RESIST2 :

Policy

Have we made progress in understanding and using modelling for AMR policy? COVID-19 has affected AMR in many different ways. Are there lessons to be learnt for modelling AMR?

Antimalarial resistance, modelling to inform policy

[Alfred Amambua-Ngwa, Associate Professor at Medical Research Council Unit, The Gambia at LSHTM]

Mathematical modelling was used to identify transmission clusters and trans-Gambian transmission paths for Malaria infections. This helped understand the way and rate transmission occurs in Gambia across communities.

Using genomic data, an axis of transmission was uncovered between eastern and western part of Gambia highlighting clusters of transmission.

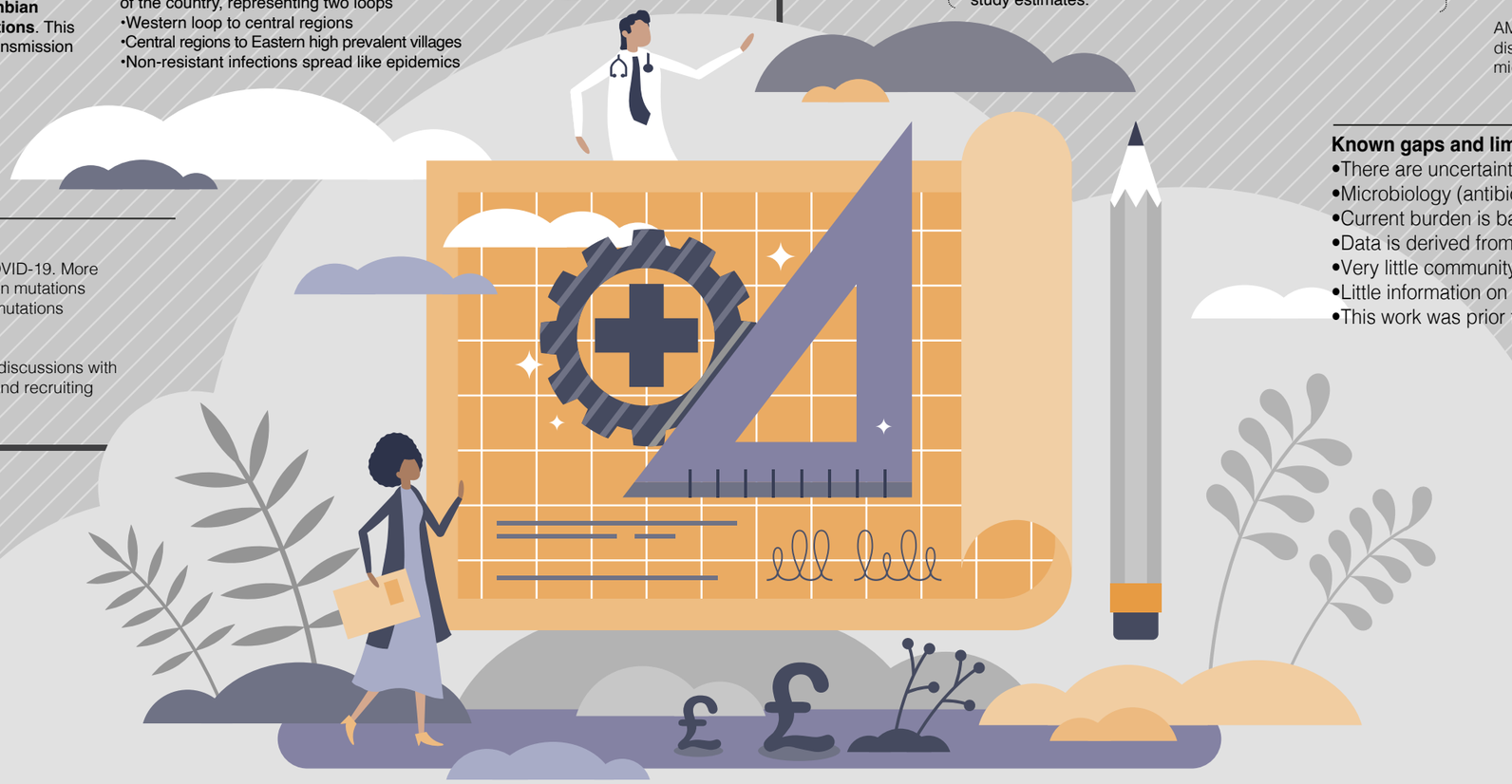
Cross-border synchronization of interventions between Senegal and Gambia National Malaria Control Programmes

Cross border transmission of infections
- Highly related infections detected between sites in Senegal and within the Gambia
- Transmission in the Gambia spans the length of the country, representing two loops
- Western loop to central regions
- Central regions to Eastern high prevalent villages
- Non-resistant infections spread like epidemics

Gaps / Future Recommendations

1. Enhanced surveillance, similar to that seen with COVID-19. More surveillance and data is required, to show transmission mutations across communities / the likelihood of drug resistant mutations spreading.

2. Funding to help facilitates important meetings and discussions with stakeholders, including organising training sessions and recruiting engagement officers.



Using modelling for policy: Estimating the global burden of AMR

[Catrin Moore, Research group leader in the global burden of AMR, University of Oxford]

The GRAM project

A partnership between the University of Oxford Big Data Institute and Global Health and Tropical Medicine and the Institute of Health Metrics and Evaluation, uses mathematical modelling to:
- Prepare a comprehensive and up to date global data synthesis of AMR of selected bacterial pathogens.
- Perform geospatial mapping of the distribution of resistance of selected bacteria and antibacterial drug combinations.
- Incorporate the mortality and morbidity caused by these drug resistant bacterial pathogens into the global burden of disease study estimates.

Results

1.27 Million deaths
(95% UI 0.91-1.71 million) attributable to bacterial AMR worldwide in 2019

4.95 Million deaths
(95% UI 3.62-6.57 million) associated with bacterial AMR worldwide in 2019

AMR is a leading global health issue which disproportionately affects people living in low- and middle- income countries

AMR is a global concern - political will has increased:

- **2014** — UK Government commissioned the O'Neil Review, aimed at defining economic impact of AMR
- **2015** — Global Action Plan adopted by World Health Assembly for AMR. WHO launched the Global Antimicrobial Resistance Surveillance System (GLASS)
- **2016** — Call for countries to develop NAPs
- **2017** — Interagency Coordination Group on AMR was convened
- **2020/21** — One Health Global Leaders Group is launched. In 2021 G7/G20 meetings with AMR on the Agenda

Known gaps and limitations
- There are uncertainties surrounding this modelling work
- Microbiology (antibiotic sensitivity testing) is the most abundant data
- Current burden is based on phenotypic resistance
- Data is derived from microbiology laboratories in hospitals
- Very little community data exists
- Little information on health seeking behaviour
- This work was prior to the COVID-19 pandemic

A modeller goes undercover! ...inside a funding organisation

[Bilal Mateen,
Senior Manager Digital Technology,
Wellcome Collection]

How can we more effectively engage with funders, and convert insights into policy relevant action?

Investment in the underpinning of digital tools and infrastructure can make a bigger difference than building the latest "flashy" thing

Start with the end user and start with their needs in mind Wayfinding can be more important than the destination. What is the next incremental step that the decision maker needs to take?

How do we democratise mathematical modelling so that it leaves a legacy? Where a model isn't perceived as a publishable unit that goes into a paper, but rather it contributes to an ecosystem that everyone benefits from

Impact of COVID-19: the changing backdrop of antibiotic use and resistance

[Julie Robotham,
Head of AMR Modelling and Evaluation, Healthcare Associated Infections and Antimicrobial Resistance, UKHSA]

- The national picture of antimicrobial usage and resistance changed during the COVID-19 pandemic.
- As well as other contextual factors such as healthcare utilisation, infection prevention and control practices, mixing patterns ...
- Given this changing backdrop how do we evaluate effectiveness of interventions, or 'real' progress against government ambitions?

- Understanding what these changes mean for interventions (and their effectiveness) is a priority
- Support research to better understand the routes and burden of transmission of drug resistant infections and to evaluate potential interventions, to inform control measures and behaviour change initiatives

How could experiences from the COVID-19 pandemic be applied to advance AMR research and policy?

- Diagnostics and surveillance; Repurposing of testing infrastructure; Public adoption of new technologies
- An imaginative response characterised by a willingness to think outside the box; Cross-sectoral working
- Rapid development and approval of therapeutics and vaccines