

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



**SAVICS**<sup>®</sup>  
Everyone matters

Global Digital Health Forum  
08/12/2020



# Agenda

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# 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

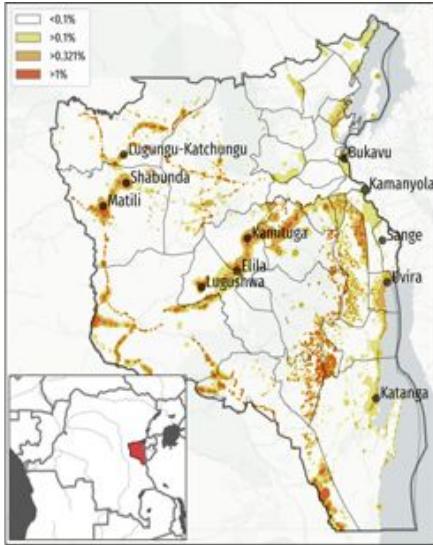
# Context

3.6 million cases of Tuberculosis are missing yearly.

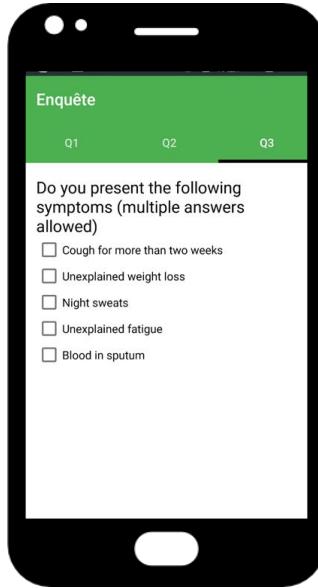
Health workers have difficulty identifying communities to focus surveillance efforts such as active case finding.

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

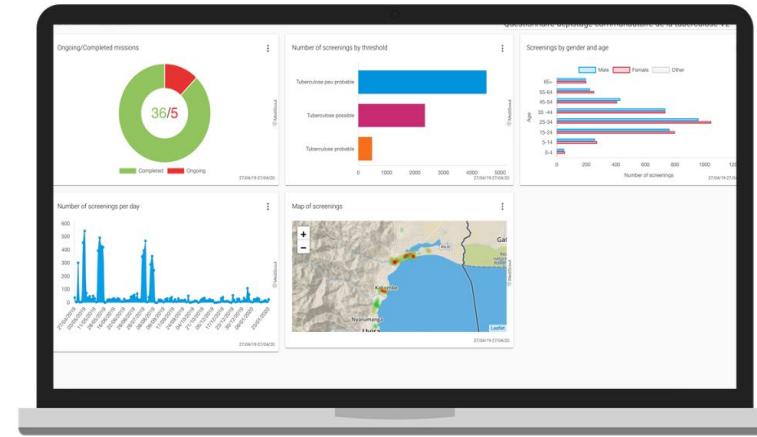
# Solution Suite



**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

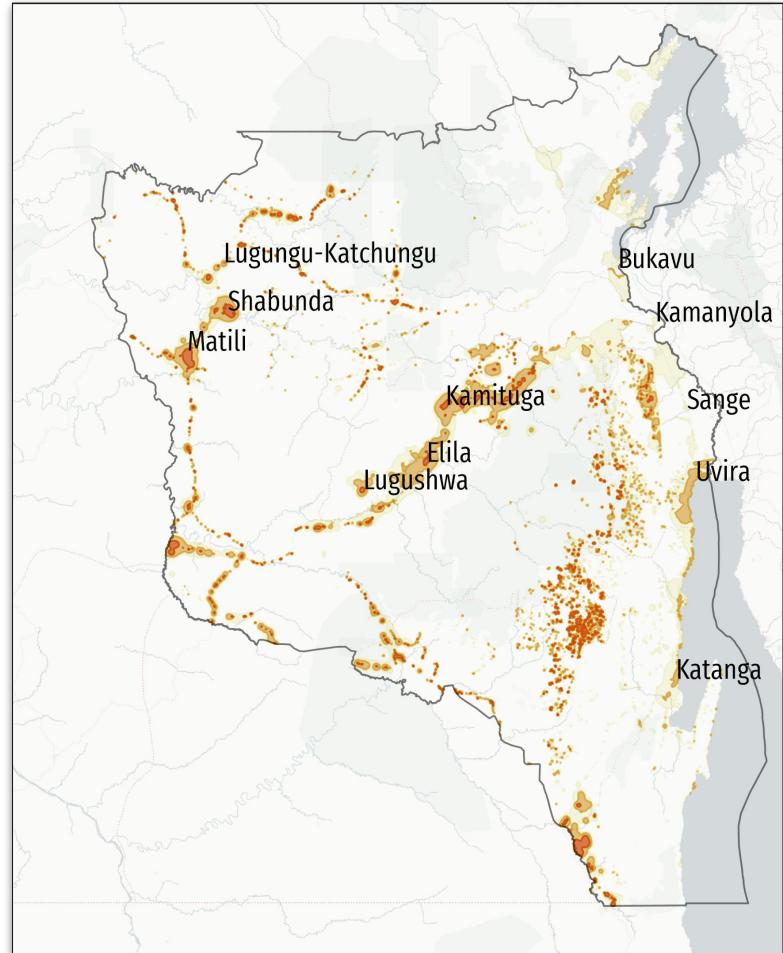
# Data used

## 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.

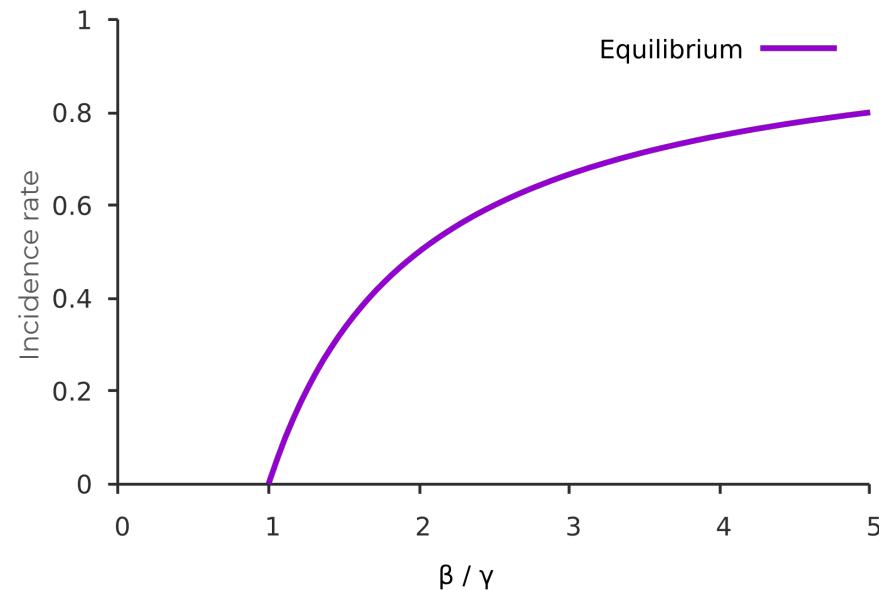
Self training model from **Bayesian statistical inference** to learn from collected data

# 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).



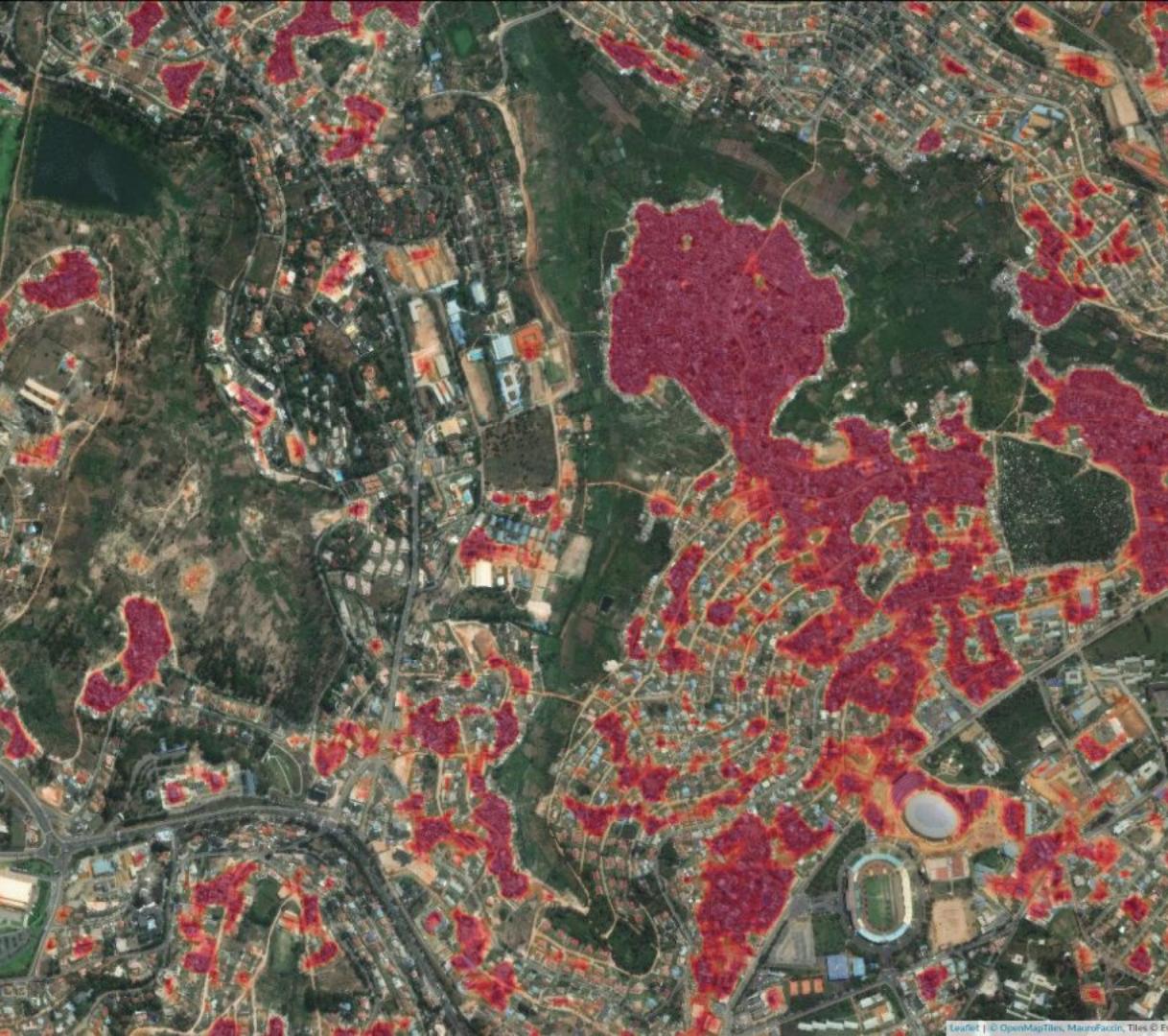
The model parameters depend on the population density. Below a certain threshold the disease is expected to extinguish.

# Satellite imagery

Computer vision techniques

**Edge detection** on  
highly detailed satellite  
imagery within cities.

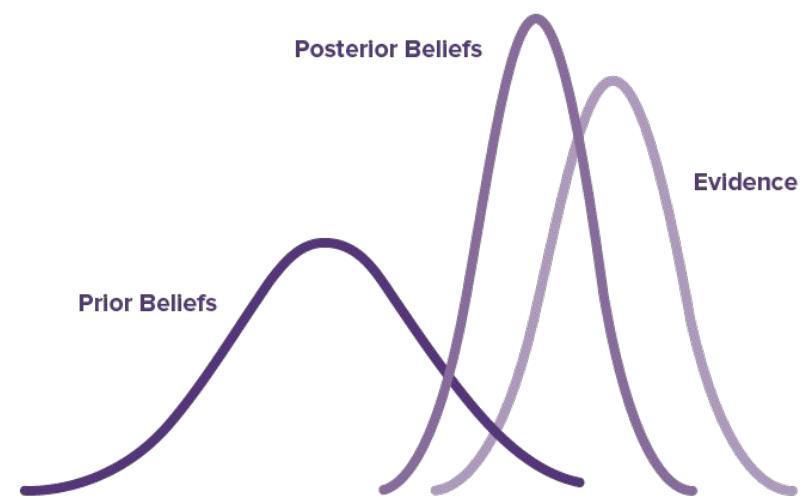
Detection of **highly  
populated** (high  
density of buildings)  
**neighborhoods**.



# Automatic learning from collected data

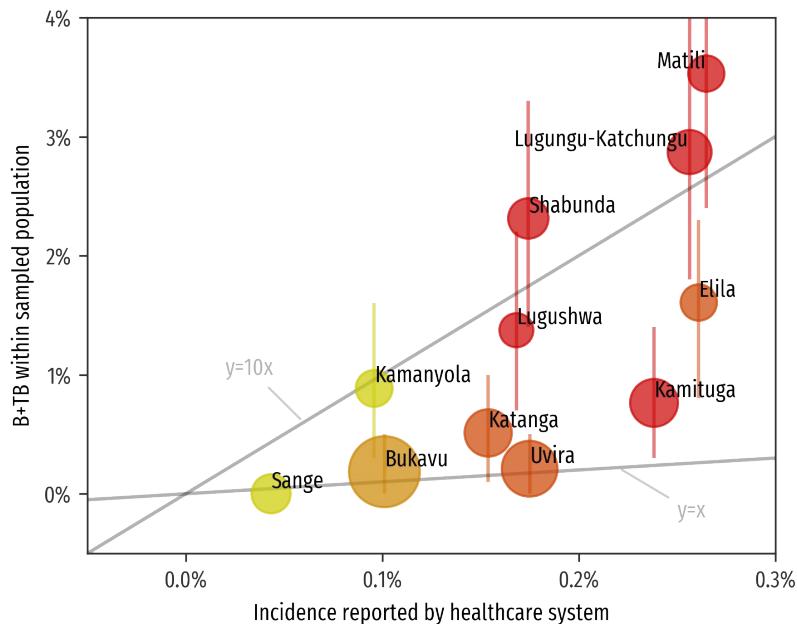
Bayesian (statistical) inference:

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

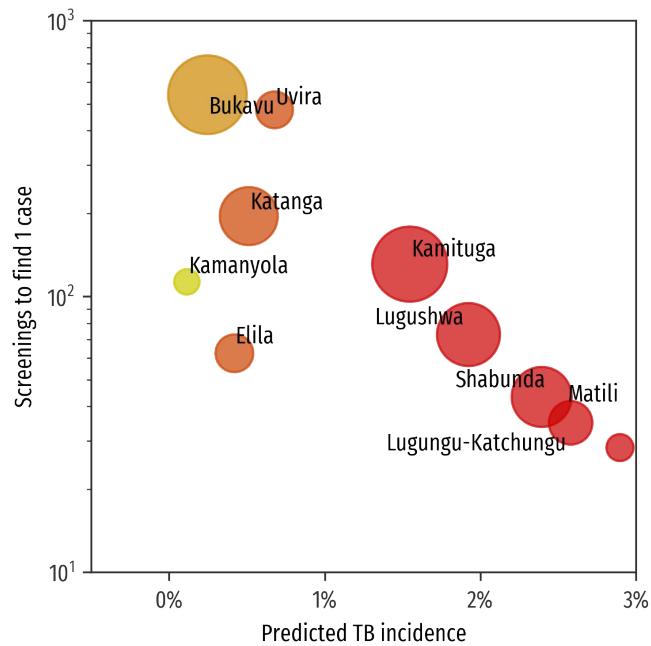


# South Kivu Pilot case

**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](mailto:mediscoutqdhf@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

The screenshot shows a mobile application interface for managing surveys. On the left is a green sidebar menu with icons and labels: Ambassadors for TB, Organizations, Surveys (selected), Missions, Agents, Respondents, Profile, Settings, Legal, Notifications, and Sign Out. The main screen displays a survey titled "TB active case finding". It includes fields for "Total score" (set to 21) and "Person information (default)" with icons for Firstname, Lastname, Birthday, Gender, Phone, Weight, and Temperature. A green button labeled "Threshold activated" is shown. Below this is a "Thresholds" section with a note: "Note: Last threshold value should be greater or equal to the current total score." It contains a table with two rows:

Name *	From Score (incl.) *	To Score (excl.) *	Action *
Tuberculosis Unlikely	0	4	Sensitize about TB

A "COLOR" button is located at the bottom right of the thresholds section.

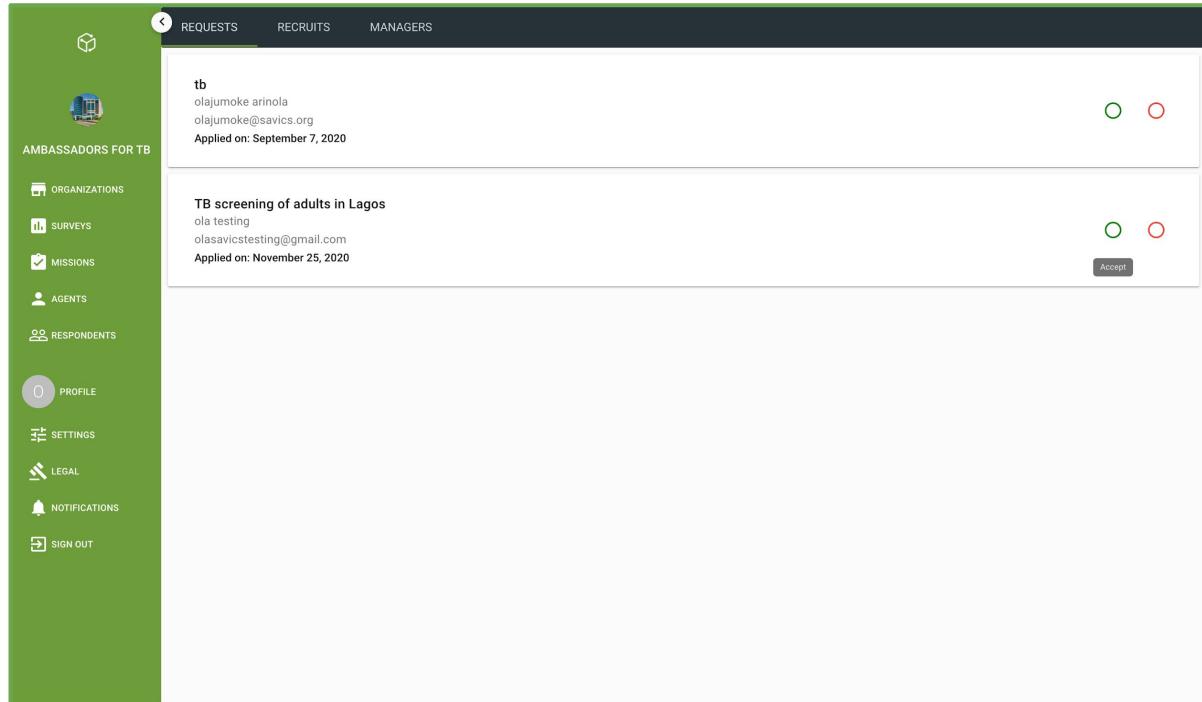
# Design a Screening Mission

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 (which is checked), AGENTS, RESPONDENTS, PROFILE, SETTINGS, LEGAL, NOTIFICATIONS, and SIGN OUT. The main area has tabs at the top: RECENTLY CREATED, ONGOING MISSIONS, and MISSIONS COMPLETED. Below the tabs, there is a search bar with the placeholder "Create a new mission" and a "Type\*" field containing "Screening". There is also a "Enter a location" input field and a "Radius (m...)" dropdown menu. Further down are fields for "Survey\*", "Category\*", "Name\*", "Description\*", "Total of screenings\*", "Duration(day)\*", and a status indicator "Candidates: Open". At the bottom right are "BACK" and "SUBMIT" buttons.

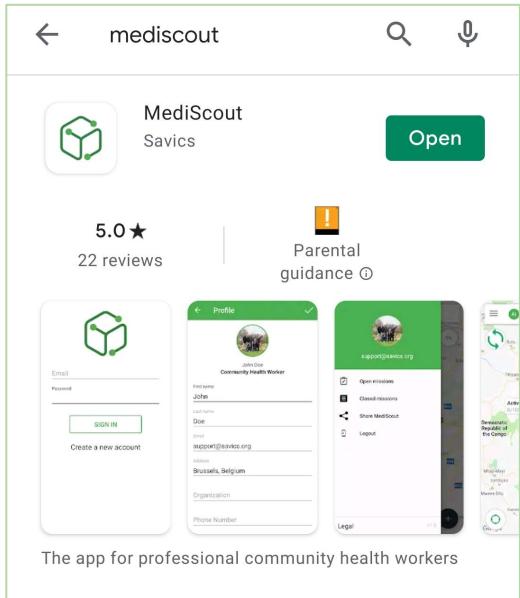
# Approve CHWs

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



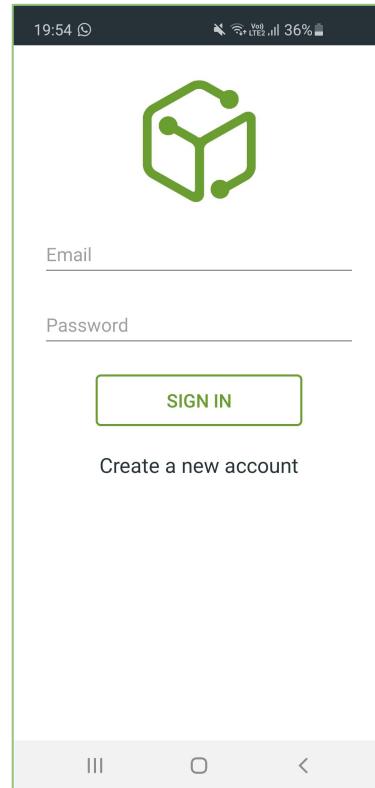
# TB Screening

# Create an account



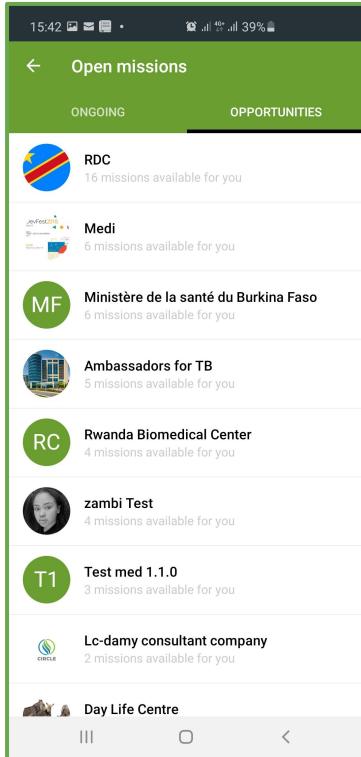
Search and download  
**“MediScout”** on the Google  
Playstore

[Link](#)

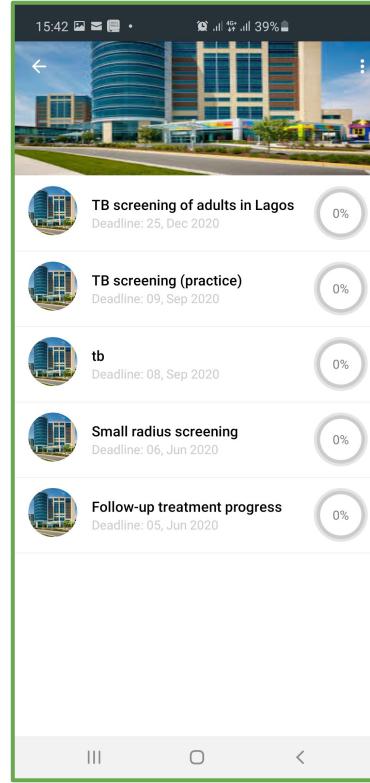
A screenshot of the MediScout app's account creation screen. It has a green header with a back arrow, a checkmark, and the text "Create a new account". The form includes fields for "First name", "Last name", "Email", "Password", and "Password confirmation". At the bottom, there is a checkbox with the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

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

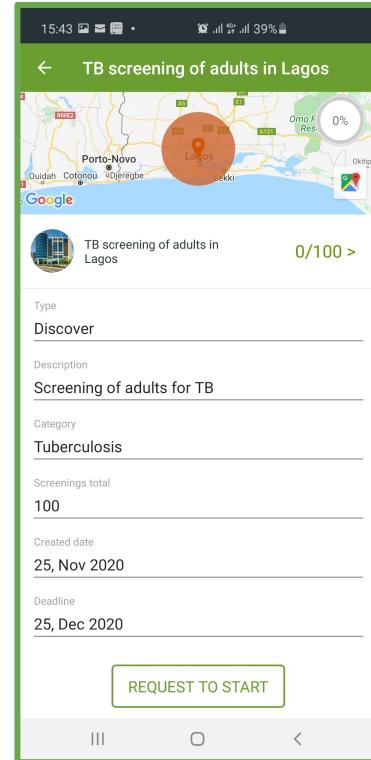
# Find Open Missions



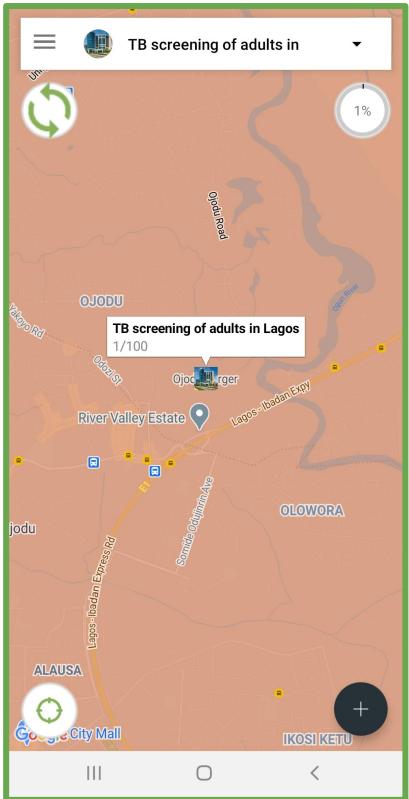
From the **Menu bar**; select “**Open Missions**” to view organizations & available missions



“**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?". Below the question are five options with checkboxes:

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

The "Q2" tab is selected at the top.

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 large green "OK" button is at the bottom right. Navigation icons (back, forward, etc.) are at the bottom.

# 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 with the URL [geoscout.org/details/surveys/5fc9cfda3c6ac046e2216a94](https://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.

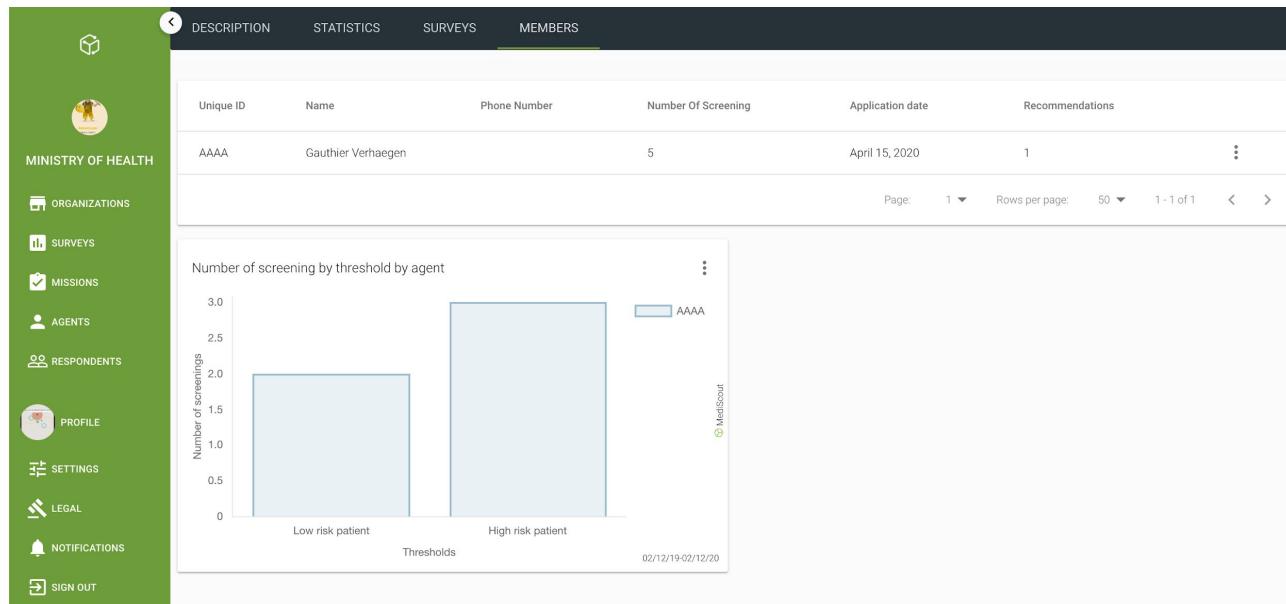
Below this, a Microsoft Excel window is displayed, showing a table of data. The table has columns labeled A through F. The data rows are as follows:

	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

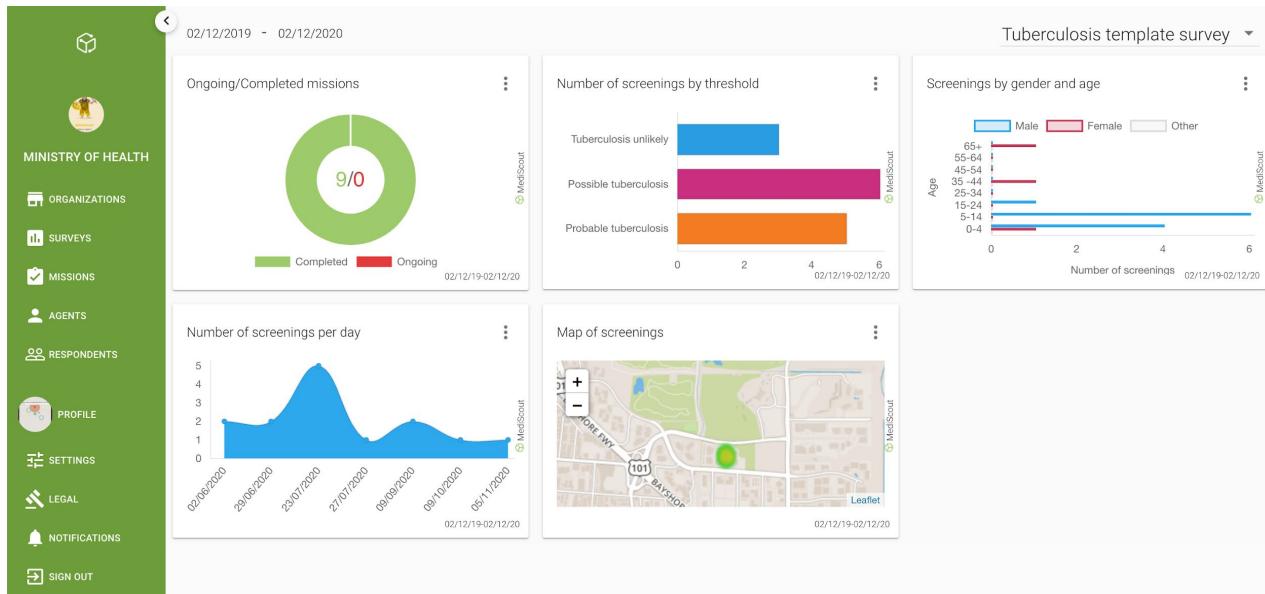
To review progress of a CHW;

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!

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