





Finanziato  
dall'Unione europea  
NextGenerationEU



Ministero  
dell'Università  
e della Ricerca

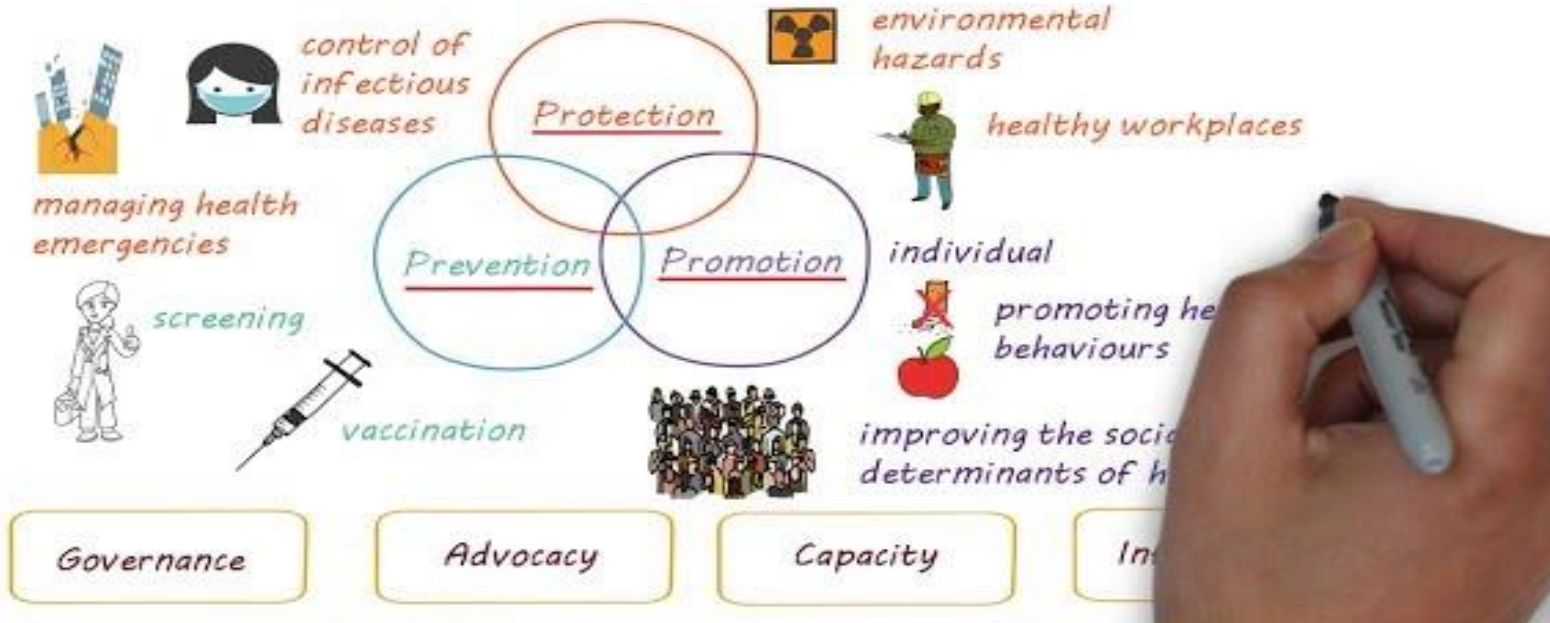


Italiadomani  
PIANO NAZIONALE  
DI RIPRESA E RESILIENZA



UNIVERSITÀ  
DI PISA

# WHAT IS PUBLIC HEALTH?





Finanziato  
dall'Unione europea  
NextGenerationEU



Ministero  
dell'Università  
e della Ricerca



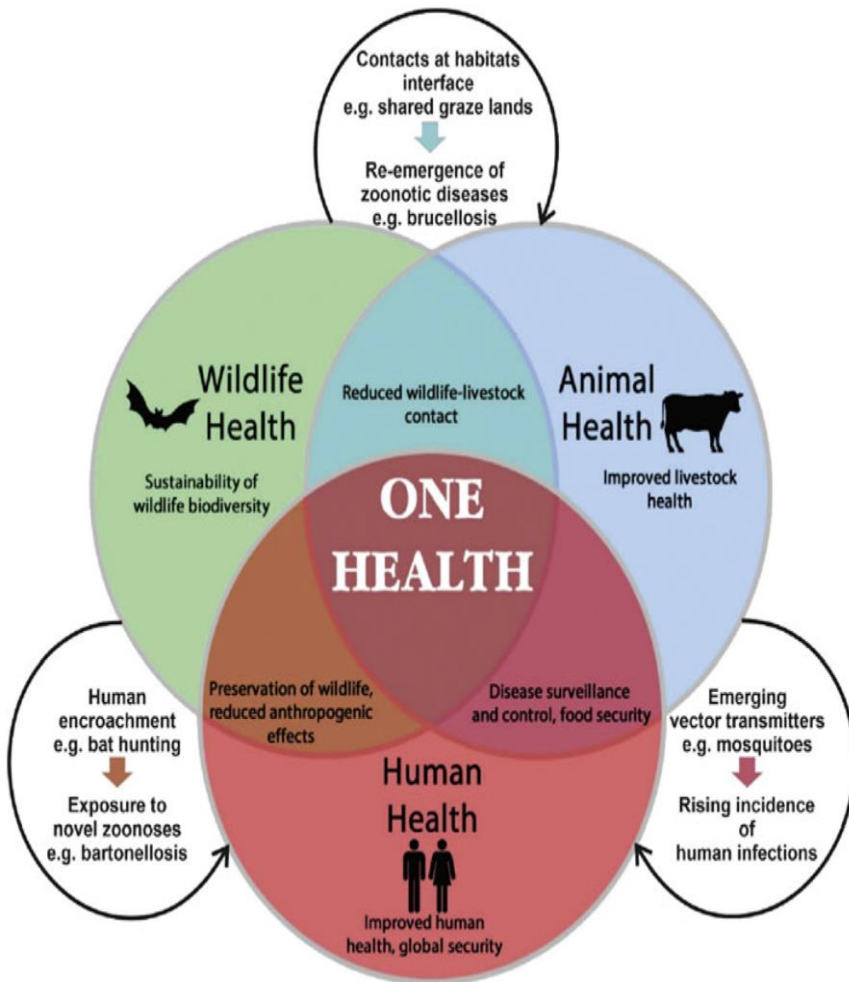
Italiadomani  
PIANO NAZIONALE  
DI RIPRESA E RESILIENZA



UNIVERSITÀ  
DI PISA

- ‘One Health recognizes that the health of humans, animals and ecosystems are **interconnected**.
- One Health is an approach to ensure the well-being of people, animals and the environment through **collaborative problem solving—locally, nationally, and globally**’





- The intersection of human, animal, and environmental health—known as the **One Health** approach—addresses complex threats to human health.
- e.g human infectious diseases that originate from animals,
- Hence one health approach enables early detection, rapid response, and prevention by recognizing that the health of people, animals, and ecosystems is interdependent.





Finanziato  
dall'Unione europea  
NextGenerationEU



Ministero  
dell'Università  
e della Ricerca



Italiadomani  
PIANO NAZIONALE  
DI RIPRESA E RESILIENZA



UNIVERSITÀ  
DI PISA

### Cause of Human threats

- Human populations are growing and expanding into new geographic areas. As a result, **more people live in close contact with wild and domestic animals**, both livestock and pets.
- **Animals play an important role in peoples' lives**, whether for food, fiber, livelihoods, travel, sport, education, or companionship.
- Close contact with animals and their environments **provides more opportunities for diseases to pass between animals and people**.
- The movement of people, animals, and animal products has increased **from international travel and trade**.
- As a result, diseases can spread quickly across borders and around the globe

The health of people is closely connected to the health of animals and the shared environment

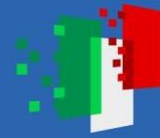




Finanziato  
dall'Unione europea  
NextGenerationEU



Ministero  
dell'Università  
e della Ricerca



Italiadomani  
PIANO NAZIONALE  
DI RIPRESA E RESILIENZA



# Key Public Health Issues Addressed by One Health Approach

1. Zoonotic diseases
2. Antimicrobial resistance
3. Food safety
4. Environmental contaminants
5. Climate change



Finanziato  
dall'Unione europea  
NextGenerationEU



Ministero  
dell'Università  
e della Ricerca



Italiadomani  
PIANO NAZIONALE  
DI RIPRESA E RESILIENZA



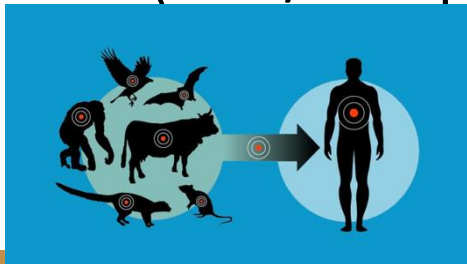
UNIVERSITÀ  
DI PISA

# 1. Zoonotic diseases



## Zoonotic diseases

- **Zoonotic Diseases** Diseases that spread between animals and humans, such as COVID-19, SARS, Ebola, Rabies, Anthrax, and Brucellosis and avian influenza, which often cause pandemics.
- Zoonotic diseases account for over 60% of known human infections.
- Transmission occurs via direct contact with infected animals, environmental contamination, vector bites (ticks/mosquitoes), or consuming contaminated food.



- **Transmission Methods:**
- **Direct Contact:**  
Saliva, blood, urine, or feces from infected animals (e.g., rabies).
- **Indirect Contact:** Touching areas where animals live or objects contaminated by them (e.g., barns, pet habitats).
- **Vector-borne:** Bites from mosquitoes, ticks, or fleas carrying the pathogen (e.g., Lyme disease, West Nile virus).
- **Foodborne:** Consuming undercooked meat, unpasteurized dairy, or contaminated produce.



## Zoonotic diseases examples

### Rift Valley Fever (RVF):

- Rift Valley fever (RVF) is endemic in Kenya, with periodic outbreaks linked to heavy rainfall in arid/semi-arid regions (Isiolo, Garissa, Mandera) and, increasingly, in warmer, wetter highlands. Seroprevalence in high-risk areas has shown rates around 21–28% in humans and livestock

### Brucellosis:

- Brucellosis is a highly endemic zoonotic disease in Kenya, particularly in arid and semi-arid regions, with human seroprevalence ranging from 2% to over 40% in high-risk, nomadic pastoralist communities. It is a leading cause of fever, with some studies in pastoral areas reporting up to 32.3% prevalence -associated with consumption of **unpasteurized milk and low public awareness.**

### Rabies:

- Ministry of health 2014. reported that Rabies is endemic throughout Kenya, causing an estimated 2,000 human deaths annually, primarily affecting children in rural areas. Over 99% of human cases are caused by bites from infected domestic dogs. Despite being preventable, it remains a major public health challenge due to **low dog vaccination rates, high populations of stray dogs, and limited access to post-exposure prophylaxis (PEP).**





Finanziato  
dall'Unione europea  
NextGenerationEU



Ministero  
dell'Università  
e della Ricerca



Italiadomani  
PIANO NAZIONALE  
DI RIPRESA E RESILIENZA



## Kenya's Zoonotic Policy Framework: Components

- Zoonotic Diseases Unit (ZDU): Established as a joint venture between the Ministry of Health (MOH) and the Ministry of Agriculture, Livestock, Fisheries and Cooperatives (MALF) to promote inter-sectoral collaboration
- Disease-Specific Strategies:
  - Rabies Elimination Strategy (2014-2030): Aims to **eliminate dog-mediated human rabies by 2030** through mass dog vaccination and public awareness, utilizing the Rabies Act of 1965.
  - Brucellosis Prevention and Control Strategy (2021-2040): Aims to **reduce the disease burden by 80%–95% through livestock vaccination**, food safety measures (pasteurization), and enhanced surveillance.
  - Rift Valley Fever (RVF) Contingency Plan: Provides guidelines for managing outbreaks.





Finanziato  
dall'Unione europea  
NextGenerationEU



Ministero  
dell'Università  
e della Ricerca



Italiadomani  
PIANO NAZIONALE  
DI RIPRESA E RESILIENZA



UNIVERSITÀ  
DI PISA

## How one health can address vector borne diseases

**Integrated Surveillance & Prediction:** Monitor zoonotic pathogens in animal populations and vectors (mosquitoes, ticks) to predict spillover events into humans. For instance, tracking Rift Valley fever virus in livestock allows for earlier warnings to protect human communities.

**Environmental Management & Control:** Controlling VBDs requires addressing environmental factors like climate change, deforestation, and urbanization, which drive vector proliferation. Interventions include managing standing water and sanitation to eliminate breeding sites

**Ecological & Biological Control:** Instead of relying solely on chemical insecticides, the approach uses environmental management to reduce vector habitats and employs biological agents, such as predatory fish for mosquito larvae

**Interdisciplinary Collaboration:** Veterinarians, ecologists, public health officials, and community members should work together to create comprehensive, sustainable strategies that are more effective than fragmented efforts





Finanziato  
dall'Unione europea  
NextGenerationEU



Ministero  
dell'Università  
e della Ricerca



**Italiadomani**  
PIANO NAZIONALE  
DI RIPRESA E RESILIENZA



UNIVERSITÀ  
DI PISA

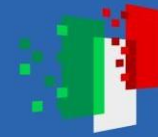
## 2. Antimicrobial Resistance (AMR)



Finanziato  
dall'Unione europea  
NextGenerationEU



Ministero  
dell'Università  
e della Ricerca



Italiadomani  
PIANO NAZIONALE  
DI RIPRESA E RESILIENZA

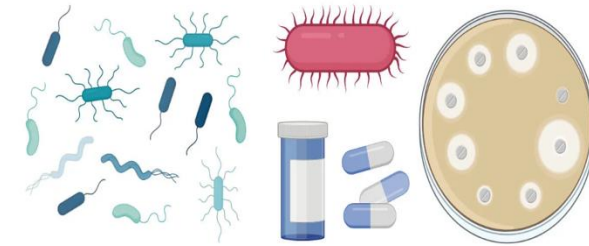


UNIVERSITÀ  
DI PISA

# Antimicrobial Resistance (AMR)

- Antimicrobial resistance: The **spread of drug-resistant germs across**, soil, water, and food supplies, rendering medical treatments ineffective.
- Antimicrobial resistance (AMR) occurs when microorganisms—bacteria, viruses, fungi, and parasites—**evolve to withstand treatments, making standard infections harder to cure and** increasing mortality.
- It is a major global health threat, linked to nearly 5 million deaths annually. The primary driver is the misuse and overuse of antibiotics in humans, animals, and agriculture.
- The misuse of antibiotics in humans, livestock, and agriculture leads to **drug-resistant "superbugs"** that circulate through shared environments like soil and water.

Antimicrobial resistance (AMR)  
and  
Antibacterial Resistance (ABR)





Finanziato  
dall'Unione europea  
NextGenerationEU



Ministero  
dell'Università  
e della Ricerca



Italiadomani  
PIANO NAZIONALE  
DI RIPRESA E RESILIENZA



UNIVERSITÀ  
DI PISA

- Research indicates that the environment acts as a critical reservoir for resistant bacteria.
- A study by Hamilton 2024 on 13 slaughter houses in Western Kenya found that 43.8% of *E. coli* isolates were multidrug-resistant (MDR), with high contamination on carcasses, floors, and in water sources, demonstrating a **direct path for antibiotic-resistant bacteria to enter the food chain.**





Finanziato  
dall'Unione europea  
NextGenerationEU



Ministero  
dell'Università  
e della Ricerca



Italiadomani  
PIANO NAZIONALE  
DI RIPRESA E RESILIENZA



UNIVERSITÀ  
DI PISA

- Kenya has established a multisectoral national action plan (NAP) on antimicrobial resistance (AMR), which provides a common framework for action by all stakeholders from different sectors in implementing AMR containment activities.
- These activities, often guided by the WHO Global Action Plan, include
  - strengthening surveillance,
  - improving infection control,
  - enhancing awareness, and
  - optimizing antimicrobial use.
- Key challenges identified for the implementation of the NAP-AMR included **lack of adequate funding; difficulties in effective collaboration across and within relevant sectors**; weak laboratory-clinical interface; erratic supply of laboratory reagents, equipment, and supplies leading to underutilization of microbiology laboratories; and poor internet connection





Finanziato  
dall'Unione europea  
NextGenerationEU



Ministero  
dell'Università  
e della Ricerca



Italiadomani  
PIANO NAZIONALE  
DI RIPRESA E RESILIENZA



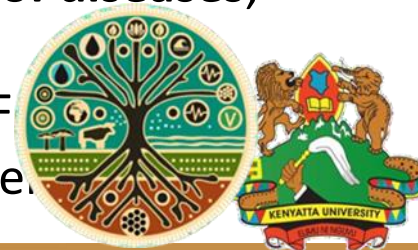
## Key strategies of using one health to address anti-microbial resistance

**Responsible Antimicrobial Use in Agriculture:** Implementing **strict veterinary oversight and improving animal husbandry** (e.g., vaccines, probiotics) reduces the reliance on antibiotics in livestock, minimizing the selection pressure that creates drug-resistant pathogens

**Environmental Protection and Waste Management:** Enhancing **wastewater treatment processes**, particularly near pharmaceutical manufacturing sites, hospitals, and farms, prevents active antimicrobials and resistant genes from entering the soil and water, which serves as a major reservoir for AMR dissemination

**Infection Control (WASH Improvement):** Improving Water, Sanitation, and Hygiene (WASH) infrastructure in communities and healthcare settings reduces the **overall transmission of diseases**, which decreases the total demand for antibiotics in both humans and animals

**Collaborative Policy and Action:** Global collaboration (e.g., World Health Organization, FAO, Agriculture Organization, World Organisation for Animal Health) fosters consistent, evidence-based practices that address the root causes of resistance across all three sectors.





Finanziato  
dall'Unione europea  
NextGenerationEU



Ministero  
dell'Università  
e della Ricerca



**Italiadomani**  
PIANO NAZIONALE  
DI RIPRESA E RESILIENZA



UNIVERSITÀ  
DI PISA

# 3. Food safety



Finanziato  
dall'Unione europea  
NextGenerationEU



Ministero  
dell'Università  
e della Ricerca



Italiadomani  
PIANO NAZIONALE  
DI RIPRESA E RESILIENZA



UNIVERSITÀ  
DI PISA

## Food safety

- Food safety ensures food is free from contaminants and risks (like bacteria or chemicals) to **prevent illness, while food security means everyone has consistent physical and economic access to enough safe, nutritious food for a healthy life.**
- They're linked: **unsafe food undermines security, but security also requires safety measures**, involving different strategies, from hygiene (safety) to poverty reduction (security)
- One Health should ensure safety from "**farm to fork**" by **addressing contamination at all stages.**
- Practices preventing foodborne illnesses by keeping food free from harmful biological or chemical contaminants.





Finanziato  
dall'Unione europea  
NextGenerationEU



Ministero  
dell'Università  
e della Ricerca



Italiadomani  
PIANO NAZIONALE  
DI RIPRESA E RESILIENZA



- Unsafe food causes illness (600M people annually) and economic loss, hindering development
- An estimated 600 million – almost 1 in 10 people in the world – fall ill after eating contaminated food and 420 000 die every year.
- **US\$ 110 billion is lost each year in productivity and medical expenses** resulting from unsafe food in low- and middle-income countries.
- **Children under 5 years of age carry 40%** of the foodborne disease burden, with 125 000 deaths every year.
- **Foodborne diseases impede socioeconomic development** by straining health care systems and harming national economies, tourism, and trade.



Finanziato  
dall'Unione europea  
NextGenerationEU



Ministero  
dell'Università  
e della Ricerca



Italiadomani  
PIANO NAZIONALE  
DI RIPRESA E RESILIENZA



UNIVERSITÀ  
DI PISA

## KEY APPLICATIONS OF ONE HEALTH IN FOOD SAFETY

- **Integrated Surveillance:** Monitoring diseases in livestock, wildlife, and ecosystems helps detect potential outbreaks early, before they affect humans.
- **Managing Zoonotic Diseases:** By understanding the transmission of pathogens like Salmonella at the human-animal-environment interface,, specific control measures can be implemented in production systems
- **Addressing AMR:** The framework tackles the spread of antimicrobial-resistant bacteria, which can move through the food chain from animals to humans
- **Environmental Risk Reduction:** Identifying how factors like climate change, water pollution, and land use affect the survival of foodborne pathogens allows for better prevention strategies
- **Cross-Sectoral Collaboration:** Combining veterinary inspections, food safety public health data helps in creating more effective, comprehensive policies





Finanziato  
dall'Unione europea  
NextGenerationEU



Ministero  
dell'Università  
e della Ricerca



Italiadomani  
PIANO NAZIONALE  
DI RIPRESA E RESILIENZA



UNIVERSITÀ  
DI PISA

- Environmental factors significantly influence food safety.
- Climate change, deforestation, and pollution affect the prevalence and distribution of foodborne pathogens. Rising temperatures, for example, can promote the growth of certain bacteria in food, while extreme weather events can disrupt food production and increase the risk of contamination
- Effective food safety requires a coordinated and integrated approach.
- For example, veterinarians play a crucial role in identifying and controlling zoonotic diseases in animals, while public health officials investigate foodborne outbreaks and implement control measures.
- Environmental scientists monitor environmental contamination and assess the impact of climate change on food safety.





Finanziato  
dall'Unione europea  
NextGenerationEU



Ministero  
dell'Università  
e della Ricerca



Italiadomani  
PIANO NAZIONALE  
DI RIPRESA E RESILIENZA



UNIVERSITÀ  
DI PISA

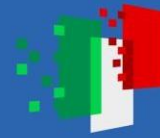
# 4. Environmental contaminants



Finanziato  
dall'Unione europea  
NextGenerationEU



Ministero  
dell'Università  
e della Ricerca



Italiadomani  
PIANO NAZIONALE  
DI RIPRESA E RESILIENZA



UNIVERSITÀ  
DI PISA

## Environmental contaminants

- Environmental contamination is the **introduction of harmful chemical**, physical, or biological substances into air, water, and soil, primarily driven **by human activities like industrial processes, agriculture**, and urbanization. These pollutants, including heavy metals, pesticides, and microplastics, degrade ecosystems, reduce biodiversity, and pose severe, long-term risks to human health.
- Contamination of water, soil, and air from industrial, agricultural, and residential waste directly impacts human and animal health.
- Pollution of air, water, and soil affects both human and animal health. For example, **pharmaceuticals or pesticides dumped in water** sources can disrupt entire ecosystems and return to humans through food or drinking water.
- Kirago et al 2024: Air pollution is the **eighth leading risk factor for premature death in Kenya**. In Nairobi, high levels of particulate matter causes 400–1,400 premature deaths annually in Nairobi, driven by vehicular emissions, industrial activity, and open waste burning





Finanziato  
dall'Unione europea  
NextGenerationEU



Ministero  
dell'Università  
e della Ricerca



Italiadomani  
PIANO NAZIONALE  
DI RIPRESA E RESILIENZA



UNIVERSITÀ  
DI PISA

**Environmental Impact:** Contamination disrupts ecosystems, causes deforestation, contributes to climate change, and results in bioaccumulation in the food chain.

**Human Health Risks:** Exposure occurs through inhalation, ingestion, and skin contact, leading to toxic reactions and long-term health issues.



Finanziato  
dall'Unione europea  
NextGenerationEU



Ministero  
dell'Università  
e della Ricerca



Italiadomani  
PIANO NAZIONALE  
DI RIPRESA E RESILIENZA



## One health and environmental health

- The **One Health** approach promotes environmental health by recognizing that the health of humans, animals, and ecosystems is inextricably linked and interdependent. Key strategies of promoting environmental health
- **Integrated Environmental Surveillance:** Monitoring pathogens, antimicrobial resistance (AMR), and pollutants across air, water, and soil to detect emerging threats at their source.
- **Ecosystem Restoration and Protection:** Protecting and restoring natural habitats—such as forests and oceans—to maintain biodiversity, which acts as a buffer against disease spillover from wildlife to humans
- **Sustainable Resource Management:** Advocating for land-use planning that limits human encroachment into wild areas and promotes sustainable agriculture to prevent soil and water degradation.





Finanziato  
dall'Unione europea  
NextGenerationEU



Ministero  
dell'Università  
e della Ricerca



Italiadomani  
PIANO NAZIONALE  
DI RIPRESA E RESILIENZA



UNIVERSITÀ  
DI PISA

# 5. Climate Change



Finanziato  
dall'Unione europea  
NextGenerationEU



Ministero  
dell'Università  
e della Ricerca



Italiadomani  
PIANO NAZIONALE  
DI RIPRESA E RESILIENZA



## Climate change

1. **Climate Change** The earth has experienced changes in climate and land use, such as deforestation and intensive farming practices.
2. Disruptions in environmental conditions and habitats can provide new opportunities for diseases to pass to animals.
3. climate-driven environmental degradation causes **zoonotic diseases, malnutrition, and vector-borne illnesses that impact all species**. It requires a multi-sectoral approach to address food safety, biodiversity loss, and ecosystem health together.
4. Acting as a "threat multiplier," **climate change drives animal migration and changes disease dynamics, leading to an estimated 250,000 additional human deaths per year from conditions like malnutrition and heat stress**





Finanziato  
dall'Unione europea  
NextGenerationEU



Ministero  
dell'Università  
e della Ricerca



Italiadomani  
PIANO NAZIONALE  
DI RIPRESA E RESILIENZA



UNIVERSITÀ  
DI PISA

## Impacts of climate change on human, animals and environment

**Emerging Zoonotic Diseases:** Rising temperatures and habitat destruction increase risks of diseases jumping from animals to humans, such as COVID-19 or Ebola.

**Vector-Borne Diseases:** Warmer climates expand the geographical range of mosquitoes and ticks, spreading diseases like malaria, dengue, and chikungunya.

**Food and Water Insecurity:** Extreme weather (floods/droughts) degrades agriculture and water supplies, increasing malnutrition and waterborne diseases like cholera.

**Environmental Degradation:** Pollution and loss of biodiversity undermine ecosystem stability, threatening the natural resources needed for human and animal survival.





Finanziato  
dall'Unione europea  
NextGenerationEU



Ministero  
dell'Università  
e della Ricerca



Italiadomani  
PIANO NAZIONALE  
DI RIPRESA E RESILIENZA



UNIVERSITÀ  
DI PISA

## Climate change policy framework

Kenya's effort to address climate change.

- Kenya's One Health and climate change policy framework is highlighted in the **Kenya Climate Change and Health Strategy 2024–2029** and the **One Health Strategic Plan (2021–2025)**.
- These frameworks address **climate-sensitive diseases (e.g., Rift Valley Fever)**, strengthen surveillance, and promote interdisciplinary coordinated action across sectors.





Finanziato  
dall'Unione europea  
NextGenerationEU



Ministero  
dell'Università  
e della Ricerca



Italiadomani  
PIANO NAZIONALE  
DI RIPRESA E RESILIENZA



## One health and climate changes

To address climate change effectively, the **One Health** framework integrates the health of humans, animals, and the environment. This holistic approach focuses on the root causes of global crises rather than treating them in isolation.



## 1. Strengthening Climate Mitigation

The intersection of these sectors provides direct pathways to reduce greenhouse gas emissions:

**Sustainable Agriculture:** Integrating One Health into farming reduces environmental degradation.

For instance, **effective manure management** can lower methane emissions while mitigating disease risks by using manure for biogas or fertilizer

**Responsible Antimicrobial Use:** Reducing the misuse of antibiotics in livestock not only curbs **Antimicrobial Resistance (AMR)** but can also contribute to lower methane emissions in ruminants

**Ecosystem Conservation:** Protecting forests and wetlands serves as a critical **carbon sequestration** strategy while simultaneously reducing the risk of zoonotic pathogen spillover into humans





Finanziato  
dall'Unione europea  
NextGenerationEU



Ministero  
dell'Università  
e della Ricerca



Italiadomani  
PIANO NAZIONALE  
DI RIPRESA E RESILIENZA



UNIVERSITÀ  
DI PISA

## 2. Enhancing Climate Adaptation & Resilience

One Health strategies help communities and systems adapt to a warming world

- **Integrated Surveillance Systems:** Monitoring pathogens across humans, wildlife, and livestock allows for **early warning** of outbreaks. Detecting vector-borne diseases in animals or vectors before they reach humans can **significantly reduce health costs and prevent** pandemics
- **Food Security Protections:** By addressing animal and plant health concurrently, One Health secures diverse food sources. **Protecting livestock and crops from climate-driven heat stress and disease** ensures a **stable food supply**, particularly for vulnerable pastoralist communities.

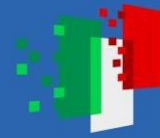




Finanziato  
dall'Unione europea  
NextGenerationEU



Ministero  
dell'Università  
e della Ricerca



**Italiadomani**  
PIANO NAZIONALE  
DI RIPRESA E RESILIENZA



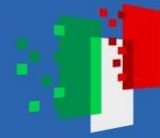
# Conclusion



Finanziato  
dall'Unione europea  
NextGenerationEU



Ministero  
dell'Università  
e della Ricerca



Italiadomani  
PIANO NAZIONALE  
DI RIPRESA E RESILIENZA



UNIVERSITÀ  
DI PISA

## Challenges of using one health to address public health issues

- Large number of people are **in contact with pet and farming animals** = hotspot for emerging zoonotic diseases
- Animal health sector **lacks proper surveillance and reporting of animal diseases** and laboratory diagnosis
- Lack of **support from partners, especially medical personnel**, in setting up surveillance programs
- **Milder zoonotic diseases that pose low and medium risk** which when not addressed can convert into major problem are not monitored.
- Wild zoonosis lacks proper attention.
- **Insufficient collaboration and coordination** among the stake holders to adopt a standard OH protocol





Finanziato  
dall'Unione europea  
NextGenerationEU



Ministero  
dell'Università  
e della Ricerca



Italiadomani  
PIANO NAZIONALE  
DI RIPRESA E RESILIENZA



UNIVERSITÀ  
DI PISA

# How the intersection of human health, animal health and environment fields is used to address specific threats:

## 1. Integrated Disease Surveillance and Early Detection

Instead of waiting for human outbreaks, One Health **surveillance monitors animal populations** (both wildlife and livestock) to identify pathogens before they cross over to humans.

- **Ebola:** Surveillance focuses on fruit bats (the suspected reservoir) and non-human primates in forest-human interfaces, particularly in areas with high deforestation, to predict and prevent spillover.

- **Rabies:** Coordinated systems **monitor dog populations for infections**, allowing for **targeted responses before human exposure**.

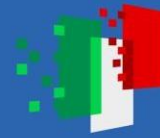




Finanziato  
dall'Unione europea  
NextGenerationEU



Ministero  
dell'Università  
e della Ricerca



Italiadomani  
PIANO NAZIONALE  
DI RIPRESA E RESILIENZA



UNIVERSITÀ  
DI PISA

## 2. Proactive Vaccination and Control Programs

One Health uses veterinary and environmental interventions to stop the transmission chain at its source.

- **Rabies:** Mass vaccination of dogs, rather than relying solely on human post-exposure treatment, **breaks the cycle of transmission**. This has successfully eliminated human rabies in regions of the Philippines and parts of Africa.
- **Ebola:** Research and development of vaccines for primates in the wild can reduce the risk of transmission to humans.





Finanziato  
dall'Unione europea  
NextGenerationEU



Ministero  
dell'Università  
e della Ricerca



Italiadomani  
PIANO NAZIONALE  
DI RIPRESA E RESILIENZA



UNIVERSITÀ  
DI PISA

### 3. Environmental Management and Land-Use Planning

- **Reducing Spillover Risks:** By monitoring deforestation and habitat encroachment, ecologists can **map "hotspots" where human interaction with wildlife is too high**, allowing for land-use policies that create safer, more sustainable buffers.
- **Vector Control:** For diseases like Rift Valley Fever, environmental management includes **monitoring rainfall and water management to reduce mosquito populations**, which act as vectors for livestock-to-human transmission.





Finanziato  
dall'Unione europea  
NextGenerationEU



Ministero  
dell'Università  
e della Ricerca



Italiadomani  
PIANO NAZIONALE  
DI RIPRESA E RESILIENZA



## 4. Cross-Sectoral Data Sharing and Collaboration

One Health fosters collaboration between epidemiologists, veterinarians, ecologists, and local communities.

- **"Four-Way Linking approach"**: This method, used in Indonesia, links animal health surveillance data, human health epidemiology, laboratory results, and environmental factors to provide a comprehensive picture of risk.





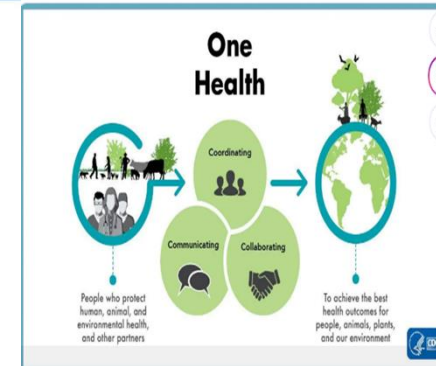
Finanziato  
dall'Unione europea  
NextGenerationEU



Ministero  
dell'Università  
e della Ricerca



Italiadomani  
PIANO NAZIONALE  
DI RIPRESA E RESILIENZA



## 5. Food Safety and Security

- **One Health strengthens surveillance from "farm to fork".**
- **Preventing Infection:** This involves **monitoring livestock for infections like Brucellosis and regulating food handling practices** which **lowers the risk of disease transmission to humans.**

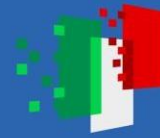




Finanziato  
dall'Unione europea  
NextGenerationEU



Ministero  
dell'Università  
e della Ricerca



Italiadomani  
PIANO NAZIONALE  
DI RIPRESA E RESILIENZA



UNIVERSITÀ  
DI PISA

*Thanks for listening*

