ANTIMICROBIAL RESISTANCE AND OCCUPATIONAL HEALTH

AARHUS INSTITUTE OF ADVANCED STUDIES
AARHUS UNIVERSITY

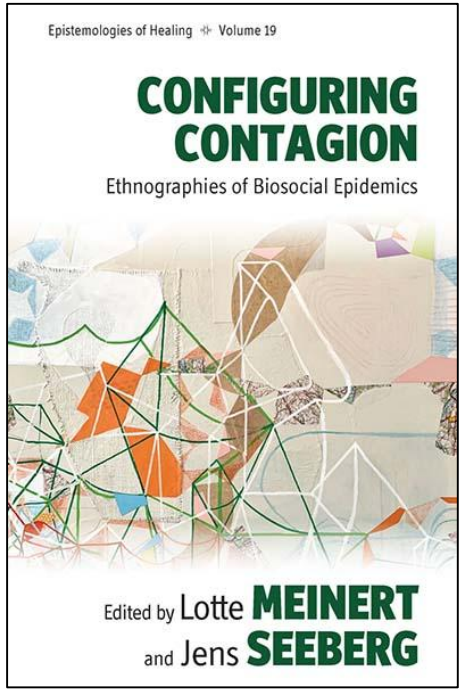
11TH NATIONAL SUMMIT OF HEALTH AND POPULATION SCIENTISTS IN NEPAL

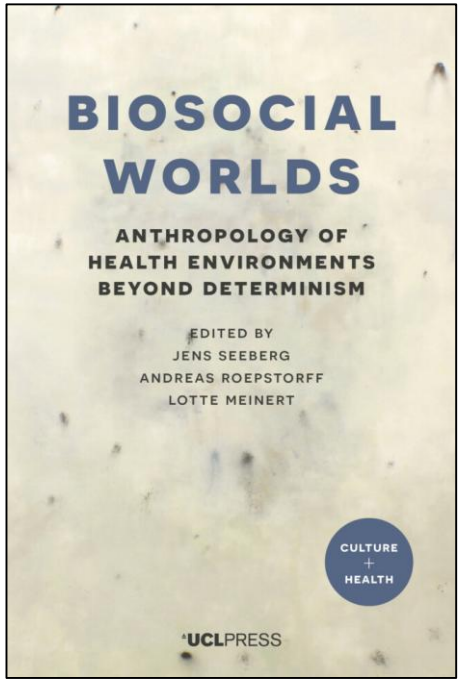
JENS SEEBERG
PROFESSOR

10 APRIL 2025

SHORT BIO

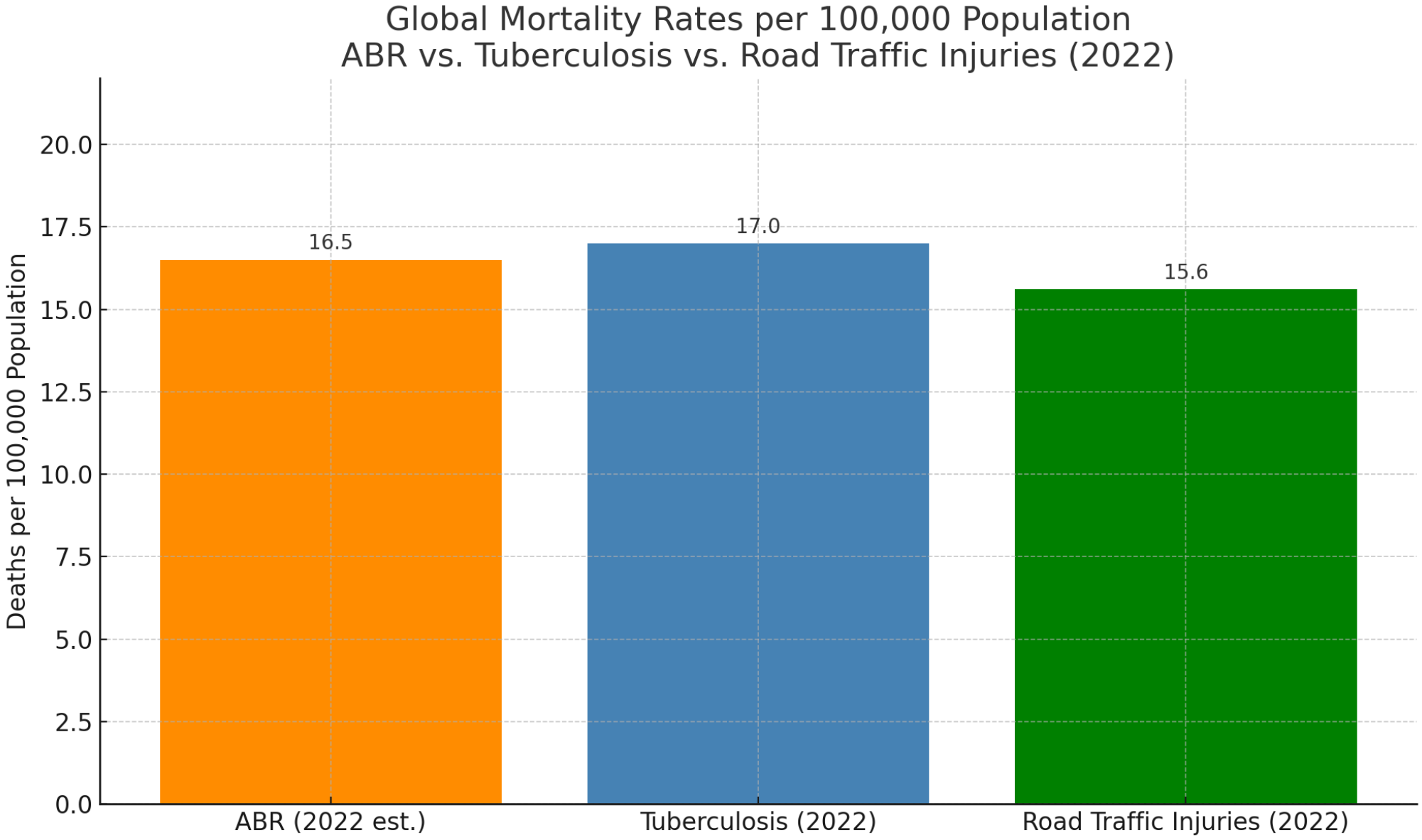
- Professor of medical anthropology at Aarhus University
- PhD degree from Aarhus University 1996
- Previously worked with WHO SEARO and RNTCP India
- Worked extensively on tuberculosis in India
- Currently lead of several interdisciplinary projects on antimicrobial resistance in Nepal, India and Denmark.





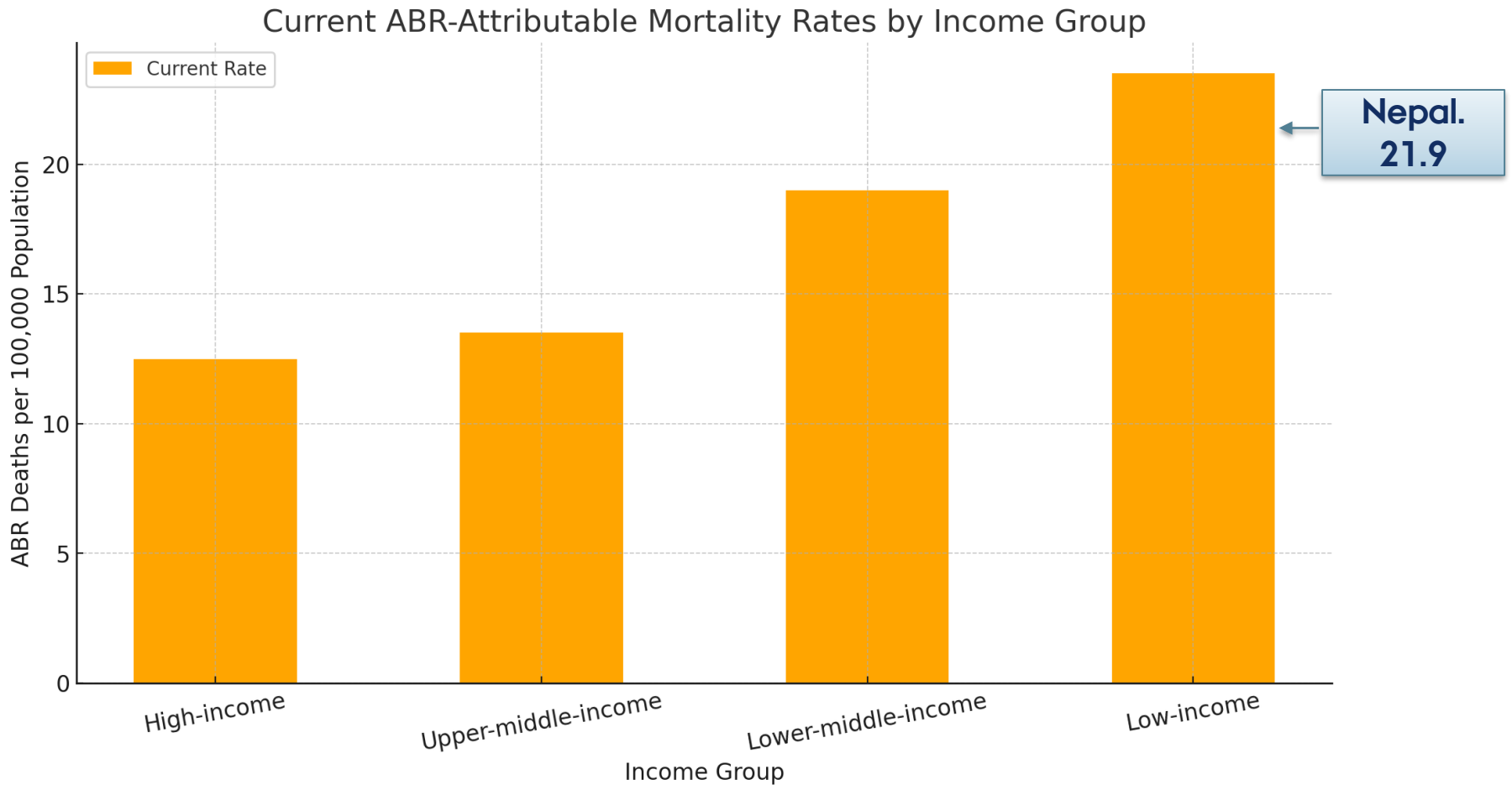
I am an advocate of interdisciplinary research as a necessary instrument to understand drivers of complex health challenges such as antimicrobial resistance.

I work to develop a biosocial approach as a bridge across different traditions of scientific knowledge in the face of the complex health challenges that the world is facing.



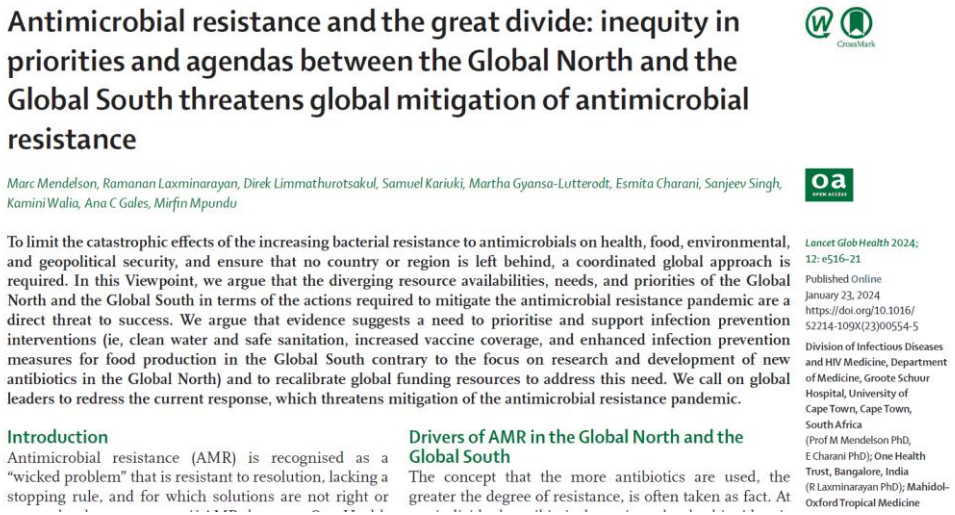
Sources: WHO GRAM Study (2022), WHO Tuberculosis Report (2023), WHO Global Road Safety Report (2023).

EXCESS ABR MORTALITY RATES BY COUNTRY INCOME GROUP



Sources: WHO GRAM Study (2019), IHME/WHO Forecasts (The Lancet, 2022).
Figures represent deaths attributable to antibiotic-resistant bacterial infections.

AMR AND GLOBAL INEQUITY



Antimicrobial resistance and the great divide: inequity in priorities and agendas between the Global North and the Global South threatens global mitigation of antimicrobial resistance

Marc Mendelson, Ramanan Laxminarayan, Direk Limmathurotsakul, Samuel Kariuki, Martha Gyansa-Lutterodt, Esmita Charani, Sanjeev Singh, Kamini Walia, Ana C Gales, Mirfin Mpundu

To limit the catastrophic effects of the increasing bacterial resistance to antimicrobials on health, food, environmental, and geopolitical security, and ensure that no country or region is left behind, a coordinated global approach is required. In this Viewpoint, we argue that the diverging resource availabilities, needs, and priorities of the Global North and the Global South in terms of the actions required to mitigate the antimicrobial resistance pandemic are a direct threat to success. We argue that evidence suggests a need to prioritise and support infection prevention interventions (ie, clean water and safe sanitation, increased vaccine coverage, and enhanced infection prevention measures for food production in the Global South contrary to the focus on research and development of new antibiotics in the Global North) and to recalibrate global funding resources to address this need. We call on global leaders to redress the current response, which threatens mitigation of the antimicrobial resistance pandemic.

Introduction

Antimicrobial resistance (AMR) is recognised as a "wicked problem" that is resistant to resolution, lacking a stopping rule, and for which solutions are not right or

Drivers of AMR in the Global North and the Global South

The concept that the more antibiotics are used, the greater the degree of resistance, is often taken as fact. At

Lancet Glob Health 2024; 12: e516–21

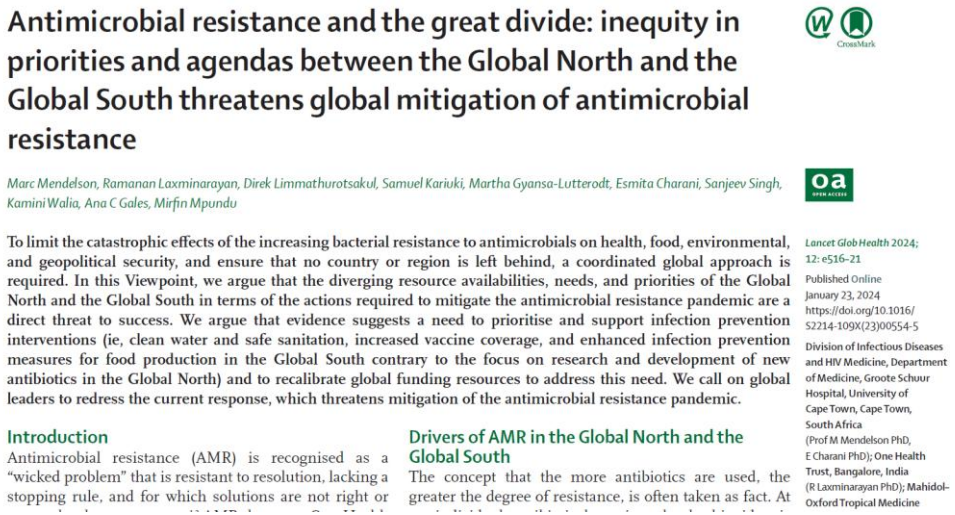
Published Online January 23, 2024 https://doi.org/10.1016/S2214-109X(23)00554-5

Division of Infectious Diseases and HIV Medicine, Department of Medicine, Groote Schuur Hospital, University of Cape Town, Cape Town, South Africa (Prof M Mendelson PhD, E Charani PhD); One Health Trust, Bangalore, India (R Laxminarayan PhD); Mahidol-Oxford Tropical Medicine

Antimicrobial resistance and the great divide: inequity in priorities and agendas between the Global North and the Global South threatens global mitigation of antimicrobial resistance. Mendelson, Marc et al. *The Lancet Global Health*, 12, 3, e516 - e521. 2024

"In the Global North, {…] access to clean water, improved sanitation, and hygiene; strong health systems with funding for high-coverage vaccination programmes; and generally high nutrition standards have reduced the burden of disease and antibiotic use. Accordingly, mitigation priorities in high-income countries focus on research and development of new, probably costly, antibiotics for difficult-to-treat, resistant bacterial infections associated with health care."

AMR AND GLOBAL INEQUITY



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"Contrastingly, the focus for low-income, lower-middle-income, and most upper-middle-income countries is on reducing infection burden for the majority of the population (so as to reduce the need for antibiotic use), rather than on costly new antibiotics that can be accessed only by a minority of people attending private or tertiary level academic teaching hospitals."

Whereas these factors are generally important, their varying role as drivers may be evened out at the global aggregate level and therefore be misguiding for national policy-making.
There is a need for better AMR data at national and local levels.

SOURCE: Collignon, P., Beggs, J. J., Walsh, T. R., Gandra, S. & Laxminarayan, R. (2018). "Anthropological and Socioeconomic Factors Contributing to Global Antimicrobial Resistance: A Univariate and Multivariable Analysis". The Lancet Planetary Health, 2, e398-e405.

ABR – INDIA AND NEPAL

Open and porous border

Visible Indian influence in southern Nepal

Large Indian pharma industry

OTC use of antibiotics as standard treatment for most symptoms

Espec. India a major hotspot for antibiotics resistance

ABR tends to follow faultlines of inequality and inequity

AIM

To determine biosocial dynamics of antimicrobial resistance patterns in vulnerable populations of migrant workers across healthcare boundaries in northern South Asia.

ANTIMICROBIAL RESISTANCE AND LABOUR MIGRATION ACROSS HEALTHCARE BOUNDARIES IN NORTHERN SOUTH ASIA

AARHUS INSTITUTE OF ADVANCED STUDIES
AARHUS UNIVERSITY

10 APRIL 2025

Research team

Interdisciplinary complementarities

Medical Anthropology

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Department of Anthropology

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Associate Professor, AU
India and South Asia Studies

Pharmacology

Anita Kotwani
Professor, VPCI
Department of Pharmacology

Labour and Migration studies

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Assistant Professor, SAU
Department of Sociology

Karen Valentin
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Danish School of Education

Coordination

Mia Korsbæk
Administrative coordinator, AU

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School of Public health & Community Medicine

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School of Public health & Community Medicine

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MD
University Hospital Odense

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Department of Microbiology

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Associate Professor, AU
Department of Biomedicine

Neelam Pargain
Scientist B, VPCI
Department of Microbiology

Postdoctoral fellows

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Postdoc, AU
Department of Anthropology

Anisa Bhutia
Postdoc, AU
Department of Anthropology

Arya Thomas
Postdoc, SAU
Department of Sociology

Kumud Bhansali
Postdoc, SAU
Department of Sociology

Laxmi Dhungel
Research Officer, BPKIHS

Jenny Jami
Postdoc, VPCI

Deepali Vashist
Project Assistant, VPCI
Department of Microbiology

Nishant Gautam
Project Technician, VPCI
Department of Microbiology

Partnership between Aarhus University (Denmark), South Asian University (India), V. Patel Chest Institute (India) and B. P. Koirala Institute of Health Sciences (Nepal)

Collaboration with Center for Molecular Dynamics Nepal

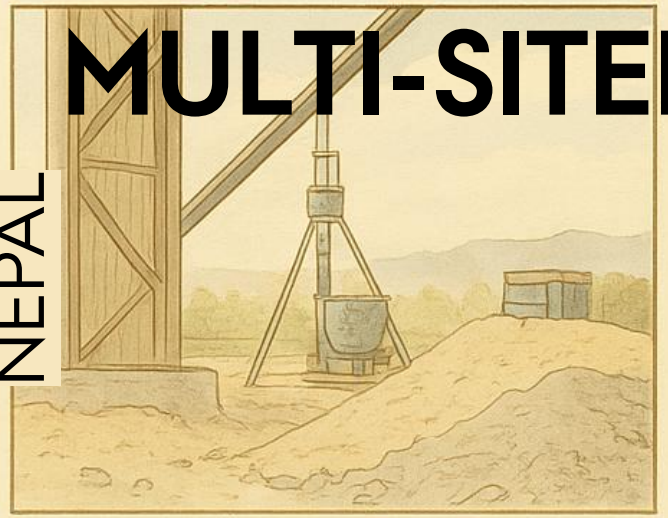
Project period 1.4.22-31.3.26

Anthropology – Public health – Clinical medicine – Microbiology – Molecular biology - Pharmacology

Funded by Novo Nordisk Fonden

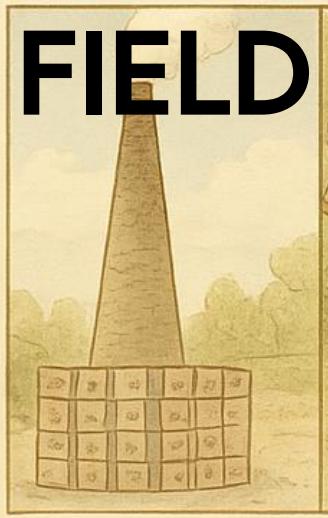
MULTI-SITED RESEARCH FIELD

NEPAL



CEMENT

STEEL

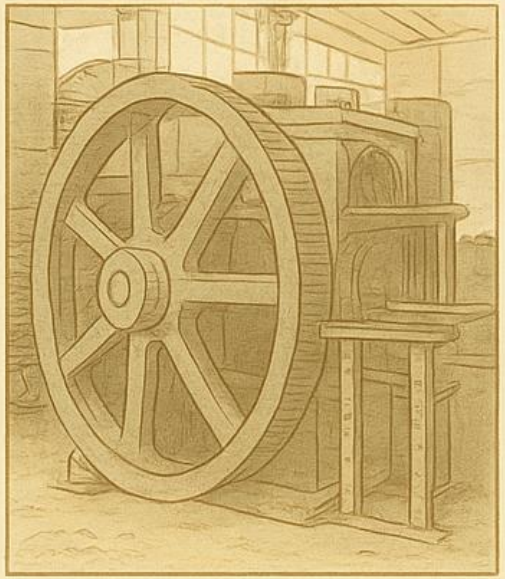


BRICKS

TEA

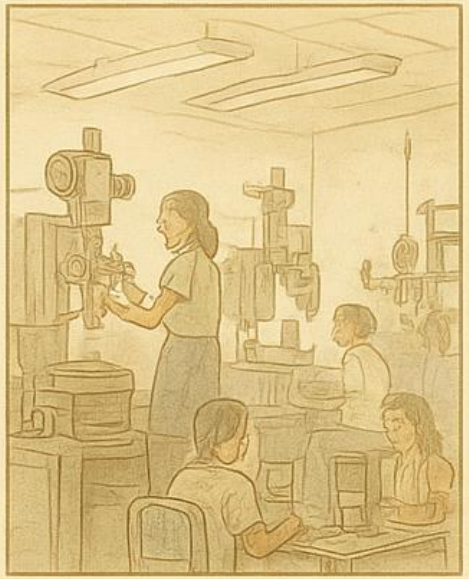
INDIA

CAR PARTS

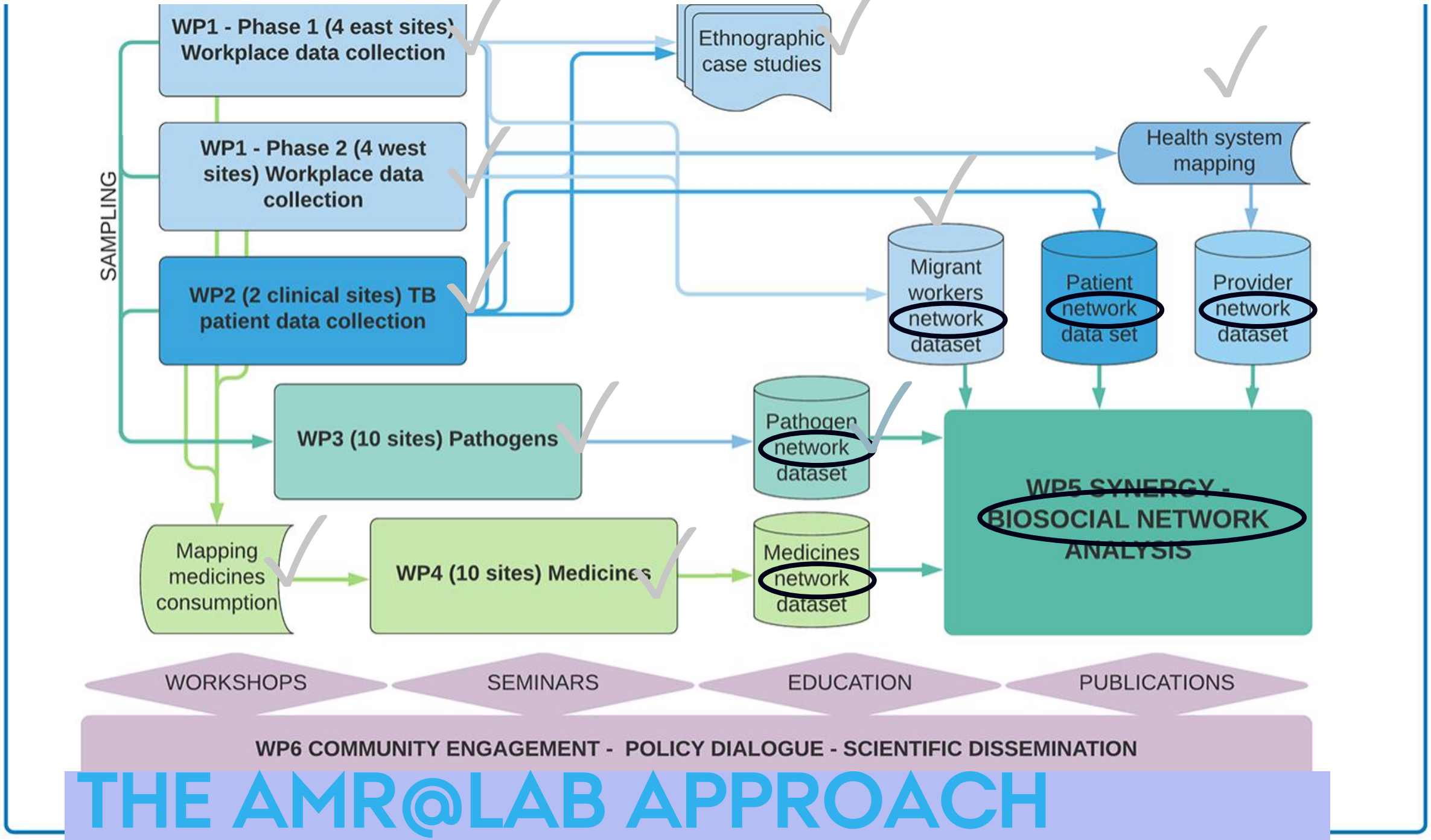


SUGAR MILL

RICE MILL



NOODLES

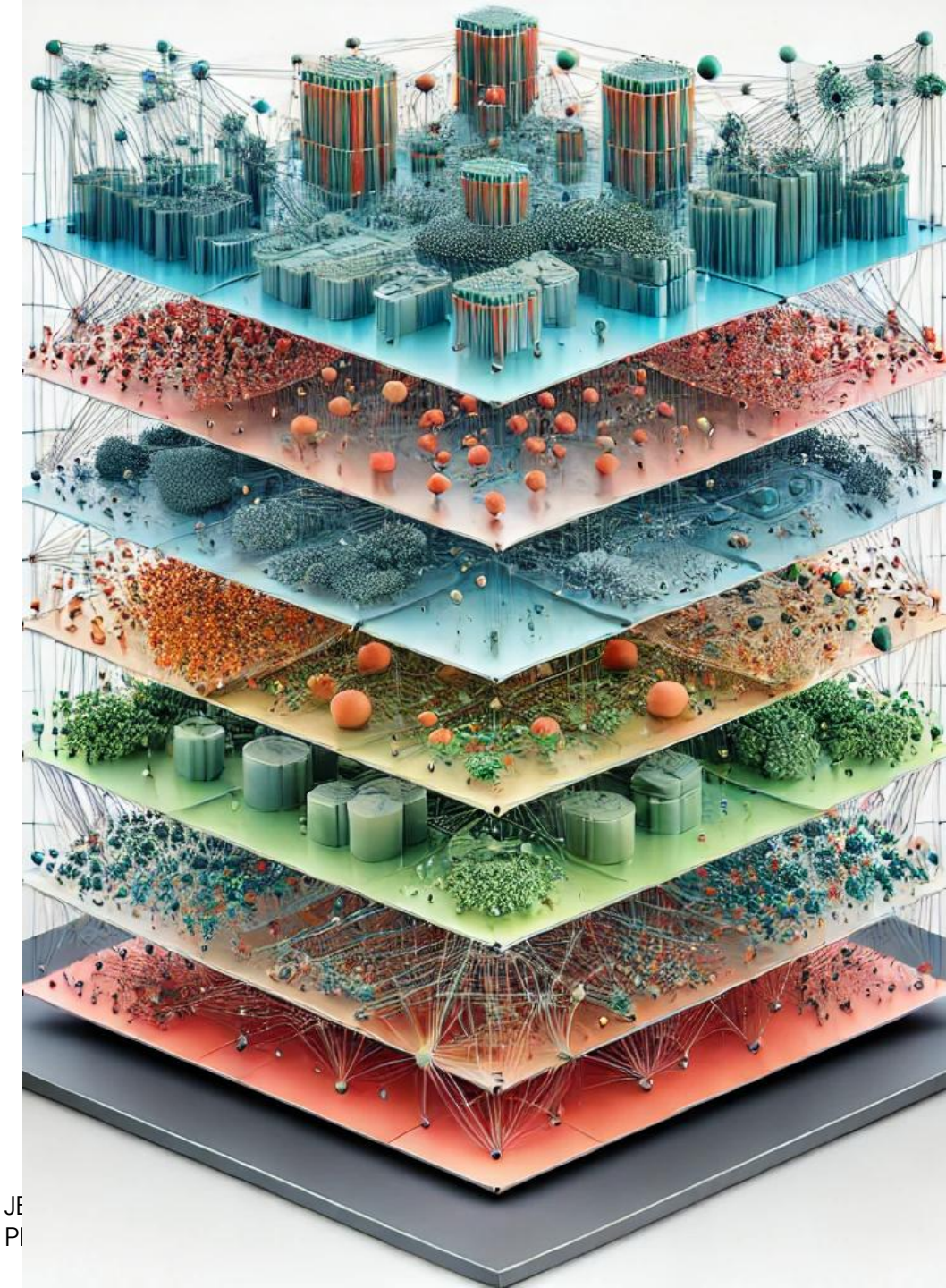


THE AMR@LAB APPROACH

MULTI-SCALAR NETWORK

Working toward network analysis can bring all involved disciplines together in a shared biosocial focus because the network is a recognizable analytical tool across disciplines.

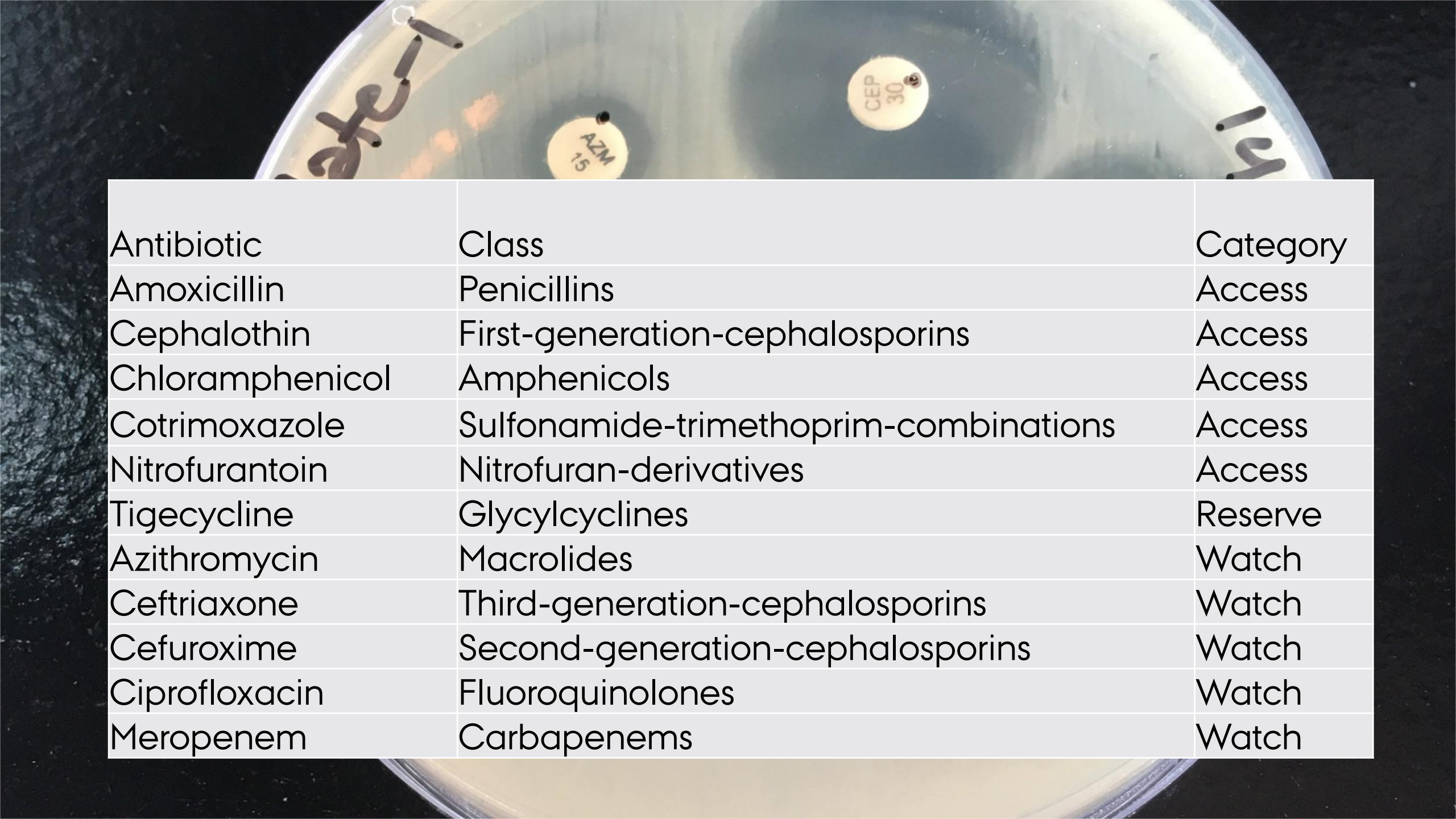
Getting to this stage requires all disciplines to first do 'their own work', which yields valuable results along the way toward biosocial network analysis.



DATA COLLECTION (E.G. CEMENT)

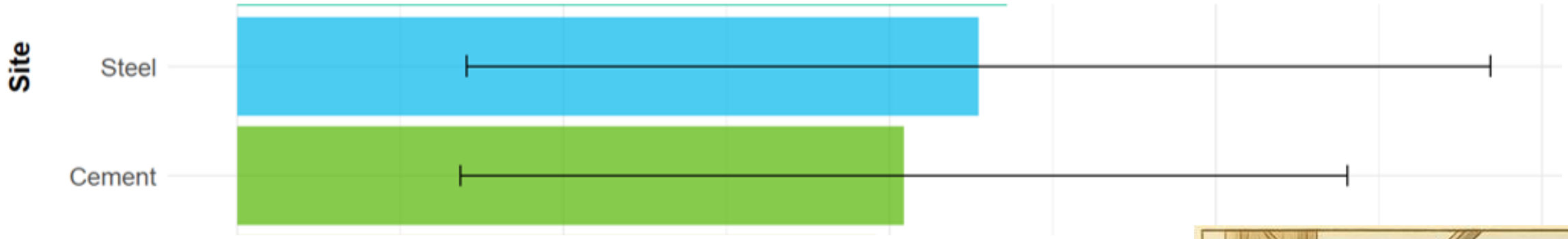
Survey	125
Stool Samples	107
Ecoli. Isolates	97
K. pneumoniae	41
WGS_K	16
WGS_E	33
Qualitative Interviews	26
Qual. interviews w. healthcare providers	3
Medicine Mapping: Participants	39
Medicine Mapping: Medicines	108
Exit Interview: Participants	123
Exit Interview: Medicines	267

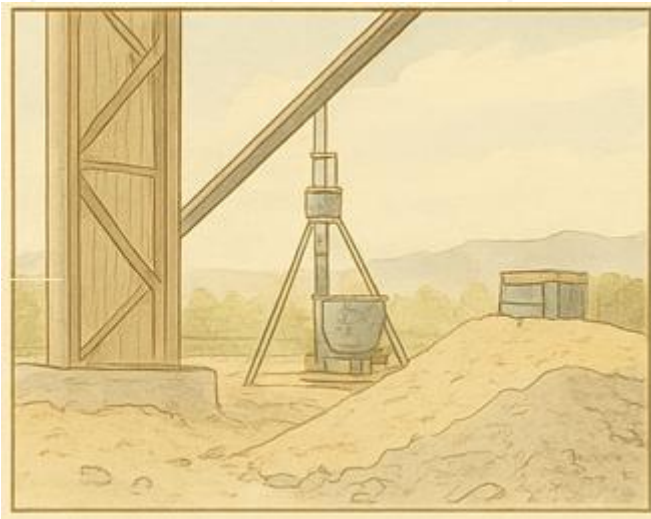
- Economy
- General
- Health Expense
- Illness
- Living Conditions
- Migration
- Social Network
- Workplace



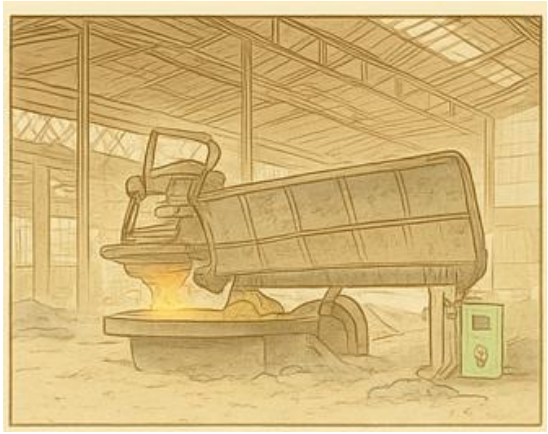
Antibiotic	Class	Category
Amoxicillin	Penicillins	Access
Cephalothin	First-generation-cephalosporins	Access
Chloramphenicol	Amphenicols	Access
Cotrimoxazole	Sulfonamide-trimethoprim-combinations	Access
Nitrofurantoin	Nitrofuran-derivatives	Access
Tigecycline	Glycylcyclines	Reserve
Azithromycin	Macrolides	Watch
Ceftriaxone	Third-generation-cephalosporins	Watch
Cefuroxime	Second-generation-cephalosporins	Watch
Ciprofloxacin	Fluoroquinolones	Watch
Meropenem	Carbapenems	Watch

AVERAGE RESISTANCE DENSITY ACROSS TWO SITES



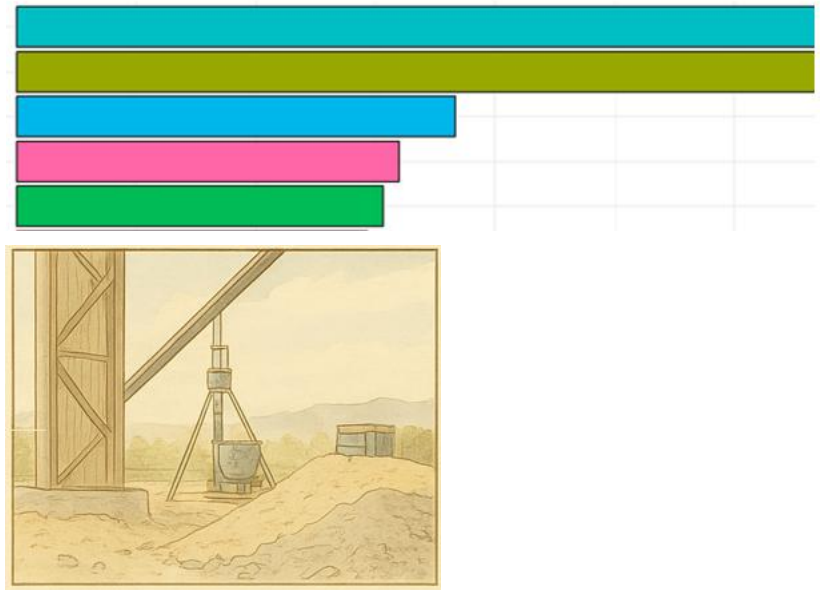


TOP FIVE HAZARDS



CEMENT

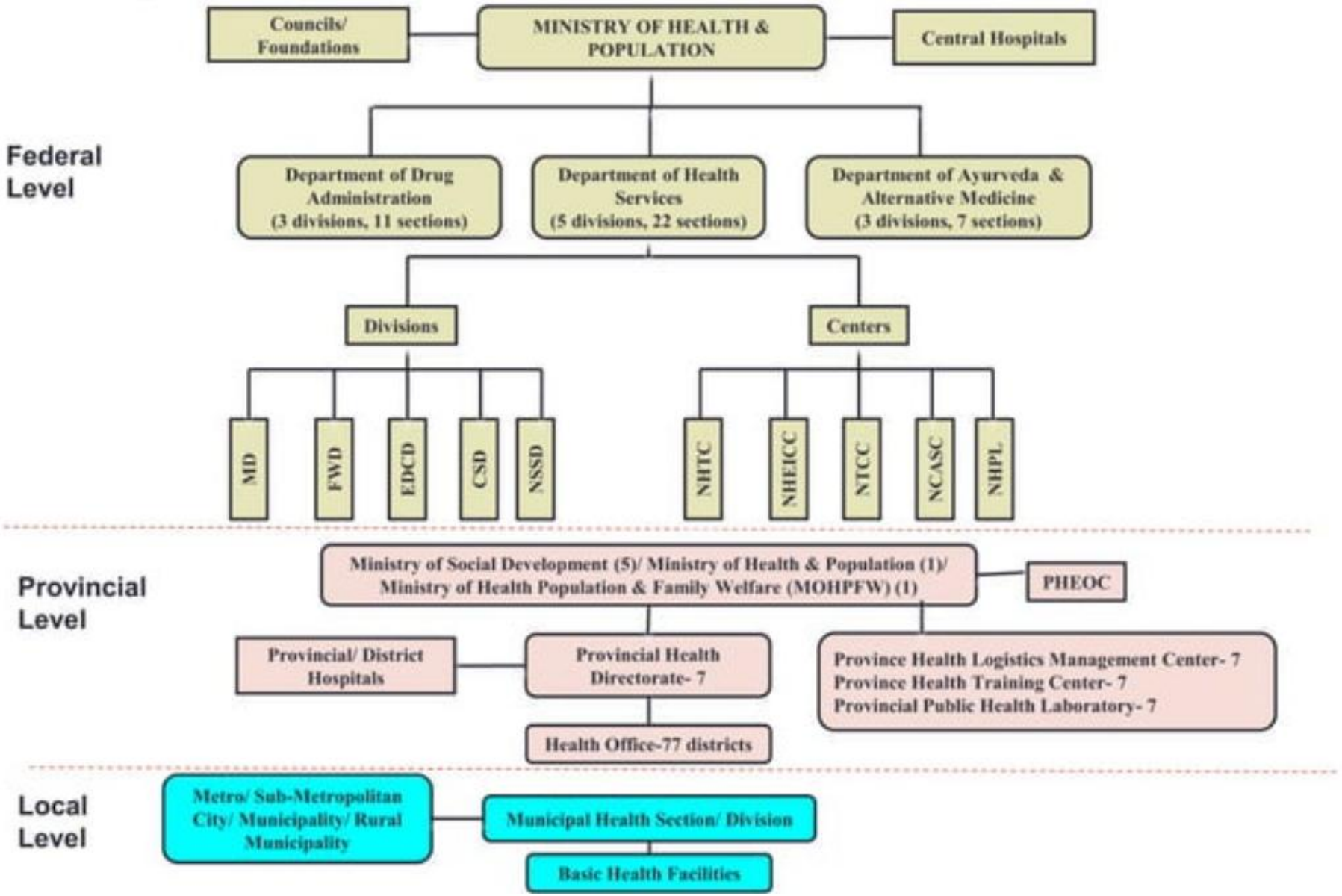
NOISE
DUST (CEMENT)
VIBRATING TOOLS
STATIC POSTUURE
SMOKE



STEEL

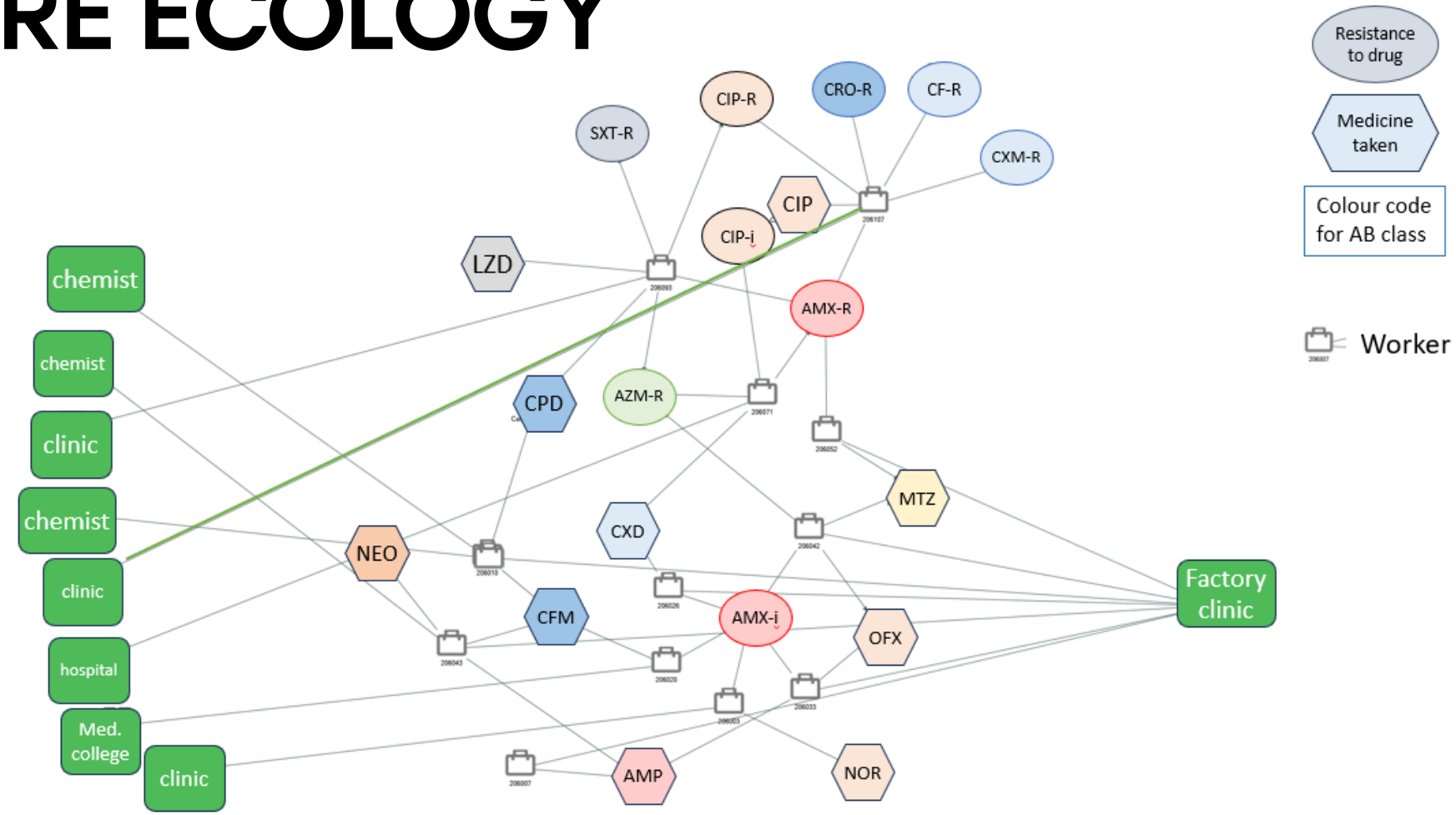
NOISE
EXTREME HEAT X4
DUST
PHYSICAL INJURY X3
STATIC POSTUURE

An illustration of the health system may look something like this



HEALTHCARE ECOLOGY

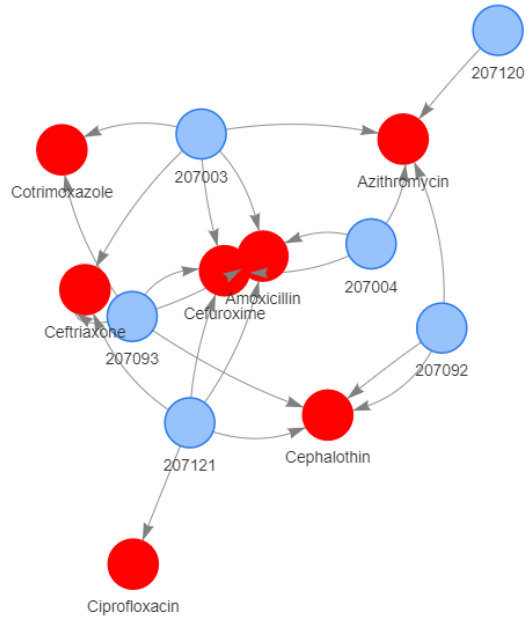
An illustration of the pathways of AMR may look something like this



ABR DYNAMICS IN STEEL VS CEMENT

NEXT STEPS IN AMR@LAB

Biosocial networks based on WGS



Developing healthcare ecology

Specific medicine mapping

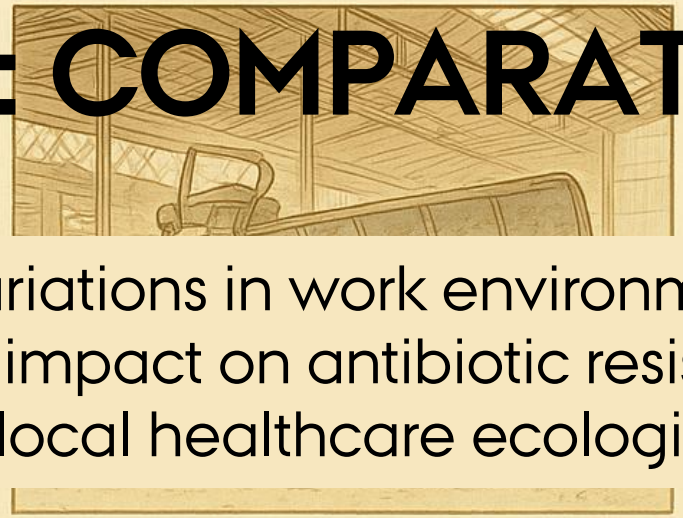
Exit interviews outside medicine shops and clinics

NEXT STEPS: COMPARATIVE ANALYSIS

NEPAL

How do variations in work environment and workers' conditions impact on antibiotic resistance in the context of local healthcare ecologies?

CEMENT



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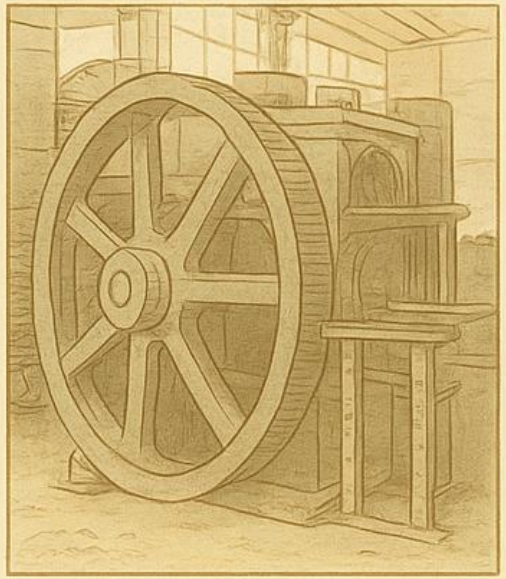

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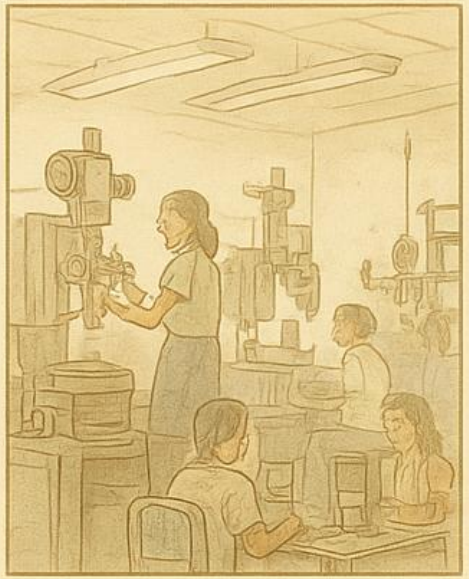
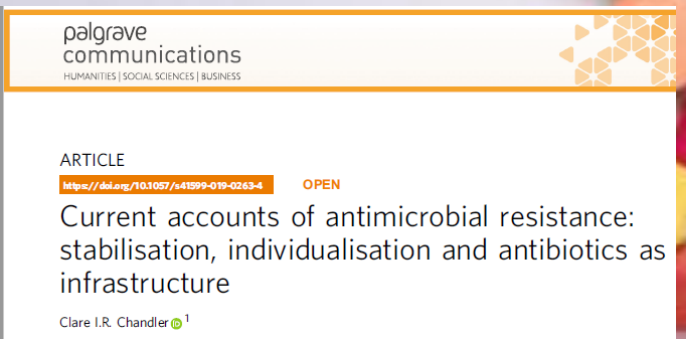


NOODLES

...antibiotics have become part of the health infrastructure such that they shape possibilities and constraints in pathways to health.

Chandler 2019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ARTICLE

https://doi.org/10.1057/s41599-019-0263-4 OPEN

Current accounts of antimicrobial resistance: stabilisation, individualisation and antibiotics as infrastructure

Clare I.R. Chandler [1]

IN CONCLUSION

Hazardous work environments constitute an overlooked driver of AMR

Health is broken in society

Health may be repaired in the healthcare sector

But health can only be made in society, including by improving work environments

Reducing work-induced ill-health can be a major contribution to mitigating AMR

THANK YOU FOR YOUR ATTENTION!

AMR@LAB

B.P. KOIRALA INSTITUTE OF HEALTH SCIENCES 1993

UNIVERSITY OF DELHI

SAU SOUTH ASIAN UNIVERSITY

AARHUS UNIVERSITY