

# Antibiotic Resistance in **W**astewater: Transmission **R**isks for **E**mployees and **R**esidents around **W**aste **W**ater **T**reatment **P**lants

The AWARE-WWTP Study

PhD candidate: Daloha Rodríguez-Molina, MSc

✉ [daloha.rodriguez\\_molina@med.uni-muenchen.de](mailto:daloha.rodriguez_molina@med.uni-muenchen.de)

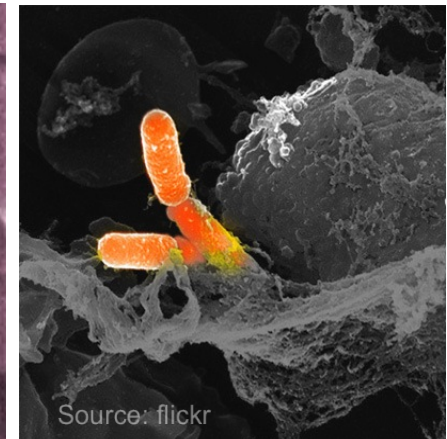
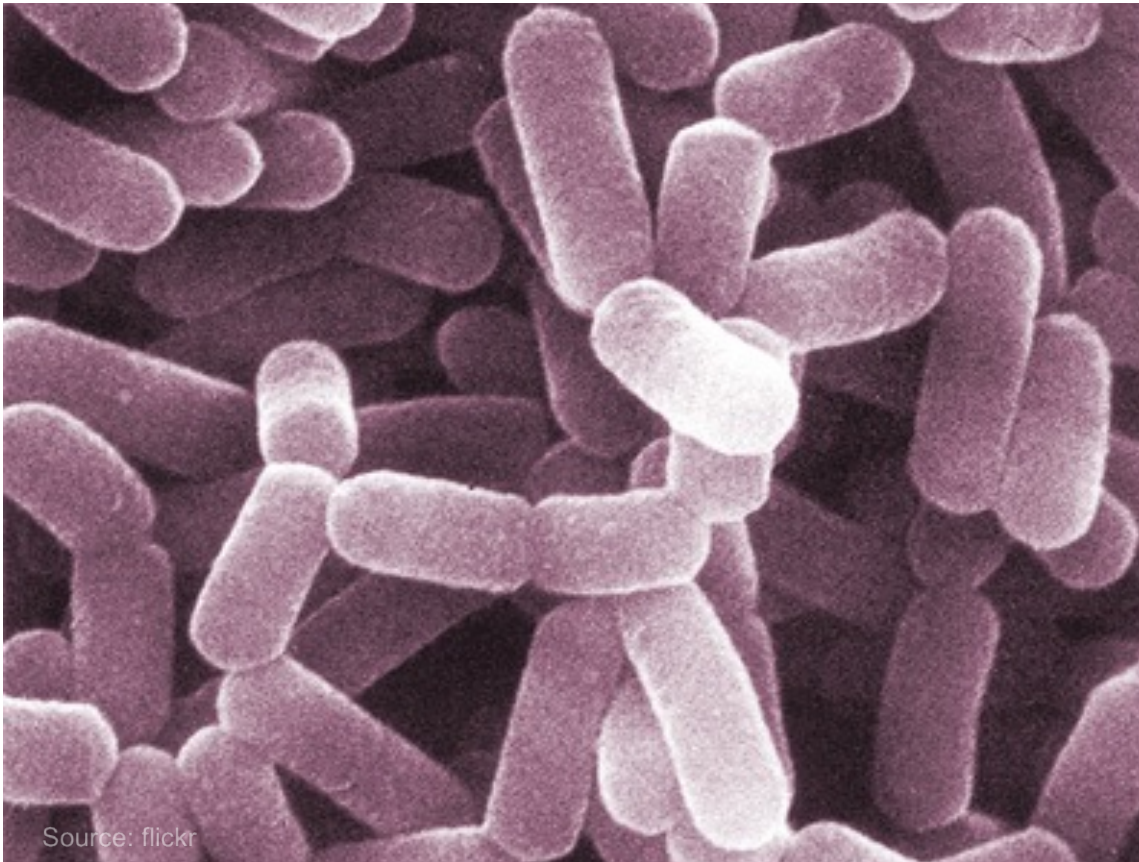
🐦 @darokun

Supervisor: Prof. Dr. Katja Radon, MSc

Post-doc: Dr. Laura Wengenroth, MSc



# 1. Background - Antibiotic Resistance and WWTPs



## 2. Methods

### Study design

Cross-sectional multi-country epidemiological study.

### Exposure assessment

- Questionnaire data
- Quantitative models
  - Ingestion exposure: stool samples
  - Airborne exposure: air and water samples

### Main outcome

Dose-response models for carriage of resistant genes as affected by proximity to WWTP as point source.

### Overview of the AWARE-WWTP study



Source: Study Protocol

Funding:



## 2. Methods

### Population

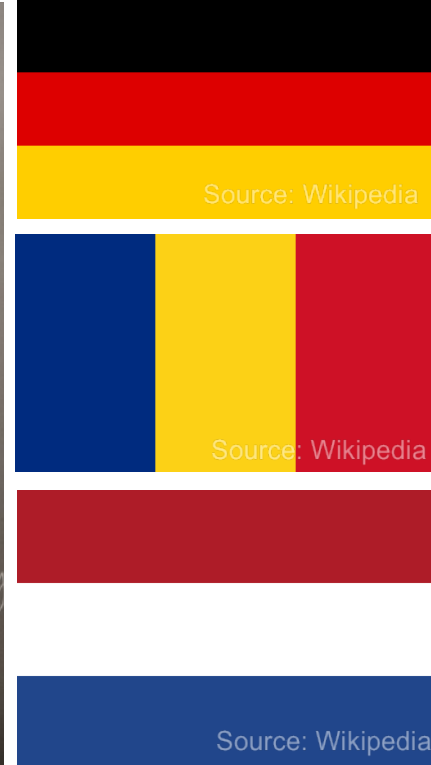
n = 100/country



Close to WWTP: n = 400/country  
Far from WWTP: n = 400/country



Three countries:

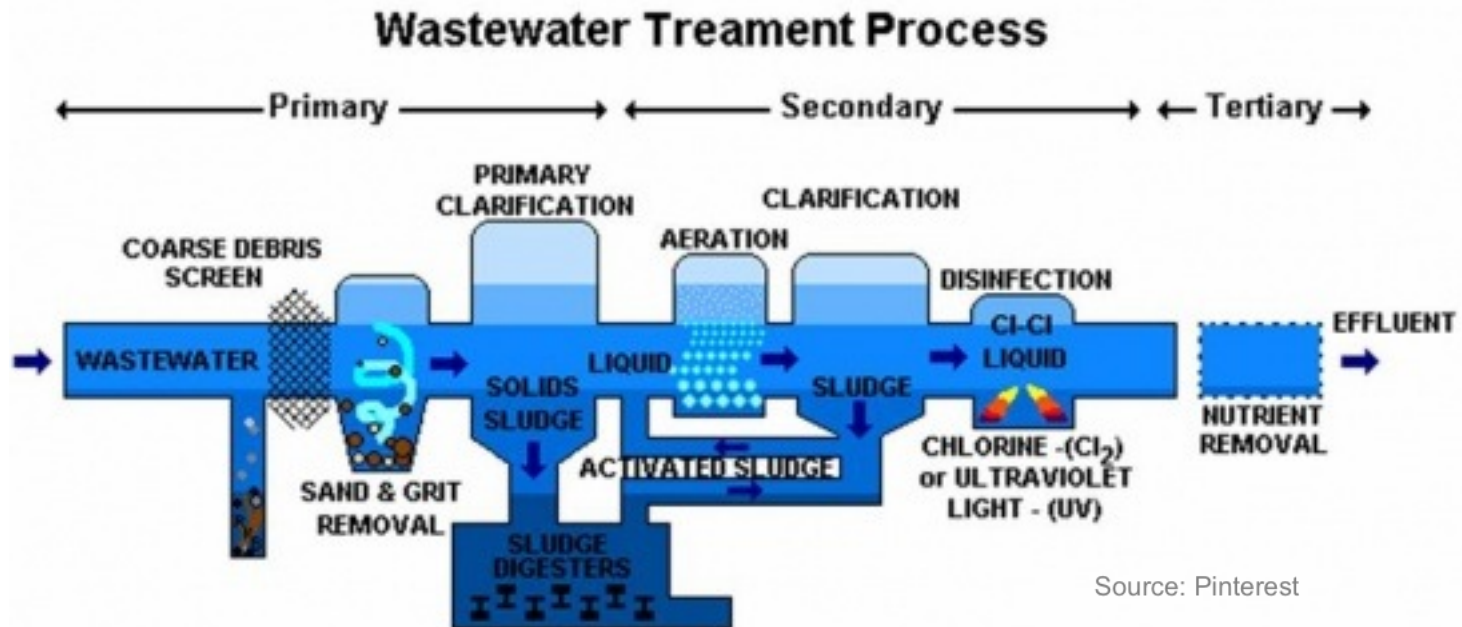




## 2. Methods

WWTP sampling campaign

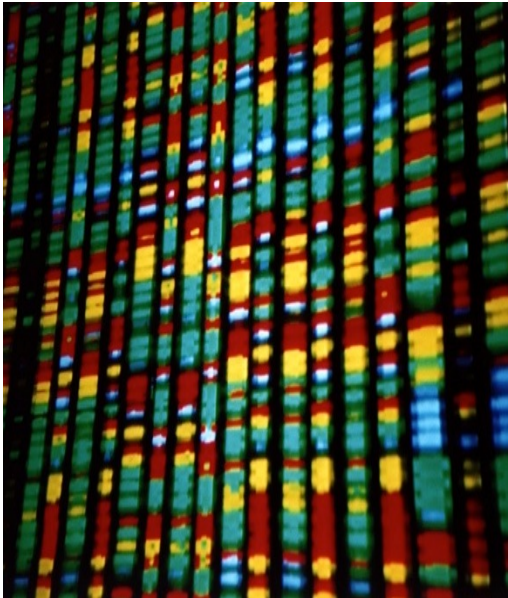
- n = 80 to 100 plants in all three countries.
- Air and water samples.
- Treatment stages to sample: influent, aeration tank, effluent, sewage sludge.



## 2. Methods

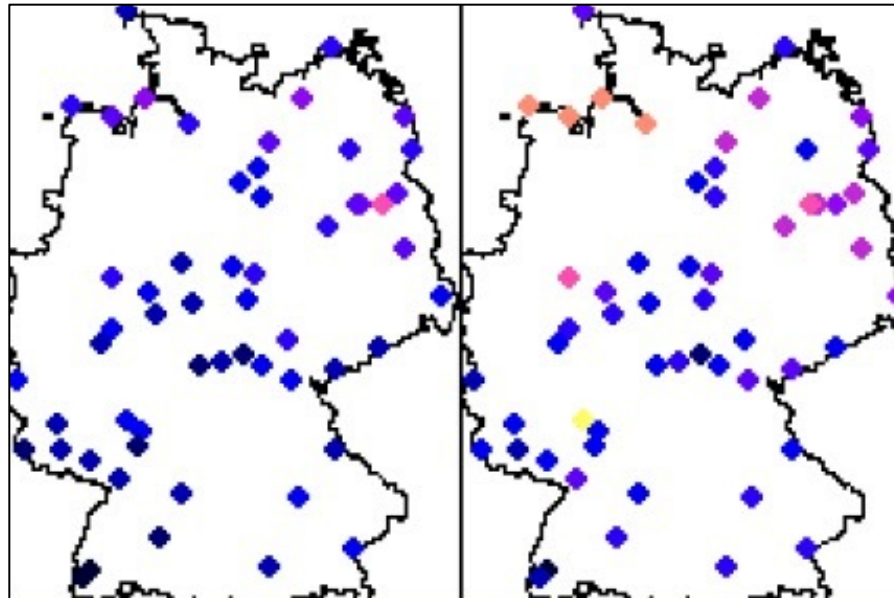
### Analyses

#### Microbiology + Genetics



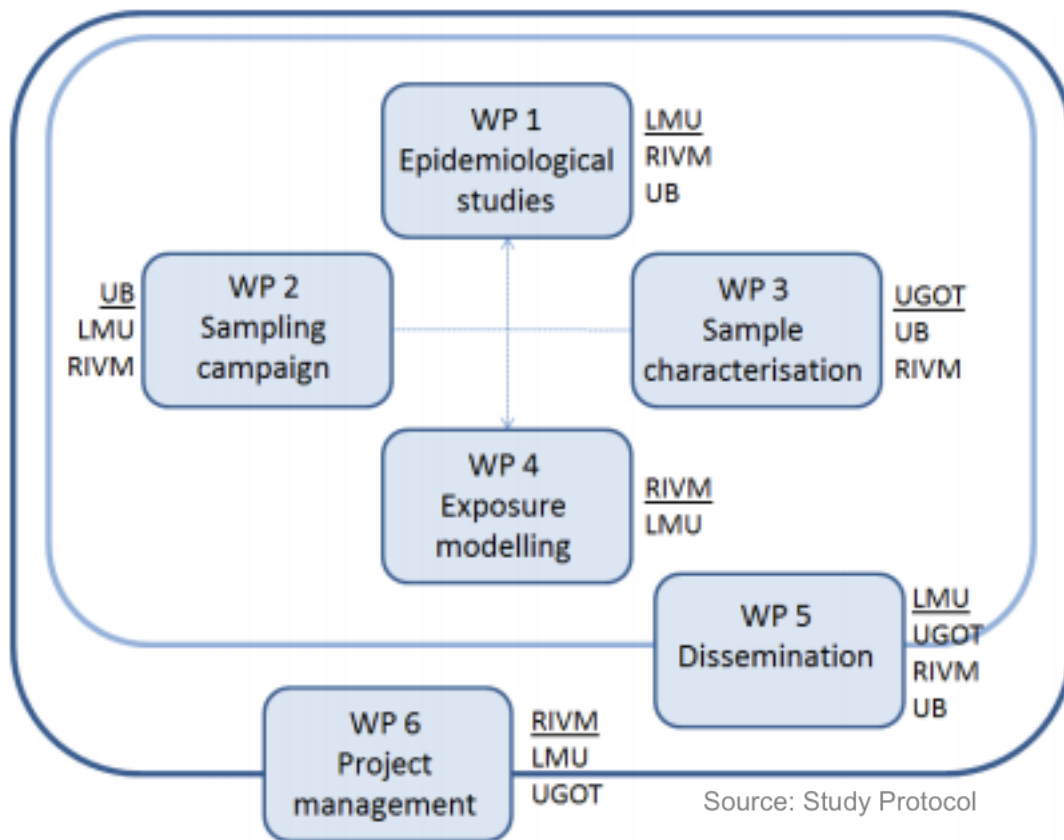
Source: flickr

#### Spatial modeling



Source: Blogspot

### 3. Working packages



Source: Study Protocol

#### Acronyms

LMU



UB



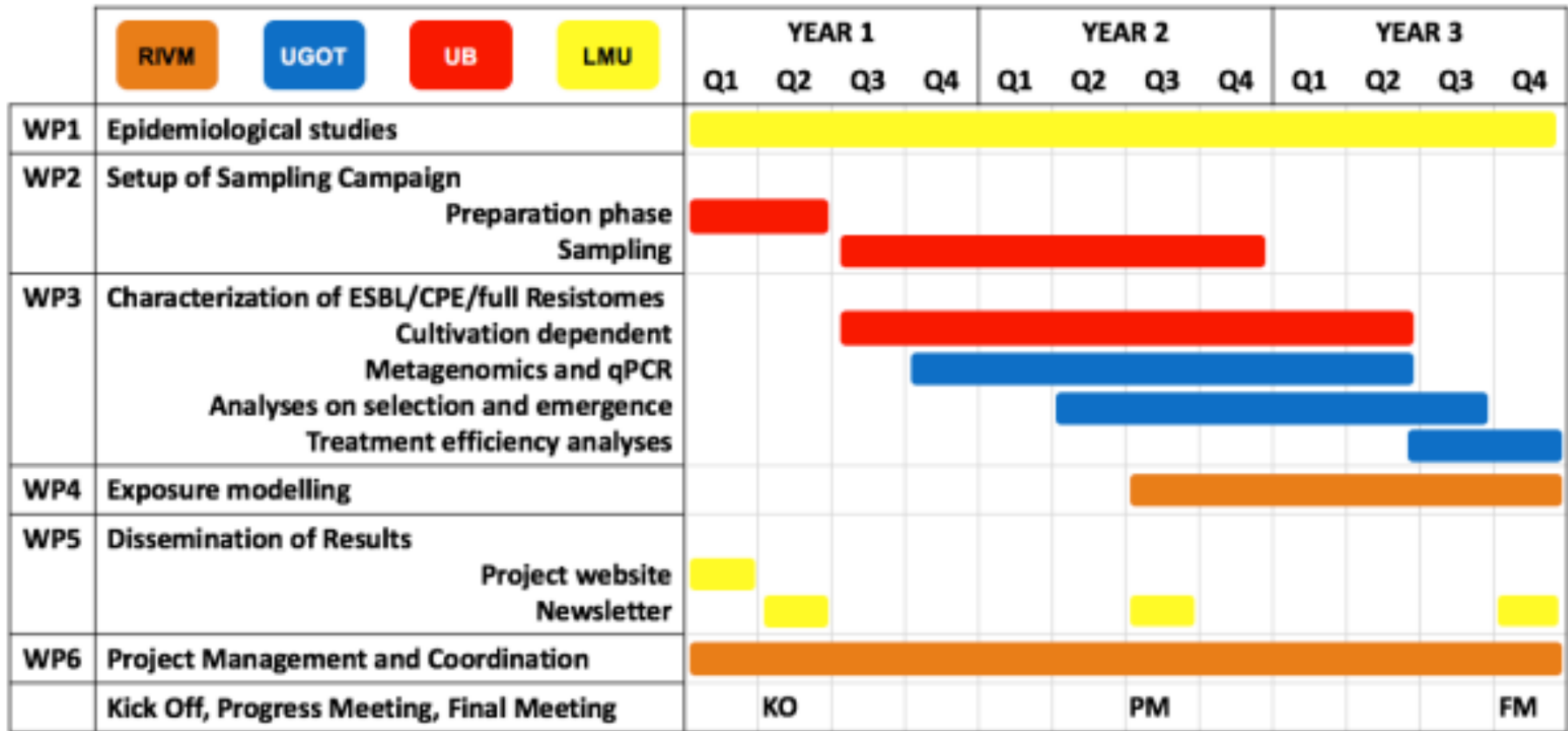
UGOT



RIVM



## 4. Timeline. Start of the project: 01.06.2017



Source: Study Protocol



## 5. Potential risks to project results and how to tackle them

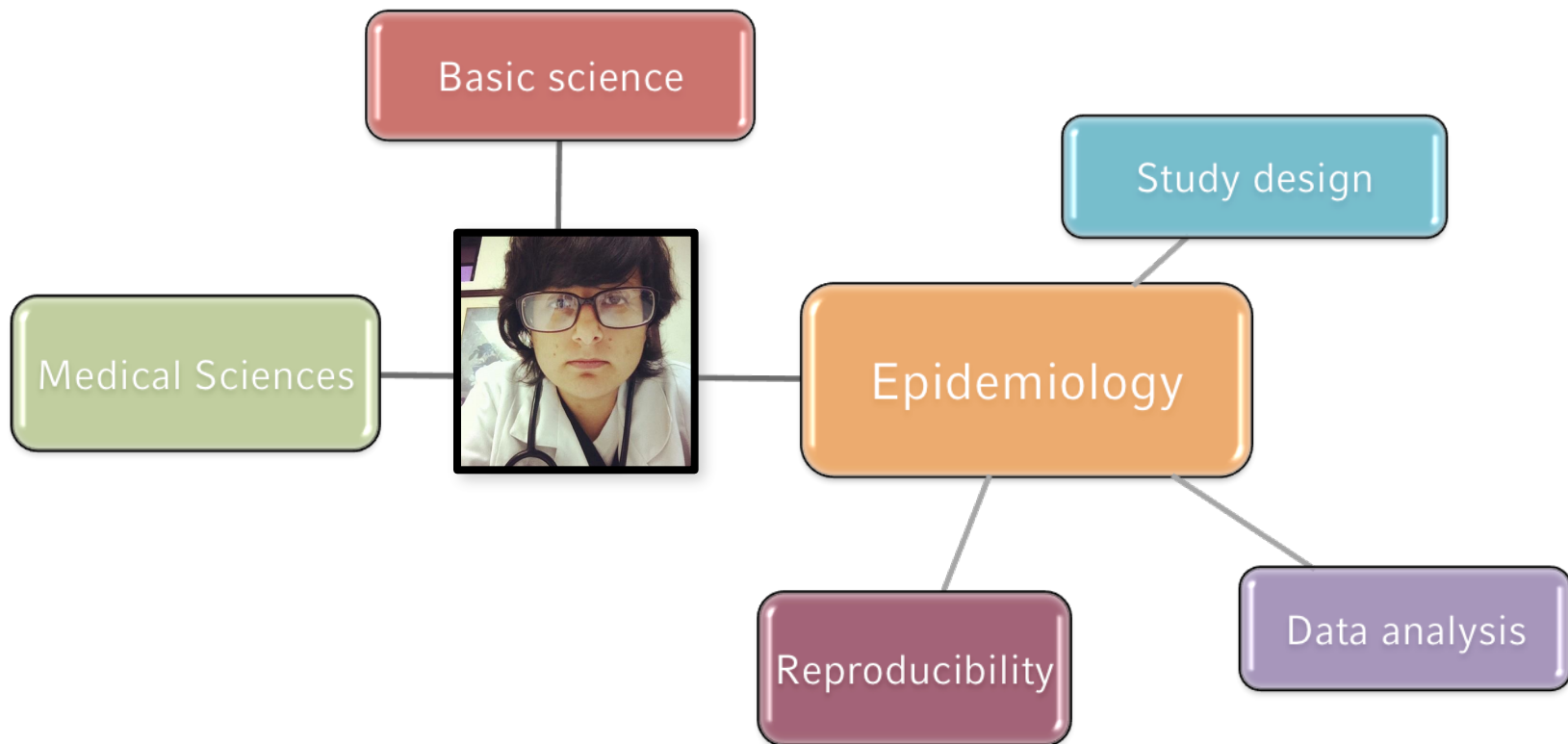
### Potential risks

- Insufficient number of WWTPs.
- Recruitment of insufficient participants.
- Loss of sample during shipment.
- Potential Confounders.
- Difficulties within the consortium.

### How to prevent these risks

- Positive past collaboration with >100 WWTPs in Sweden and the Netherlands.
- WWTPs and the general population have shown high response.
- Companies specialized in international transport of biological samples + sending samples in batches.
- Reduced through careful design of questionnaires.
- Clear consortium agreement, tight communication.

## 6. Motivation to join the AWARE-WWTP project



## 7. Motivation to enroll in the **PhD Medical Research – Epidemiology and Public Health** Program

- It is a structured PhD program
- I find the „Tailor-made learning“ attractive and fitting to my needs
- I would have the support from the IBE and the Pettenkofer School of Public Health
- I can further develop my expertise in the Epidemiology and Public Health fields

# Thank you!

- Questions? Suggestions?

## Contact

✉ [daloha.rodriguez\\_molina@med.uni-muenchen.de](mailto:daloha.rodriguez_molina@med.uni-muenchen.de)

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## References

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- Martinez, J. L. et al. A global view of antibiotic resistance. *FEMS Microbiol. Rev.* 33, 44–65 (2009).
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- Rizzo, L. et al. Urban wastewater treatment plants as hotspots for antibiotic resistant bacteria and genes spread into the environment: a review. *Sci. Total Environ.* 447, 345–360 (2013).

## Image sources

- Slide 1:
  - email icon: <http://www.freeiconspng.com/free-images/email-icon-126>
  - Twitter icon: <http://imageog.flaticon.com/icons/png/512/23/23931.png?size=1200x630f&pad=10,10,10,10&ext=png&bg=FFFFFF>
- Slide 2:
  - left bacteria: <https://www.flickr.com/photos/ajc1/8344600413/>
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- Slide 5:
  - WWTP process: <https://s-media-cache-ak0.pinimg.com/originals/c2/fb/ce/c2fbce6bb007d44e1841e308c8931b7a.jpg>
- Slide 6:
  - DNA: <https://www.flickr.com/photos/creativecomputer/261445720/>
  - spatial model: <http://1.bp.blogspot.com/-FIIQdyY5CE/Vd2CQmxy2hI/AAAAAAAAARGI/Mv7vp4p1sXc/s1600/Fig1.tif>
- Slide 7:
  - flag of Sweden: <http://www.demoshelsinki.fi/wp-content/uploads/2016/07/sweden.jpg>