VISIONAIR

Co-funded by the European Union

INCREASING THE VISIBILITY AND KNOWLEDGE BASE ON AIR QUALITY WITH BIG DATA AND ITS IMPACT ON THE POPULATION HEALTH

Erasmus+ KA220 Cooperation Partnerships

# HOW TO PRESENT AIR QUALITY DATA IN A SIMPLE WAY

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| **Project number** | 2023-1-SK01-KA220-HED-000158470 |
| **Document type** | Manual |
| **Version** | 1.0 |

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This comprehensive manual addresses the critical challenge of translating complex, technical air quality metrics (such as µg/m$^3$ concentrations and moving averages) into intuitive, actionable public health information. It outlines the core principles of effective communication using standardized Air Quality Index (AQI) color-coded frameworks and the European Copernicus program.

Additionally, this document presents practical educational strategies tailored for Compulsory Secondary Education students (ages 12–16) and adult community workshops, alongside a detailed user manual for the **VISIONAIR Interactive Air Quality Dashboard**.

**HOW TO PRESENT AIR QUALITY DATA IN A SIMPLE WAY**

Official Air Quality Index (AQI) Guidelines & Pollutant Concentration Thresholds

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This manual has been designed for communicators, technical personnel, journalists, and environmental activists. The central objective is to translate the complexity of scientific air quality metrics into a clear, graphic, and direct language that allows any citizen to understand the risks and act immediately to protect their health.

### 1. INTRODUCTION AND RATIONALE

Scientific measurement of air quality generates a vast amount of technical data essential for researchers and regulators: micrograms per cubic meter, parts per million (ppm), moving averages, and seasonal indicators.

However, when it comes to alerting and informing the general public, these terms act as communication barriers. An average citizen reading that the moving average for $PM_{2.5}$ is 35.4 µg/m³ will rarely know if it is safe to go for a run, if they should close their windows, or if their asthmatic child is in danger.

**Key Takeaway:** Air quality data is only useful when people can understand it.

Before communicating data, ask yourself: *What do citizens actually need to know?* The answer is almost never a raw number; it is a simple explanation accompanied by a recommendation whenever necessary. Therefore, communicating simply does not mean lowering scientific rigor—it means translating hard data into useful information for daily decision-making. This manual provides the key tools to achieve that transition successfully.

#### International Frameworks and the Copernicus Program

To convey air quality information internationally, a color-coded system based on numerical algorithms is used to simplify complex data. In Europe, data collection and representation are managed under the **Copernicus** program.

**Copernicus** is the European Union's Earth Observation Programme that monitors our planet and its environment for the ultimate benefit of European citizens. It provides data,

information, and services based on Earth observation satellite data and *in situ* (non-spaceborne) data. The Program is funded, coordinated, and managed by the European Commission in cooperation with partners such as the European Space Agency (ESA) and the European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT).

*Useful Links & Resources:*

- **Copernicus Air Quality Forecasts:** atmosphere.copernicus.eu/european-air-quality-forecast-plots
- **Atmospheric Data Store:** ads.atmosphere.copernicus.eu
- **Copernicus Smart Decisions:** atmosphere.copernicus.eu/smart-decisions
- **Global Air Quality Map (eLichens):** elichens.com/global-air-quality-map

## 2. FUNDAMENTAL PRINCIPLES OF EFFECTIVE COMMUNICATION

To achieve high-impact and easily digestible outreach, always apply the following three principles:

- **Less is More (Focus on the Essentials):** Do not saturate a graphic with five pollutants simultaneously. Highlight only the critical pollutant determining the overall air status at that moment.
- **Immediate Cognitive Accessibility:** Design and text should allow anyone to grasp the situation in a quick **3-second glance**.
- **Action-Oriented (The *"So What?"* Factor):** Data without behavioral recommendations is sterile. Always pair a diagnosis with a practical action to protect health.

Recommended Information Sequence

1. **Lead with the message:** Start by stating whether the air quality is *good*, *moderate*, or *unfavorable*. Add technical data second.
2. **Explain the context:** Indicate why values are changing (e.g., traffic, weather patterns, Saharan dust intrusion, or wildfires).
3. **Use plain language:** Avoid jargon. Replace *"atmospheric concentration"* with *"amount of pollutants in the air"*.
4. **Turn data into actionable insight:** Explain what the data means and if action is required. Offer proactive guidance (e.g., *"Schools are advised to keep recess indoors today"*).
5. **Rely on visual aids:** Use clear color coding, intuitive icons, and simple graphs.
6. **Tailor the message to your audience:** Do not communicate the same way to students, the general public, or technical specialists.

7. **Review before publishing:** Double-check for clarity, context, timeliness, and source reliability.

Practical Examples of Effective Communication

*$PM_{2.5}$ and $PM_{10}$ (Particulate Matter)*

**Plain explanation:** *"These are microparticles so tiny they can pass directly into the deepest parts of your lungs."*

- ❌ **Avoid:** $PM_{2.5} = 22\ \mu g/m^3$
- ✔ **Better:** *"Air quality remains acceptable, though there are more fine particles today than yesterday."*
- **Contextualized:** *"Particles are elevated today due to an incoming Saharan dust plume. This is a temporary phenomenon."*

*Nitrogen Dioxide ($NO_2$)*

**Plain explanation:** *"Morning rush-hour traffic has elevated nitrogen dioxide levels along main roadways."*

*Ground-Level Ozone ($O_3$)*

**Plain explanation:** *"High temperatures promote ozone buildup during the afternoon. This is not the 'good' ozone layer high in the sky, but an irritating gas formed near the ground by traffic exhaust and strong sunlight."*

## 3. THE AIR TRAFFIC LIGHT AND THE AIR QUALITY INDEX (AQI)

The human brain processes colours far faster than numerical codes or text. Leveraging the universal standard of the **Air Quality Index (AQI)** using a visual traffic-light colour system is the most powerful outreach strategy available. The standardized matrix ready for public channels, as published in official regulations [European Environment Agency rules: https://airindex.eea.europa.eu/AQI/index.html], is as follows (Table 1 and Table 2).

**Table 1. Pollutant Concentration Thresholds.** *Concentration ranges for specific atmospheric pollutants per Air Quality Category. All values are expressed in µg/m³.*

| Air Quality Level | $SO_2$ (Sulphur Dioxide) | $PM_{2.5}$ (Fine Particles) | $PM_{10}$ (Suspended) | $O_3$ (Ozone) | $NO_2$ (Nitrogen Dioxide) |
|---|---|---|---|---|---|
| **Good** | 0 – 100 | 0 – 10 | 0 – 20 | 0 – 50 | 0 – 40 |
| **Reasonably Good** | 101 – 200 | 11 – 20 | 21 – 40 | 51 – 100 | 41 – 90 |
| **Moderate** | 201 – 350 | 21 – 25 | 41 – 50 | 101 – 130 | 91 – 120 |

| | | | | | |
|---|---|---|---|---|---|
| **Unfavorable** | 351 – 500 | 26 – 50 | 51 – 100 | 131 – 240 | 121 – 230 |
| **Very Unfavorable** | 501 – 750 | 51 – 75 | 101 – 150 | 241 – 380 | 231 – 340 |
| **Extremely Unfavorable** | 751 – 1250 | 76 – 800 | 151 – 1200 | 381 – 800 | 341 – 1000 |

*Note: All pollutant threshold values are expressed in micrograms per cubic meter (µg/m³), measured according to official national air quality monitoring standards.*

**Table 2. Health Recommendations by Air Quality Level.** *Actionable health guidance for sensitive groups and the general population based on air quality conditions.*

| Air Quality Level | General Health Message | Risk Groups & Sensitive Population | General Population |
|---|---|---|---|
| **Good** | Satisfactory air quality. | Enjoy your outdoor activities normally. | Enjoy your outdoor activities normally. |
| **Reasonably Good** | Acceptable air quality; pollution poses no health risk. | Enjoy your outdoor activities normally. | Enjoy your outdoor activities normally. |
| **Moderate** | Unlikely to affect the general population, but may pose a moderate risk for sensitive groups. | Consider reducing prolonged and strenuous outdoor activities.<br>• Asthma / Respiratory issues: Carefully follow your medication plan.<br>• Heart conditions: Pay attention to palpitations, shortness of breath, or unusual fatigue. | Enjoy your outdoor activities normally.<br>Monitor for symptoms such as coughing, throat irritation, shortness of breath, or excessive fatigue. |
| **Unfavorable** | The entire population may experience health effects; risk groups may experience more serious effects. | Consider reducing outdoor activities (move them indoors or postpone until air quality is good or reasonably good). Follow your medical treatment plan meticulously. | Consider reducing prolonged and strenuous outdoor activities, especially if experiencing coughing or throat irritation. |
| **Very Unfavorable** | Public health emergency conditions; the entire | Reduce all outdoor activity (move indoors or postpone). Follow | Consider reducing outdoor activities (move indoors or postpone |

| | | | |
|---|---|---|---|
| | population may be severely affected. | your medical treatment plan meticulously. | until air quality improves). |
| **Extremely Unfavorable** | Public health emergency conditions; the entire population may be gravely affected. | Avoid prolonged outdoor stays. Follow your treatment plan carefully, and seek emergency medical care if your health condition worsens. | Reduce all outdoor activity (move indoors or postpone). Use appropriate protection for essential outdoor work. |

## 4. PRE-PUBLICATION CHECKLIST

Use this quick checklist as an editorial quality control filter before publishing any data to the general public:

- [ ] **Is the message understandable without technical background?** Can an average citizen without scientific training understand the state of the air in under 5 seconds by looking at the graphic?
- [ ] **Is the isolated use of complex units (such as µg/m$^3$) completely eliminated** from the main design elements?
- [ ] **Is the data up to date?**
- [ ] **Does the assigned indicator color accurately match** the universal Air Quality Index (AQI) color codes?
- [ ] **Does the message include a clear, direct, and action-oriented recommendation** for health protection?
- [ ] **Is the chosen distribution channel visually clean** and free of unnecessary text clutter?

## 5. SPECIAL CASES OF EDUCATING IN DATA CONSULTATION AND UNDERSTANDING:

## PROGRAM I: COMPULSORY SECONDARY EDUCATION (AGES 12–16)

## CONVEYING AIR QUALITY DATA TO THE YOUTH IN THE CLASSROOM

We propose an instructional unit structured under the principles of **Universal Design for Learning (UDL)** and advanced didactic transposition.
Its objective is to regulate, sequence, and operationalize how an educator, technician, or communicator should structure, adapt, and present scientific air quality data to three distinct audiences, ensuring maximum assimilation according to their cognitive level and environmental needs.

- **Core Focus of the Presentation:** From molecular abstraction to the visible human scale.
- **Educator's Goal:** Present data by transforming micrograms and chemical nomenclature into color codes, physical analogies, and spatial narratives linked to the students' daily routines (school, play, transportation).

*1. Learning Objectives (*What will students achieve through this presentation?*)*

- **LO.SEC.1:** Identify the main air pollutants ($PM_{2.5}$, $PM_{10}$, $NO_2$) by associating them with macroscopic analogies and their direct local anthropogenic sources.
- **LO.SEC.2:** Decode absolute concentration numerical data ($\mu g/m^3$) using the linear color scale of the Air Quality Index (AQI).
- **LO.SEC.3:** Differentiate the spatial representativeness value of an educational/supplementary sensor from the legal-regulatory rigor of an official reference station.
- **LO.SEC.4:** Propose a safe school mobility action plan based on reading and interpreting graphs showing hourly pollution peaks.

*2. Content Blocks*

- **Conceptual Content:**
  - The concept of fine and coarse particulate matter: aerodynamic diameters compared to human hair or grains of sand.
  - Invisible vehicular combustion gases ($NO_2$) and secondary summer pollutants ($O_3$).
  - The AQI algorithm: simplification of statistical scales into standardized color bands.
- **Procedural Content:**
  - Visual extraction of trends from simple time-series graphs (X-axis: hours of the day; Y-axis: pollution level).
  - Navigation of interactive school mapping platforms.
  - Translation of a color alert into an active physical safety protocol at school.
- **Attitudinal Content:**
  - Development of critical thinking regarding pollution in the immediate school environment.
  - Co-responsibility in sharing personal protective habits within the school community.

*3. Methodological Strategy and Pedagogical Approach*

**Challenge-Based Learning (CBL)** is applied in combination with **Structural Gamification**. The educator does not lecture on chemistry; instead, they act as the director of an *"Atmospheric Alert Center."* Sensory anchors and physical objects are used to ground abstract concepts before showing digital data screens.

*4. Detailed Activity Sequence (4-Hour Block Structure)*

Hour 1: The Challenge of Invisibility and Body Scale

- **Phase:** Introduction / Prior Knowledge Activation.
- **Grouping:** Guided plenary session (0–20 min) followed by paired work (20–60 min).
- **Step-by-Step Execution:**

1. The educator starts the session with a ruler, asking a student to mark one millimeter. On the whiteboard, the educator draws a 1-meter diameter circle representing the thickness of a human hair (µm).
2. Working in pairs using linear proportionality, students calculate and draw the relative size of a $PM_{10}$ and a $PM_{2,5}$ particle inside the "hair."

3. **Presenting the Data:** The educator introduces the concept of micrograms per cubic meter ($\mu g/m^3$). To make it understandable, they use the sugar cube analogy: *"Imagine crushing a fine sugar cube and spreading its grains across the entire air volume of an Olympic gymnasium. That is one microgram."*

Hour 2: The Atmospheric Traffic Light Board

- **Phase:** Development / Data Processing.
- **Grouping:** Fixed cooperative teams of 4 students with assigned roles:
  - **Time Manager:** Controls the timer.
  - **Spokesperson:** Communicates team decisions.
  - **Graph Analyst:** Interprets data screens.
  - **Action Designer:** Writes down health measures.
- **Step-by-Step Execution:**

1. The educator projects a raw dataset on the main screen from the local monitoring station (or the nearest available station, e.g., $NO_2$: 85 $\mu g/m^3$, $PM_{2,5}$: 38 $\mu g/m^3$).
2. Each team has a physical panel displaying the European AQI color bands (using the national standard as a reference). The Graph Analyst checks a simplified lookup table to determine which color dominates today based on the worst-performing pollutant.
3. **Simulation Dynamic:** The educator introduces a fictional weather shift: *"A strict thermal inversion sets in, and wind drops to zero."* Teams must calculate the estimated data spike and hold up the corresponding AQI color card (Orange or Red). Meanwhile, the Action Designer writes the protective order on a visible sign for recess (e.g., *"Today, recess will take place in the indoor gymnasium"*).

Hour 3: School Environment Audit Using Sensors

*Note: This activity depends on the availability of sensors at the school facility.*

- **Phase:** Development / Practical Application.
- **Grouping:** Same teams of 4 students in controlled outdoor movement.
- **Step-by-Step Execution:**

1. The educator equips each team with a mobile device connected to an educational particulate matter sensor and a field data sheet.
2. Teams simultaneously move to four critical spots around the school: the perimeter fence next to the main road, the wooded inner courtyard, the main entrance lobby, and a crowded classroom.
3. For 20 minutes, they record data every 60 seconds. Upon returning to the classroom, the educator projects the four time-series streams side-by-side on the main screen, guiding students to spot the spikes: *"Look at the fence graph at 9:00 AM—why does the line shoot up?"* Students link the spike to idling school bus engines.

Hour 4: Final Output — Express Alert Campaign

- **Phase:** Closing / Synthesis and Evaluation.
- **Grouping:** Cooperative teamwork (0–40 min) and Spokesperson Plenary (40–60 min).
- **Step-by-Step Execution:**

1. Each team is challenged to design a visual communication resource (a digital poster or analog alert template) that translates what they learned into a format suitable for younger elementary students at a neighboring school.
2. The educator imposes a strict design constraint: **Decimal numbers and full chemical formulas are prohibited.** Everything must be conveyed using the AQI color code, tailored icons, and action statements limited to 8 words or fewer.
3. Spokespersons deliver a 1-minute pitch (*"Elevator Pitch"*) scientifically justifying their chosen color alert level based on the data analyzed during Hour 3.

*5. Educational Resources and Materials*

- Conventional whiteboard and colored markers.
- Physical AQI cards printed on high-density cardstock (15X15 cm) using standardized colors (Green, Yellow, Orange, Red, Purple).
- Portable educational particulate matter sensors utilizing laser-scattering technology with a simplified visual interface.
- Multimedia projector and computers/tablets with access to the public viewer of the local air quality monitoring network.
- A3 cardstock sheets for poster creation.

*6. Assessment and Grading*

Evaluation is based on a competency performance rubric focused on the student's ability to translate technical information.

| **Evaluation Criteria** | **Excellent Achievement (4)** | **Adequate Achievement (2)** | **Insufficient Achievement (1)** |
|---|---|---|---|
| **Accuracy in Color Simplification** | Accurately translates raw numerical concentrations into the exact AQI color by applying the worst-pollutant rule. | Identifies the AQI color but confuses which pollutant determines the daily alert level. | Assigns colors randomly without correlation to the provided concentration values. |
| **Distinction of Measurement Tools** | Clearly explains that the school sensor measures local spatial variations and lacks legal validity for regulatory enforcement. | Knows the classroom sensor differs from the official station but cannot explain the technical reason for its lack of legal validity. | Treats educational sensor data as absolute legal truth equivalent to the regulatory network. |
| **Rigor in Visual Storytelling** | Designs a communication resource free of complex technical jargon that effectively guides health self-protection. | The design is visually appealing but contains technical terms that confuse the target audience of younger children. | The final resource repeats raw numerical data without making any effort toward didactic transposition. |

## PROGRAM II: GENERAL PUBLIC (CITIZEN TRAINING WORKSHOPS)

- **Core Focus of the Presentation:** Practical utility, plain language, an andragogical approach, and the removal of socioeconomic and technological barriers.
- **Trainer's Goal:** Present air quality data by eliminating complex mathematical equations, dense chemical jargon, and abstract scales. The information must be translated into everyday family health decisions, home self-protection, and the identification of institutional support channels.

### 1. Learning & Training Objectives (*What will citizens take away at the end of the workshop?*)

- **LO.PUB.1:** Autonomously locate and consult official meteorological information channels and mobile early-warning air quality apps provided by their municipality.
- **LO.PUB.2:** Decode pollution warnings from mass media, translating them into correct guidelines for smart home ventilation and the protection of vulnerable individuals (children, elderly, asthmatics).
- **LO.PUB.3:** Detect and neutralize hoaxes, alarmist maps, or fake news about pollution shared on social networks by verifying the spatial and temporal validity of the news.
- **LO.PUB.4:** Identify in-person administrative help desks as well as municipal and state financial aid lines for replacing inefficient heating systems or conducting home insulation renovations.

### 2. Content Blocks (*Neighbourhood Action-Oriented Information*)

- **Conceptual Content:**
  - **The air around us:** Common neighbourhood pollutants explained simply (car exhaust, heating smoke, airborne Saharan dust).
  - **My neighbourhood's Air Quality Traffic Light:** The meaning of official colours for daily life.
  - **Selective ventilation versus continuous ventilation:** Knowing when to open or close windows.
- **Procedural Content:**
  - Guided setup of official environmental health mobile applications on personal devices.
  - Application of quick checklists for home decision-making during pollution alerts.
  - Identification of physical application channels for public energy grants and subsidies.

- **Attitudinal Content:**
    - Citizen empowerment based on verified official information, reducing paralyzing eco-anxiety.
    - Community solidarity and active protection of vulnerable groups within the immediate neighbourhood.

## 3. Methodological Strategy and Pedagogical Approach

**Critical Andragogy** and **Community-Centred Design** are applied. The trainer strips away academic terminology and uses Plain Language. Sessions are structured through proximity dynamics such as *World Café* style mixed roundtables. The existence of a digital divide, energy poverty, or administrative vulnerability within the audience is acknowledged, adapting the discourse to offer realistic and accessible solutions for all socioeconomic backgrounds.

## 4. Detailed Activity Sequence (2-Hour Community Workshop)

### Block 1: Air at My Table (Sensory Demystification) [00:00 – 00:30]

- **Phase:** Introduction / Connection with Lived Experiences.
- **Grouping:** Community roundtables of 5 people arranged by neighbourhood proximity or shared interests.
- **Step-by-Step Execution:**
    1. The trainer opens the workshop by placing three mysteriously labelled, sealed glass jars at the centre of each table (e.g., *"Park Air"*, *"Central Avenue Air at 8:30 AM"*, *"Closed Living Room Air"*).
    2. The trainer asks neighbours to share their perceptions: *"What do you think is inside each jar? Is air pollution always visible?"* Space is opened for participants to share daily issues (eye irritation on busy avenues, children coughing in winter).
    3. **Presenting the Data:** The trainer projects a map of the city showing official monitoring stations in their neighbourhood on a large screen. Instead of explaining chemical formulas, each station is linked to an iconic landmark known to everyone: *"The station you see here with high numbers isn't an abstract figure; it's the screen measuring exhaust fumes at the intersection we all cross to reach the health centre."*

### Block 2: Assisted Mobile Alert Setup [00:30 – 01:00]

- **Phase:** Development / Direct Technological Training.
- **Grouping:** Assisted individual work paired with peer support (younger or tech-savvy participants actively assist older attendees at their table).
- **Step-by-Step Execution:**

1. The trainer projects an official QR code alongside a simplified, interactive visual step-by-step guide showing the local government's official environmental quality app.
2. The workshop facilitator and peer-support helpers walk around the tables ensuring that all participants download the legitimate municipal or regional app, avoiding commercial private platforms containing ads.
3. **Practical Setup:** Each attendee is guided to enter their exact postal code and enable the *"Automatic Health Alerts"* checkbox. The trainer conducts a live simulation: *"If the app sends you an orange alert tomorrow, what does that mean for your routine?"* The correct response in plain language is practiced collectively.

**Block 3: The Game of Household Decisions [01:00 – 01:30]**

- **Phase:** Development / Practical Real-Life Application.
- **Grouping:** Same cooperative roundtables of 5 people.
- **Step-by-Step Execution:**
    1. The trainer hands out a set of situational cards printed on large-format cardstock with high-visibility typography to each table.
    2. **Proposed Case Study:** *"It's a hot July afternoon, and the city council's official channel issues an unfavourable Ozone ($O_3$) alert for the next 6 hours. Your neighbour Luisa suffers from severe asthma and usually opens all her apartment windows wide at 5:00 PM to cool down the house. How can we help Luisa using the air quality traffic light?"*
    3. Each table spends 15 minutes discussing the optimal solution using a home remedies guide from the manual. The table spokesperson presents their conclusion in everyday language: *"We'll tell Luisa that the air colour warns us that ozone risk spikes under the afternoon sun. The apartment should be ventilated early in the morning when the air is green, and windows kept closed at 5:00 PM while using blinds to block out the heat."*

**Block 4: The Path to Institutional Support Against Exclusion [01:30 – 02:00]**

- **Phase:** Closing / Economic Empowerment and Wrap-up.
- **Grouping:** Interactive plenary session and distribution of physical takeaway materials.
- **Step-by-Step Execution:**
    1. The trainer presents the economic context transparently, openly acknowledging that air quality measures (such as traffic restrictions or mandatory heating system upgrades) create unfair economic and social barriers if not paired with direct public support.
    2. A simplified map of the city's Housing and Energy Support Offices is projected. The trainer outlines three steps to apply for equipment replacement subsidies without needing upfront cash (pre-financing programs for low-income households or energy vulnerability).

3. **Exit Assessment (*The Workshop Thermometer*):** Before leaving the room, each participant drops a coloured card into a transparent urn to visually answer a final question: *"Do you feel prepared to understand your neighbourhood's alerts and protect your family starting tomorrow?"*
    - **Green Card:** Yes, with total independence.
    - **Yellow Card:** Yes, but I need support from brochures.
    - **Red Card:** No, I still find the channels confusing.

## 5. Educational Resources and Materials

- Physical simulation jars for the initial sensory exercise.
- Printed physical brochures in a foldable format (bifold/trifold) designed under universal accessibility standards (sans-serif fonts larger than 14pt, high contrast, plain language, descriptive icons without technical jargon).
- Multimedia projector with a stable internet connection for live mobile health app demonstrations.
- Simplified paper roadmaps and official application forms for municipal energy grants.
- Physical exit voting cards and a transparent community urn.

## 6. Evaluating Community Presentation Impact

Evaluation in adult citizen training moves away from academic numerical grades, focusing instead on indicators of communication effectiveness, accessibility, and real-world message transfer.

| **Session Evaluation Criteria** | **Community Impact / Success Indicator** | **Verification Method in the Workshop** |
|---|---|---|
| **Digital Autonomy & Alert Location** | 90% of participants at each table finish the session having successfully configured their postal code within the municipality's official early warning channels. | Direct visual verification by the workshop facilitator table by table before closing. |
| **Retention of Health Guidelines in Plain Language** | Participants verbalize self-protection actions omitting chemical acronyms while retaining the concept of smart selective ventilation according to AQI colours. | Analysis of table responses during the practical case study exercise regarding neighbour. |
| **Detection of Bureaucratic** | The workshop generates a feedback document collecting neighbours' questions | Written log of recurring questions recorded by the |

| Session Evaluation Criteria | Community Impact / Success Indicator | Verification Method in the Workshop |
|---|---|---|
| **Barriers & Exclusion** | and complaints about complex terms in official public guides to send to the city council's communication team. | trainer during Block 4 of the workshop. |

**VISIONAIR**

## Interactive Air Quality Dashboard

*User Manual*

VISIONAIR — The Role of Information and Awareness in Promoting Eco-Friendly Behaviors

*Czech Republic · Spain · Croatia · Slovakia*

**Live dashboard:** https://tonis81.shinyapps.io/VISIONAIR_v00/

Data coverage: April 6 – December 10, 2025

*July 2026*

# 1. Overview

The VISIONAIR dashboard is a free, browser-based tool for exploring air quality and meteorological data collected between April 6 and December 10, 2025 across four countries participating in the VISIONAIR project: Czech Republic, Spain, Croatia, and Slovakia. No installation is required — simply open the link below in any modern web browser.

> **Live application:** https://tonis81.shinyapps.io/VISIONAIR_v00/

# 2. Page Layout at a Glance

Scrolling down the application, you will encounter the following sections in order:

1. Logo and title banner
2. Dataset variable glossary
3. Analysis Dashboard — the interactive exploration tool
4. Air Quality FAQ — an expandable question-and-answer panel
5. Footer with links to official air-quality monitoring websites

# 3. Using the Analysis Dashboard

### Step 1 — Set the global filters (left sidebar)

These two filters apply to every tab described below.

| Filter | Effect |
|---|---|
| Country (ISO) | Restricts all charts and tables to one country, or keep “All” |
| Season | Restricts to Spring, Summer, Autumn or Winter, or keep “All” |

### Step 2 — Choose a tab

**Univariate Analysis** Select a Variable and adjust the Histogram Bins slider. The chart shows a histogram with a red density curve overlay; for PM2.5, PM10 and O3, a dashed red line marks the WHO maximum recommended level. Summary Statistics below reports sample size (n), mean, median, min/max and quartiles.

**Bivariate Analysis** Choose an X-Axis and a Y-Axis variable. The scatter plot shows each observation (hover for its date) with an orange trend line; when either variable has a WHO threshold, points are colored green (“Within limit”) or red (“Exceeds limit”). Correlation Metrics reports the Pearson coefficient (r) and its p-value.

**Raw Data Explorer** A searchable, sortable table of the filtered dataset. Use the search box or column headers to find specific values, and scroll horizontally to see all variables.

### Dataset variables at a glance

| Variable | Meaning |
|---|---|
| O3, PM2.5, PM10 | Ozone, fine and coarse particulate matter (µg/m³) |
| RH, TEMP, WIND, WIND_CHILL, RAIN, PRESSURE | Meteorological conditions |
| country_iso | Monitoring station's country (ISO code) |
| local_season | Season derived from local month |

## 4. Air Quality FAQ

A separate accordion panel offers 20 expandable questions on why air quality matters for outdoor exercise — covering health risks, pollution peaks, vulnerable groups and WHO guidelines. Click a question to expand or collapse its answer.

## 5. Tips for Best Results

- If a chart or correlation looks empty, widen the Country/Season selection — the current filter combination may match too few rows.
- The scatter plot is interactive (zoom, pan, hover) via Plotly; double-click to reset the view.
- The app runs live R code, so results update automatically whenever a filter or dropdown changes — no “submit” button is needed.