

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



SAVICS[®]
Everyone matters

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

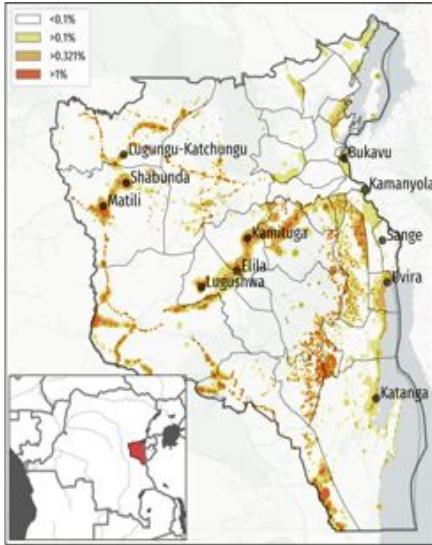
Context

3.6 million cases of Tuberculosis are missing yearly.

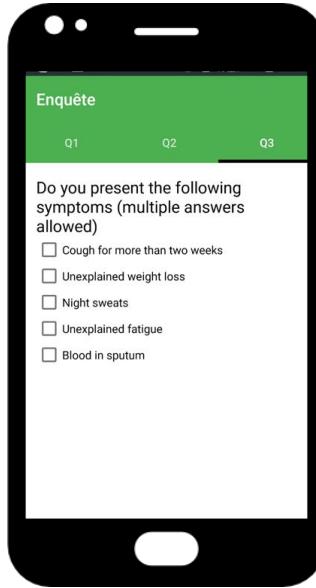
Health workers have difficulty identifying communities to focus surveillance efforts such as active case finding.

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

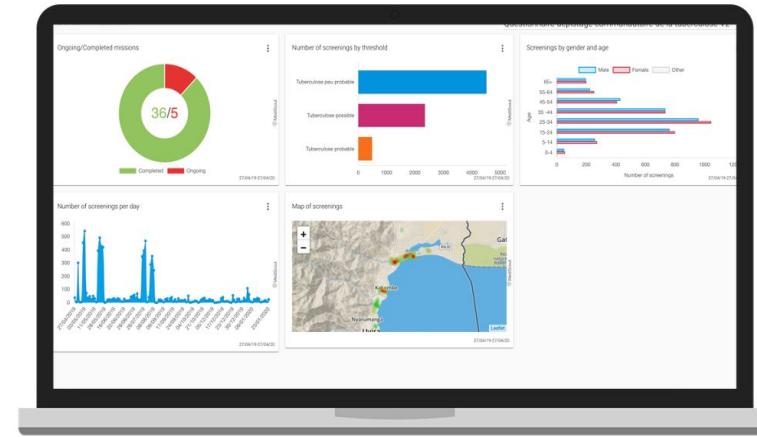
Solution Suite



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

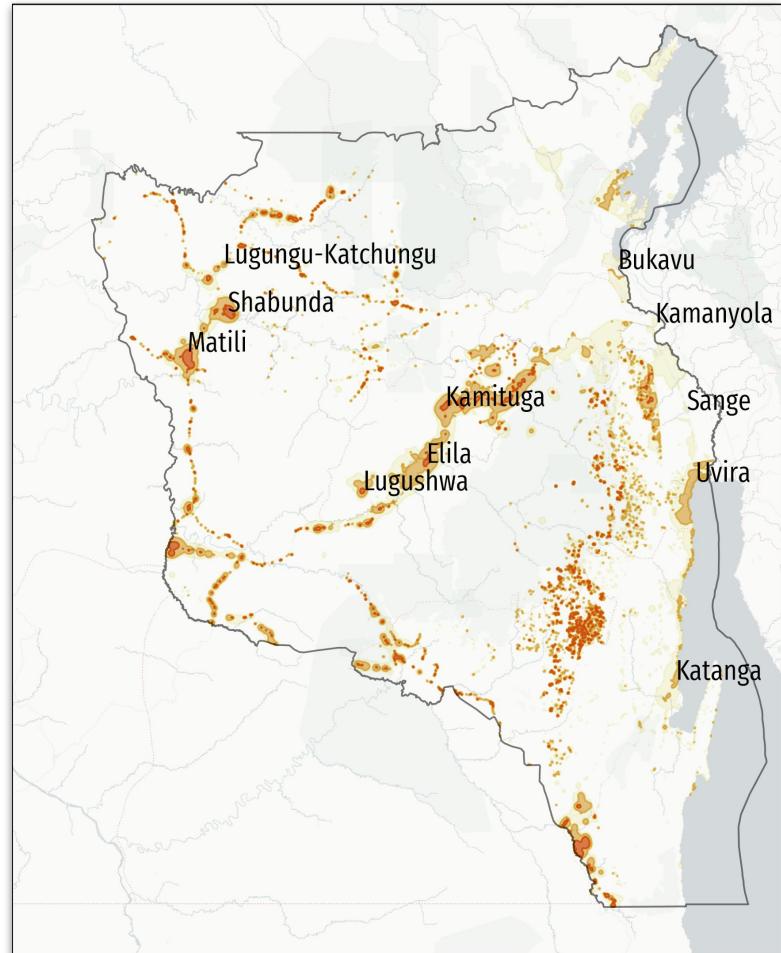
Data used

Openly available datasets:

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

(Worldpop, 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.

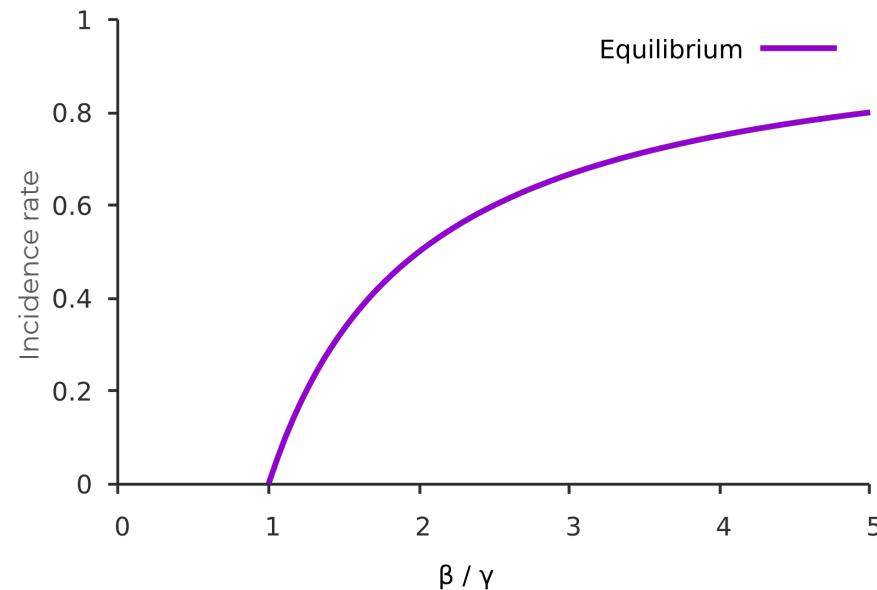
Self training model from **Bayesian statistical inference** to learn from collected data

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).



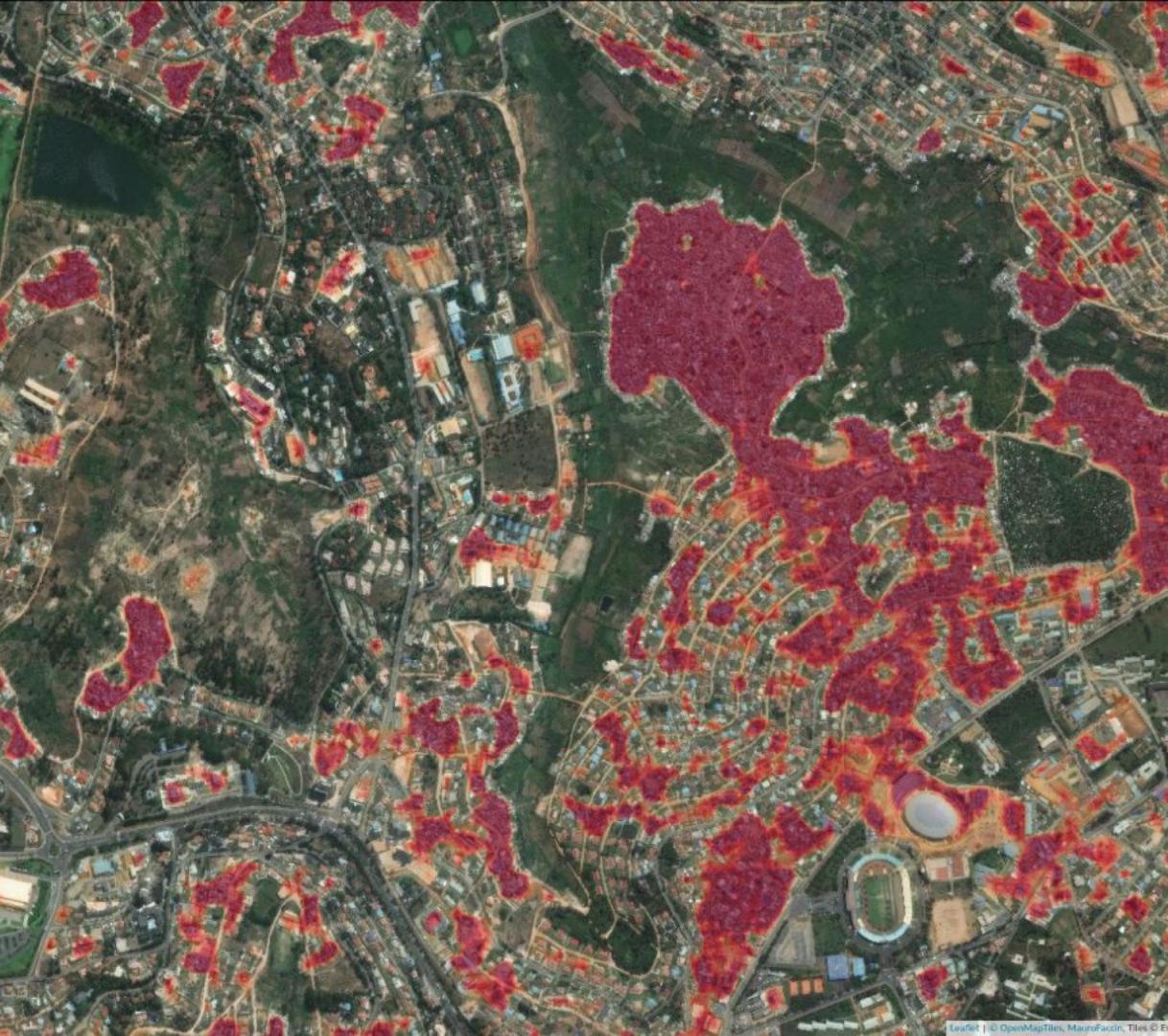
The model parameters depend on the population density. Below a certain threshold the disease is expected to extinguish.

Satellite imagery

Computer vision techniques

Edge detection on
highly detailed satellite
imagery within cities.

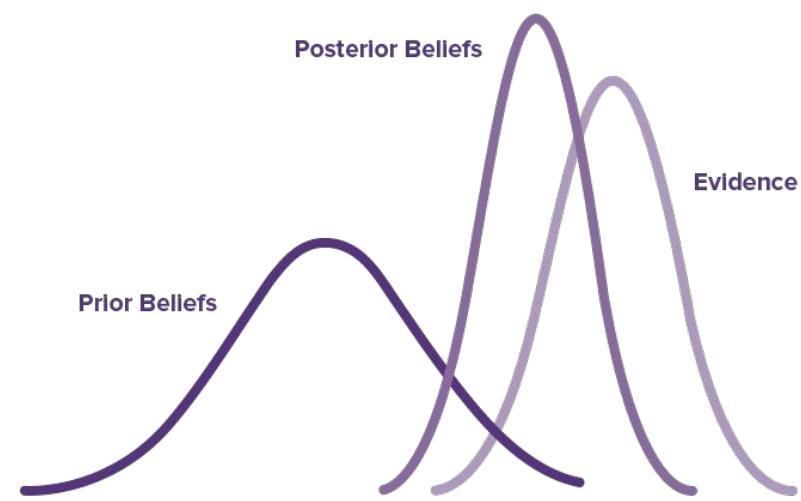
Detection of **highly
populated** (high
density of buildings)
neighborhoods.



Automatic learning from collected data

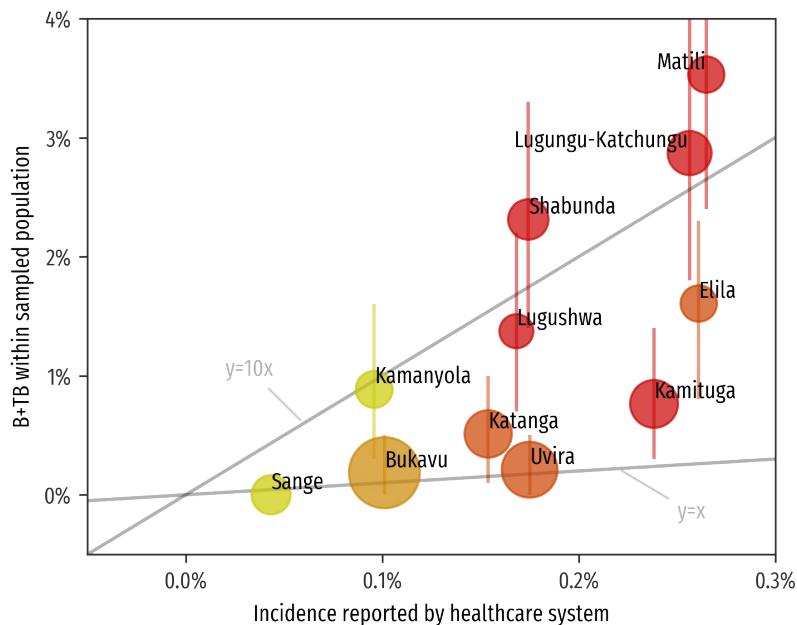
Bayesian (statistical) inference:

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

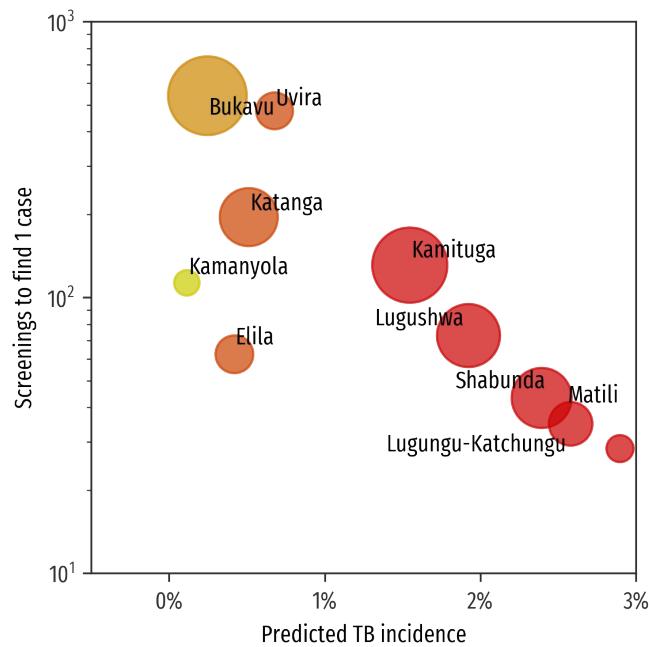


South Kivu Pilot case

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 = mediscoutqdhf@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 = mediscoutghf@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 Ambassadors for TB software interface. On the left is a green sidebar menu with options: ORGANIZATIONS, SURVEYS (which is selected), MISSIONS, AGENTS, RESPONDENTS, PROFILE, SETTINGS, LEGAL, NOTIFICATIONS, and SIGN OUT. The main area has a white background with a green header bar. The title "TB active case finding" is in the top left. Below it is a section for "Person information (default)" with fields for FIRSTNAME, LASTNAME, BIRTHDAY, GENDER, PHONE, WEIGHT, and TEMPERATURE. A green button labeled "Threshold activated" is visible. At the bottom, there's a "Thresholds" section with a note: "Note: Last threshold value should be greater or equal to the current total score." It shows a row for "Tuberculosis Unlikely" with "From Score (incl.) * 0" and "To Score (excl.) * 4". A green "COLOR" button is at the bottom right.

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 software application window titled "Create a new mission". On the left is a vertical sidebar menu with the following items:

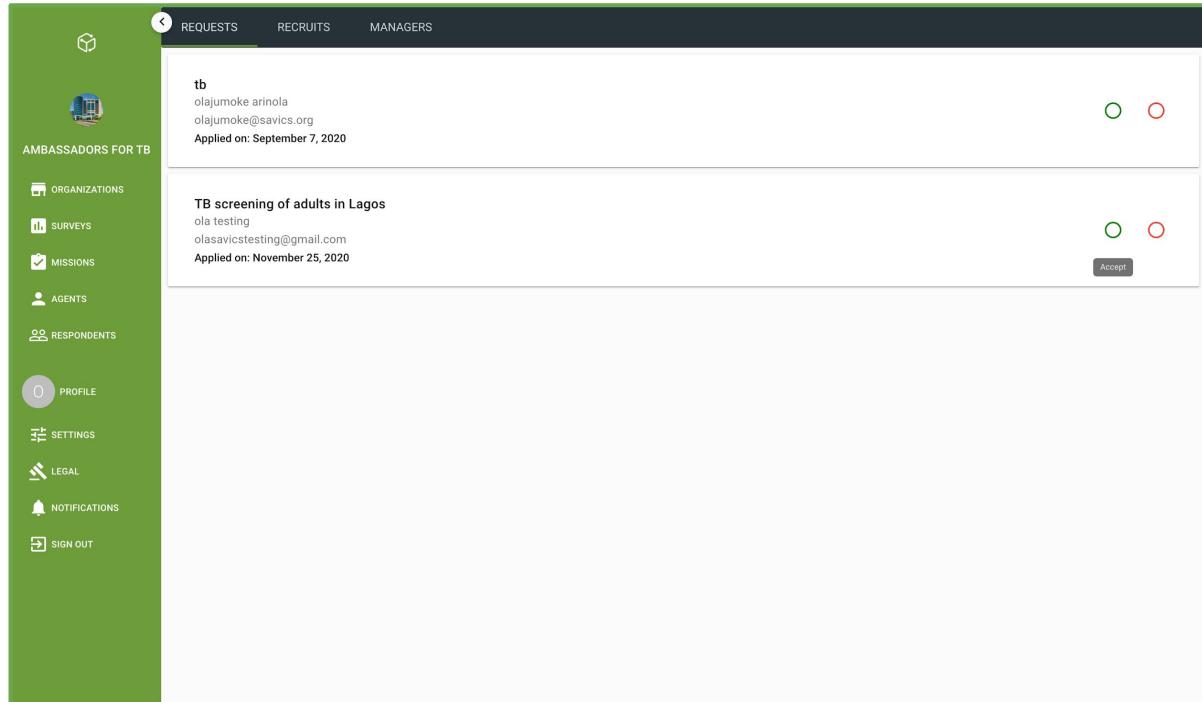
- AMBASSADORS FOR TB
- ORGANIZATIONS
- SURVEYS
- MISSIONS** (with a checked checkbox)
- AGENTS
- RESPONDENTS
- PROFILE
- SETTINGS
- LEGAL
- NOTIFICATIONS
- SIGN OUT

The main right panel has the following fields:

- Type*:
- Enter a location
- Latitude * Decimal Degrees (e.g.: 48.1)
- Longitude * Decimal Degrees (e.g.: 2.1)
- Radius (m...)
- Survey*
- Category*
- Name*
- Description*
- Total of screenings*
- Duration(day)*
- Candidates: Open
- BACK
- SUBMIT

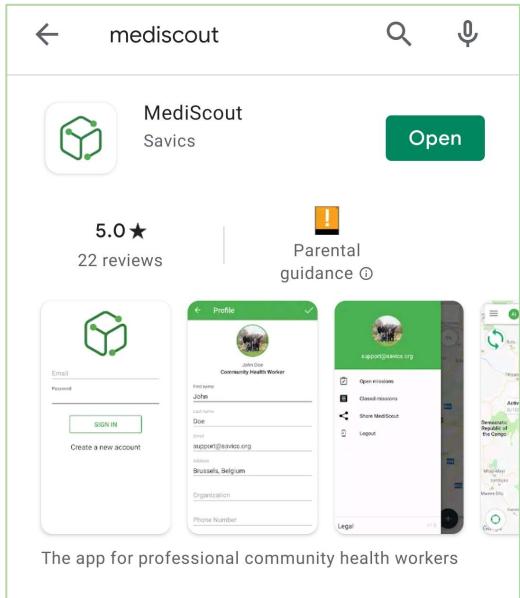
Approve CHWs

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



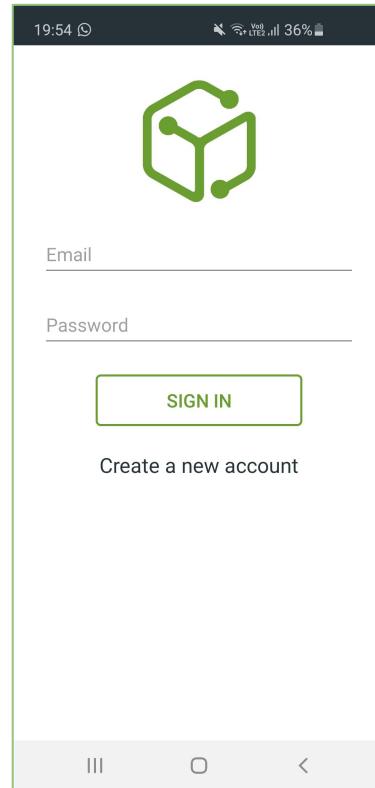
TB Screening

Create an account



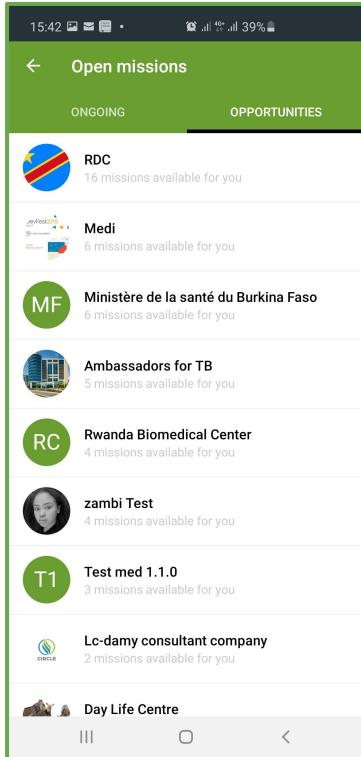
Search and download
“MediScout” on the Google
Playstore

[Link](#)

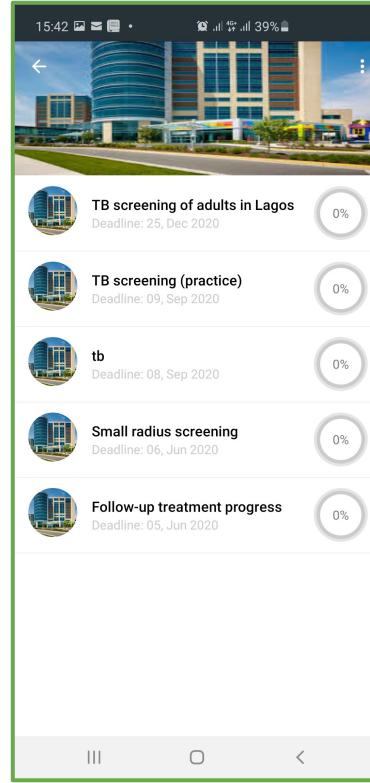
A screenshot of the MediScout app's account creation screen. The title is "Create a new account". It contains fields for "First name", "Last name", "Email", "Password", and "Password confirmation". At the bottom, there is a checkbox with the text: "By checking this box, I agree with the [Term of services](#) of Savics sprl and the [Privacy Policy](#) of Savics sprl." A green checkmark icon is at the top right. A navigation bar with three icons is at the bottom.

“Create an account” to log in to the app

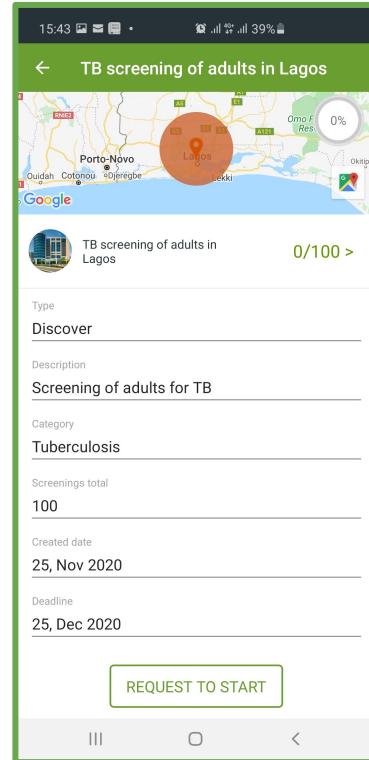
Find Open Missions



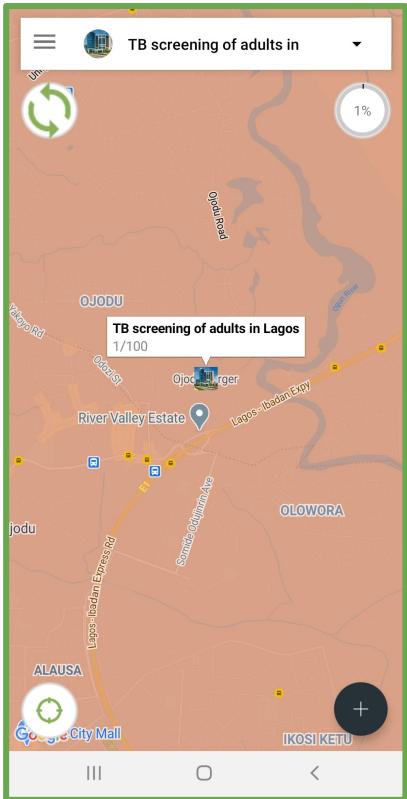
From the **Menu bar**; select “**Open Missions**” to view organizations & available missions



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



Report a Screening



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

A survey interface showing a question: "Do you have any of these pulmonary symptoms?". It includes a list of symptoms with checkboxes:

- Cough (less than 15 days)
- Cough (more than 15 days)
- Blood in sputum
- Chest pain
- None of the above

Select responses to all questions and submit

A survey results summary screen. It shows:

Result Survey
Score
11/21
Unique ID
AADO-0-M-20
Result Survey
Tuberculosis very likely
Recommended action
Collect sputum samples for lab test

A green "OK" button is at the bottom right.

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 a web browser window for the URL geoscout.org/details/surveys/5fc9cfda3c6ac046e2216a94. The page title is "SURVEYS". The left sidebar has a green vertical bar with icons for Home, Surveys, Members, Log Out, and Help. The main content area displays a table of screening reports with the following data:

#	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: 50.8278626 Longitude: 4.3999485	0	TB unlikely - low risk	AACV	04/12/2020 - 07:11

At the bottom right, there are pagination controls: Page: 1, Rows per page: 10, and a link to 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 software interface for managing missions. On the left, there's a sidebar with icons for recently created, ongoing, and completed missions. A specific mission titled "GDHF - Screening TB in Etterbeek" is selected, showing details like Survey, Total screenings: 100, Progress: 5%, and Created on: 04/12/2020. On the right, a context menu is open with options: Edit, Export results (which is highlighted with a green border), Finish, and Delete.

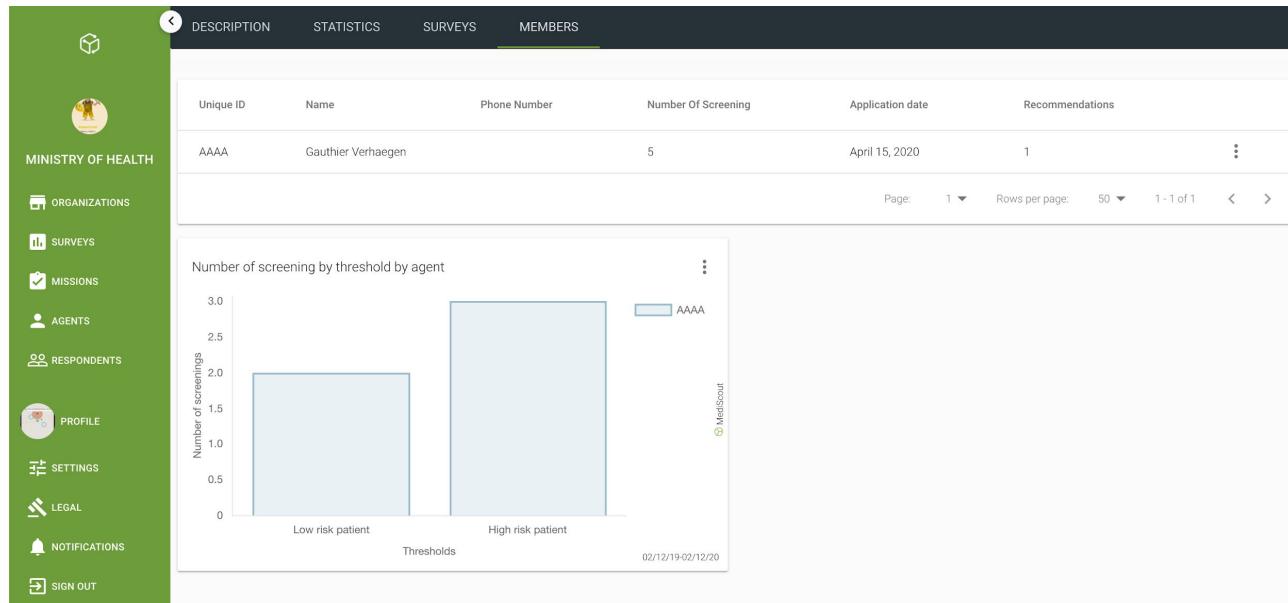
Below this, a Microsoft Excel window is open, showing a table of data. The table has columns labeled A through F. The data rows are as follows:

	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

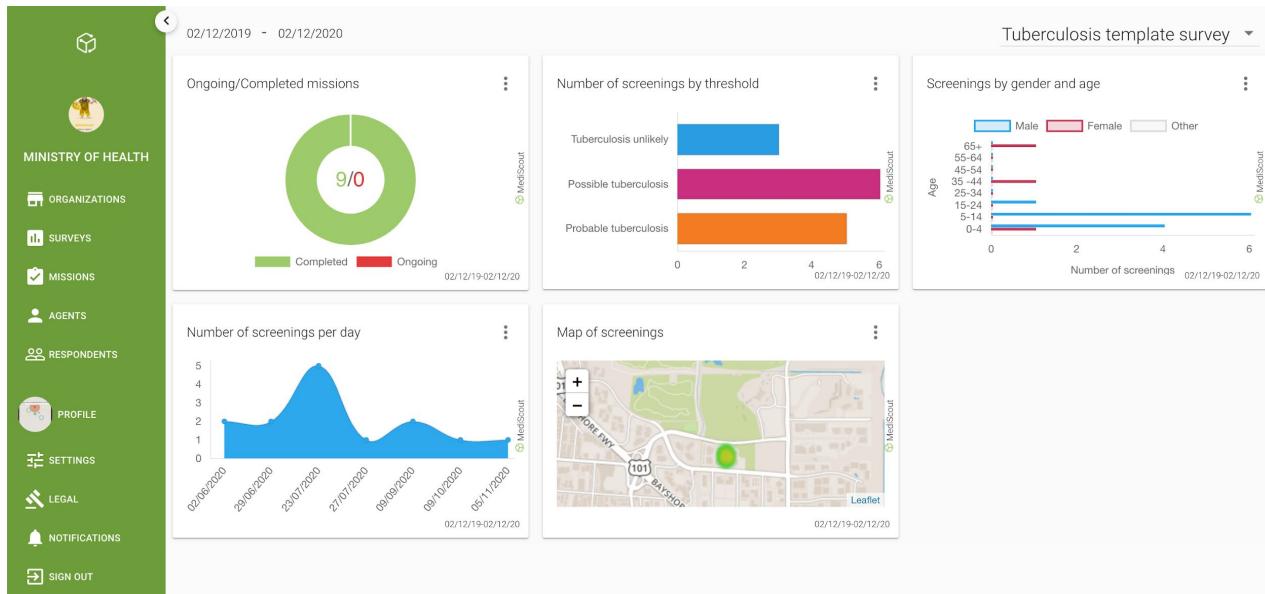
To review progress of a CHW;

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