

# Citizens4science

s

approach in  
monitoring  
air quality and  
personal  
exposure to  
PM2.5

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# Air pollution is driving a global health crisis.

**6.5 million**

premature deaths are caused by air pollution each year. Nearly half are due to outdoor air pollution.<sup>1</sup>

**80 percent**

of people in urban areas\* are exposed to air pollution levels exceeding the WHO safety limits.<sup>2</sup>

\*where air pollution is monitored

# Monitoring air pollution is important to inform solutions

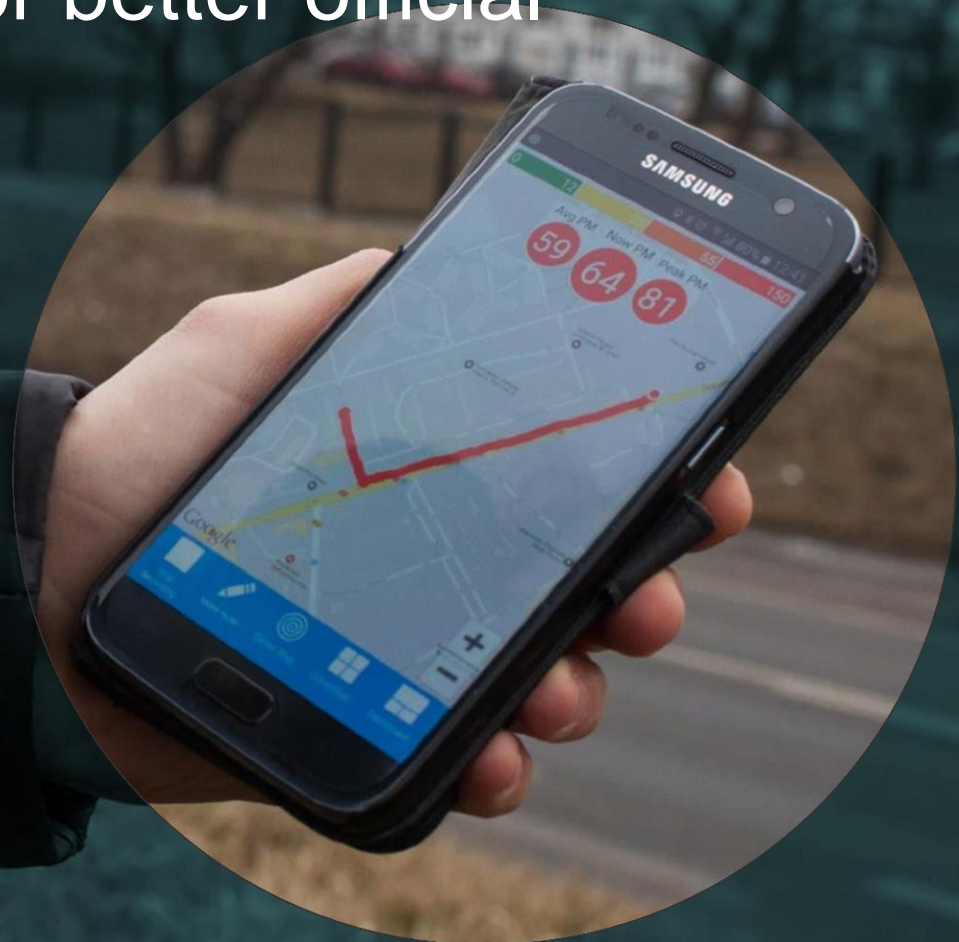
City/Town means			PM10		PM2.5	
Regio	Country	City/Town	Annual mean, ug/m3	Year	Annual mean, ug/m3	Year
Emr LMI	Afghanistan	Kabul	260	2009	86	2009
Emr LMI	Afghanistan	Mazar-e Sharif	334	2009	68	2009
Eur LMI	Albania	TIRANA	32	2013	16	2013
Eur HI	Andorra	Escaldes-Engordany	18	2014	11	2014
Amr HI	Argentina	Buenos Aires	26	2015	14	2015
Wpr HI	Australia	Adelaide	17	2014	7	2014

- WHO Air Pollution Database contains PM10 and PM2.5 measurements from 3000 cities globally
- Not all cities, however, have official air pollution measurements

# Community-based monitoring

can play a role to raise awareness, and call for better official monitoring.

While not a substitute for official monitoring, it gives communities access to data that can be used to raise awareness and call for formal monitoring.





“No one can say  
'polluted air does not  
affect me'. Each one  
of us can and should  
do something to  
clean the air.”

-Dr. Saša Milićević, Pediatric Doctor,  
Serbia



**UNMASK  
MY CITY**



Photo: HEAL/Milan Ilicic

- Pollutant concentrations are typically subject to a high **spatial** and **temporal variability**.
- *quantify human exposure to specific pollutants of concern*

# What we're using for community-based monitoring

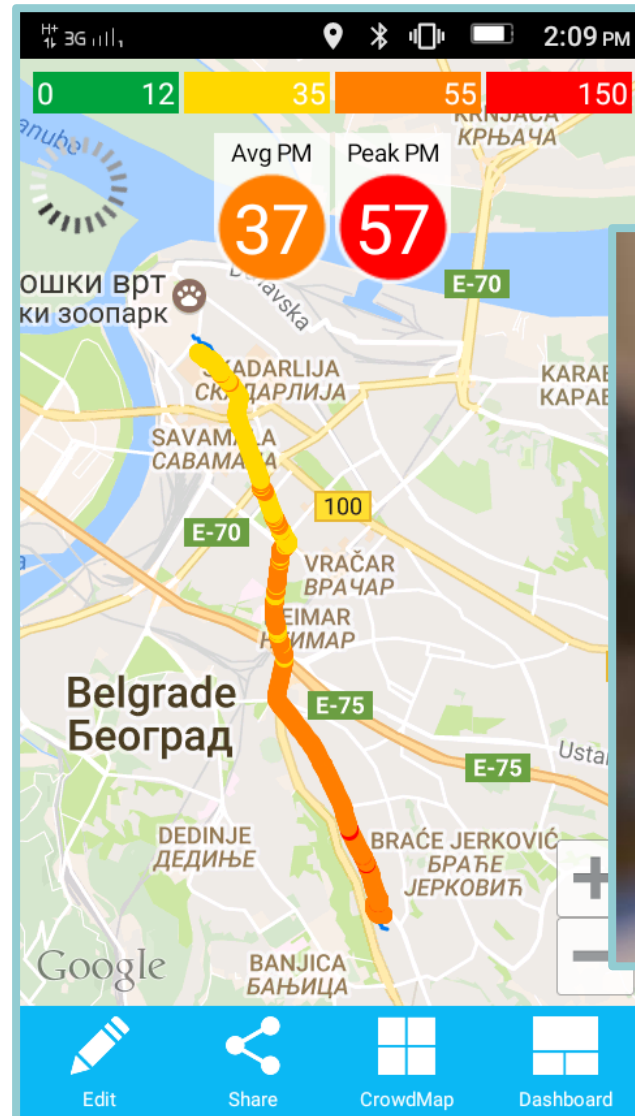


- AirBeam, an open-source, portable monitor
- Measures fine particulate matter (PM2.5), temperature, and relative humidity
- Not a substitute for official, scientific measurements – but useful in raising awareness.



# How community-based monitoring works

- AirBeam is connected via bluetooth to the AirCasting Android app to construct real-time maps and graphs of air pollution data
- Can also transmit data to web-based air pollution maps



GCCA/GregMcNevin



# Community-based monitoring: Accuracy

- The AirBeam is accurate up to 100ug/m<sup>3</sup>
- Good representation from 100 to 300ug/m<sup>3</sup>
- Decreased accuracy as readings get higher.
- Thus, while it is useful for community monitoring, it is no substitute for official, scientific measurements.

# Participants and schedule of monitoring



- In total 19 participants were monitoring the personal exposure to the PM2.5 with four AirBeam devices in April 2017.
- 24 hours to record levels of PM2.5 in the air

# Challenges in studying personal exposure

- 1) Problems with the devices itself,
- 2) participants' adherence to the study protocol - participants motivation to monitor the air pollution and record their daily activities, and to other
- 3) technical and technological issues

# Challenges in studying personal exposure-cont.

- Synchronisation of the data
- Automation and participants' technical literacy
- Real-time display of results
- Full length recordings and tracking human activity
- Making use of citizens4science data gathering
- Motivation of the participants



# CONCLUSION

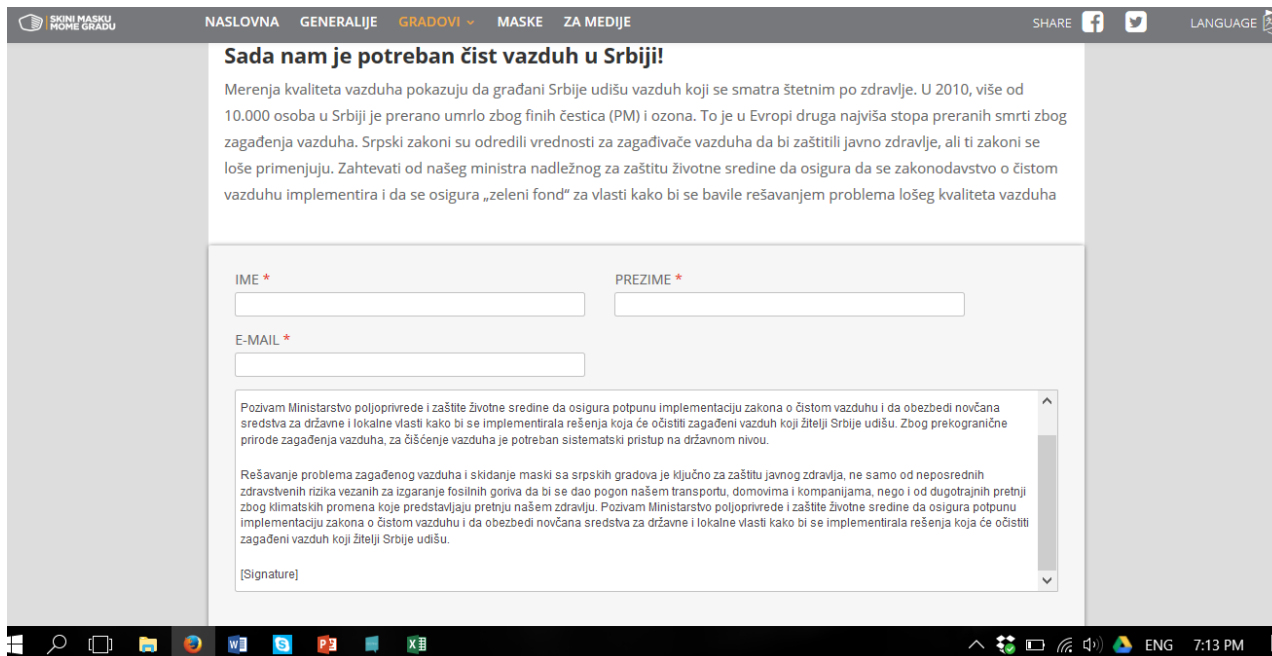
- This pilot study has demonstrated, as proof of concept, that **small, portable, low-cost devices** for measuring air pollution could be **useful tool in generating knowledge** and have significance in **clinical researches** that aim at tracking **personal exposure and linking it to the health effects** of the individuals as well as increasing citizens and community engagement on air pollution problems.

# CONCLUSION

- implications in supporting the health impacts assessments (HIA)
- various decisions making regarding safe air pollutant levels and on “clean air zones”
- co-creations of solutions how individuals could be exposed to less total load of PM2.5
- influence individual decisions on mobility patterns or changes of personal behaviours or ways of living.

# Get Involved in Sebja

- <http://unmaskmycity.org/project/belgrade/#takeaction>



The screenshot shows a web browser displaying a petition page titled "Sada nam je potreban čist vazduh u Srbiji!". The page is in Serbian and discusses air quality issues in Serbia. It includes a form for signing the petition with fields for "IME \*" (First Name), "PREZIME \*" (Last Name), and "E-MAIL \*". Below the form is a text area for a signature, with a placeholder "[Signature]". The page also features a "SHARE" button and social media icons for Facebook and Twitter. The bottom of the page shows a Windows taskbar with various application icons and system information like "ENG" and "7:13 PM".

**Sada nam je potreban čist vazduh u Srbiji!**

Merenja kvaliteta vazduha pokazuju da građani Srbije udišu vazduh koji se smatra štetnim po zdravlje. U 2010. više od 10.000 osoba u Srbiji je prerano umrlo zbog finih čestica (PM) i ozona. To je u Evropi druga najviša stopa preranih smrti zbog zagađenja vazduha. Srpski zakoni su odredili vrednosti za zagađivače vazduha da bi zaštitili javno zdravlje, ali ti zakoni se loše primenjuju. Zahtevati od našeg ministra nadležnog za zaštitu životne sredine da osigura da se zakonodavstvo o čistom vazduhu implementira i da se osigura „zeleni fond“ za vlasti kako bi se bavile rešavanjem problema lošeg kvaliteta vazduha

IME \*  PREZIME \*

E-MAIL \*

Pozivam Ministarstvo poljoprivrede i zaštite životne sredine da osigura potpunu implementaciju zakona o čistom vazduhu i da obezbedi novčana sredstva za državne i lokalne vlasti kako bi se implementirala rešenja koja će očistiti zagađeni vazduh koji žitelji Srbije udišu. Zbog prekogranične prirode zagađenja vazduha, za čišćenje vazduha je potreban sistematski pristup na državnom nivou.

Rešavanje problema zagađenog vazduha i skidanje maski sa srpskih gradova je ključno za zaštitu javnog zdravlja, ne samo od neposrednih zdravstvenih rizika vezanih za izgaranje fosilnih goriva da bi se dao pogon našem transportu, domovima i kompanijama, nego i od dugotrajnih pretnji zbog klimatskih promena koje predstavljaju pretnju našem zdravlju. Pozivam Ministarstvo poljoprivrede i zaštite životne sredine da osigura potpunu implementaciju zakona o čistom vazduhu i da obezbedi novčana sredstva za državne i lokalne vlasti kako bi se implementirala rešenja koja će očistiti zagađeni vazduh koji žitelji Srbije udišu.

[Signature]

# THANK YOU!

**Learn more about Unmask:**

[www.UnmaskMyCity.com](http://www.UnmaskMyCity.com)

#UnmaskMyCity    



**Contact HEAL to join:**

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