Analysing the spread of COVID-19 in refugee camps - an innovative tool

Video conference, 15 October 2020

On October 15, **KUNO** hosted a working session in which researchers from the **Resilience Lab** at the **Delft University of Technology** presented their tool for analysing the spread of COVID-19 in refugee settlements.

The tool provides a safe testbed for policy measures to control the spread of COVID-19 in refugee settlements. Starting from the daily activities that refugees undertake, the tool provides insight in the risk of certain activities or locations where communicable diseases can spread. For example, when refugees (are waiting in a queue to) use shared facilities. Various policy measures can be applied in the tool to gain insight in the effect they have, in combination with different settlement characteristics.

During the second part of the working session, all participants where challenged to think about possible applications in humanitarian response for such an innovative tool. Together, the participants found many interesting applications. Some examples of these applications are: crowd control in queues and route planning; advocacy and deliberation between different interests; and in the long run it can be used to optimize camp designs. The biggest interest was shown for response scheduling of e.g. food and healthcare distribution. The final part of the working session was therefore focused around the question what factors should be taken into account when using the tool as a means to this end.

It was a very interesting and fruitful afternoon. If you are interested to continue the conversation about this tool or learn more, feel free to reach out to one of the team members of the **Resilience Lab**.

Modeling COVID-19 in Refugee Settlements

Providing a safe environment to explore implications of policies to control the spread of COVID-19 in a refugee settlement

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COVID-19 response in refugee settlements

Policy options
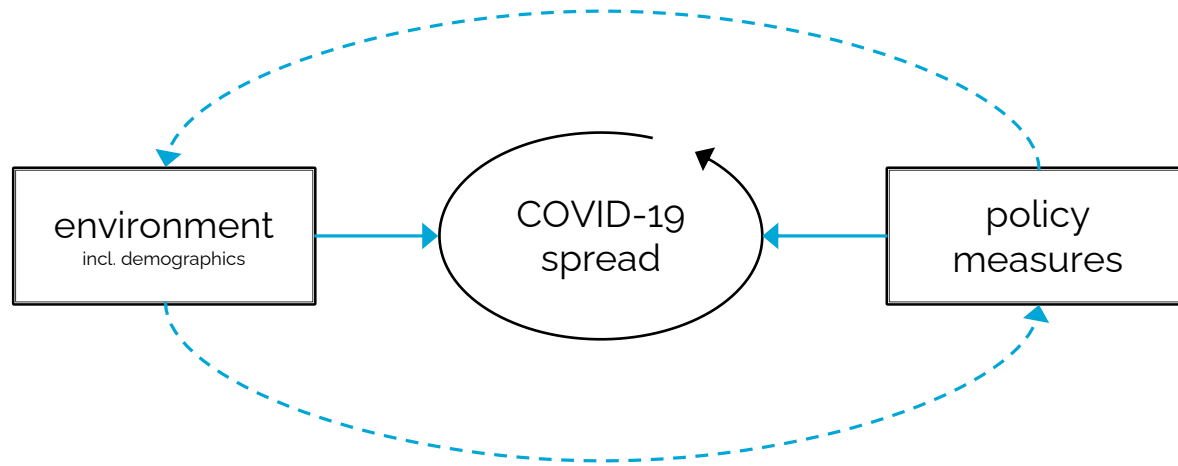
implications
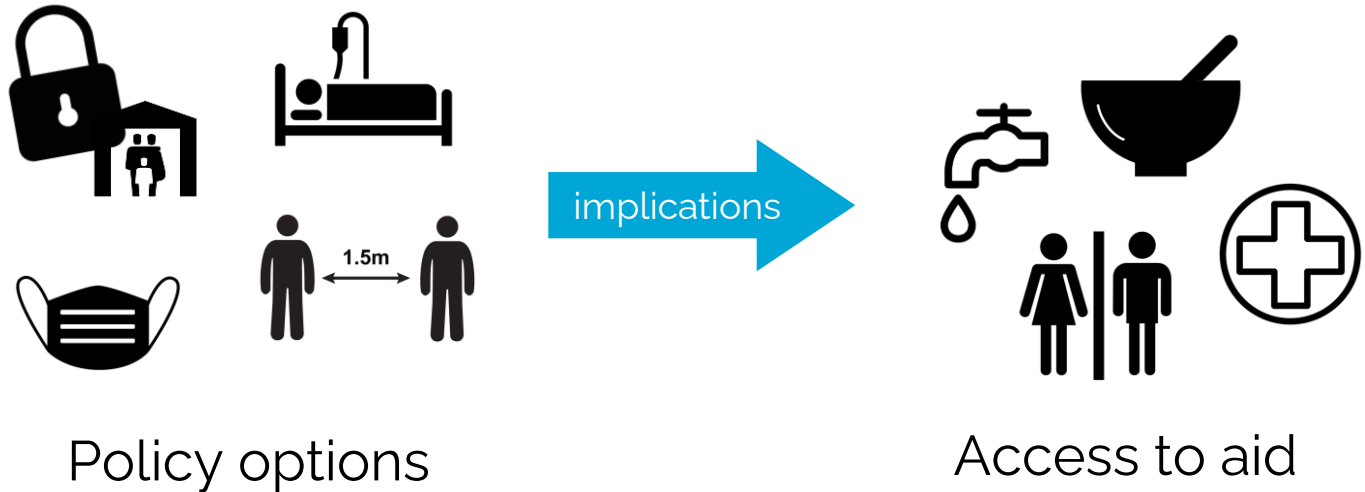
Access to aid

Different policy options have been implemented in refugee settlements, without knowing what the implications will be on the access to aid for the inhabitants. This research project aims to provide a safe testing ground for policy measures, to ensure that access to aid is maintained during COVID-times.

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Safe **testbed** for policy implications

Bottom-up approach

- Mimic key characteristics of behaviour
- Capture the dynamic of interactions
- Embedded into a spatial environment
- Analyse the implications of different policies
- Take into account a range of possible scenarios

The project aims to provide insight in (blue arrows):

- the implications of environmental factors and policy measures on the spread of COVID-19;
- how changes in one of these two factors impact the effect of the other factor on the spread of COVID-19.

Our prototype captures

Key characteristics of a settlement
- demographics
- population density
- shelter conditions
- facilities

Daily **activities of refugees** where COVID-19 can spread
- obtain food and water
- use WASH facilities
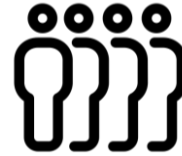- go to school / work
- visit markets

} future work

Simulation tool

Policies &
Input parameters

- disease epidemiology
- settlement characteristics and activities
- policy options

Simulation

daily activities in refugee settlement

🏠 → **activity** → 🏠

Effects of Policies
Results

- COVID-19 spread
  Ro, infection curve, deaths
- infection networks
- risk of distribution methods
- access to aid

Distinguishing from other models

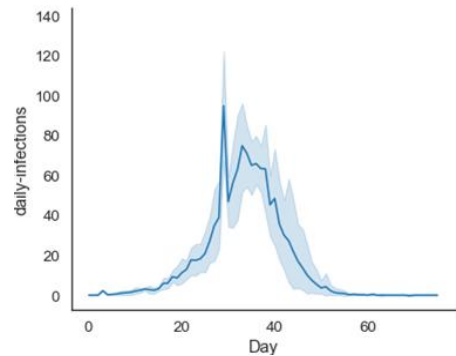Time steps in minutes important for COVID-19
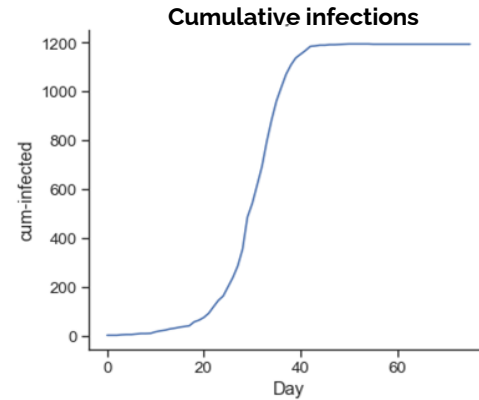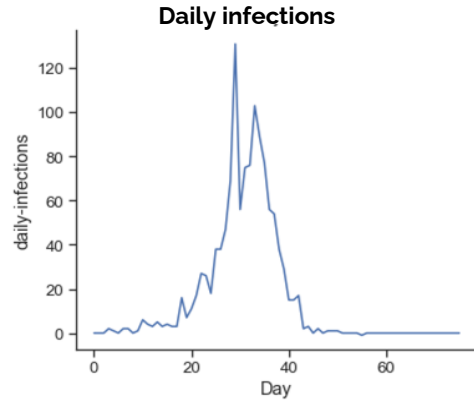
Crowd formation and queueing behavior

- 1.5 meter -

Insightful representation of disease spread
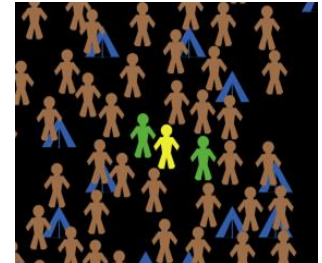
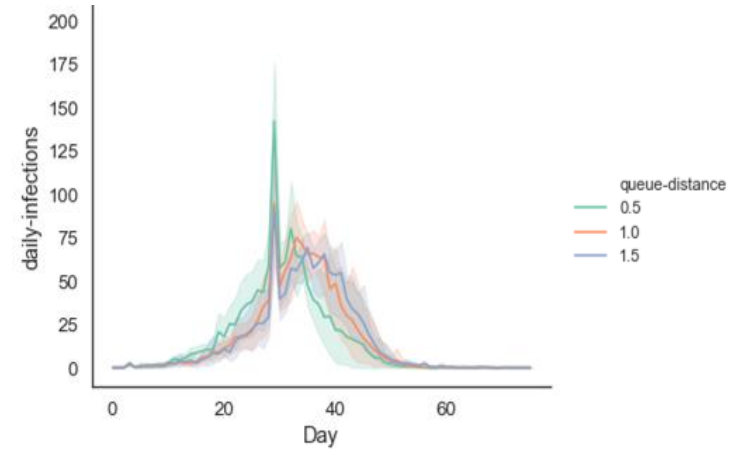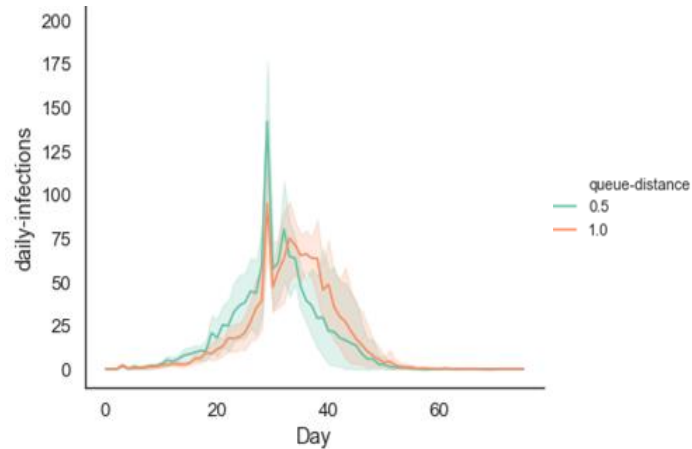# Gain insight in

Infections over time

Daily infections

Cumulative infections
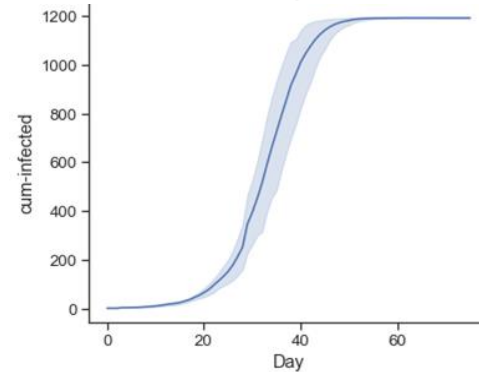
Gain insight in
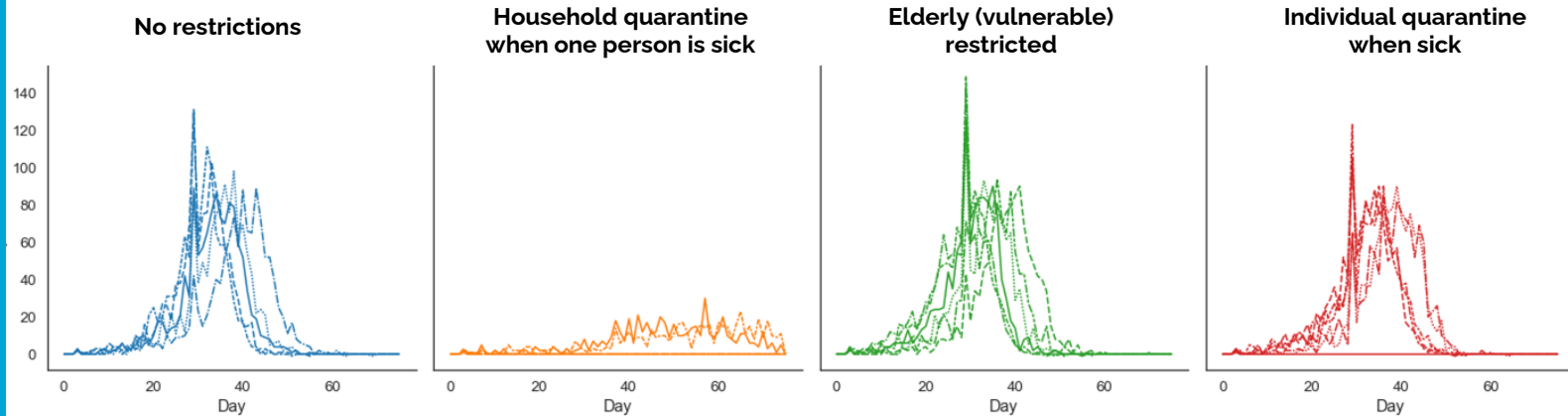
Impact of distancing in queues on daily infections

*Distancing in queues can be effective to '**flatten the curve**'*

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Gain insight in

Impact of restricting movement around the settlement

No restrictions **Household quarantine when one person is sick** **Elderly (vulnerable) restricted** **Individual quarantine when sick**

Isolating entire households *seems effective to limit COVID-19 spread*

Gain insight in

Impact of behavior of refugees (compliance to imposed rules)

**Household quarantine
when one person is sick**
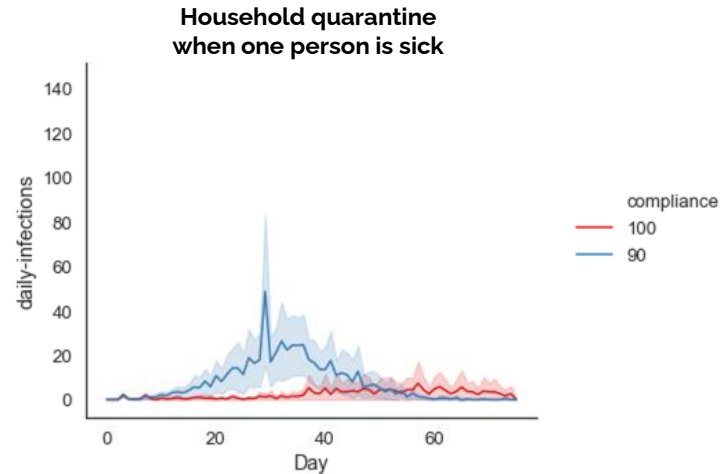
*A **10% decrease in compliance** strongly affects the effect of an isolation policy*
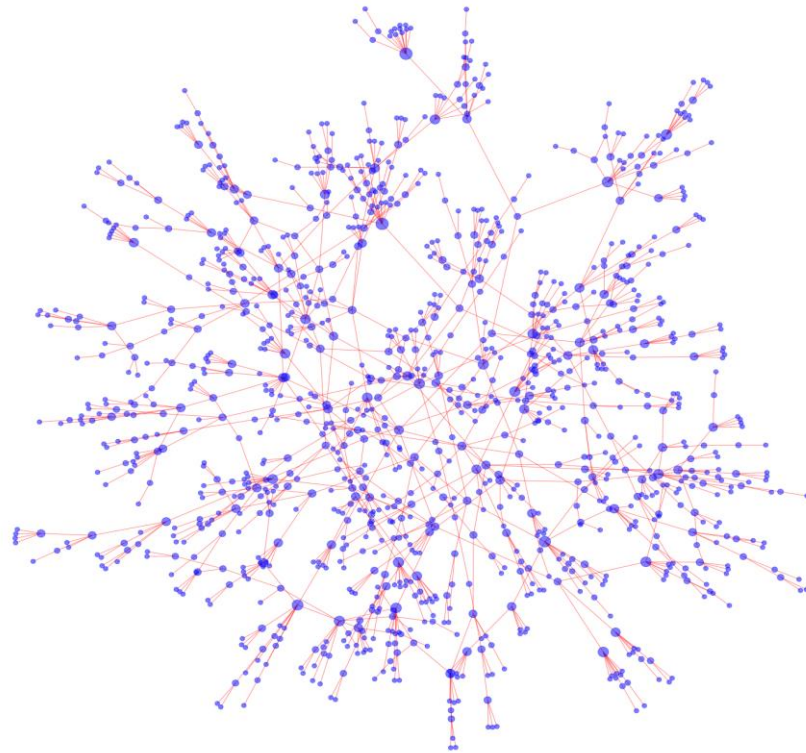
Gain insight in

Impact of wearing masks

Free movement
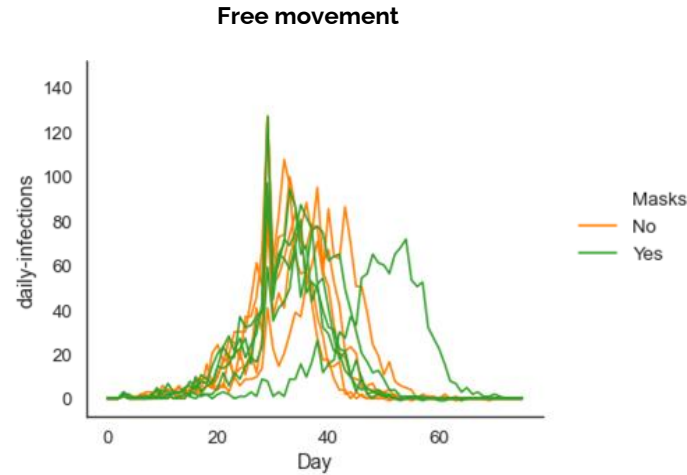
*Wearing **masks** appears to have a **minimum effect** on the number of infections*

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Trace the network of infections

Visualizing the infection network shows how the disease has spread among the population

Application and opportunities

- Pilot
  - Settlement specific
  - Data-driven
- Planning response activities
- Other communicable diseases
  - Previous: data to validate tool
  - Future: new outbreaks

- We are ready to explore cooperation opportunities together!

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Stay informed?

- Reach out to the **ResilienceLab** or KUNO

- Other topics of interest covered by the ResilienceLab
  - Humanitarian logistics
  - Technology diffusion in refugee settlements
  - Predictive analytics for forecast-based financing
  - Information management

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