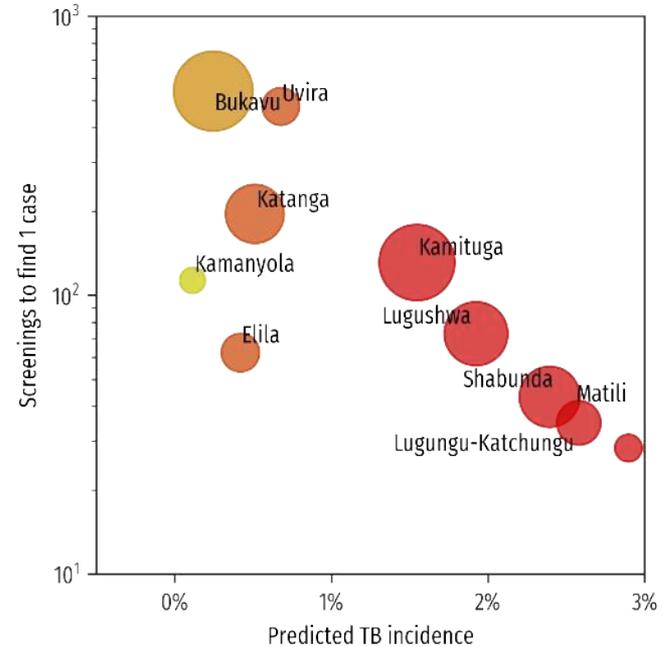


South Kivu Pilot case

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

Community health worker

Perform screenings in the field

Search for “**MediScout**” on the PlayStore: [Play Store](#)



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

Design a screening mission

Design Questionnaire

Url = <https://mediscout.org/sign>

Username = mediscoutgdhf@gmail.com

Password = labsession

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

The screenshot shows the Mediscout.org survey creation interface. On the left is a green sidebar with navigation options: ORGANIZATIONS, SURVEYS, MISSIONS, AGENTS, RESPONDENTS, PROFILE, SETTINGS, LEGAL, NOTIFICATIONS, and SIGN OUT. The main content area is white and contains the following elements:

- Description:** A text input field containing "TB active case finding".
- Total score:** A text input field containing "21".
- Person information (default):** A section with icons and labels for FIRSTNAME, LASTNAME, BIRTHDAY, GENDER, PHONE, WEIGHT, and TEMPERATURE.
- Threshold activated:** A green toggle switch that is turned on.
- Thresholds:** A section with a note: "Note: Last threshold value should be greater or equal to the current total score." Below this is a form with:
 - Name:** A text input field containing "Tuberculosis is Unlikely".
 - From Score (inc):** A text input field containing "0".
 - To Score (exc):** A text input field containing "4".
 - Action:** A text input field containing "Sensitize about TB".
 - Submit:** A green button with a white checkmark icon and the text "Submit".

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

The screenshot shows a web application interface for creating a new mission. The interface is divided into a sidebar menu on the left and a main content area on the right. The sidebar menu is green and contains the following items: 'ORGANIZATIONS', 'OFFICES', 'MISSIONS', 'MISSED', 'RESPONDENTS', 'PROFILE', 'HELPERS', 'EMAIL', 'NOTIFICATIONS', and 'SIGN OUT'. The main content area is white and has a dark header with the text 'Create a new mission'. Below the header is a form with the following fields: 'Type' (a dropdown menu with 'Screening' selected), 'Enter a location' (a text input field with a location pin icon), 'Latitude*' (a text input field with the subtext 'Decimal Degrees (e.g. 78.1)'), 'Longitude*' (a text input field with the subtext 'Decimal Degrees (e.g. 2.12)'), 'Radius' (a text input field), 'Survey*' (a dropdown menu), 'Category*' (a text input field), 'Name*' (a text input field), 'Description*' (a text input field), 'Total of screenings*' (a text input field), and 'Duration (sec)*' (a text input field). At the bottom of the form, there is a 'Candidates Open' checkbox and two buttons: 'BACK' and 'SUBMIT'.

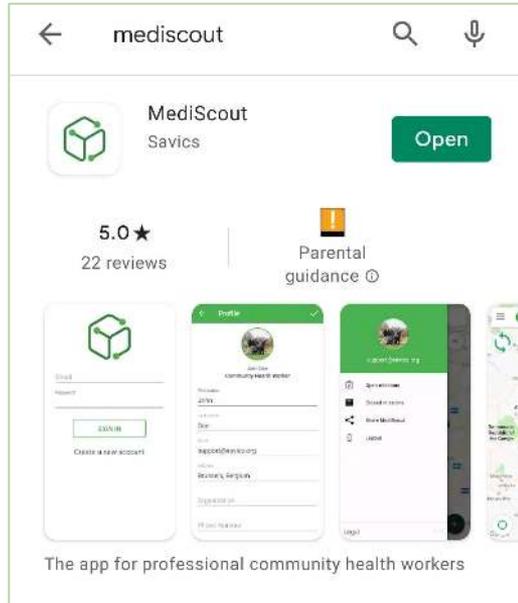
Approve CHWs

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

The screenshot shows a web application interface with a dark green sidebar on the left and a main content area on the right. The sidebar contains a navigation menu with the following items: ORGANIZATIONS, SURVEYS, MISSIONS, AGENTS, RESPONDENTS, PROFILE, SETTINGS, LEGAL, NOTIFICATIONS, and SIGN OUT. The main content area has a dark header with tabs for REQUESTS, RECRUITS, and MANAGERS. Below the header, there are two request cards. The first card is for 'tb' with contact information 'olajumoke.artinola@ajumoke.org' and an application date of 'September 7, 2020'. It has a green status icon and a red status icon. The second card is for 'TB screening of adults in Lagos' with contact information 'olajumoke.testing@gmail.com' and an application date of 'November 25, 2020'. It also has green and red status icons and a 'Approve' button.

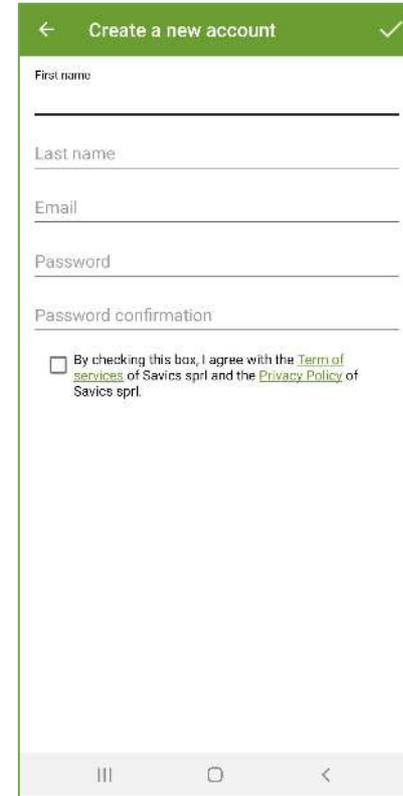
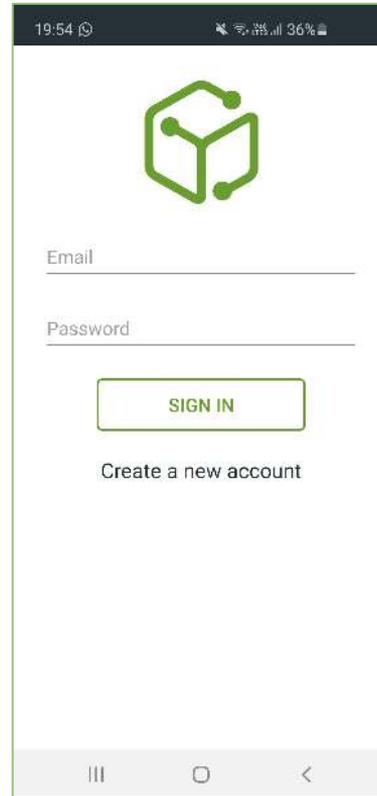
TB Screening

Create an account



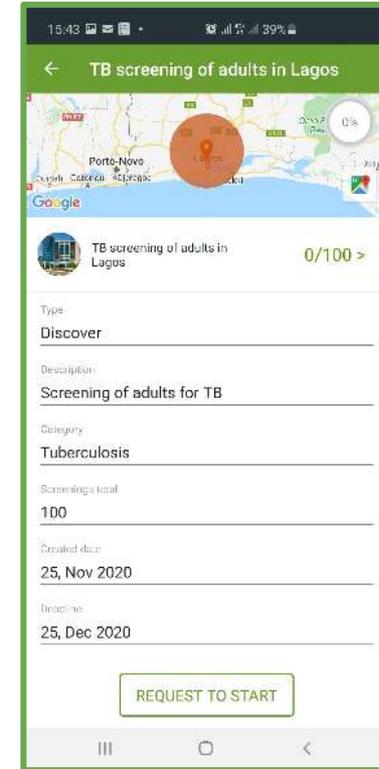
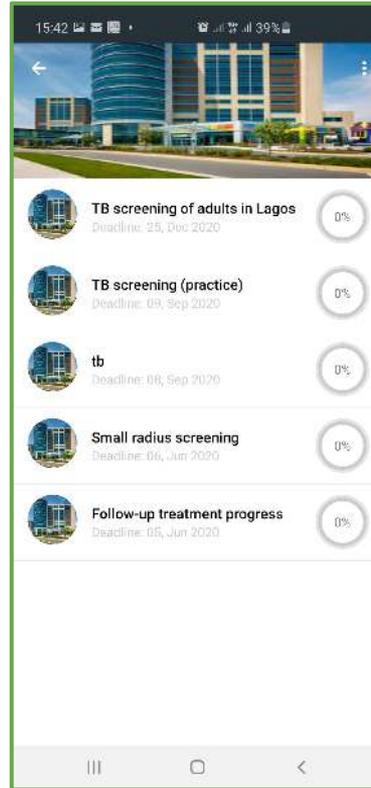
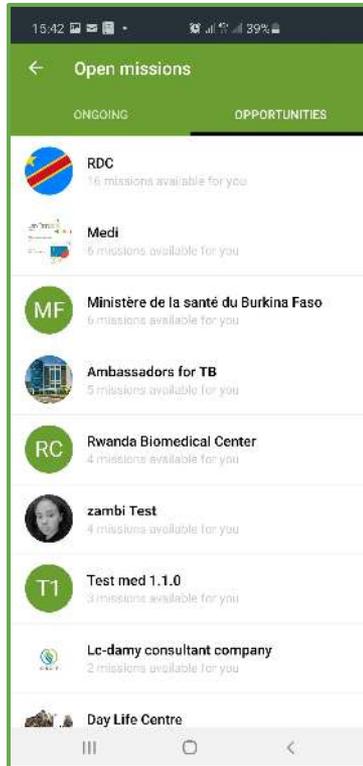
Search and download
“**MediScout**” on the Google
Playstore

[Link](#)



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

Find Open Missions



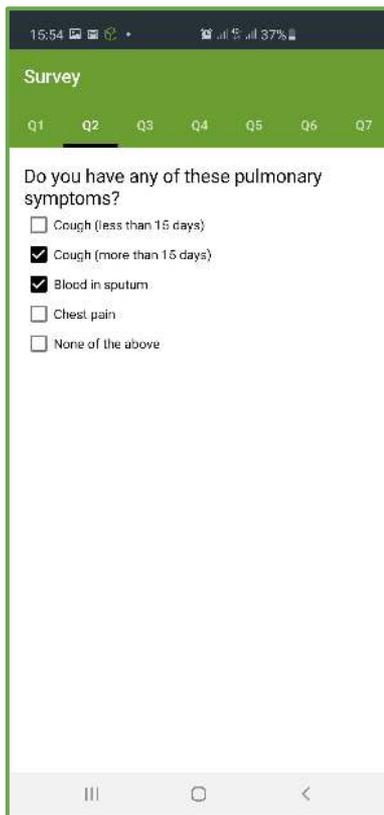
From the **Menu bar**; select **“Open Missions”** to view organizations & available missions

“Request to Start” mission and await approval by an Admin

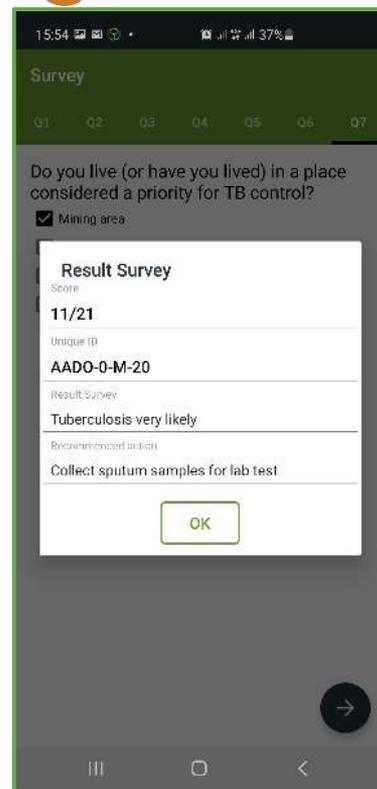
Report a Screening



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



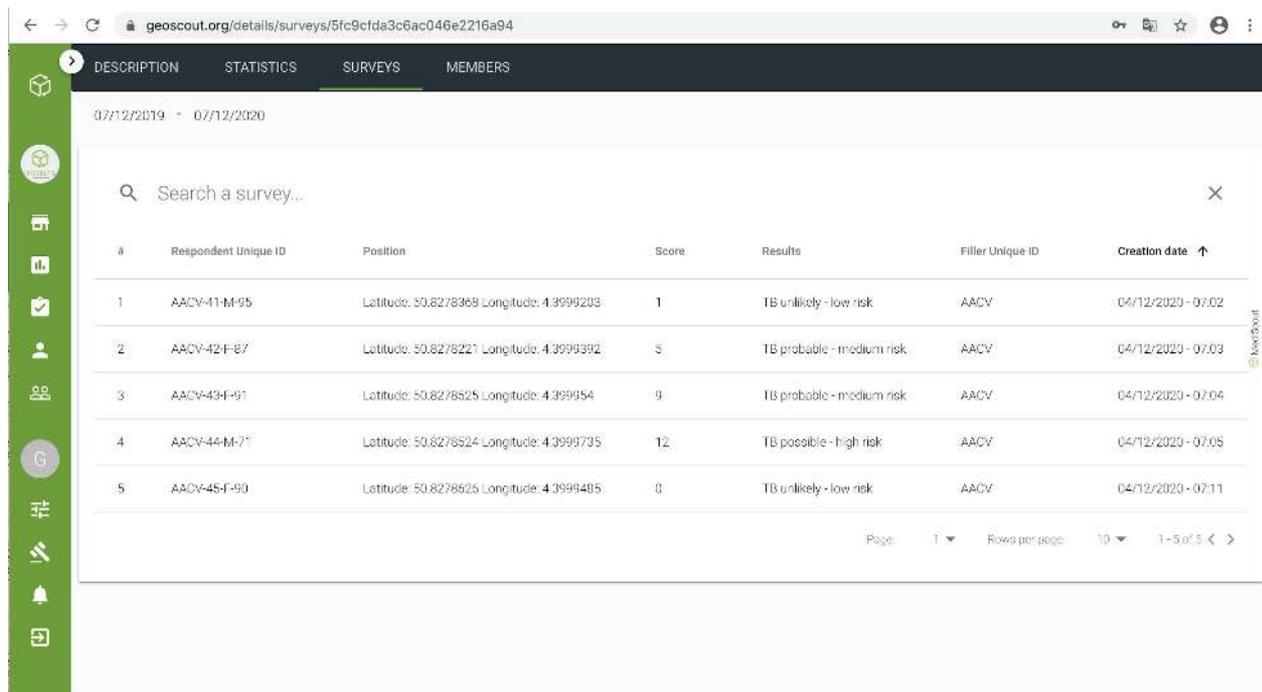
Select responses to all questions and submit



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.



The screenshot shows the 'SURVEYS' tab selected in the navigation bar. The page displays a list of screening reports for a specific mission. The table has the following columns: #, Respondent Unique ID, Position, Score, Results, Filler Unique ID, and Creation date. The data is as follows:

#	Respondent Unique ID	Position	Score	Results	Filler Unique ID	Creation date
1	AACV-41-M-95	Latitude: 50.8278368 Longitude: 4.3999203	1	TB unlikely - low risk	AACV	04/12/2020 - 07:02
2	AACV-42-F-87	Latitude: 50.8278221 Longitude: 4.3999392	5	TB probable - medium risk	AACV	04/12/2020 - 07:03
3	AACV-43-F-91	Latitude: 50.8278525 Longitude: 4.399954	9	TB probable - medium risk	AACV	04/12/2020 - 07:04
4	AACV-44-M-71	Latitude: 50.8278524 Longitude: 4.3999735	12	TB possible - high risk	AACV	04/12/2020 - 07:05
5	AACV-45-F-90	Latitude: 50.8278625 Longitude: 4.3999485	0	TB unlikely - low risk	AACV	04/12/2020 - 07:11

At the bottom of the table, there is a pagination control showing 'Page: 1', 'Rows per page: 10', and '1 - 5 of 5'.

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”**.

The screenshot shows a web application interface with a dark header containing three tabs: 'RECENTLY CREATED', 'ONGOING MISSIONS', and 'MISSIONS COMPLETED'. On the left is a green sidebar with icons for home, mission, reports, checklist, user, and group. The main content area displays mission details for 'GDHF - Screening TB in Etterbeek', including 'Survey: Total screenings: 100', 'Progress: 5%', and 'Created on: 04/12/2020'. In the top right corner, there is a green 'EXPORT ALL' button. A context menu is open on the right, with the 'Export results' option highlighted by a green border. Other options in the menu include 'Edit', 'Finish', and 'Delete'.

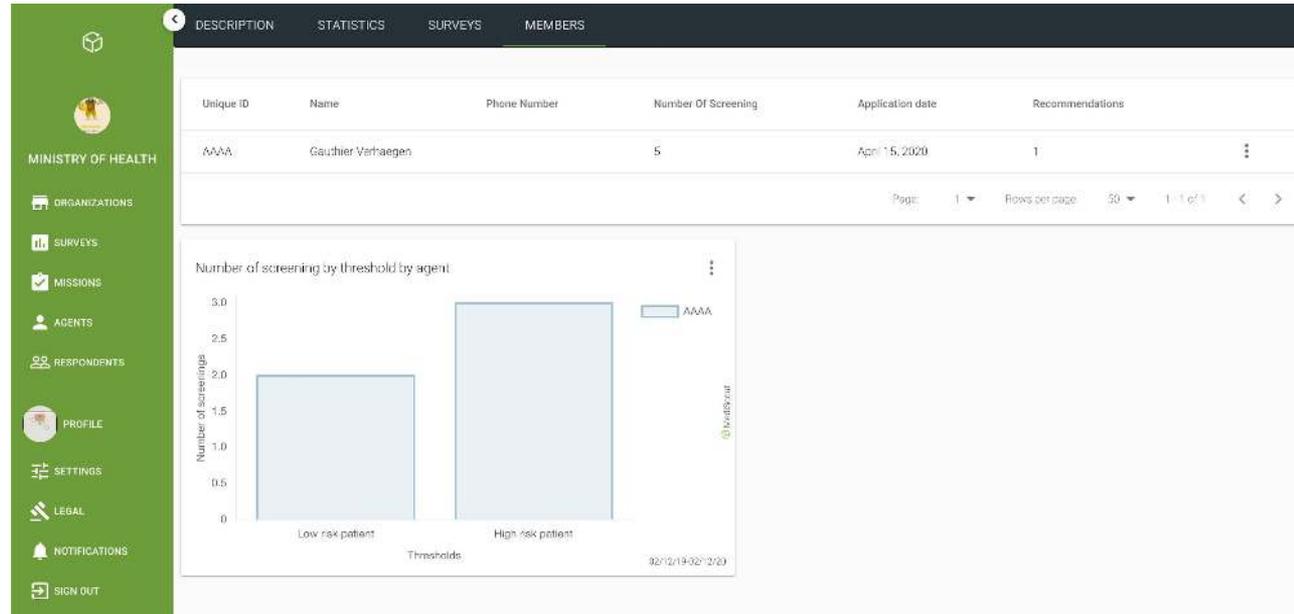
The screenshot shows a Microsoft Excel spreadsheet with the following data:

	A	B	C	D	E	F
1	code	position/latitude	position/longitude	score		
2	AACV-41-M-95	50,8278368	4,3999203	1		
3	AACV-42-F-87	50,8278221	4,3999392	5		
4	AACV-43-F-91	50,8278525	4,399954	9		
5	AACV-44-M-71	50,8278524	4,3999735	12		
6	AACV-45-F-90	50,8278626	4,3999485	0		
7						
8						
9						

Review CHW progress

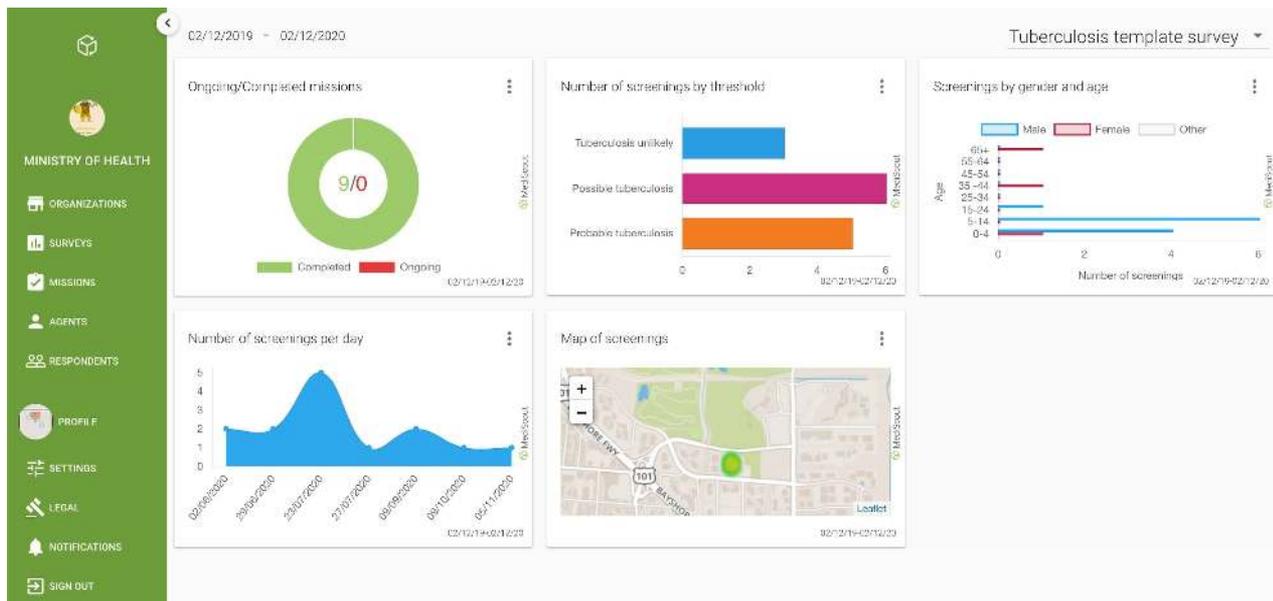
To review progress of a CHW;

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!

Gauthier Verhaegen
Product Owner

Olajumoke Arinola
Project Manager

Mauro Faccin
Data Analyst

Contact us:
info@savics.org

