Utilizing health economic modeling and translational action to demonstrate vaccine effectiveness for institutions combating AMR

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Introduction
- Antimicrobial resistance (AMR) refers to growing pathogen response against traditional treatments (i.e. antibiotics), rendering these treatments ineffective.
- 1.27 million deaths were attributable to bacterial AMR worldwide in 2019 (Murray et al., 2022)

Reflection

Part 1: Research Assistant (supervised by Dr. Giridara Gopal Parameswaran)
- Tweaked Markov models demonstrating the cost-benefit effectiveness of vaccines in reducing DALYS* and infectious disease burden across all states and union territories in India excluding data-deficient zones that were noted.
- Ran Monte Carlo-derived probabilistic sensitivity analyses for all available states and union territories to determine cost-benefit financial incentives for governments to pursue two different vaccination programs, then calculating and organizing obtained data.
- Model inputs were inherently approached with uncertainty, and thus, represented using appropriate distributions in the analysis.

Part 2: Presentation (supervised by Dr. Erta Kalanxhi and Rishi Bhagawati)
- Assisting GARP
- The Global Antibiotic Resistance Partnership (GARP) helps low- and middle-income countries develop policies to tackle AMR.
- Created presentations demonstrating the work of GARP for meetings with the following countries (Tanzania, Zimbabwe, India, Kenya, South Africa, Vietnam, Mozambique, Laos, Nigeria).
- Contributor to the following policy briefs on the value of vaccines to mitigate antimicrobial resistance (Pakistan, South Africa, Nepal, Uganda, Nigeria).
- Wrote sections on infectious disease burden within these countries (for Pakistan, wrote sections including executive summary and the status quo of vaccination programs).

Objective
- Vaccinations have been proven effective in combating AMR by reducing prevalence of resistant pathogens and decreasing inappropriate antibiotic use (Micoli et al., 2021).
- Policymakers must be convinced that vaccination initiatives are worthwhile in reducing AMR burden.

Work Profile
- Contribute to policy briefs detailing the burden of AMR while synthesizing research studies that model vaccine effectiveness.
- Run and tweak economic models that establish the cost-effectiveness of vaccines in combating AMR.

Looking ahead | Conclusions
- Continue to work with Dr. Giri on creation of health economic models using R.
- Presentations and policy briefs hopefully play a role in spurring effective vaccination programs in the nations who need them the most.
- Internship taught some important basics regarding health economic modeling as well as the government-health interface.

Questions
- Examining potential impact that educational level and socioeconomic status have in stratifying access to appropriate AMR treatments, especially relating to information access regarding antibiotic misuse.

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*DALYS = disability-adjusted life years
YLD (years lived with disability) + YLL (years of life lost)