



Care About Air:
Health Impacts of Indoor Air Quality
2024 HSMP Annual Meeting



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Disclosures

My salary is supported by funding from the following:

- CDC/NIOSH Contract 312463-00001: *Reusable Elastomeric Respirators in Adult and Pediatric Healthcare Settings – Assessments, Best Practices, and Preferred Uses*
- Balvi Foundation Philanthropic Fund : *Indoor Air, Human Health, and Germicidal UV*
- NAIAD U19 AI 162130: *Evaluating Modes of Influenza Transmission (EMIT-2) using Innovative Technologies and Designs in Controlled Environments*

Current Volunteer Affiliations:

- Member of the Healthcare Working Group and Board of Directors of the *International UV Association* (Unpaid - 2024 to present)
- Associate Editor *New Solutions Journal of Environmental and Occupational Policy* (Unpaid - 2023-present)
- Consultant *Workplace Health & Safety Journal* (Unpaid 2024)



INDOOR AIR QUALITY

KEY TO PREVENTING AIRBORNE INFECTIONS

Think about *what you know* about the air in your indoor spaces

Count the *number of times* you or your family or your staff came down with a cold, flu, or Covid-19 in the past year

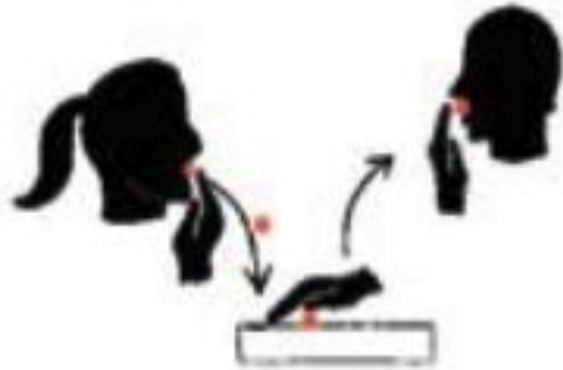
Explain the *CDC Guidance* on ventilation in buildings

Become motivated to learn more about *your indoor air quality!*

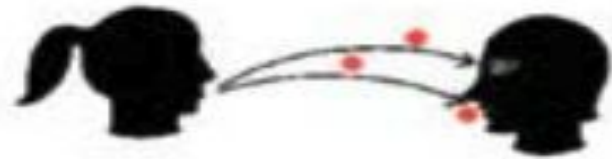


How people get infections

Contact: Direct vs Indirect



Airborne/Inhalation vs Direct Deposition (spray)



Common Indoor Public Spaces

- Classrooms and Lecture Halls
- Offices, Libraries, Churches
- ED/Clinic Waiting Rooms
- Nursing Homes
- Libraries/Churches
- Gyms/Fitness Centers
- Salons and Barber Shops



Why should we (public health) care about indoor air?

- **On average, we spend almost 22 hours of our day indoors**
- Infections like flu, COVID, measles travel through the air
- Everyone but especially children has difficulties concentrating, learning, and working when there is **poor ventilation**
- Harmful particles from wildfire smoke, car exhaust, air pollution, and allergens come indoors **due to poor or no filtration**
 - This makes asthma, COPD, bronchitis and heart ailments worse





CLEAN AIR IN BUILDINGS

PLEDGE OPPORTUNITY

The White House is inviting organizational leaders and building owners and operators across the country to join us in our efforts to continue fighting the spread of COVID-19 by publicly pledging to meet the Clean Air in Buildings Challenge.



CDC Guidelines

<https://www.cdc.gov/coronavirus/2019-ncov/community/ventilation.html>

- Inspect/make sure the **HVAC system** is operating properly
- Upgrade Central HVAC to **MERV-13 Filtration**
- Aim for **5 Air Changes per Hour (ACH)**
 - Need airflow through the system and volume of room (cfm)
 - May also need portable air cleaners to achieve 5 ACH
- Use **Upper Room UVC** as a supplemental treatment to inactivate airborne viruses





**Why should St. Mary's County
care about indoor air?**

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Wastewater Surveillance in Maryland

Maryland Launches COVID-19 Sewer Sentinel Initiative

Health departments will test wastewater in public housing settings and correctional facilities across Maryland to help track the spread of COVID-19.

By Kaia Hubbard | Nov. 13, 2020, at 4:07 p.m.

St. Mary's Collaboration to Study COVID-19 in Wastewater

Joint Press Release:

St. Mary's County Metropolitan Commission
St. Mary's College of Maryland
St. Mary's County Health Department

Anne Arundel County's Wastewater Data Reveals a Rise in COVID-19 Cases

DEC. 24, 2022 MIDNIGHT

COVID-19 Wastewater Surveillance in Montgomery County

Effective August 27, 2024, we are pausing the data updates for wastewater surveillance on this page.

Montgomery County's Department of Health and Human Services (DHHS) is collaborating with the University of Maryland's Department of Civil and Environmental Engineering (UMD) and Inspection Experts, Inc. (IEI) to implement wastewater surveillance of COVID-19 in Montgomery County, leveraging experiences from the Maryland's Sewer Sentinel Initiative. The project's goal is to collect data to observe trends in SARS-Cov-2 concentrations over time.

On this page

- [Water Sampling Protocol and Methods of Analysis](#)
- [Water Sample Collection Sites](#)
- [Data](#)

Implementing wastewater surveillance for SARS-CoV-2 on a university campus: Lessons learned

Brian A Wartell ¹, Camila Proano ¹, Lena Bakalian ¹, Devrim Kaya ¹, Kristen Croft ¹, Michael McCreary ¹, Naomi Lichtenstein ¹, Victoria Miske ¹, Patricia Arcellana ¹, Jessica Boyer ¹, Isabelle Van Benschoten ¹, Marya Anderson ¹, Andrea Crabb ², Susan Gilson ², Anthony Gourley ², Tim Wheeler ², Brian Trest ³, Glynnis Bowman ³, Birthe V Kjellerup ¹

Affiliations + expand

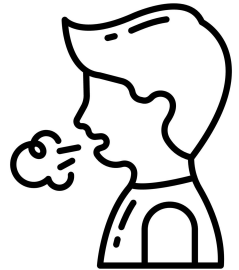
PMID: 36372781 PMID: [PMC9827968](#) DOI: [10.1002/wer.10807](#)



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Why should St. Mary's County care about indoor air?

- Poor indoor air quality can
 - Make it more likely to catch infections like **COVID, Flu, RSV and colds**
 - This causes absenteeism from work and school
 - It can cause or worsen **chronic breathing problems**
 - Asthma
 - Chronic lower respiratory disease (CLRD)
 - Increase use of healthcare like the **emergency room**
- Groups like the **elderly & young children** are high risk
 - SMC has a slightly higher % of people < 5 years old than statewide



Why should St. Mary's County care about indoor air?

- CLRD is the **3rd leading cause of death** in SMC
 - Age-adjusted death rate (**42.7 deaths per 100,000**) is nearly **double** of that statewide (23.8/100,000)
- Asthma: SMC sees **higher** rates of asthma than statewide
 - **16.4%** of adults have been told by a health care provider that they have asthma
 - **Above** statewide (14.8%)
 - Age-adjusted ER rate due to asthma: **68.1 ER visits per 10,000 people**
 - **Slightly above** statewide average (67/10,000)





How can my community improve indoor air?



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Elements of Clean Indoor Air

- **Ventilation:** moving air in/out
- **Filtration:** removing particles
- **Disinfection:** killing germs
 - Germicidal Ultraviolet Light (GUV) or UV-C



Elements of Clean Indoor Air

- **Ventilation:** moving air in/out
 - CDC: Indoor spaces should have at least 5 air changes/hour
 - eACH: equivalent Air Changes per Hour
 - CADH: Clean Air Delivery Rate
 - Consider using CO2 monitors (pictured right)
 - CDC says keep CO2 levels < 800 ppm

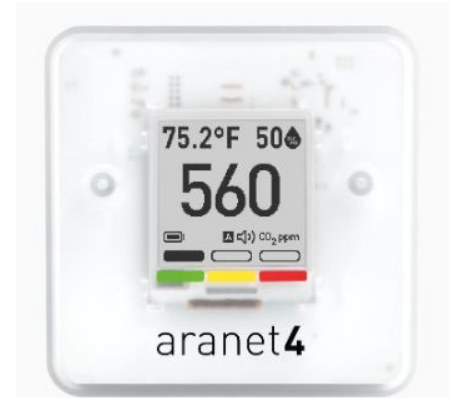


Image of aramet CO2 monitor from aramet.com

Dr. Kim Prather: CO2 Monitors

Watch Dr. Prather discuss
air monitoring *Live*

KUSA Go

<https://www.youtube.com/watch?v=0Q0cSCn9C40&t=216s>



Elements of Clean Indoor Air

- **Filtration:** removing particles
 - HEPA (Highly Efficient Particulate Air) Filter
 - Corsi-Rosenthal Box (3 sizes pictured right)
 - HVAC systems with Merv-13 filters



Image from @phlabumd on Instagram



DIY: Ventilation and Filtration

Building a Corsi-Rosenthal Box



Elements of Clean Indoor Air

- **Disinfection:** killing germs using **Germicidal Ultraviolet Light (GUV)**
- **GUV:** using ultraviolet light energy to kill germs like Flu, COVID-19, mold, etc
 - Lowers your chances of getting sick in crowded indoor spaces



Our Work Surrounding GUV

Our Goal

To improve the **clarity** and **understandability** of GUV communication to the public

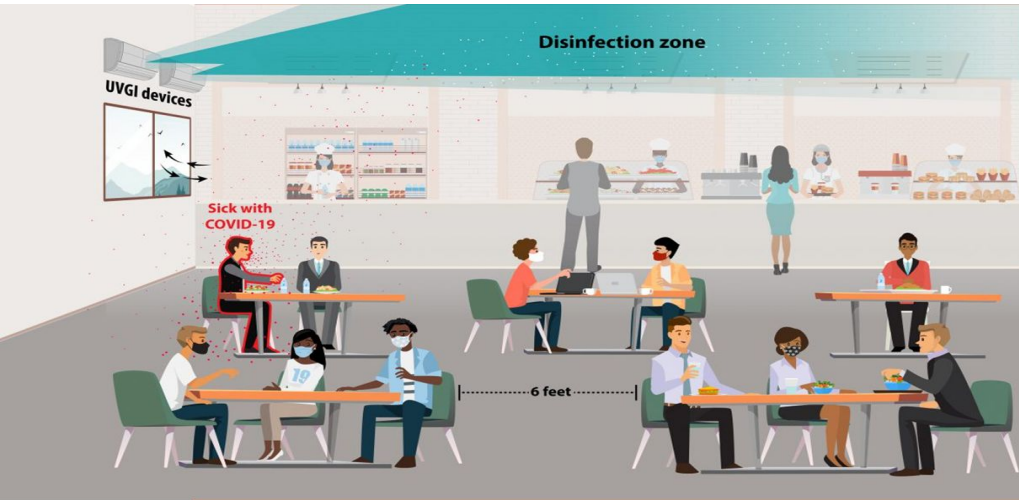
Our Actions

Talking with the **community** about GUV
&
Creating plain language GUV **information**

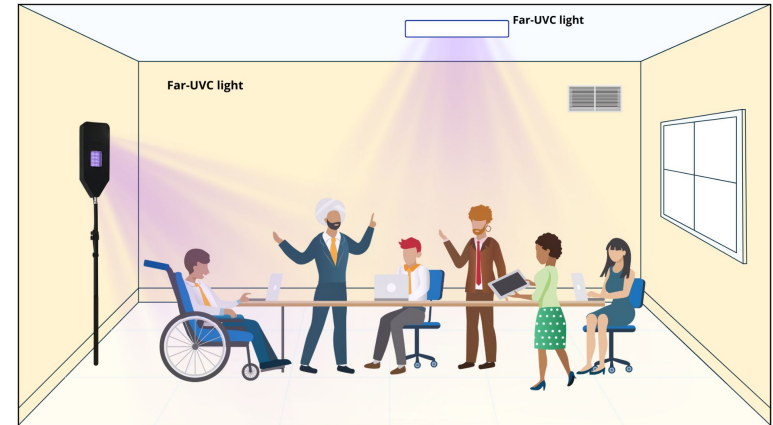


Common Types of GUV

Upper Room UVC (254nm)



Far-UVC (222nm)



Important note: purple color shows the disinfection zone, but GUV light is not visible in real life.

Image from the CDC page on UVGI

Image by the PHABLab



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GUV Safety

- Looking at UV-C directly from close range can cause **temporary eye irritation**
- 254nm can cause **temporary skin irritation** if light directly shines on skin
- Has been used for **years** in airports, schools, and hospitals



GUV Safety

- UV-C is **different** than the type of UV that causes sunburn and skin cancer
- UV-C does not reach deep into the skin, it is **safe to use in a room full of people**
 - 254nm safe as upper-room GUV
 - 222nm safe to shine down on people

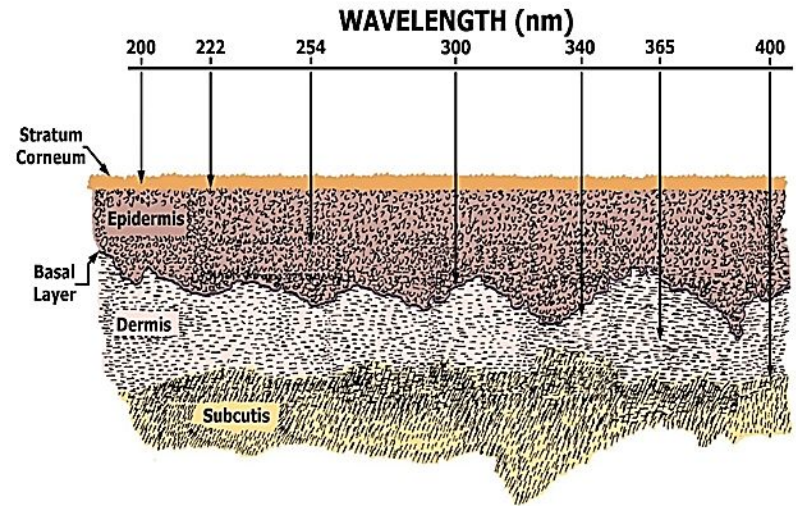
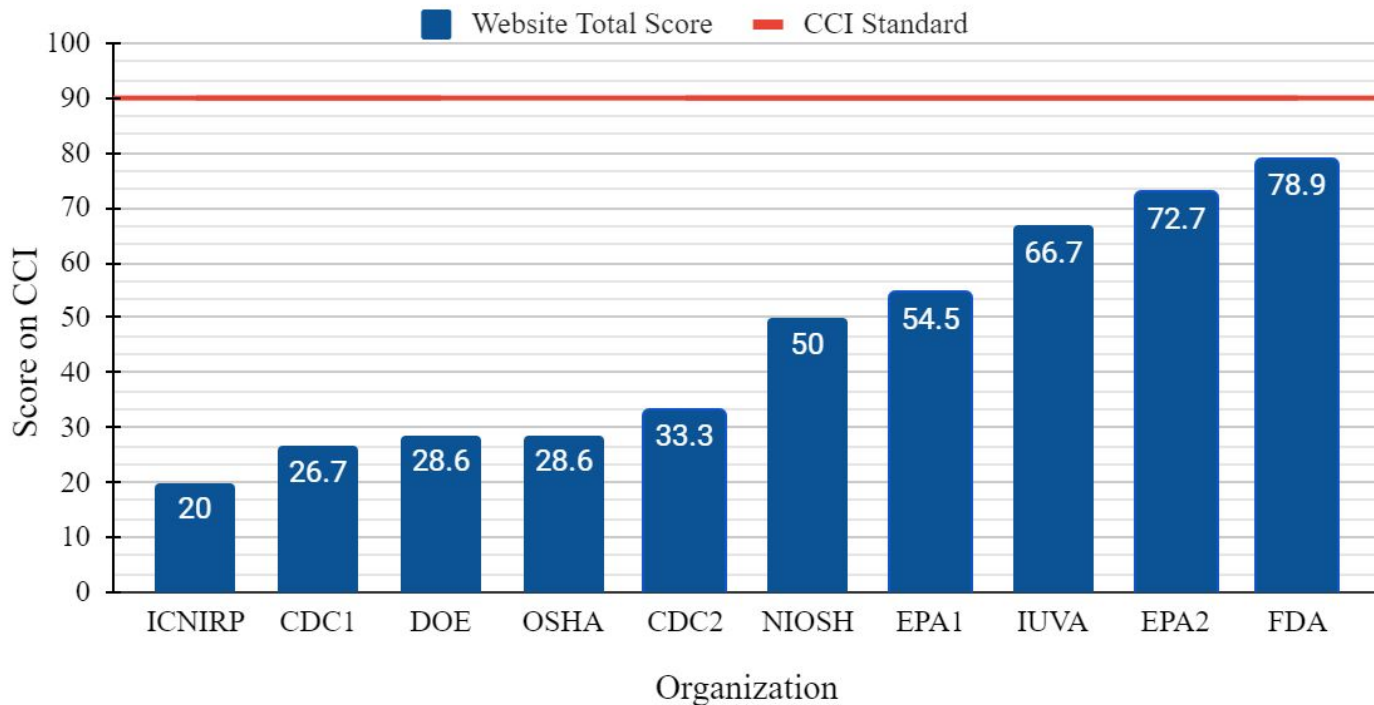


Image by IUVA, published in 2021



UVC Webpages of Public Health/Regulatory Agencies: Total CCI Score



Our Work in St. Mary's

- Key informant interviews
- Focus group
 - Lexington Park library
 - Preliminary findings: People search and find information that is **wrong or confusing**
 - **January 2025 Sign Up with me**



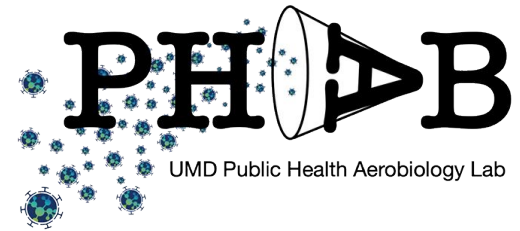
How can my community improve indoor air?

- Raise awareness of indoor air and health
- Follow the guidelines for:
 - Ventilation
 - Filtration
 - Disinfection
- Educate public health practitioners, employers, pastors, librarians, principals and building owners and managers



Partnerships for improving IAQ in SMC

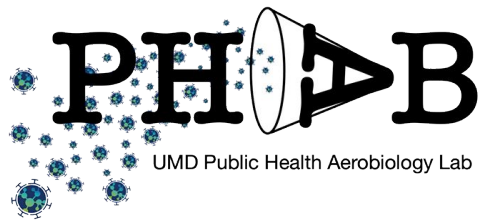
- Breathe Well St. Mary's
 - Outdoor air quality monitoring and health education initiative
 - **Expand to promote indoor air quality**
 - Using GUV, CO2, and air filters
- UMD PHAB Lab
 - Community education
 - Research studies



Readings and Resources

- [CDC Guidelines for Ventilation in Buildings](#). Updated May 12, 2023
- [Lancet Commission Report \[249 KB, 33 pages\]](#)
- Morawska L, Milton DK. It is time to address airborne transmission of coronavirus disease 2019 (COVID-19). *Clin Infect Dis.* (2020) 71:2311–3. doi: 10.1093/cid/ciaa939: <https://academic.oup.com/cid/article/71/9/2311/5867798>
- [School Ventilations: A Vital Tool to Prevent COVID-19 Spread](#) May 2021 Johns Hopkins Bloomberg School of Public Health Center for Health Security
- Yale School of Public Health/COVID-19 Community Outreach: [Ventilation Key to Reducing Risk](#)
- [Clean Air Crew Ventilation: https://cleanaircrew.org/ventilation/](#)
- [Read How to Build a Corsi-Rosenthal Box](#)





Thank you to our funders:



- Special thanks to our 2024 Summer Interns:
Changwen Ding, Elizabeth Mercado, Rithik Patel, Katie Ringer



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