ONE HEALTH FOR CITIES

THE ESSENTIAL GUIDEBOOK FOR CITY MAKERS

SECTION 3: HANDLING INFORMATION MANAGEMENT IN ONE HEALTH

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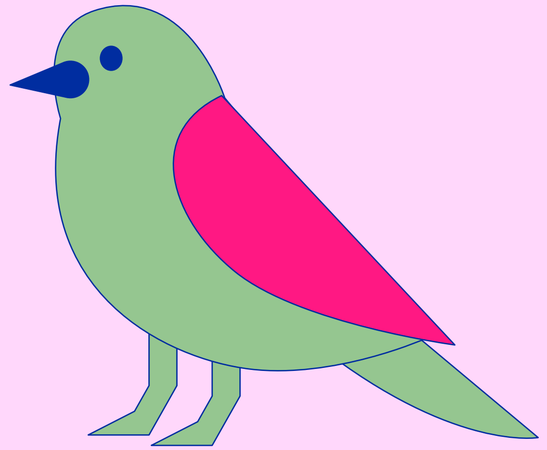


INTRODUCTION

WHY IS INFORMATION MANAGEMENT IMPORTANT IN ONE HEALTH?

Information management in a One Health context involves **collecting, organising, analysing, and sharing high-quality data** on the interactions among humans, animals, plants, and urban ecosystems. In fast-changing cities, it enables **early risk detection, coordinated action, informed planning, and evidence-based policies and interventions**. It also strengthens transparency and accountability by showing whether interventions work and how changes in one domain affect others.

Information management operates at **two complementary levels**. The first focuses on **understanding a territory** by establishing baseline conditions, tracking trends, identifying risks, and interpreting ecosystem dynamics.

This includes data on environmental conditions, climate, biodiversity, and human, animal, and plant health, helping activate early-warning and prevention systems.

The second level focuses on **monitoring and evaluating specific interventions**. Linked to a particular policy or project, it involves selecting indicators, setting baselines, tracking changes, and adjusting actions to improve outcomes. While it covers the full scope of One Health variables, the data collected are specific to the intervention.

These levels combined ensure that One Health approach is comprehensive and evidence-based, serving both a **reactive function** (risk detection) and a **strategic purpose** (intervention evaluation).

TYPES OF MONITORING INDICATORS

Monitoring indicators are grouped into five categories: inputs, processes, outputs, outcomes, and impacts. Together, they ensure that cities can assess both the **quality of implementation and the longer-term effects** of One Health interventions.

While **outcome and impact indicators are particularly valuable** for assessing the transformative potential and One Health impacts of interventions, **input, process, and output indicators** remain essential for **evaluating implementation quality** and methodological soundness, especially in contexts where impact data are still limited. For example, cities might begin by tracking the funding allocated to One Health programmes or the number of awareness campaigns conducted before measuring the impact on animal or human health.

Type of Indicator	Explanation	Example for a One Health project
Input Indicator	Measure the resources invested in implementing activities, including funding, personnel, or infrastructure.	• Amount of budget allocated to the coordination of a local One Health working group. • Number of staff assigned to coordinate a local One Health working group.
Process Indicator	Track whether planned activities are carried out effectively and on schedule. Process indicators can also facilitate the monitoring of the 4 Cs (communication, coordination, collaboration and capacity building).	• Percentage of planned One Health • coordination meetings conducted. • Percentage and diversity of stakeholders remaining engaged throughout the project.
Output Indicator	Capture the immediate, measurable results of implemented activities.	• Number of municipal staff trained in One Health principles. • Total area of new green spaces planted (m^2).
Outcome Indicator	Assess medium-term changes that reflect progress toward strategic objectives.	• Percentage of city departments integrating One Health approaches into their thematic strategies by 2030. • Percentage increase in the ecological quality index of restored habitats (based on vegetation structure, ecological connectivity, and presence of indicator species) by 2030.
Impact Indicator	Reflect long-term, sustained transformations in health, environment, or systems performance.	• Percentage reduction in the prevalence of childhood asthma (specified age group) by 2040. • Percentage increase in the city's house sparrow breeding population (e.g., a 12% rise over five years, from 15,000 to 16,800 breeding pairs).

INFORMATION MANAGEMENT AND ONE HEALTH PRACTICAL TIPS

BROADEN THE SCOPE OF THE INFORMATION MANAGEMENT

THE URBAN DETERMINANTS OF ONE HEALTH

Urban environments shape the health of humans, animals, plants, and ecosystems through a web of interconnected factors. These determinants include housing and habitats' quality, green and blue spaces, food and energy systems, mobility patterns, exposure to pollution, governance structures, social equity, the state of air, water, and soil, etc.

While cities often focus on urban determinants of human health, a One Health perspective requires **expanding the lens** to include how **urban systems influence all living beings and the ecosystems** they depend on.

This means identifying, monitoring, and integrating a broader set of determinants:

- **Urban determinants of animal health**
- **Urban determinants of plant health**
- **Urban determinants of ecosystem health**
- **Urban determinants of the interlinkages of One Health**

By systematically tracking these determinants, cities can better understand how urban environments shape health across all domains.

THE INTERLINKAGES OF ONE HEALTH

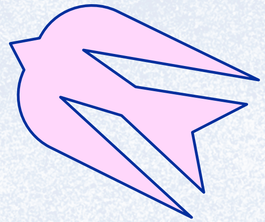
Understanding each domain separately is not enough. **There is no One Health without understanding the interconnections** among human, animal, plant, and environmental health. Effective information management requires analysing how city systems and urban interfaces link these domains together. **Apply a systems thinking approach.**

Interactions occur in places such as parks, rivers, drainage systems, street trees, markets, wastewater networks, industrial zones, community gardens, and shared habitats. **Changes in one area often ripple through others**, sometimes creating co-benefits, sometimes producing unintended impacts.

For example, monitoring antimicrobial resistance (AMR) in wastewater reflects antibiotic use in humans and animals, the performance of sanitation systems, and the health of aquatic ecosystems. When combined with data on biodiversity, air quality, or disease incidence, it reveals hidden patterns and system-wide impacts.

A clear understanding of these interlinkages helps cities anticipate both positive and negative effects of urban actions. A new green space, for instance, may boost mental health and biodiversity while increasing pollen exposure. **Only a holistic view reveals these trade-offs and supports better planning and decision-making.**

By linking data, integrating analyses, and understanding cross-domain interactions, cities can design interventions that are integrated, preventive, and transformative.



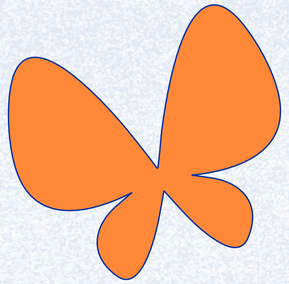
— ONE HEALTH TIPS

— UNDERSTAND THE INTERLINKAGES AND INTERACTIONS

- **Map each indicator across the One Health domains**, human, animal, plant, and environmental health, rather than analysing them in isolation. Use a simple matrix to organise this information and ensure no domain is left out. This approach makes relationships between indicators explicit, highlights gaps in data coverage, and **supports integrated analysis across sectors**.
- **Include indicators that explicitly reflect interlinkages** (ecological connectivity, pathogen circulation, health/environment co-benefits etc.), for example, the number of spillover events per year from wildlife or livestock to humans or the percentage of green corridors (street trees, parks, greenways) that remain physically connected across the city.
- Prioritise indicators that **capture multiple dimensions of health** or serve as key metrics across the One Health domains. Measuring everything is neither necessary nor efficient.
- **Analyse One Health information in context** by integrating health indicators with cross-sectoral datasets, including mobility, heat exposure, biodiversity, socio-economic factors, and water and air quality, etc. (all relevant urban determinants of One Health).
- **Consider the unintended consequences of interventions** or policies that may benefit one domain while harming another. Early identification of trade-offs allows stakeholders to **adjust strategies proactively and minimise risks.**

— INTEGRATE DIVERSE DATA AND SYSTEMS APPROACHES

- **Integrate data from participatory methods**, including citizen science approaches such as community health mapping or participatory sensing. These methods capture lived experiences and support a more democratic understanding of urban health.
- **Integrate spatial data** from multiple sectors and overlay maps to reveal cross-sector patterns and interdependencies.
- **Combine** temporal, behavioural, ecological, sensor-based, and health-system data to build a **multidimensional perspective** and complement with qualitative insights to strengthen the interpretation of patterns and trends.
- Use tools such as systems maps, causal chains, interaction matrices, or co-benefit and trade-off assessments to **structure complex information and make cross-sector relationships visible.**
- **Apply analytical methods** such as network analysis, system dynamics, time-series modelling, and machine learning to uncover feedback loops, hidden pathways, and emerging risks within the One Health system.



STRENGTHEN INFORMATION MANAGEMENT CAPACITY THROUGH COLLABORATION FOR ONE HEALTH

CITIES ARE NOT THE ONLY HOLDERS OF ONE HEALTH DATA

Cities and their departments often **struggle to access data**, especially since much of the information they need comes from outside their own jurisdiction or their department. Access is also limited by licences, privacy rules, security restrictions, and proprietary data controls. **Many municipalities face added challenges**, such as limited resources, competing priorities, siloed departments, and insufficient technical capacity. To build a solid evidence base for decision-making, **cities need to collaborate with universities**, research centres, private companies, utilities, digital platforms, and specialised agencies. These partners offer scientific expertise, complementary datasets, analytical tools, and added credibility.

A COMPLEX, TRANSPARENT INFORMATION SYSTEM REQUIRES ROBUST GOVERNANCE

Given the diversity of data sources and the need to analyse interlinked systems, **strong governance is central to effective One Health information management**. Governance structures should establish clear institutional roles and mandates, protocols for data quality, interoperability, and ethical use, transparent procedures for access, sharing, and **accountability**, and mechanisms for **cross-sector coordination and conflict resolution**. Robust governance ensures that cities and their partners can reliably integrate information, interpret cross-sector connections, and **make decisions that support and improve One Health.**

— ONE HEALTH TIPS

— CREATE AN INFORMATION MANAGEMENT COMMUNITY AND CULTURE

- Identify **where relevant data sits** both inside and outside the municipality. Cities already manage significant datasets (public health, biodiversity, mobility, waste, social surveys). Universities, NGOs, utilities, and private companies hold complementary data on food systems, pollution, mobility, water quality, and more
- **Establish clear partnerships for data-sharing**, define mutual benefits, simplify sharing processes, and agree on protocols for data collection, sharing, analysis, and use. Safeguard privacy and ethical standards while enabling evidence-based decisions.
- **Identify who collects each indicator**, who updates it, who validates it, and who performs cross-sector integration (platforms, workshops, expert review, etc.).
- Ensure that **all sectors have equitable access to shared data** and are fairly represented within the datasets themselves. Prevent any single sector from dominating the information landscape or shaping analyses through an overly anthropocentric lens.
- **Develop interoperable systems** enabling datasets to be shared, overlaid, and compared across institutions. Harmonise formats, scales, and metadata to ensure true integration. **Opt for open data** wherever possible to amplify One Health outcomes and support other projects.

— SET UP ROBUST INFORMATION MANAGEMENT GOVERNANCE

- **Establish an Information Management Committee** to oversee the effective implementation and monitoring of the partnership's results, thereby ensuring accountability and transparency.
- **Introduce governance indicator**s such as: the frequency and quality of information management meetings; the diversity and balance of sector representation; the existence of formal data-sharing agreements, etc.
- **Enhance accountability** by holding regular review meetings to update methodologies, tracking results, and assessing alignment with evolving One Health priorities.

> *"Much of the innovation in One Health information management lies not in collecting new data but in analysing existing datasets in new ways"*
>
> **– Eliabel Seys, Eurometropolis of Strasbourg**

TOOLBOX

TOOLS FOR INFORMATION MANAGEMENT

- One Health Knowledge Audit
- One Health Stakeholder Map
- Urban Determinants of One Health
- How to Design One Health Risk Indicators and do Mapping Analysis

CASE STUDY

UNDERSTANDING THE TERRITORY THROUGH THE ONE HEALTH PERSPECTIVE: STRASBOURG'S WORK ON IDENTIFYING INDICATORS

CONTEXT

As part of the co-creation of the One Health Integrated Action Plan, Strasbourg's local group (ULG) chose an operational approach by defining an experimental sub-area for concrete actions and testing the integration of the One Health approach. This intermediate scale provides a relevant framework for monitoring the various components of human, animal, plant and environmental health. The perimeter encompasses several neighbourhoods in Strasbourg and Illkirch (Meinau, Neuhof, Stockfeld, and the Illkirch Innovation Park). It was first sketched out by hand and then consolidated using IRIS statistical units. This territory features a wide variety of environments, uses, and populations, encompassing natural spaces, dense urban areas, transportation infrastructure, deprived areas and industrial zones. All of these elements make it an ideal testing ground for the One Health approach.

While identifying the actions to be implemented, it became clear that there was a need for in-depth, shared knowledge of the area regarding the interrelated issues of human, animal, plant and environmental health. Strasbourg Eurometropolis therefore, called upon the Regional Health Observatory (ORS) Grand Est to make a One Health diagnosis of the territory (first of its kind), a first at this local level. This initial diagnosis establishes a baseline, which is essential for measuring and monitoring the future project's impact.

The development of the method remains crucial: it must define what constitutes a One Health diagnosis, clarify this inherent complexity, and, most importantly, transform this tool into a practical mechanism for effective monitoring and decision support.

The collaborative effort between the Strasbourg team and the ORS successfully established a preliminary methodology for territorial analysis grounded in the One Health approach. This methodology involved defining the conceptual scope, identifying priority themes, selecting and structuring indicators, and choosing appropriate representation methods. Consequently, it provides the foundation for a comprehensive, holistic understanding of the territory's local issues by integrating social, health, environmental, and ecological data.

METHOD

The results of the work completed by ORS Grand Est are presented below.

- A large amount of data from multiple sources
- Various forms of analysis: key figures, maps, illustrations, photos, etc.
- Presentation in the form of a 16-page summary booklet

The selected indicators are divided into seven thematic groups and associated with issues relevant to the One Health approach. Together, they represent the foundation of shared knowledge about the designated area and a basis for implementing integrated actions within it.

Theme	Data and indicators selected	One Health issues
Territorial features	• Sociodemographic data: number of inhabitants, density, age structure • Social conditions: poverty rate, unemployment, proportion of young people without employment or training, single-parent families • Social disadvantage index (based on the unemployment rate, proportion of manual workers, proportion of high school graduates, and median income) • Type and status of housing: proportion of collective and social housing	• Human health: identifying social and territorial health inequities, identifying areas requiring special attention and targeted prevention needs, raising awareness • Environmental health: influence of living conditions on exposure to risks • Animal health: indirect (urban pressure, proximity to habitats/natural areas)
Living environment	• Housing quality: energy performance rating, greenhouse gas emissions, heating method, proportion of households experiencing energy poverty • Facilities serving vulnerable groups: nurseries, schools, middle schools, high schools, nursing homes, social and medical-social institutions • Access to food: food shops, markets, local producers, family gardens • Mobility: transport networks, cycle paths, pedestrian and sports routes	• Human health: effects of fuel poverty on physical and mental health, role of housing in health, access to healthy and sustainable food, social cohesion, soft mobility • Environmental health: impact of heating systems and infrastructure on emissions and biodiversity • Animal health: waste management
Natural spaces, resources, and biodiversity	• Biophysical land cover (Corine land cover): artificial areas, forests, grasslands, wetlands, water bodies) • Wetlands, water supply, catching areas, and water quality • Eco-geographical entities (defined according to climate, soil, topography, hydrology): coherent natural units for ecological management • Fauna/flora biodiversity inventory, list of protected species and associated issues • Trails and outdoor walking areas	• Human health: benefits of contact with nature, opportunities for outdoor activities, environmental education, risks associated with wetlands (mosquitoes) • Environmental health: role of forests and meadows in carbon storage, heat and water regulation, protection of water resources, preservation of biodiversity • Animal health: preservation of habitats, support for ecological balance, species conservation

Protection tools and measures	• Green network: terrestrial continuities including forests, hedgerows, meadows, bocage, and agricultural areas of high ecological value • Blue network: aquatic continuity including rivers, streams, ponds, wetlands, marshes, and bodies of water • Dark network: management of artificial light at night along ecological corridors, light pollution • Biodiversity reservoirs and ecological corridors	• Human health: managing zoonotic risks, balancing nature in cities with health safety • Environmental health: adapting to climate change • Animal health: tackling habitat fragmentation, biodiversity reservoirs and ecological corridors, maintaining connectivity for species, preserving and restoring biodiversity
Activities and pressures	• Land use: types of agricultural activities, commercial, business, and service areas, industrial areas (proportion of artificial surfaces) • Air pollution: concentrations of the main pollutants NO_2, PM10, ozone • Noise pollution: road and industrial noise maps • Urban heat islands (local climate zone – LCZ): building typology and vegetation cover • Climate projections for 2030, 2050, and 2100	• Human health: exposure to pollution, noise, and heat; increased inequalities; building thermal renovation • Environmental health: preservation of green spaces and tree canopy • Animal health: adaptation of habitats in the face of artificialization; increased zoonotic risk
Proximity to animals	• Presence of species of concern: rodents, mosquitoes, pigeons, and domestic animals • Management and control measures: regulation campaigns, entomological monitoring, and public awareness.	• Human health: well-being, prevention of nuisances and zoonoses • Environmental health: balance between urban wildlife and natural spaces • Animal health: integrated and balanced management of animal populations, co-existence between domestic and wild animals, and consideration of animal welfare
Human health	• Accessibility to healthcare: density of healthcare professionals, distance to a pharmacy • Emerging risks: environmental diseases, zoonoses • Epidemiological data: mortality rates, prevalence of chronic diseases (diabetes, obesity, overweight)	• Human health: comprehensive monitoring of health status, identification of local disparities • Environmental health: integration of environmental exposure into health policies

HOW TO ADVANCE THIS METHODOLOGY

- **Cross data and analyse interlinkages**: Shifting from a data inventory to a systemic and temporal analysis, highlighting the interactions between social, environmental, health, and ecological conditions to identify areas of cumulative vulnerabilities and co-benefits.
- **Integrate social and behavioural dimensions**: Supplement quantitative data with qualitative information on behaviours and lifestyles, residents' perceptions, and community and citizen initiatives to better understand the territorial dynamics.
- **Strengthen the animal health component**: Document the links between domestic animals, wildlife, and livestock farming (livestock populations, veterinary data, antibiotic use, health monitoring).
- **Introduce the concept of exposome**: Analyse data on pesticide contaminants, heavy metals, endocrine disruptors (in water, soil, air), and map multiple exposures to identify cumulative areas.
- **Analyse governance mechanisms**: Identify local actors, programs, and policies and explore synergies and gaps.

— EXTRA ONE HEALTH TIPS

- Quantify human–environment relationships more systematically, as these links, though evident, remain under-measured in many contexts.
- Strengthen the animal health component by going beyond basic biodiversity inventories to capture more meaningful indicators.
- Incorporate qualitative and social dimensions to fully understand territorial dynamics and lived experiences.
- Address social and environmental health inequities to more effectively prioritise actions and interventions.