

INTERNATIONAL HIGHER SCHOOL OF MEDICINE

A P P R O V E D

Председатель УМС, проректор по УВРиЛР

_____ А.А. Усенова

«_____» _____ 20__ год

WORKING PROGRAM

ECOLOGY AND RESPIRATORY DISEASES for students of Master Degree 561000 Public Health and Medicine

Total volume: 2 credits (60 h)
In class: 32 h.
Independent study: 28 h.
Semester: 1
Final control: Pass
Program is developed by: Candidate of bio.sciences, ass.prof..
Ch.S.Ismailova

In accordance with the curriculum of the International Higher School of Medicine, the discipline is taught in the following volume:

Semester	Number of credits	Lectures, h	Practical classes, h	Seminars, h	Unit control, h	Independent study, h	Total, h
1	2	8	8	12	4	28	60
Total	2	8	8	12	4	28	60

Considered
at a meeting of the Natural Sciences Department

Protocol № ____ dated « ____ » _____ 2025

Head of the department _____

Ch.S.Ismailova

Considered at a meeting of the Cycle Methodological Commission for PDE

Protocol № ____ dated « ____ » _____ 2025

Chairman of the CMC PDE _____ A.E.Bazhanova.

Bishkek

3. Planned Learning Outcomes for the Course

3.1 Course Objectives

- ❖ To develop master's students' understanding of the impact of environmental factors on respiratory health.
- ❖ To study the mechanisms by which air pollutants, climate change, and occupational factors influence the development and course of respiratory diseases.
- ❖ To prepare future physicians to use environmental knowledge in the diagnosis, prevention, and treatment of respiratory diseases.

The objectives of the course are:

- ❖ To familiarize master's students with the main environmental risk factors for the respiratory system (atmospheric pollutants, allergens, tobacco smoke, occupational factors, and climate change).
 - ❖ To examine the pathophysiological mechanisms of respiratory damage under the influence of environmental factors.
 - ❖ To study the relationship between air quality and the prevalence of chronic and acute respiratory diseases (asthma, COPD, respiratory infections, and lung cancer).
 - ❖ To analyze modern methods of air quality monitoring and their use in the epidemiology of respiratory diseases.
 - ❖ To teach students how to assess environmental risks to patients and the public and develop preventative measures.
 - ❖ To develop students' ability to use data from international organizations (WHO, European Respiratory Society, EPA, etc.) to analyze environmental conditions and respiratory health.
 - ❖ To develop skills in an interdisciplinary approach to environmental and human health issues, with an emphasis on respiratory pathology.
- 3.2 Place of the discipline in the structure of the educational program

3.2.1 Prerequisites:

- ❖ Anatomy
- ❖ Pathophysiology
- ❖ Therapy
- ❖ Medical Biology
- ❖ Molecular Biology

3.2.2 Postrequisites:

- ❖ Public Health and Medicine
- ❖ Clinical Disciplines

Competencies developed during the study of the discipline

PC-2 – capable of conducting educational, training, and promotional activities among the population aimed at preventing the most common diseases, promoting a healthy lifestyle, and maintaining and improving public health.

Knowledge: Factors adversely affecting public health. Causes and conditions for the occurrence and development of the most common diseases.

Ability: Identify adverse factors that contribute to the deterioration of a person's condition and the development of a disease.

Skills: Skills in planning measures to eliminate the adverse effects of harmful factors and conditions.

PC-5 – Able to analyze patterns of functioning of individual organs and systems, utilize knowledge of anatomical and physiological characteristics, basic methods of clinical and laboratory examination, and assessment of the functional state of the body in adults and children for the timely diagnosis of diseases and pathological processes.

Know: the specifics of the main syndromes of organ and system damage in the most common diseases.

Be able to: group disease syndromes into nosological entities based on clinical, laboratory, and functional examination methods for adults and children to diagnose diseases and pathological processes.

Skills: the skills to substantiate and formulate a diagnosis based on the results of clinical, laboratory, and functional examinations of adults and children.

The volume of compulsory academic knowledge that an MD student has to master

Volume, content of the course and types of academic work

№	The theme of the unit	Total volume	Work in classroom					Independent study		
			Lectures	Practical classes	Seminars	Unit control	Total work in a classroom	Task for execution	Work with A literature	Total independent study
1.	Environmental factors and respiratory pathology	30	4	4	6	2	16	7	7	14
2.	Infectious and non-infectious respiratory diseases in poor environmental conditions	30	4	10		2	16	7	7	14
	BCEFO	60	8	20		4	32	14	14	28

The Structure and Content of a Discipline

UNIT №1

Environmental Factors and Respiratory Pathology

Total volume – 30 h.

Lectures – 4 h.

Practical classes – 4 h.

Seminars – 6 h.

Unit control – 2 h.

Independent study – 14 h.

In classroom	16 h.
Independent study	14 h.

Topics of lectures

№	Topic	Hours
1.	Lecture 1. Air Pollution and Respiratory Diseases. Introduction to Environmental Medicine. Chemical composition of polluted air: SO ₂ , NO _x , CO, CO ₂ , ozone, heavy metals. Fine particulate matter (PM _{2.5} , PM ₁₀) and their pathogenic significance. Respiratory disease statistics in cities with high pollution levels. Preventive measures and air quality control.	2
2.	Lecture 2. Mechanisms of atmospheric pollutant impact on the respiratory system. Industrial emissions: metallurgy, energy, transportation. Bad habits: smoking and passive smoking as an environmental factor. Household pollutants: radon, mold, building materials. Mechanisms of respiratory epithelial damage. Current research and approaches to prevention.	2
	Totally:	4

Topic of practical classes and seminars

№	Topic	Hours
1.	Practical class 1. Air quality analysis. Task: Working with monitoring data (PM _{2.5} , PM ₁₀ , CO ₂). Workshop: Calculating the Air Quality Index (AQI). Conclusion: Link between pollution and disease rates.	2
2.	Practical class 2. Clinical cases: asthma and COPD. Analysis of asthma/COPD patient histories. Analysis of living conditions and environmental factors. Development of prevention recommendations.	2
3.	Seminar 1. Air Pollution and Human Health. Discussion: "What is more dangerous for the respiratory system – exhaust gases or industry?" Presentations by master's students in regional statistics.	2
4.	Seminar 2. Tobacco smoking and passive smoking. Discussion of articles about the effects of tobacco on the lungs. Role-playing: a doctor explains the dangers of smoking to a patient..	2
5.	Seminar 3. Environmental air monitoring. Analysis of WHO and regional service reports. Discussion of the role of monitoring in disease prevention..	2

6	Unit control: Test (30 questions)	2
	Totally	12

Independent study (14 hours)

The MD student completes one assignment of their choice.

- ❖ Prepare an essay on "The Impact of Polluted Air on the Human Respiratory System."
- ❖ Analyze statistics on respiratory disease incidence in the region of residence.
- ❖ Prepare a presentation on "Urban Ecology and the Risk of Bronchial Asthma."

Examples of situational problems

Problem 1.1. "Urban Runner"

• **Situation:** A 25-year-old man lives in a large industrial city. He actively runs in a city park located 200 meters from a busy highway. Over the past few months, he has noticed an occasional cough, a sore throat, and nasal congestion after his runs. The symptoms subside within a few hours after finishing his workout. When he goes out of town on weekends, he does not experience these symptoms during his runs.

• **Questions:**

1. What are the main air pollutants typical for the area near the highway that could have triggered this patient's symptoms?
2. Describe the possible pathophysiological mechanisms that cause coughing and sore throat when inhaling polluted air during physical activity.
3. Develop preventive recommendations for this patient (modifying his training regimen, using protective equipment, etc.).

Problem 1.2. "The New Homeowner's Problem"

• **Situation:** A family with a 6-year-old child moved into a new apartment after a major renovation (new plastic windows, laminate flooring, and new chipboard furniture). A month later, the child's allergic rhinitis and nighttime coughing became more frequent. The parents note a persistent "chemical" odor in the apartment. The child's symptoms subside when going for a walk.

• **Questions:**

1. What are the main sources and types of indoor air pollutants likely to be present in this apartment?
2. Why are the child's symptoms more pronounced than those of adults, from a respiratory physiology perspective?
3. Develop an action plan for the family to improve the air quality in the apartment (from short-term to long-term measures).

Samples Test Questions

1. Which of the following air pollutants is considered the most hazardous to health due to its ability to penetrate deeply into the lungs and systemic bloodstream?

- a) Sulfur dioxide (SO₂)
- b) Ozone (O₃) at ground level
- c) Particulate matter PM_{2.5}
- d) Carbon monoxide (CO)
- e) Nitrogen dioxide (NO₂)

2. Which odorless, colorless gas, hazardous to the lungs, is primarily emitted from the soil beneath buildings, and its accumulation is especially likely in poorly ventilated spaces?

- a) Ozone (O₃)
- b) Formaldehyde

- c) Radon
- d) Carbon monoxide (CO)
- e) Nitrogen dioxide (NO₂)

3. Which of the following substances is a common volatile organic compound (VOC) emitted from building materials, particleboard furniture, and carpeting and can cause respiratory irritation?

- a) Particulate matter PM₁₀
- b) Sulfur dioxide (SO₂)
- c) Formaldehyde
- d) Ozone (O₃)
- e) Asbestos

4. Which of the following is the most effective long-term measure to reduce radon concentrations in a residential area?

- a) Installing a carbon filter in the kitchen
- b) Installing a forced ventilation system (e.g., a breezer)
- c) Regular ventilation
- d) Installing an air conditioner
- e) Using an air ionizer

5. Why can physical activity (e.g., running) in polluted urban air cause more harm to the respiratory system than at rest?

- a) The temperature of inhaled air increases
- b) The minute respiratory volume increases, and more pollutants enter the lungs
- c) The heart rate slows, worsening hypoxia
- d) The blood's ability to carry oxygen decreases
- e) The production of gastric juice increases, causing reflux

6. What is the common pathophysiological mechanism for the effects of most air pollutants (ozone, particulate matter) on the respiratory tract?

- a) Direct destruction of the alveolar membrane
- b) Suppression of the cough center
- c) Development of systemic arterial hypertension
- d) Activation of oxidative stress and inflammation
- e) Immediate development of pulmonary fibrosis

7. Which of the following occupational lung diseases is characterized by the development of fibrosis ("hardening" of lung tissue) due to prolonged inhalation of silicate dust?

- a) Bronchial asthma
- b) Silicosis
- c) Alveolitis
- d) Lung cancer
- e) COPD (chronic obstructive pulmonary disease)

8. Which of the following tests is the "gold standard" for confirming and assessing the degree of bronchial obstruction characteristic of bronchial asthma and COPD?

- a) Chest X-ray
- b) Sputum analysis
- c) Spirometry
- d) Bronchoscopy
- e) Computed tomography (CT)

9. The concept of "synergism" in environmental pulmonology means that:

- a) Air pollutants and allergens neutralize each other's effects
- b) The combined effect of two or more factors (e.g., pollen and nitrogen dioxide) results in a stronger effect than the sum of their individual effects
- c) The body develops tolerance to pollutants over time
- d) All air pollutants affect the body equally

e) Diseases develop only in genetically predisposed individuals

10. Which of the following applies to primary prevention measures for eco-dependent bronchial asthma in a child at risk?

a) Regular use of inhaled corticosteroids

b) Annual influenza vaccination

c) Creating a hypoallergenic home and quitting smoking in the presence of the child

d) Emergency use of bronchodilators during an attack

e) Spa treatment during remission

Correct answers to Unit 1:

1. c) Suspended particles PM2.5

2. c) Radon

3. c) Formaldehyde

4. b) Installation of a forced ventilation system (e.g., a breezer)

5. b) The minute respiratory volume increases, and more pollutants enter the lungs

6. d) Activation of oxidative stress and inflammation

7. b) Silicosis

8. c) Spirometry

9. b) The combined effect of two or more factors leads to a stronger effect than the sum of their individual effects

10. c) Creating a hypoallergenic home and quitting smoking in the presence of the child

The Structure and Content of a Discipline

UNIT №1

Environmental Factors and Respiratory Pathology

Total volume – 30 h.

Lectures – 4 h.

Practical classes – 4 h.

Seminars – 6 h.

Unit control – 2 h.

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Independent study	14 h.

Topics of lectures

№	Topic	Hours
1.	Lecture 3. Ecology and infectious diseases of the respiratory system. Tuberculosis: the relationship between incidence and environmental conditions. The impact of air pollution on the course of pneumonia. COVID-19 and environmental factors. Vulnerable population groups.	2
2.	Lecture 4. Allergic and immunopathological diseases of the respiratory tract. Urbanization and the rise of allergic diseases. Environmental allergens (pollen, fungal spores, household allergens). Immune mechanisms of respiratory	2

	hypersensitivity. Climate change and the rise of allergies. Approaches to prevention.	
	Totally	4

Topics of practical classes and seminars

No	Topic	Hours
1.	Practical Session 3. Ecology and Epidemiology of Tuberculosis. Analysis of tuberculosis incidence statistics depending on environmental conditions. Mini-group assignments: identify environmental risk factors.	2
2.	Practical Session 4. Clinical Analysis: Pneumonia. Case Study: Pneumonia in an Environmentally Disadvantaged Area. Clinical Data Analysis. Collaborative Development of a Prevention Plan.	2
3.	Seminar 4. Allergic Diseases and Ecology. Discussion: "Why are allergies more common in cities than in rural areas?" Mini-presentations by master's students.	2
4.	Seminar 5. Immune mechanisms of respiratory hypersensitivity. Discussion of current publications. Group work: mapping the immune response.	2
5.	Seminar 6. Environmental Prevention Strategies. Comparative analysis of prevention programs in different countries. Final discussion: "What measures can realistically be implemented in our region?"	2
6	Unit control: Test (30 questions)	2
	Totally	12

Independent Work (14 hours)

The student completes one assignment of their choice.

- ❖ Prepare an essay on "The Impact of Climate Change on the Prevalence of Respiratory Diseases."
- ❖ Search for and analyze scientific publications on the role of pollutants in the development of respiratory infections.
- ❖ Prepare a report on "Environmental Programs for the Prevention of Respiratory Diseases Around the World."

Samples of situational problems.

Problem 2.1. "Asthma Exacerbation during the Birch Blossom Season"

• **Case:** A 35-year-old woman diagnosed with mild persistent allergic asthma. Her condition was well controlled with standard therapy. She consulted a doctor complaining of increasing asthma attacks, wheezing, and the need for rescue medication over the past two weeks. She attributes the worsening symptoms to the onset of the birch blossom season and dry, windy weather. She lives in a residential area of the city.

• **Questions:**

1. Explain how the combination of natural (pollen) and anthropogenic (urban air pollution) factors could lead to an asthma exacerbation (explain the concept of the "synergistic effect").
2. What non-drug methods for exacerbation prevention would you recommend in this situation?
3. Explain why it is recommended to open windows less frequently and use air conditioning systems with filters during periods of increased air pollution and pollen concentration.

Problem 2.2. "Miner's Cough"

• **Situation:** A 58-year-old man, a former miner (25 years of underground work experience), smoked for 30 years (he quit 5 years ago). He consulted a pulmonologist complaining of progressive shortness of breath during previously habitual physical activity (climbing to the second floor) and a persistent productive cough in the morning. Spirometry revealed signs of bronchial obstruction, not fully reversible after a bronchodilator test.

• **Questions:**

1. What is the most likely underlying diagnosis? What is the contribution of occupational factors (coal dust) and smoking to the development of the disease?
2. Describe the pathological processes in the lungs (remodeling of the airways, inflammation) that led to the development of irreversible obstruction.
3. Is this disease exclusively occupational? What primary prevention measures were appropriate for this patient in the past, and what secondary prevention measures are appropriate now?

Примеры тестовых заданий

1. Which environmental factor is most often associated with an increase in the incidence of bronchial asthma?

- A) Radiation
- B) Fine particulate air pollution (PM_{2.5})
- C) Increased fluoride levels in water
- D) Noise pollution
- E) Iodine deficiency

Correct answer: B

2. Which infectious respiratory disease is most sensitive to deteriorating air quality in cities?

- A) Tuberculosis
- B) Pneumonia
- C) Chronic bronchitis
- D) Measles
- E) Lung cancer

Correct answer: B

3. Which disease is considered a non-infectious respiratory disease?

- A) Influenza
- B) Tuberculosis
- C) Pneumonia
- D) Chronic obstructive pulmonary disease (COPD)
- E) COVID-19

Correct answer: D

4. Which factor is considered the most significant for the increase in tuberculosis in poor environmental conditions?

- A) Carbon dioxide air pollution
- B) Lack of sunlight
- C) Social and environmental factors (overcrowding, unsanitary conditions, poor ventilation)
- D) Excess ozone in the atmosphere
- E) Radon emissions

Correct answer: C

5. Which substances, when inhaled, are particularly dangerous for the development of chronic bronchitis and COPD?

- A) Sulfur dioxide (SO₂) and nitrogen oxides (NO_x)
- B) Argon and helium
- C) Nitrogen and oxygen
- D) Carbon dioxide (CO₂) in normal concentrations
- E) Methane

Correct answer: A

6. Which of the following conditions is an example of the interaction of environmental and infectious factors?

- A) Increased cases of pneumonia in areas with high levels of smog
- B) Development of lung cancer in smokers
- C) Increased asthma in children in industrial areas
- D) Development of allergic rhinitis upon contact with pollen
- E) Development of tuberculosis in immunodeficiency

Correct answer: A

7. Which environmental factor plays an important role in reducing the body's resistance to respiratory infections?

- A) High air humidity
- B) Air pollution with particulate matter and toxic gases
- C) Increased oxygen concentration
- D) Increased atmospheric pressure
- E) Thermal comfort

Correct answer: B

8. Which pathogen most often causes outbreaks of infectious respiratory diseases in unsanitary conditions?

- A) Mycobacterium tuberculosis
- B) Streptococcus pneumoniae
- C) Influenza virus
- D) Adenovirus
- E) Klebsiella pneumoniae

Correct answer: B

9. What mechanism underlies the aggravation of symptoms in asthmatic patients with air pollution?

- A) Increased red blood cell production
- B) Irritation of the respiratory mucosa and the inflammatory response
- C) Activation of kidney function
- D) Decreased oxygen content in the blood plasma
- E) Increased vitamin D synthesis

Correct answer: B

10. Which indicator is most often used to assess the risk of developing respiratory diseases in conditions of air pollution?

- A) Stratospheric ozone levels
- B) Fine particulate matter (PM_{2.5} and PM₁₀) concentrations
- C) Air humidity levels
- D) Number of sunny days
- E) Air temperature

Correct answer: B

Course monitoring.

MD students' mastery of the course material is assessed through midterm assessments. The unit grade is the sum of the points for the test (maximum 60) and the independent work (maximum 40). A master's student can earn a maximum of 100 points for the unit. The final grade for the course is calculated as the average of the two units. A pass is awarded based on an interview at the end of the course. A master's student is eligible for a pass if their final score exceeds 59.

Assessment system for academic achievements of MD students

Criteria for assigning grades for the course				
Maximal score	Intervals			
	«unsatisfactory.»	«satisfactory»	«good»	«excellent»
Unit control-testing - 60	0-59	60-74	75-89	90-100
Criteria	The share of correct answers is lower than 60% of total answers	The share of correct answers makes 60% to 74% of total answers	The share of correct answers makes 75% to 89% of total answers	The share of correct answers makes 90% to 100% of total answers
Independent work- 40	0-23	24-30	31-35	36-40
Criteria	When completing an assignment, it is evident that the MD student lacks knowledge of a significant portion of the program material, makes significant errors, lacks the core content, has poor terminology, and lacks the necessary theoretical knowledge and the ability to apply it to solve practical problems. A grade of "unsatisfactory" is also assigned if the graduate student refuses to complete the independent work assignment.	When completing the assignment, it is evident that the MD student has mastered only the basic program material, but is unaware of certain features and details; makes inaccuracies; disrupts the sequence in presenting the program material; the material is not systematized, incorrectly formulated; speech is generally literate, but poor; possesses a minimally sufficient level of competence; solves professional practical problems with errors, mainly justifying the decisions made..	When completing the assignment, the MD student demonstrates developed competencies, possesses a sufficient level of professional terminology; presents the answer correctly, logically, and to the point, avoids significant errors and inaccuracies when answering questions, and presents the answer in a sufficiently systematic and consistent manner; and, when solving a practical problem, generally correctly justifies the decisions made..	When completing the assignment, it is evident that the MD student demonstrates developed competencies and can apply them in professional activities; presents the answer comprehensively, consistently, competently, and logically, without errors; the answer does not require additional questions; speaks well, is fluent in professional terminology; does not experience difficulty in answering when the assignment is changed; knows how to solve professional practical problems; correctly justifies the decisions made, and is able to independently summarize and present the material.

5. Literature recommended

Core Reading:

1. **Kurt, O.K., Zhang, J., & Pinkerton, K.E.** (2016). Pulmonary Health Effects of Air Pollution. *Current Opinion in Pulmonary Medicine*, 22(2), 138–143. (A review article on the impact of air pollution on lung health)
2. **Schraufnagel, D.E., et al.** (2019). Air Pollution and Noncommunicable Diseases: A Review by the Forum of International Respiratory Societies' Environmental Committee. Part 1: The Damaging Effects of Air Pollution. *Chest*, 155(2), 409–416. (A fundamental review from leading international respiratory societies)
3. **Thurston, G.D., & Balmes, J.R.** (2021). Air Pollution as a Cause of Pulmonary Disease: The Case for Improving Health by Reducing Air Pollution. *Clinics in Chest Medicine*, 42(4), 601–611. (The link between air pollution and specific diseases)
4. **Covert, H. H., Wahid, F. A., Wenzel, S. E., & Lichtveld, M. Y.** (2023). *Climate change impacts on respiratory health: exposure, vulnerability, and risk*. *Physiological Reviews*, 103(3), 1319–1353. <https://doi.org/10.1152/physrev.00043.2022> (A review that analyzes five climate-related respiratory health threats: heat, wildfires, pollen, extreme weather events, and viruses. It provides a risk framework, particularly for vulnerable populations.)
5. **Domingo, J. L., Gabaldon, S., et al.** (2024). *Impact of climate change on paediatric respiratory health: pollutants and aeroallergens*. *European Respiratory Review*, 33(171), 230127. <https://doi.org/10.1183/16000617.0127-2023> (The article examines children, sensitivity to pollutants and allergens, and the influence of infectious agents and non-infectious irritants in conditions of aggravated climate.)
6. **Carlson, C. J., et al.** (2023). *Viral respiratory infections in a rapidly changing climate: the need to prepare for the next pandemic*. *eBioMedicine*, 90, 104509. <https://doi.org/10.1016/j.ebiom.2023.104509> (How climate conditions and environmental changes can influence the transmission of viral respiratory infections: weather conditions, extreme events, seasonality.)
7. **Ali, N., et al.** (2024). *Impact of environmental air pollution on respiratory health and function*. *Physiological Reports*, 12(4), e70006. <https://doi.org/10.14814/phy2.70006> (Investigation of the effects of air pollution on respiratory function, both infectious and chronic diseases, including COPD, asthma, and the risk of infections.)
8. **Knittel, C. R., Miller, D. L., & Sanders, N. J.** (2024). *Air pollution and respiratory infectious diseases*. *Environmental and Resource Economics*, 87, 451–480. <https://doi.org/10.1007/s10640-024-00858-x> (The relationship between air quality and infectious respiratory disease (COVID-19, ILI) cases in the United States is examined, and methodology and potential biases are discussed.)
9. **Zhou, Y., et al.** (2025). *Impact of temperature variations on burden of lower respiratory infections under climate change (1990–2021)*. *BMC Public Health*, 25, 23203. <https://doi.org/10.1186/s12889-025-23203-3> (Analysis of the global burden of lower respiratory infections (LRI) in relation to adverse temperatures, identifying risk groups and geographic differences.)

Further Reading:

10. **GOLD.** (2024). *Global Strategy for the Diagnosis, Management, and Prevention of Chronic Obstructive Pulmonary Disease*. Report. Available from: <https://goldcopd.org/2024-gold-report/> (Current international guidelines on COPD, including the role of risk factors)
11. **GINA.** (2024). *Global Strategy for Asthma Management and Prevention*. Report. Available from: <https://ginasthma.org/> (The world's leading resource for asthma treatment, looking at environmental triggers)
12. **WHO.** (2021). *WHO global air quality guidelines: particulate matter (PM_{2.5} and PM₁₀), ozone, nitrogen dioxide, sulfur dioxide and carbon monoxide*. World Health Organization. Available from: <https://www.who.int/publications/i/item/9789240034228> (Key WHO

document setting threshold values for air pollutants)

Useful Online Resources:

13. **American Lung Association (ALA):** "State of the Air" Report.
— <https://www.lung.org/research/sota>
14. **European Environment Agency (EEA):** "Air quality in Europe" Reports.
— <https://www.eea.europa.eu/publications>
15. **Our World in Data:** Air Pollution. — <https://ourworldindata.org/air-pollution>