

From: Joakim Larsson joakim.larsson@fysiologi.gu.se
Subject: evidence relating sanitation and antibiotic resistance
Date: 5 May 2022 at 07:28
To: AMR inquiry amrinquiry@wateraid.org



IRONSCALES couldn't recognize this email as this is the first time you received an email from this sender joakim.larsson@fysiologi.gu.se

Hi,

There are many case studies, but probably much fewer that makes a good comparison among a large number of countries. Here I just want to mention three key studies that provide evidence that countries with low sanitation have a considerably higher antibiotic resistance burden. These countries would in general also have limited hygiene standards in many hospitals:

[https://www.thelancet.com/journals/lancet/article/PIIS0140-6736\(21\)02724-0/fulltext](https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(21)02724-0/fulltext)

<https://pubmed.ncbi.nlm.nih.gov/30177008/>

<https://www.nature.com/articles/s42003-020-01439-6>

Please note that the third paper (Karkman) provides completely independent evidence (based on sewage analyses) compared to the two first ones (clinical surveillance, and in the Lancet paper clinical surveillance + modelling). Karkman used sewage metagenomic data from the Global sewage project, calibrated the genetic analyses with clinical surveillance data in countries with developed high quality surveillance systems, and from that predicted clinical resistance in countries lacking clinical surveillance systems. Note also that sewage analyses compensates for a key weakness in traditional clinical surveillance, in that the comparison between sites (in this case countries) is NOT bias in the same way as clinical data often is (i.e. clinical samples used for generating surveillance data may be taken only in the worst cases if resources are limited). Still – the sewage data tells basically the same story as the (fragmented and potentially biased) clinical surveillance data. This is key to the interpretation. More info on how to interpret sewage surveillance data, see here (particularly table 1):

<https://www.nature.com/articles/s41579-021-00649-x>

Note also the key finding in the Collignon paper that reported/estimated antibiotic use is not at all as good a predictor of the antibiotic resistance burden if you do it on a global scale. Sanitation predicts resistance much better!

In a report I suggest you do not only take into account epidemiological (observational) evidence like this. I also think you should take in data showing positive changes in resistance after measures to increase hygiene. Also – I think you should discuss mechanistic evidence – i.e. to what extent there are logical explanations to and an understanding of why sanitation should have a major impact (I would say there is).

Joakim Larsson

Joakim Larsson, Professor in Environmental Pharmacology
Director, Centre for Antibiotic Resistance Research at University of Gothenburg
(CARE)
Scientific Advisory Board Member, JPIAMR

Department of Infectious Diseases, Institute of Biomedicine
The Sahlgrenska Academy at the University of Gothenburg
Guldhedsgatan 10, SE-413 46, Göteborg, Sweden

office tel: +46-31-342 4625

mobile: +46-709-621068

skype: joakim.larsson.gu

email: joakim.larsson@fysiologi.gu.se

web-site: www.gu.se/en/biomedicine/about-us/department-of-infectious-diseases/joakim-larsson-group

CARE: www.gu.se/en/care

ORCID ID: <https://orcid.org/0000-0002-5496-0328>

Suggested reading: Larsson DGJ, Flach C-F. (2021). Antibiotic resistance in the environment. Nature Reviews Microbiology. <https://doi.org/10.1038/s41579-021-00649-x>

Read-only link: <https://rdcu.be/cAQBC>.