



# Air Quality Forecast for Kampala



Research Team RPK



# Our organization

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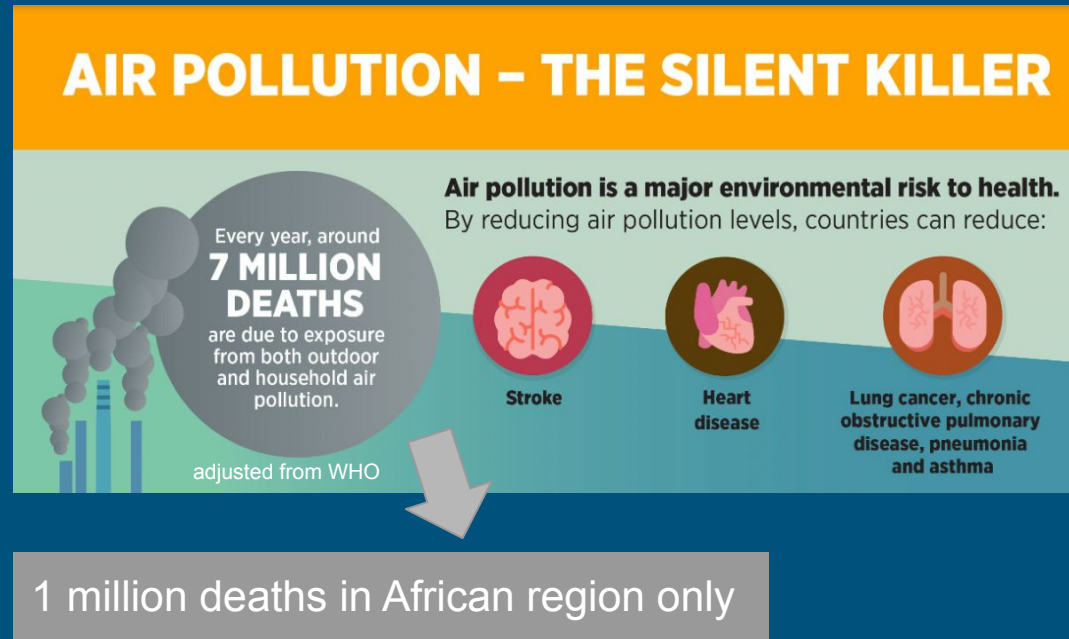
- **Research Team RPK** - a reliable partner for news channels in Uganda and other African countries
- Over 250 experts with a research background in Natural Science and Data Science
- Our focus: forecasting of air pollution and severe weather warnings
- Access to a network of air quality sensors in 65 locations in Uganda
- Access to weather data from TAHMO\*

\* Trans-African Hydro-Meteorological Observatory

# Air pollution - the silent killer

*“Over 80% of lives could be saved if the new WHO air quality guidelines targets are met.”*

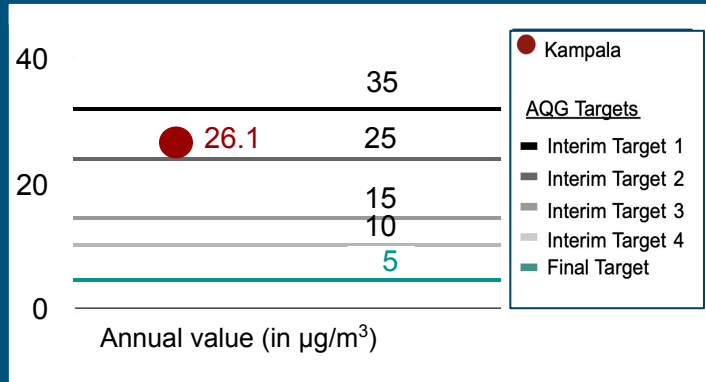
Source: AirQo Blog



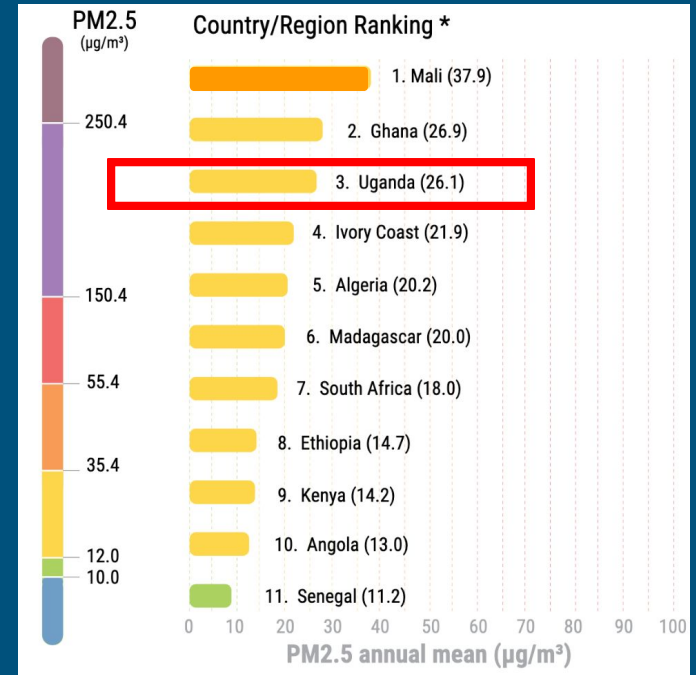
# World Air Quality Report 2020: Uganda

## African region

- Uganda has the third highest annual mean in the African region\*: 26.1  $\mu\text{g}/\text{m}^3$



AQG from WHO



\* ranking with countries which provided PM data

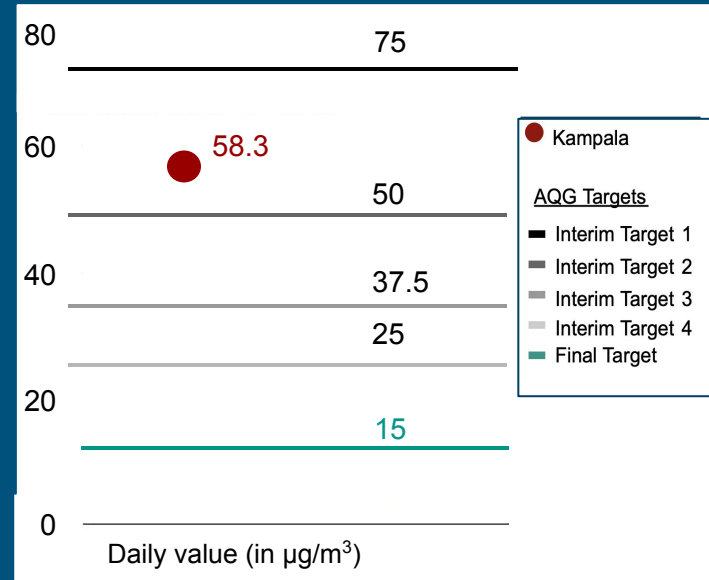
# World Air Quality Report 2020: Uganda

marked in grey and turquoise

- daily PM from the AQG:  $15 \mu\text{g}/\text{m}^3$

marked in red

- mean in our measured daily values in Kampala:  $58.3 \mu\text{g}/\text{m}^3$



AQG from WHO

# Data Basis for our forecast

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target:

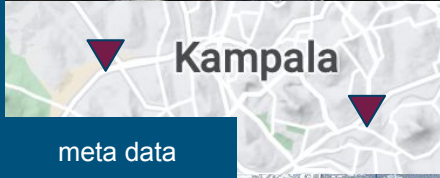
- particulate matter (PM) data following the measurements

features to conduct our forecast:

- hourly weather data from 5 sensors from the last 5 days:  
temperature, relative humidity, precipitation, wind speed, wind direction, atmospheric pressure



# Air quality monitors



Network of air  
quality monitors  
at 65 locations in  
Uganda



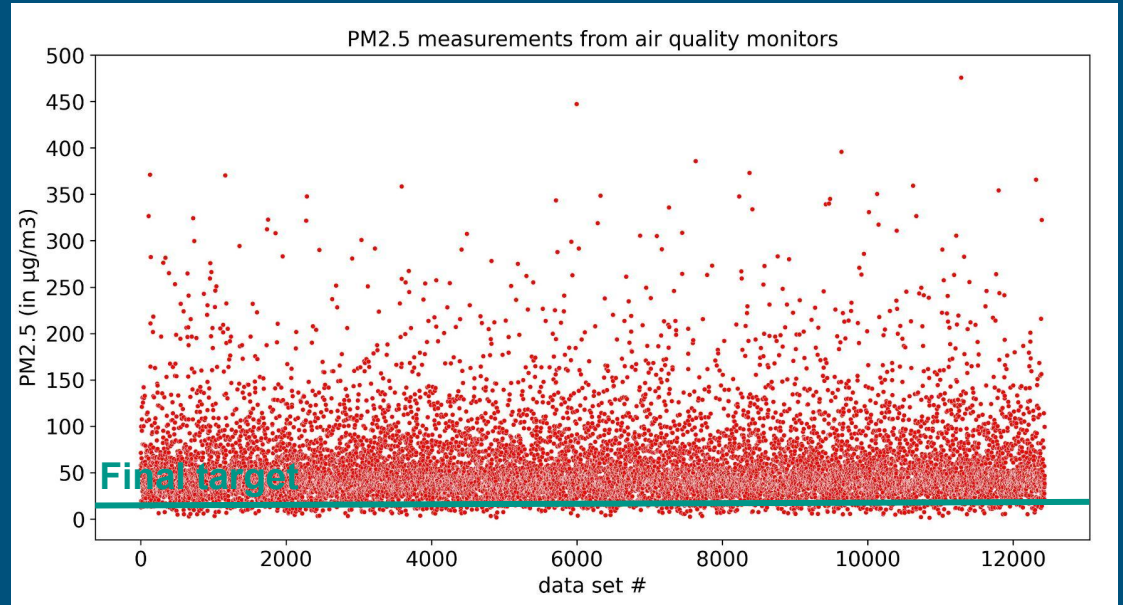
$\text{PM}_{2.5}$  in  $\mu\text{g}/\text{m}^3$



Source: AirQo

# Air quality compared to WHO targets

- Daily measurements from air quality monitors
- Highest PM<sub>2.5</sub> value: **476 µg/m<sup>3</sup>**
- WHO targets for daily PM<sub>2.5</sub>:
  - $\leq 75 \mu\text{g}/\text{m}^3$ : 79%
  - $\leq 50 \mu\text{g}/\text{m}^3$ : 56%
  - $\leq 37.5 \mu\text{g}/\text{m}^3$ : 33%
  - $\leq 25 \mu\text{g}/\text{m}^3$ : 12%
  - $\leq 15 \mu\text{g}/\text{m}^3$ : 3%

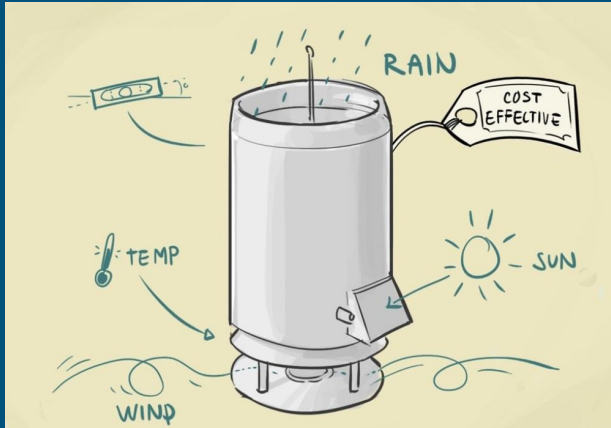




# Weather Data Stations



Weather stations



Source: TAHMO

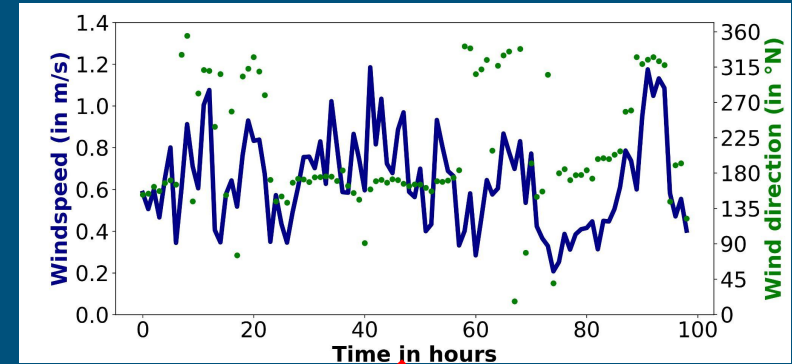
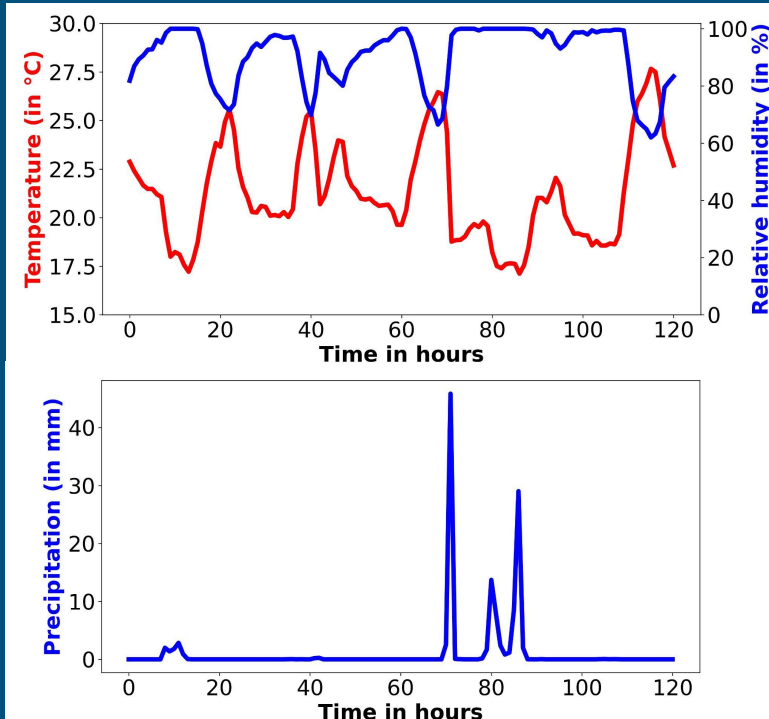
data used for the forecast

temperature  
relative humidity  
wind direction and speed  
atmospheric pressure  
precipitation



Source: TAHMO

# Example weather data set of 5 days

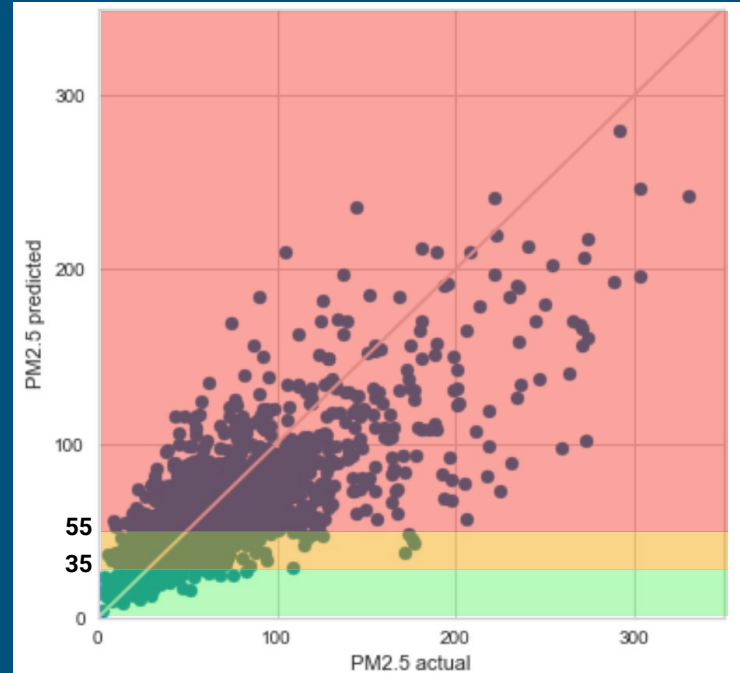


476  
 $\mu\text{g}/\text{m}^3$

**HAZARDOUS**

# Forecast and recommendations

40% warnings	unhealthy conditions
37% prewarning	Health concern for sensitive people
23% no warning	health concern low



predictive strength of PM<sub>2.5</sub> ± 25 µg/m<sup>3</sup>

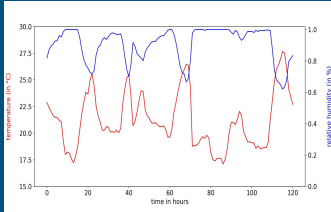
# Forecast and recommendations

actual	no warning	18 %	9 %	1 %	health concern low
	pre-warning	4 %	20 %	10 %	Health concern for sensitive people
	warning	1 %	7 %	29 %	unhealthy conditions
		no warning	pre-warning	warning	
		predicted			

# Future work/collab



distance to motor-ways and roads



Daytime/Month

Improving the  
predictive strength

bring warnings to the  
population:

**UBC**  
INSPIRING UGANDA



Nr. of Households  
in proximity



Operating industry;  
direction, nature

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