UNIVERSITÀ DEGLI STUDI DI BRESCIA

United Nations Educational, Scientific and Cultural Organization

UNESCO Chair on Training and Empowering Human Resources for Health Development in Resource-Limited Countries University of Brescia

Sistema Socio Sanitario Regione Lombardia ASST Spedali Civili

L'ANTIMICROBICORESISTENZA: *inquadramento nel mondo*

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University of Brescia and Brescia ASST Spedali Civili Hospital

UNESCO Chair "Training and empowering human resources for health development in resource-limited countries"

ANTIMICROBICORESISTENZA - *timeline*

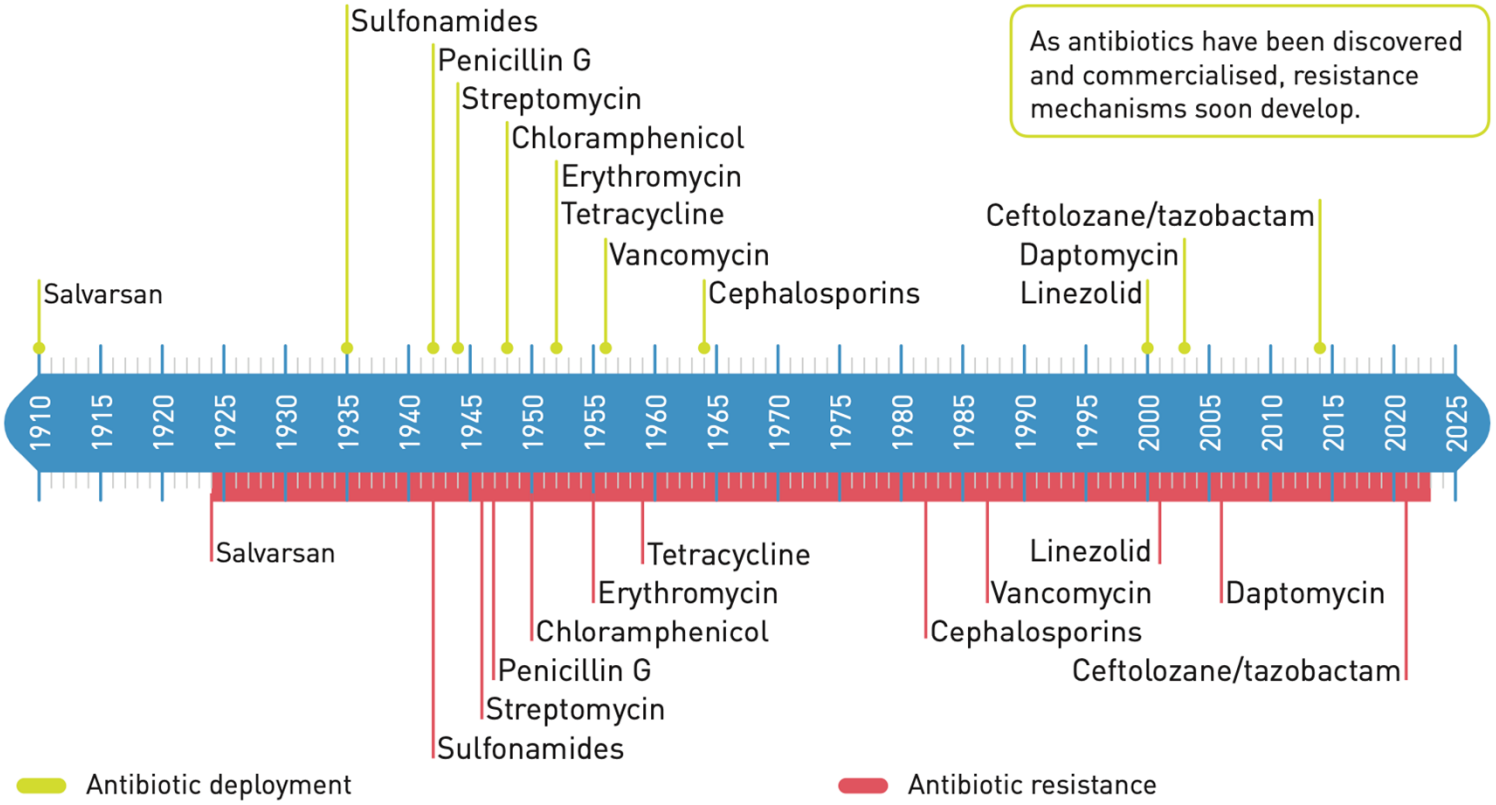


Figure 1

Commercial deployment of antibiotics and emergence of antibiotic resistance – a timeline

UN Environment programme. Bracing for Superbugs Strengthening environmental action in the One Health response to antimicrobial resistance, WHO, 2023

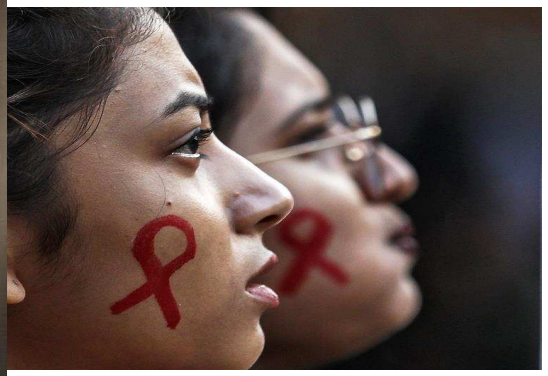

Air pollution &climate change




primary health care


PINGGAN SIHAT MALAYSIA
#SukuSukuSeparuh
Non communicable diseases


Antimicrobial resistance




Global influenza pandemic


Ebola & other emerging pathogens


Dengue

History of Medicine...

2000 BC *eat this root*



History of Medicine...

2000 BC *eat this root*

1000 AD *this root is idolatry, say a prayer instead!*



History of Medicine...

2000 BC *eat this root*

1000 AD *this root is idolatry, say a prayer instead!*

1850 AD *this prayer is superstition! Drink this potion instead*



History of Medicine...

2000 BC *eat this root*

1000 AD *this root is idolatry, say a prayer instead!*

1850 AD *this prayer is superstition! Drink this potion instead*

1920 AD *this potion is snake's oil! Take this pill*



History of Medicine...

2000 BC *eat this root*

1000 AD *this root is idolatr*

1850 AD *this prayer is supe*

1920 AD *this potion is snak*

1945 AD *this pill is ineffecti*

1955 AD *HOPS! The bacter*

1960-99 AD *after many others*

Now, take this inc



2000s AD *We have lost all antibiotics!*

Then…. Eat this root!

OMS: 12 patogeni critici per l'AMR

Priorità: CRITICA

Acinetobacter *baumannii*, carbapenemi-R

Pseudomonas aeruginosa, carbapenemi-R

Enterobacteriaceae (carbapenemi-R, ESBL- produttori)

Priorità: ALTA

Enterobacter faecium, vancomicino-R

Staphylococcus aureus, meticillino-R, vancomino-I/R

Helycobacter pylori, claritromicina-R

Campylobacter **spp.**, FQ-R

Salmonellae, FQ-R

Neisseria gonorrhoeae, cefalosporine-R, FQ-R

Priorità: MEDIA

Streptococcus pneumoniae, penicillino-R

Haemophilus influenzae, ampicillino-R

Shigella **spp.**, FQ-R

Global priority list of antibiotic-resistant bacteria to guide research, discovery, and development of new antibiotics , WHO 2017

Global burden of bacterial antimicrobial resistance in 2019: a systematic analysis

*Antimicrobial Resistance Collaborators**

Global context: a total of **4.95 million deaths** per year **are associated with** resistant bacteria – with at least **1.27 million deaths** per year **directly attributable to** antimicrobial resistance.

Antimicrobial resistance (AMR) – Important definitions and background

What is antimicrobial resistance (AMR)?	What are deaths attributable to AMR?	What are deaths associated with AMR?	What is age-standardization?
Changes in microorganisms leading to less effective or ineffective treatment of infections.	Deaths that were directly caused by drug resistance (as a result of an ineffective treatment).	Deaths that occurred from a drug-resistant infection, but for which AMR may or may not have been the cause.	A technique for comparing populations with different age structures to account for over- or under-representation of age groups in different countries.

(Source: Global burden of bacterial antimicrobial resistance in 2019: a systematic analysis. Lancet, 2022).

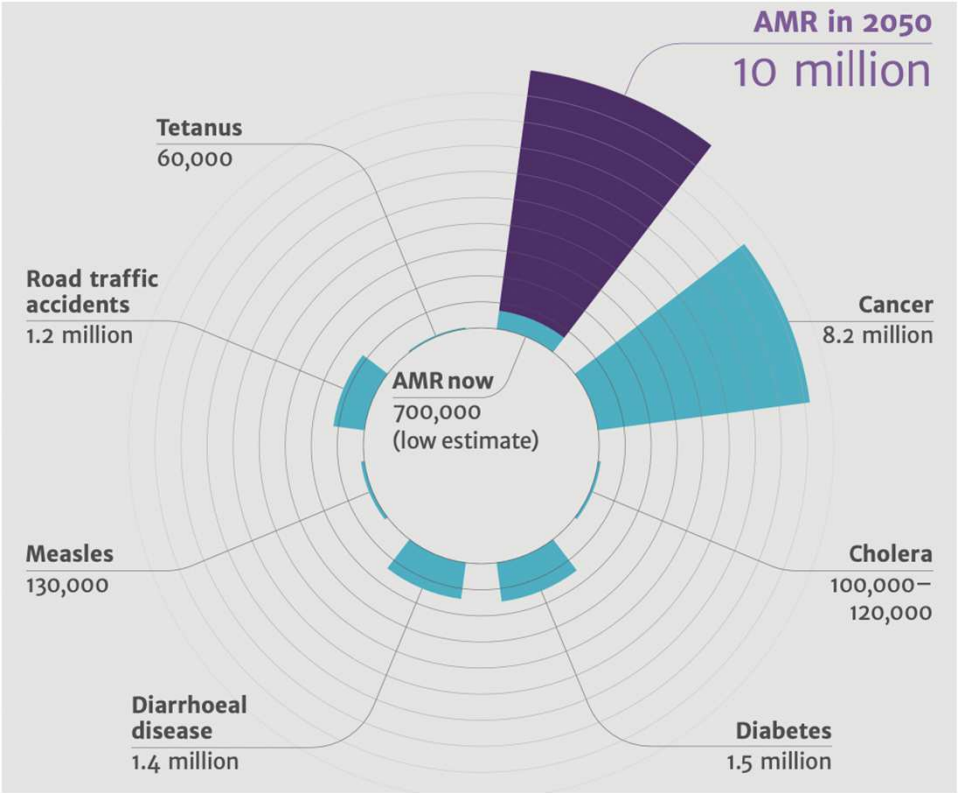
REAL	INCREASING	RELEVANT	PREVENTABLE
AMR is a leading cause of death globally, higher than HIV/AIDS or malaria. It also poses a unique global threat due to its spread from one country to another.	Continued worldwide spread of antimicrobial- resistant bacteria has increasingly reduced the effectiveness of available therapies, and new drugs are not developing fast enough.	AMR is already putting extra pressure on frontline health care workers by making common infections harder to treat and causing millions of preventable deaths worldwide.	There are immediate actions that can help countries around the world protect their health systems against the threat of AMR, but we need a multipronged and comprehensive approach now.

Antimicrobial Resistance Collaborators. Global burden of bacterial antimicrobial resistance in 2019: a systematic analysis. Lancet. 2022
The burden of antimicrobial resistance in G7 countries and globally: AN URGENT CALL FOR ACTION , 2022

TACKLING DRUG-RESISTANT INFECTIONS GLOBALLY:
FINAL REPORT AND RECOMMENDATIONS

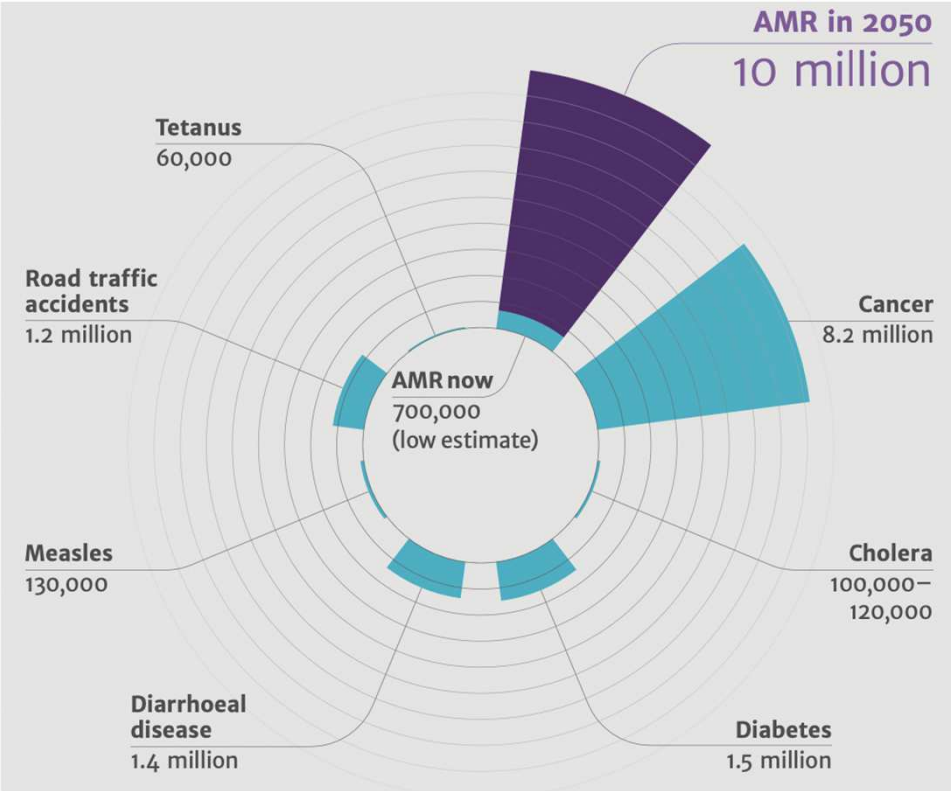
THE REVIEW ON ANTIMICROBIAL RESISTANCE

CHAIRED BY JIM O'NEILL



O'Neill J. Tackling drug-resistant infections globally: final report and recommendations. London: Review on Antimicrobial Resistance, 2016.

- 2014: 700000 morti/anno globali stimate a causa dell'AMR
- 2050: stimati fino a 10.000.000 morti/anno



O'Neill J. Tackling drug-resistant infections globally: final report and recommendations. London: Review on Antimicrobial Resistance, 2016.

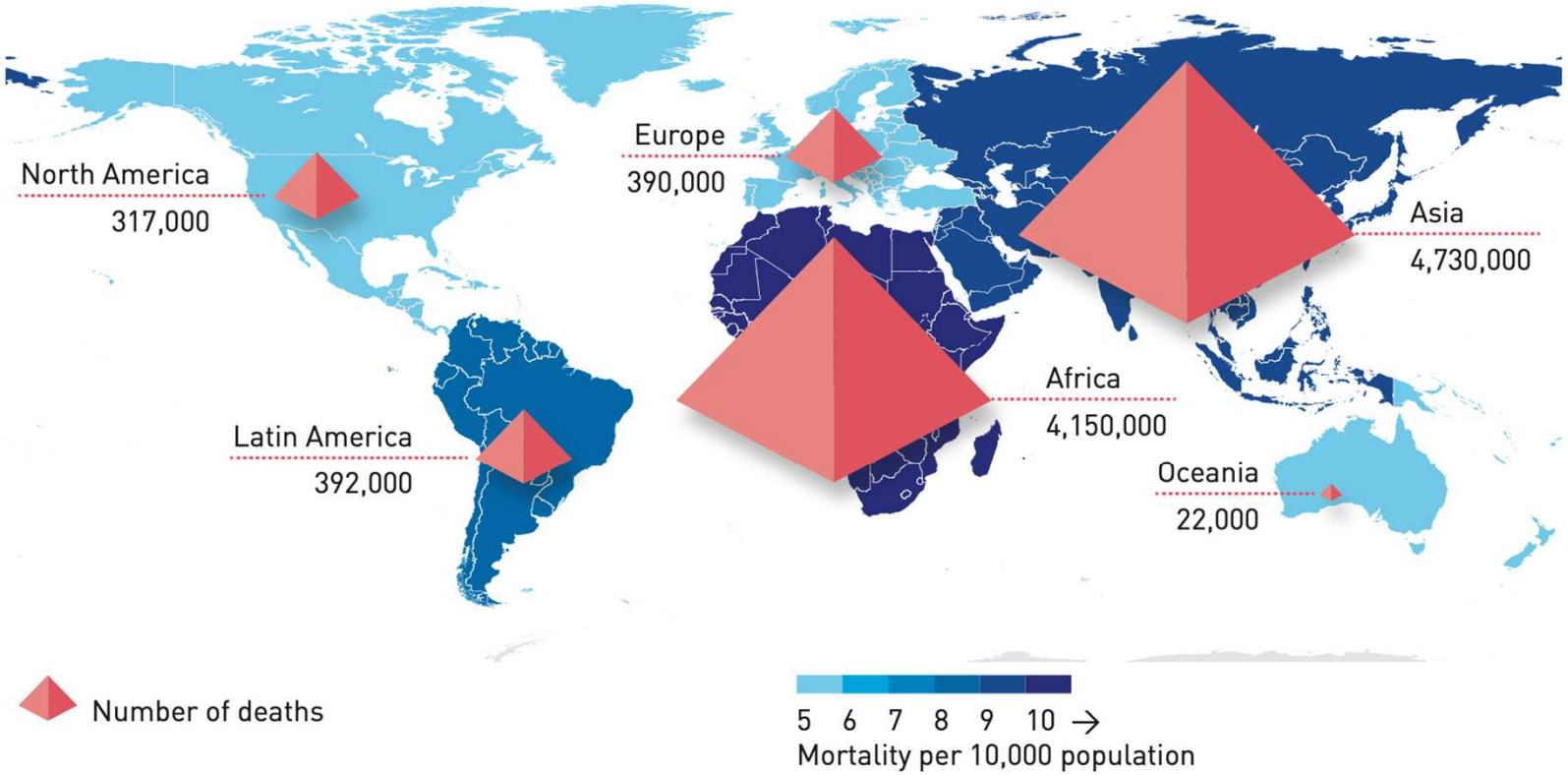


Figure 3

Predicted global deaths from AMR in 2050 (O'Neill 2014)

O'Neill J. Tackling drug-resistant infections globally: final report and recommendations. London: Review on Antimicrobial Resistance, 2016.
UN Environment programme. Bracing for Superbugs Strengthening environmental action in the One Health response to antimicrobial resistance, WHO, 2023

Fattori dell'antimicrobiocoresistenza

Fattori correlati al **prescrittore**

Fattori correlati al **paziente**

Fattori correlati al **farmaco**

Fattori correlati all'**ambiente**

UN Environment programme. Bracing for Superbugs Strengthening environmental action in the One Health response to antimicrobial resistance, WHO, 2023

Available online at www.sciencedirect.com
ScienceDirect
journal homepage: www.elsevierhealth.com/journals/tmid

A passage from India: Association between air traffic and reported cases of New Delhi Metallo-beta-lactamase 1 from 2007 to 2012

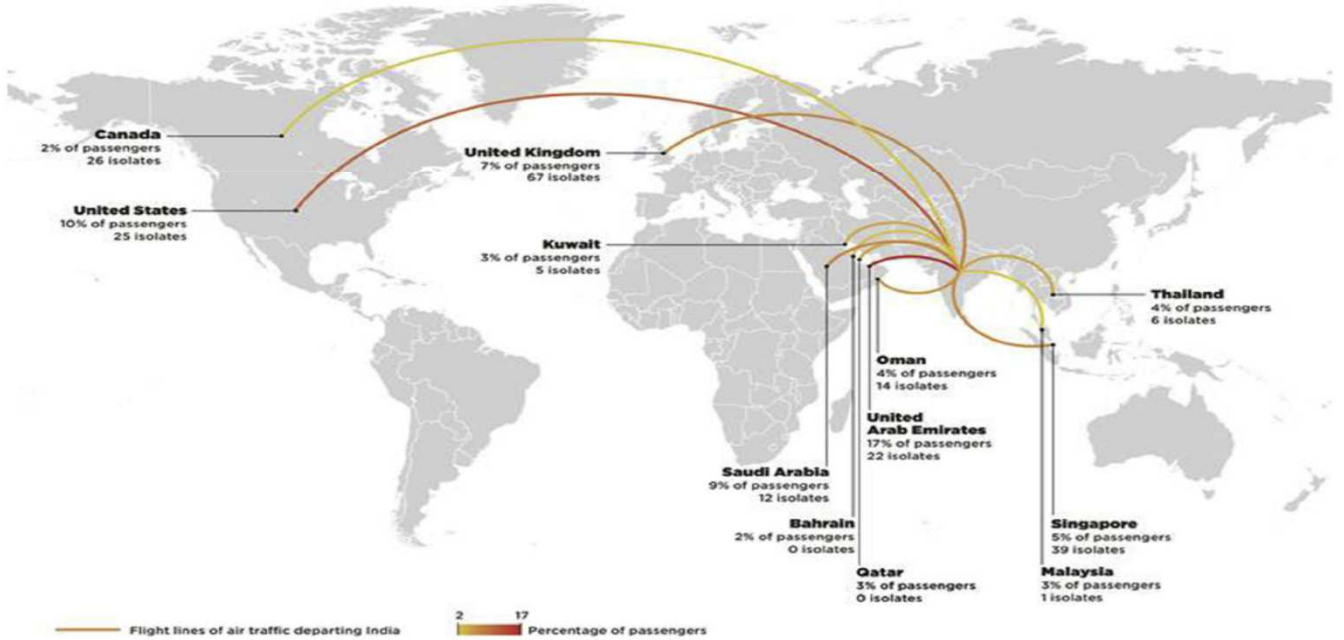


Fig. 1 Map of air traffic departing India to the 12 highest volume (percentage) destination countries, and total published NDM-1 cases in these countries from 2007 to 2012.

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frontiers in Public Health

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Microbial Resistance Movements: An Overview of Global Public Health Threats Posed by Antimicrobial Resistance, and How Best to Counter

Sameer Dhingra[1†], Nor Azlina A. Rahman[2†], Ed Peile[3†], Motiur Rahman[4,5†], Massimo Sartelli[6†],

JTM Journal of Travel Medicine
International Society of Travel Medicine
Promoting healthy travel worldwide

Review

Risk factors for acquisition of multidrug-resistant Enterobacterales among international travellers: a synthesis of cumulative evidence

Luis Furuya-Kanamori[1,*], Jennifer Stone[1], Laith Yakob[2], Martyn Kirk[1], Peter Collignon[3,4], Deborah J Mills[5,†] and Colleen L Lau[1,5,†]

JTM Journal of Travel Medicine
International Society of Travel Medicine
Promoting healthy travel worldwide

Journal of Travel Medicine, 2019, 1–13
doi: 10.1093/jtm/taz036
Review

Review

Global geographic trends in antimicrobial resistance: the role of international travel

Isabel Frost DPhil[1,2,*], Thomas P. Van Boeckel PhD[1,3], João Pires PhD[3], Jessica Craig BA, BS[1] and Ramanan Laxminarayan PhD [1,4]

JTM Journal of Travel Medicine
International Society of Travel Medicine
Promoting healthy travel worldwide

Journal of Travel Medicine, 2019, 1–2
doi: 10.1093/jtm/taz095
Editorial

Editorial

Antimicrobial resistance: a global public health emergency further exacerbated by international travel

Marisa Holubar*

Division of Infectious Diseases and Geographic Medicine, Stanford University School of Medicine, Stanford, CA 94305-5105, USA



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GRAM NEGATIVE BACILLI, MULTIDRUG RESISTANT - CHILE: ex ITALY KPC, NOSOCOMIAL

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A ProMED-mail post
<http://www.promedmail.org>
ProMED-mail is a program of the
International Society for Infectious Diseases
<http://www.isid.org>

From: Marcela Cifuentes <marcelacifuentesdiaz@gmail.com> [edited]

We report the 1st isolation in our country [Chile] of _Klebsiella pneumoniae_ carbapenemase (KPC)-producing [microorganism] in a patient admitted from Italy. The patient has non-Hodgkin lymphoma treatment and renal failure on hemodialysis, and he was hospitalized several times in Italy. On 28 Feb [2012, he was] admitted to a hospital in Santiago [Chile] to continue treatment. During hospitalization, he developed fever and microbiological studies were performed. _K. pneumoniae_ was isolated from urine. The antibiogram showed resistance
to quinolones, aminoglycosides, cephalosporins, and carbapenems and susceptible only to tigecycline and colistin.

The presence of this bacterium in urine was interpreted as asymptomatic bacteriuria, as central venous catheter-associated blood stream infection due to another organism (_Achromobacter denitrificans_) was demonstrated.

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Travel Medicine and Infectious Disease 28 (2019) 6–14

Contents lists available at ScienceDirect

Travel Medicine and Infectious Disease

journal homepage: www.elsevier.com/locate/tmaid

Microorganisms @ materials surfaces in aircraft: Potential risks for public health? – A systematic review

Bin Zhao[a], Carolin Dewald[a,d], Max Hennig[a], Jörg Bossert[a], Michael Bauer[b], Mathias W. Pletz[c,*], Klaus D. Jandt[a,d,**]



Antimicrobial resistance among migrants in Europe: a systematic review and meta-analysis

Laura B Nellums*, Hayley Thompson*, Alison Holmes, Enrique Castro-Sánchez, Jonathan A Otter, Marie Norredam, Jon S Friedland, Sally Hargreaves

Lancet Infect Dis 2018; 18: 796–811

Some migrant groups might have an increased risk of antibiotic resistance because of poor sanitation or overcrowded living conditions, barriers to accessing health services, or disruptions in treatment during migration and on arrival in host countries.

High prevalence rates of AMR in countries of origin or transit associated with insufficient health infrastructure, antibiotic stewardship, infection prevention and control, vaccine coverage, or surveillance—particularly in the context of conflict— could increase the risk of bacterial resistance.

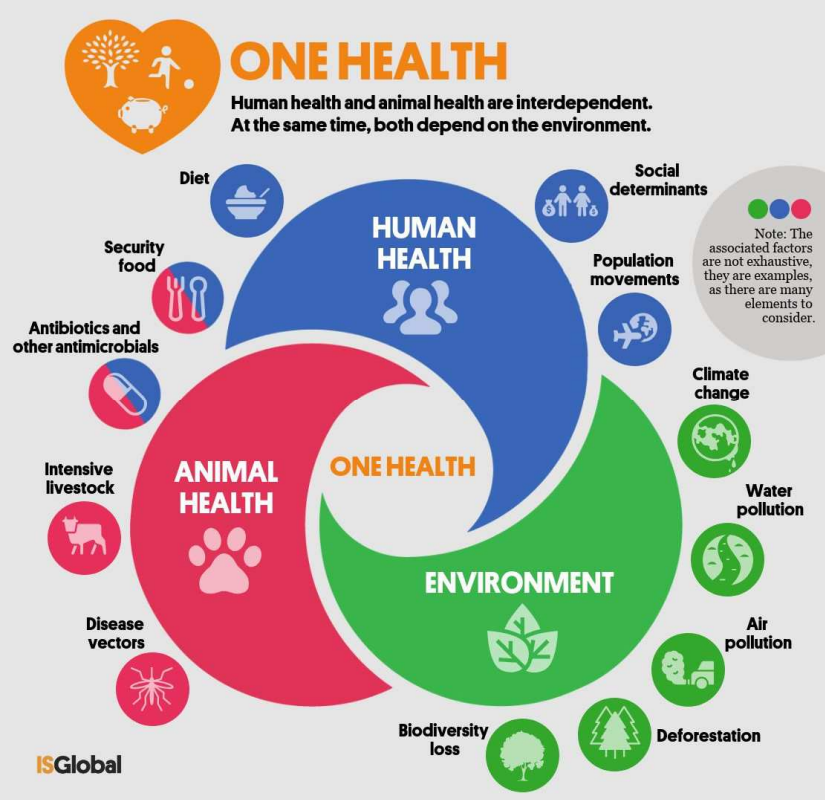
The risk of antibiotic resistance in migrant communities might be lower than it is in locally born populations in Europe because of reduced access and exposure to antibiotics or health-care facilities.

Thus, rather than importing antibiotic resistance, migrants could instead be vulnerable to exposure to AMR pathogens in host countries.



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Approccio One Health





ONE HEALTH JOINT PLAN OF ACTION (2022-2026)

TACKLING ANTIMICROBIAL RESISTANCE ON TEN FRONTS

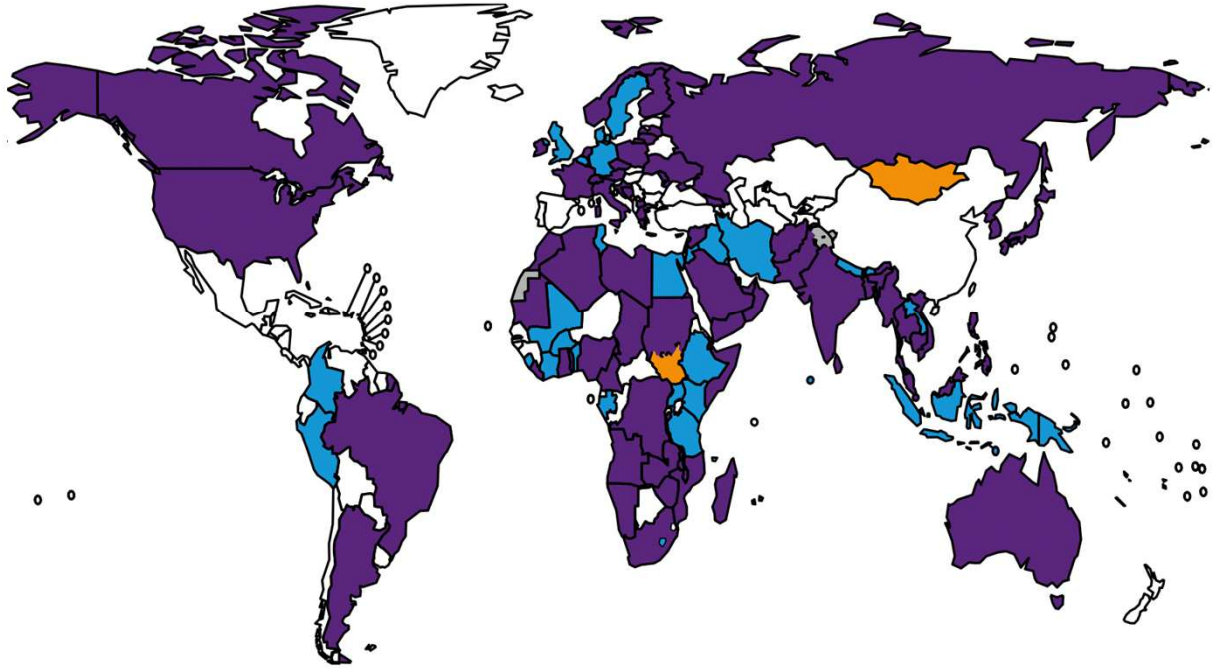


O'Neill J. Tackling drug-resistant infections globally: final report and recommendations. London: Review on Antimicrobial Resistance, 2016.
Mathew P, Thomas SA, Chandy SJ. The role of Schedule H1 and Red Line campaign in improving antibiotic use in India. J Family Med Prim Care. 2022

GLASS

Global Antimicrobial Resistance and Use Surveillance System

Enrolment status by end of 2021

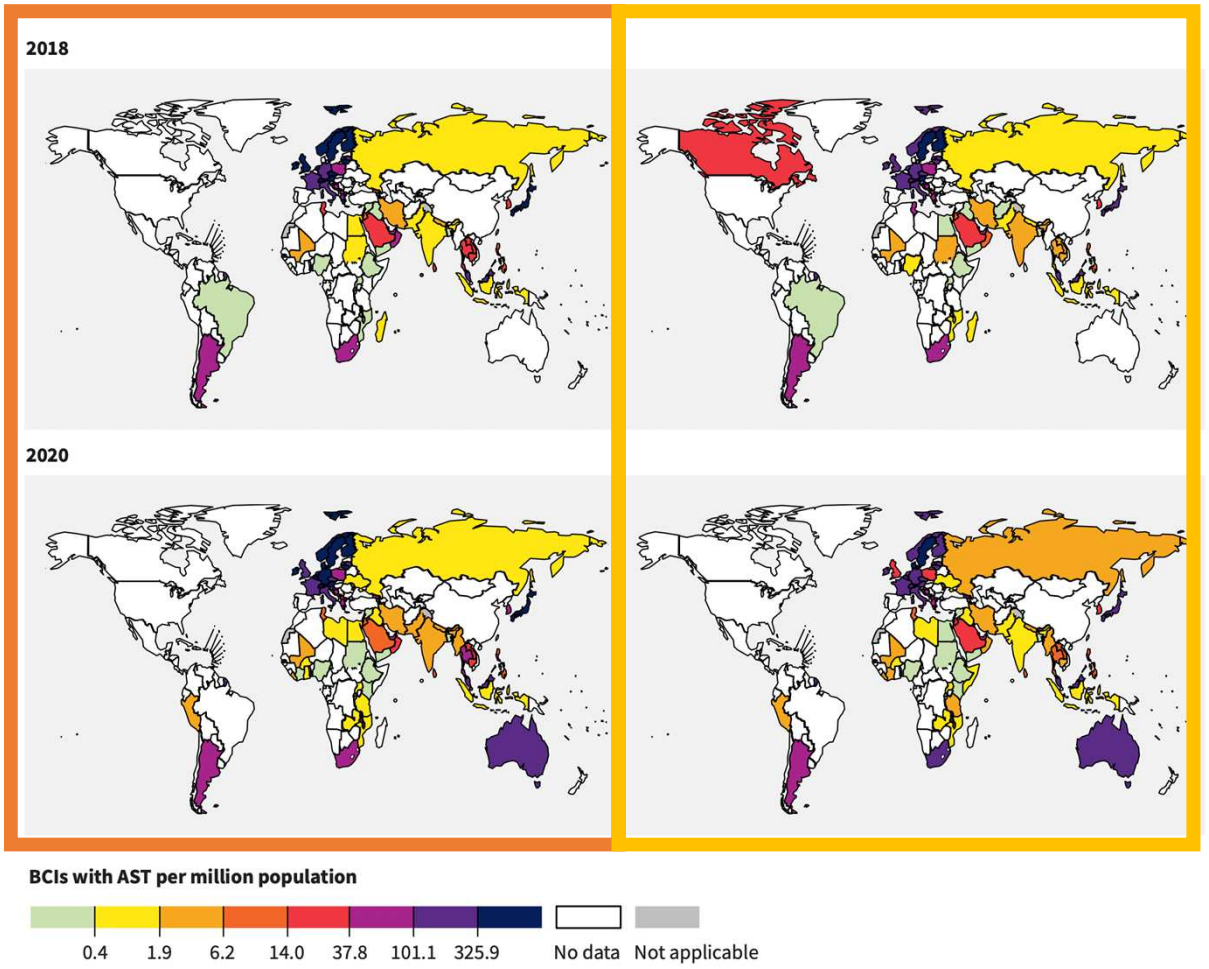


Legenda:
Stati arruolati per GLASS-AMR e AMC
Stati arruolati per GLASS-AMR
Stati arruolati per GLASS-AMC

Global Antimicrobial Resistance and Use Surveillance System (GLASS) Report 2022, WHO

Infezioni del torrente circolatorio per milione di abitanti

E.Coli resistente alle cefalosporine di III generazione

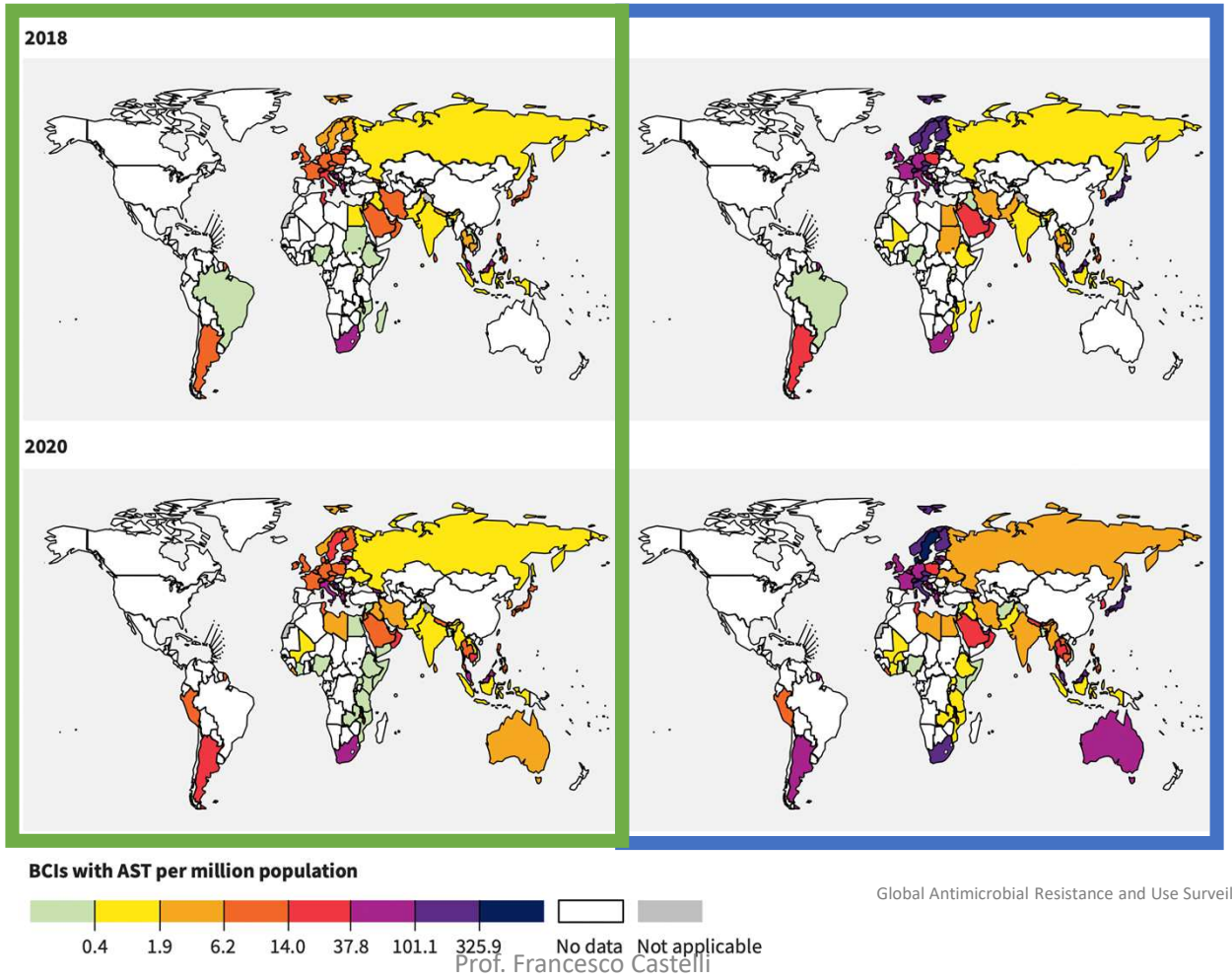


MRSA

Global Antimicrobial Resistance and Use Surveillance System (GLASS) Report 2022, WHO

Infezioni del torrente circolatorio per milione di abitanti

***Acinetobacter* spp.**
carbapenemi-R



K. pneumoniae
carbapenemi-R

Global Antimicrobial Resistance and Use Surveillance System (GLASS) Report 2022, WHO

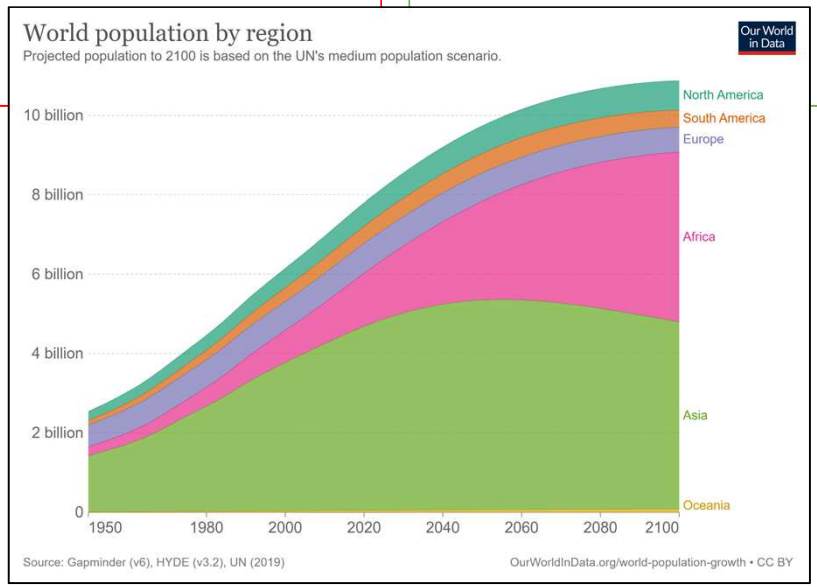
GLASS: Global Antimicrobial Resistance and Use Surveillaince System

LIMITI:

- I Paesi a basso-medio reddito hanno riportato un minor numero di dati sulla sorveglianza antibiotica
- Circa la metà dei laboratori non si sottopone a controllo esterno di qualità

PROSPETTIVE FUTURE:

- Supporto dei Paesi a basso-medio reddito per migliorare la quantità e la qualità dei dati di sorveglianza
- Espansione del monitoraggio di AMC



Global Antimicrobial Resistance and Use Surveillance System (GLASS) Report 2022, WHO

African Union

AFRICA CDC FRAMEWORK FOR ANTIMICROBIAL RESISTANCE, 2018-2023

AFRICA CDC
Centres for Disease Control and Prevention
Safeguarding Africa's Health

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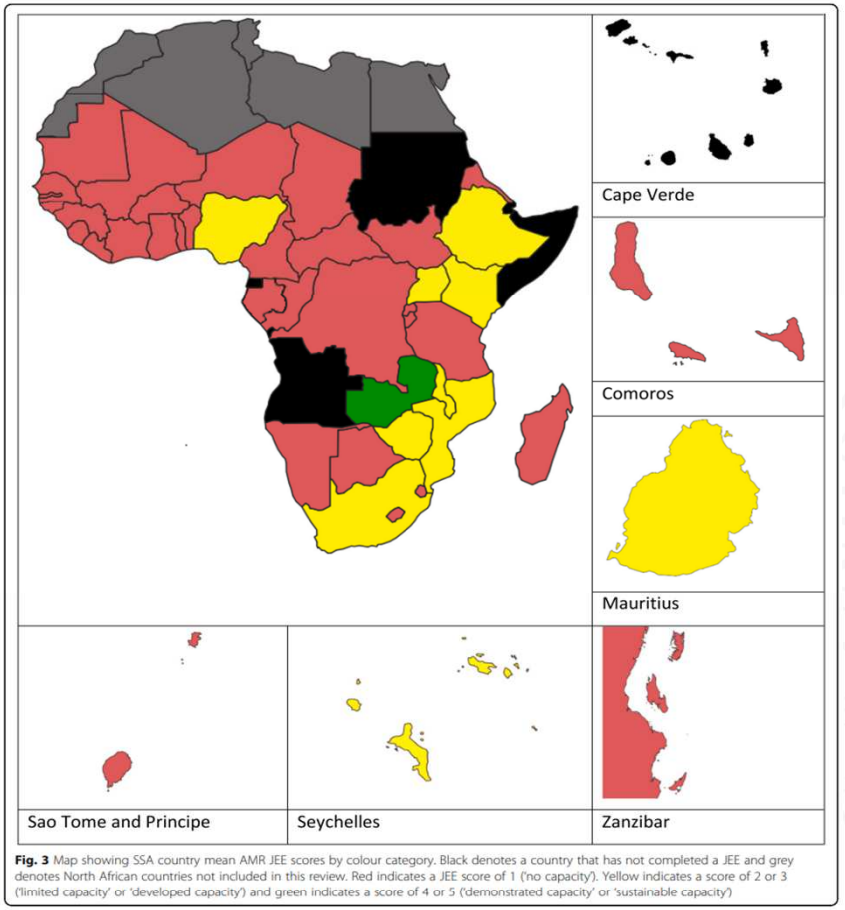


Fig. 3 Map showing SSA country mean AMR JEE scores by colour category. Black denotes a country that has not completed a JEE and grey denotes North African countries not included in this review. Red indicates a JEE score of 1 ('no capacity'). Yellow indicates a score of 2 or 3 ('limited capacity' or 'developed capacity') and green indicates a score of 4 or 5 ('demonstrated capacity' or 'sustainable capacity')

Within the next 5 years, AMRSNET's four goals are:

1. Improve surveillance of AMR organisms among humans and animals
2. Delay emergence of AMR
3. Limit transmission of AMR
4. Mitigate harm among patients infected with AMR organisms

To achieve these goals, AMRSNET will conduct three essential cross-cutting activities:

1. Advocate for policies and laws to enable long-term prevention and control of AMR
2. Civil society engagement
3. Develop human resources

Elton *et al. Antimicrobial Resistance and Infection Control* (2020) 9:145
https://doi.org/10.1186/s13756-020-00800-y

Antimicrobial Resistance and Infection Control

RESEARCH Open Access

Antimicrobial resistance preparedness in sub-Saharan African countries

TAKE HOME MESSAGE

- L'ANTIMICROBICORESISTENZA è un problema socio-economico globale
- Per combattere l'AMR sono necessari approcci multidisciplinari e sistemi di sorveglianza globali
- È necessario implementare le metodiche diagnostiche e le possibilità terapeutiche per rallentare la crescita esponenziale dei microrganismi resistenti

Acknowledgements

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University Division of Infectious and Tropical Diseases
University of Brescia, Italy

