



# Training a New Generation of One Health Scientists



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WP6 Lead - Professor Roberto La Ragione

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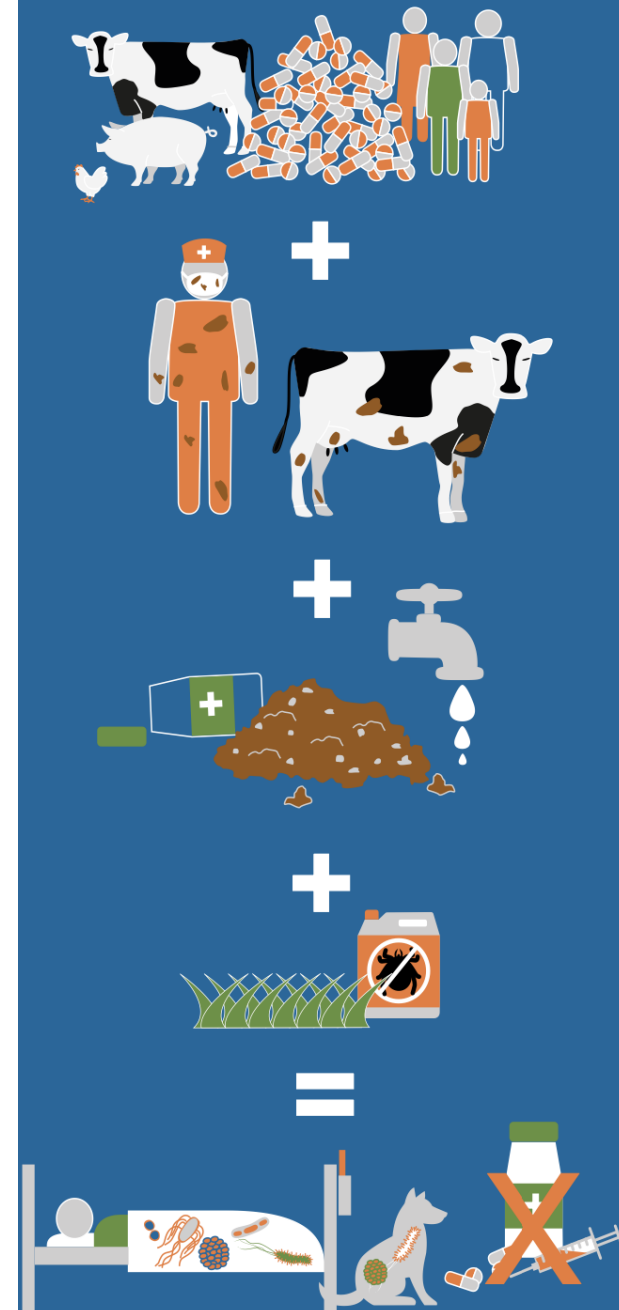
WP5/WP6 Joint Dissemination Webinar





# What are the major One Health (OH) Issues?

- Prevent further outbreaks of zoonotic disease in animals and people.
- Improve food safety and security.
- Reduce antimicrobial-resistant infections and improve human, environmental and animal health.
- Protect global health security.
- Protect biodiversity and conservation.





# Societal impact of One Health issues

- Increased morbidity and mortality.
- Poorer clinical outcomes.
- Environmental cost.
- Societal impact.
- Economic cost.



Expert Opinion on Pharmacotherapy

ISSN: 1465-6566 (Print) 1744-7666 (Online) Journal homepage: <https://www.tandfonline.com/loi/foep20>



## Clinical, economic and societal impact of antibiotic resistance

Steven L. Barriere

To cite this article: Steven L. Barriere (2015) Clinical, economic and societal impact of antibiotic resistance, Expert Opinion on Pharmacotherapy, 16:2, 151-153, DOI: 10.1517/14656566.2015.983077

To link to this article: <https://doi.org/10.1517/14656566.2015.983077>

**WHAT IS THE IMPART PROJECT?**

The IMPART project consists of 11 partners across Europe: The French Agency for Food, Environmental and Occupational Health and Safety (ANSES) in France, Public Health England (PHE) and the Animal Plant Health Protection Agency (APHA) in the UK, the Netherlands Centre for One Health and the National Institute for Public Health and the Environment (RIVM) in The Netherlands, The German Federal Institute for Risk Assessment (BfR) in Germany, Państwowy Instytut Weterynaryjny – Państwowy Instytut Badawczy (PIWET) in Poland, the Statens Serum Institut (SSI) and DTU National Food Institute (DTU FOOD) in Denmark, the Norwegian Veterinary Institute (NVI) in Norway and National Veterinary Institute (SVA) in Sweden.

With these partnerships between human, animal and plant health, food safety and environment protection institutes, the IMPART project aimed to create a unique network to harmonise phenotypic methods for detection of AMR across all pillars of One Health.

At the start of the project, several important knowledge gaps were identified:

- The need for harmonized and reliable methods to detect AMR for monitoring and diagnostic laboratories.
- The lack of harmonized methods for the isolation and detection of *Enterobacteriaceae* (bacteria found in intestinal tracts of human and animals) that are resistant to colistin (antibiotic) and carbapenemase-producing (mechanism of resistance to antibiotics).
- The lack of available criteria (epidemiological cut-off values (ECOFF)) to determine the susceptibility of animal pathogens to veterinary antimicrobials.
- The lack of a cost-effective and rapid method for the antimicrobial susceptibility testing (AST) of *Clostridium difficile*, a bacterium that can cause colitis in human and can be found in various animal species and in the environment.

The IMPART project aimed to address these knowledge gaps by:

- Harmonizing the methods of detection for specific types of AMR associated with bacteria relevant to public health, such as colistin resistant and carbapenemase producing *Enterobacteriaceae*.
- Establishing new laboratory test criteria (ECOFF) to improve international harmonisation of the monitoring of antimicrobial resistance in bacterial pathogens from animals and humans.
- Providing a cost-effective, robust and simple method to routinely test the antimicrobial susceptibility of *C. difficile* strains from human, animal or environmental origin.

Adopting a One Health approach is crucial to address AMR and provide sustainable solutions to keep antimicrobials working. Understanding and monitoring AMR across all pillars of One Health will help to improve antimicrobial stewardship which is defined as the promotion and monitoring of judicious antimicrobials use, to preserve their future effectiveness.

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# Capacity building – One Health Education and Training

What are the gaps?

- Enhancing the knowledge base for research and policy-making.
- Strengthening national and sub-regional cross-sectoral collaborations.
- Building academic capacity in One Health education.
- Enhance the abilities of government and non-governmental actors to deliver One Health solutions.
- Education programmes focused on thinking, planning, shared infrastructure and processes.
- The delivery of One Health through an integrated approach.





# Who should One Health education focus on?

- The public.
- Farmers.
- Health professionals (Vets, doctors).
- Researchers.
- Policy makers.
- Stakeholders (i.e., ECDC).
- Funders.
- Regulators.
- Educators and students (Schools at multi-education levels etc.).



**Save the Date!**  
**Collaborating to Face Future  
One Health Challenges in Europe**  
a One Health conference

**Date:** 19th to 21st June 2023

**Location:** [Museum of Natural Sciences](#), Brussels

**Audience:** Departments and executive agencies of the European Commission;  
Agencies of the European Union;  
One Health and other scientific initiatives;  
Associations for human, animal, and environmental health - private sector,  
citizen, farmers, or patients associations;  
General and specialised press.

**Website:** [for further information](#)

**Registration:** [here](#)



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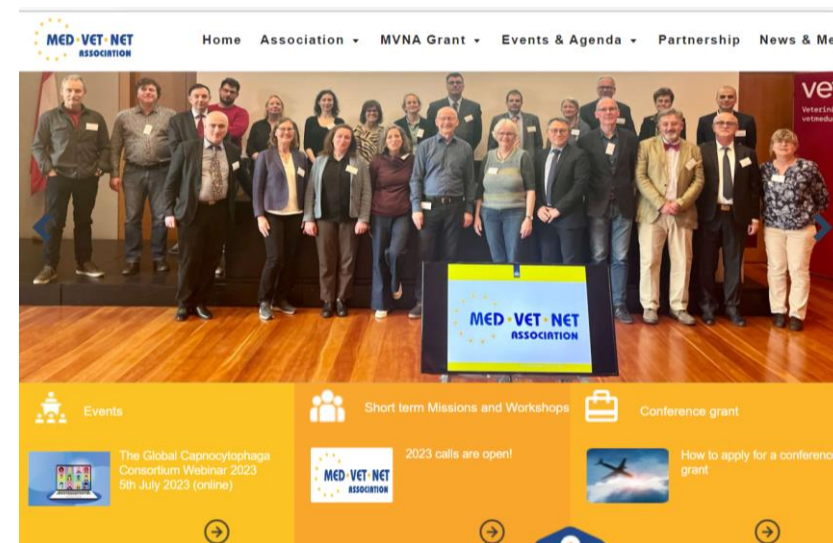
# Education and Training – The Current Status

- Education and Training is available via the OHEJP (CPD, Short-term missions).
- Formal One Health training available via a number of universities.
- European Colleges (ECVM, ECVPH etc.).
- Med-Vet-Net Association.



[Home](#) / [Study with us](#) / [Courses](#) / [Master's degrees](#) / [MSc One Health: ecosystems, humans and animals](#)

## MSc One Health: ecosystems, humans and animals

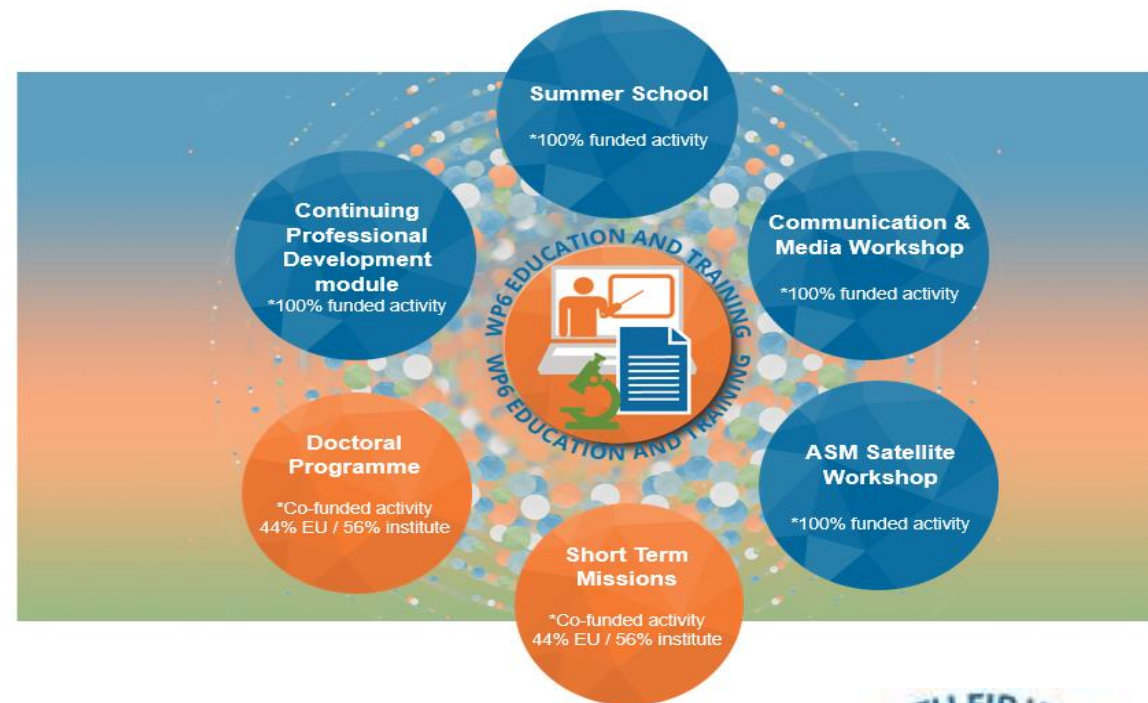




# OHEJP Education and Training Activities (WP6)

Education for the Next Generation of One Health Scientists:

- Doctoral Programme.
- Short Term Missions.
- Summer Schools.
- Continuing Professional Development.





# Doctoral Training Programme

17 PhD projects funded (16 co-funded and 1 via WP7)

What the OHEJP Doctoral Programme delivered:

- Provided interdisciplinary (med-vet-environment) training for the next generation of One Health scientists.
- Allows flexibility in the PhD project to ensure innovative hypothesis-driven research.
- Maximised international and interdisciplinary network among One Health EJP partners.
- Provided opportunities to explore and share skills, expertise and knowledge from the One Health EJP consortium.
- Built a sustainable cohort of PhD students with organised events throughout the One Health EJP.
- Produced **34 peer-reviewed** open-access publications.







# One Health EJP Summer Schools



19<sup>th</sup> – 30<sup>th</sup> August 2019  
Chatham House in London,  
UK

Approaches towards One  
Health Operationalisation

Organised by  
University of Surrey, UK

<https://onehealthjep.eu/community/education-and-training/summer-school-2019>



17<sup>th</sup> – 28<sup>th</sup> August 2020  
Online event

Global One Health, from  
research to practice

Organised by Wageningen  
Bioveterinary Research,  
The Netherlands

<https://onehealthjep.eu/community/education-and-training/summer-school-2020>



26<sup>th</sup> July – 6<sup>th</sup> August 2021  
Online event

Environmental issues in One  
Health: from risk assessment to  
surveillance

Organised by  
The Italian National  
Institute of Health (ISS)

<https://onehealthjep.eu/community/education-and-training/summer-school-2021>



5<sup>th</sup> – 7<sup>th</sup> December 2022  
Online event

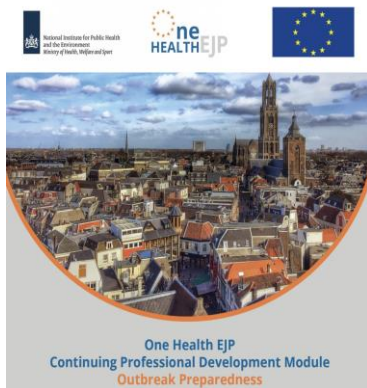
“Sustainability in One Health:  
how can it be achieved?”

Organised by  
University of Surrey, UK

<https://onehealthjep.eu/community/education-and-training/final-school-2022>



# Continuing Professional Development Module (CPD)



16<sup>th</sup> – 17<sup>th</sup> November 2020  
Online event

Outbreak Preparedness

Organised by  
Public Health and the  
Environment (RIVM) in the  
Netherlands

<https://onehealthejp.eu/community/news/ohejp-blog/one-health-ejp-cpd-module-outbreak-preparedness>



February 2021  
Online event

Digital Innovation for One  
Health Practitioners

Organised by  
German Federal Institute  
for Risk Assessment (BfR)

<https://onehealthejp.eu/community/news/ohejp-blog/one-health-ejp-cpd-module-digital-innovation-for-one-health-practitioners>



2<sup>nd</sup> – 4<sup>th</sup> November 2022  
Hybrid event

Rapid diagnostics and harmonisation of  
diagnostic tests.

Organised by  
Technical University of Denmark's  
National Food Institute (DTU Food)  
& Statens Serum Institut (SSI)

<https://onehealthejp.eu/community/news/ohejp-blog/final-cpd-module-delivered-in-denmark>





# ASM Satellites Workshops (SWS)



21<sup>st</sup> May 2019  
Dublin, Ireland

Digital Innovation and Data  
Management

Organised by The Swedish  
National Veterinary  
Institute (SVA), Sweden

<https://onehealthejp.eu/outcomes/workshops/satellite-workshop-2019>



8<sup>th</sup> October 2021  
Online event, WS2020 delayed  
due to COVID-19

Integrated Approach to  
Zoonoses – a systems thinking  
primer

Organised by the National  
Institute for Public Health  
and the Environment, The  
Netherlands

<https://onehealthejp.eu/outcomes/workshops/integrated-approaches-to-zoonoses-workshop>



7<sup>th</sup> June 2021  
Online event

Online Software Fair and  
Developer Meetup

Organised by The German  
Federal Institute for Risk  
Assessment (BfR),  
Germany

<https://onehealthejp.eu/outcomes/workshops/satellite-workshop-2021>



14<sup>th</sup> April 2022  
Hybrid event online and in  
Orvieto, Italy

Diagnostics workshop: Mobile  
detection platforms for One  
Health diagnostics applications

Jointly organised by The  
University of Surrey, UK  
and NUI Galway, Ireland

<https://onehealthejp.eu/outcomes/workshops/satellite-workshop-2022>





# One Health EJP Short Term Missions




**SHORT TERM MISSIONS**

Short Term Missions (STMs) are small travel grants with the aim of:

- Sharing scientific expertise, methodologies, equipment and facilities to harmonise the existing approaches and methodologies within the large OHEJP European network
- Driving the research forward in a collaborative and non-duplicative fashion to strengthen both the scientific capacity within the OHEJP
- Contributing to the future prevention, preparedness, detection and response of the EU to foodborne and other emerging threats across human-animal-environmental sectors.

## Validation and exchange of modelling tools to assess the risk of human Salmonellosis based on environmental factors using multiple sources of data



**Theme:** One Health Missions - Foodborne Zoonoses  
**Home Institute:** University of Surrey, UK  
**Mission Hosting Institute:** Dutch National Institute for Health and Environment (RIVM)  
**Duration of Mission:** 1 month

“  
**The mission has not only helped me to accomplish the main objective of validating the model for my PhD but has also helped me to enhance my networking and communication capacities, opening my mind to different ways of communicating and interpreting each other. I cannot thank the OHEJP consortium enough. It was inspiring to see such motivated and skilled scientists in action applying in practice what I am learning.**

Laura Gonzalez Villeta  
 University of Surrey, UK



The aim of this mission was to investigate whether the effect of weather on human salmonellosis cases is similar regardless of the country under study, using a novel statistical modelling approach developed in the University of Surrey, UK. The model was built on 30 years of daily epidemiological data from the UK Health Security Agency (UKHSA) and a high resolution spatio-temporal matching weather database from the MetOffice. The model first estimates the probability to observe salmonellosis cases conditional on a given combination of weather factors. Based on this information together with local weather and demographic data, the model reproduces relatively well the empirical patterns from epidemiological surveillance data for England and Wales. It also points to maximum air temperature, relative humidity, and day length as one of the most relevant combinations that influence the incidence of the disease.

During this mission, the model was applied to the Dutch setting, using 5 years of national surveillance data on salmonellosis cases reported to the Dutch National Institute of Public Health at a daily resolution and the weather variables of interest for the same period of time obtained from the open-resource Royal Netherlands Meteorological Institute (KNMI) website. To assess the universal component of the model to identify the weather-disease relationship regardless of geographical area, the probability of finding a salmonellosis case calculated for England and Wales were used. The model's results were then compared with salmonellosis disease records from The Netherlands. The preliminary results indicate that the model captures the magnitude and key seasonal patterns of the Dutch data. However, the model also results in some secondary peaks in the incidence in early spring not observed in the real data, perhaps related to differences in notification and health seeking behaviour.

The STM has improved on the relationship between two existing One Health EJP partners and enhanced both current and future collaborations between the partner institutes. A joint publication of the collaborative results should be published soon and this STM should result into a unified programme of research integrating the two approaches over diverse geographic and socio-economics settings.

One Health EJP has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 773830.

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## Construction of dual labelled E. coli strains to study the effect of antibiotics and microbiota interventions on the horizontal transfer of ESBL genes in the in vitro chicken caecal microbiota



**Theme:** One Health Missions - Antimicrobial Resistance (AMR)  
**Home Institute:** Wageningen Bioveterinary Research (WUR), The Netherlands  
**Mission Hosting Institute:** University of Copenhagen, Denmark  
**Duration of Mission:** 2 months

“  
**A short term mission should be a must-do for all young researchers! It was a priceless experience that enriched my knowledge and skillsets and expanded my network. I built up and exercised my lab skills, critical thinking and cooperation in a multidisciplinary group. I was challenged daily with new knowledge and experimental work but also strongly supported by a wonderful work team!”**

Ingrid Cardenas Rey  
 Wageningen Bioveterinary Research, The Netherlands

The aim of this mission was for the PhD student to learn bacterial cloning methods using fluorescent reporter proteins, to produce dual labelled *E. coli* strains. Dual labelling (fluorescent tagging of the chromosome and AMR-gene carrying plasmids) of bacteria is a powerful tool to study plasmid-mediated antimicrobial resistance among complex *in vitro* microbial communities simulated on *in vitro* gut systems like the chicken caeca. This STM enabled the PhD student to reach the objectives proposed in the OHEJP PhD project VIMOGUT, which studies the chicken gut microbiota and microbiota interventions to reduce horizontal transmission of Extended Spectrum  $\beta$ -Lactam (ESBL) genes.

During this mission, five commensal ESBL *E. coli* strains that originated from chicken broiler caeca and belonged to the collection of The Dutch National Reference Lab were used for bacterial cloning experiments. All strains carried an ESBL (blaCTXM-1 and blaSHV-12) or AmpC  $\beta$ -lactamase (blaCMY-2) gene on plasmids highly prevalent in the broilers production and were susceptible to three antimicrobials. Two fluorescent reporter proteins were used for chromosome and plasmid tagging, namely, mCherry and Green fluorescent protein (GFP). Bacterial cloning is a challenging research area that requires time and repeatability of the experimental work. Technical issues and challenges were encountered during this multi-step process. However, the PhD student learned the bacterial cloning techniques needed for the completion of future *in vitro* experiments and developed and strengthened her lab skills.

The STM opened significant cooperation channels between the AMR group at Wageningen Bioveterinary Research and the One Health Antimicrobial Resistance (OHAR) research group at the University of Copenhagen. The output of the work performed during the STM, and upcoming *in vitro* experiments are expected to be published as a collaborative research article in a scientific journal.

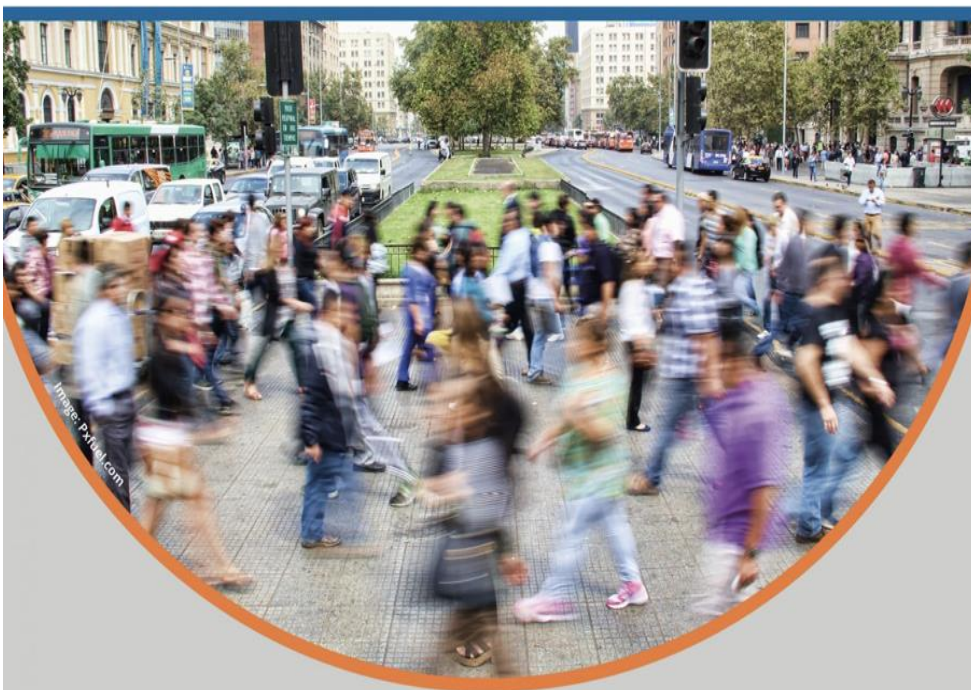
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# Communication and Media workshop (CaM)



**Communications and Media Workshop 2020**  
**How Science Achievements Reach People  
and Contribute to a Better Life**

**ne HEALTHEJP**  
**COMMUNICATION AND MEDIA WORKSHOP 2020**

*"I loved participating in the mock interviews it was a very nice learning experience."*  
Laura Gonzalez Villeta, University of Surrey, UK

*"I am glad I was a part of the One Health EJP Communication and Media workshop as it has taught me, among other things, the importance of having an online presence to share my results with public and other scientists. All the tips on improving my communication skills I obtained during this workshop I can apply to my presentations immediately. It was all well worth it, thank you!"*  
Filip Damek, OHEJP ToxSAUQMRA PhD student, ANSES, France

*"The Communication and Media Workshop taught me that university name can be used as brand to communicate your research. It was an amazing experience to participate in an exemplary media interview which taught us how to deal with the questions of journalists and pitch our messages effectively."*  
Tanveer Munir, Ecole Supérieur du Bois, France

*"I really enjoy the breakout workshop where we have learnt from our experiences and created a presentation that reflects our different contexts."*  
Gerame Sambou, Ministry of livestock and animal production of Senegal, Senegal

*"Thank you very much for facilitating this course! I really learnt a lot about risk communication and successful communication of research results. It gave me a possibility to exchange experience with communication of research results with participants from European and Asian countries representing different cultural and professional backgrounds."*  
Zuzana Nordeng, Norwegian Institute of Public Health (NIPH), Norway

*"Engaging, thought-provoking and comprehensive workshop involving people all across Europe and the world"*  
Patrick Lennard, Leiden University, the Netherlands

5<sup>th</sup> – 6<sup>th</sup> October 2020

Online event

How Science Achievements Reach People and Contribute to a Better Life

Organised by The Bulgarian Food Safety Agency and co-organised with The One Health EJP Communications Team at the University of Surrey, UK.

<https://onehealthejp.eu/outcomes/workshops/communication-and-media-workshop>





# Sustainability – Training and Education activities

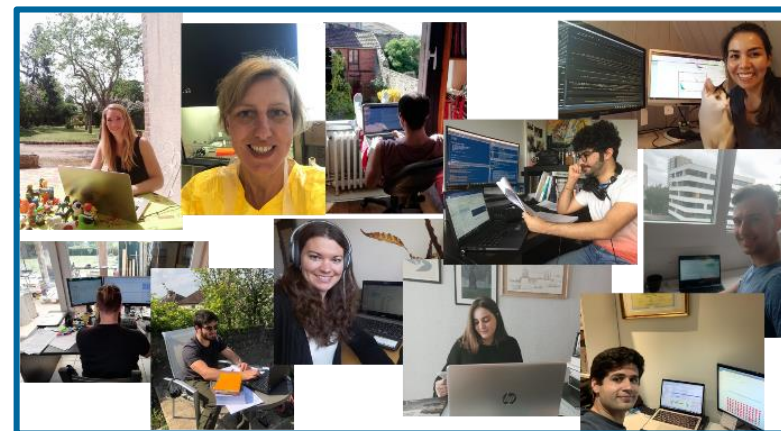
How can the training and education activities be evidenced, and momentum continued going forward?

- Short-term missions – case studies
- PhD projects – publications, outcome brochures
- Continued professional development
- Satellite workshops - testimonials
- Summer Schools – testimonials
- Final training and education outcomes brochure
- Online/social media presence (social media campaigns)
  - a. #OHEJPphdlife
  - b. #wherearetheOHEJPPhDsnow





# Building a One Health community





# Summary

- Access to One Health education and training needs to be improved.
- One Health education and training needs to be tailored to a wider range of audiences.
- Better funding needs to be allocated to One Health education and training.
- Better models for integrating One Health education and training need to be developed.
- One Health education and training needs to be better integrated into medical, veterinary and science curriculums.





# Thank you for your attention!



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