

Vaccination Can Reduce Antibiotic Utilization and Control the Growth of Antimicrobial Resistance

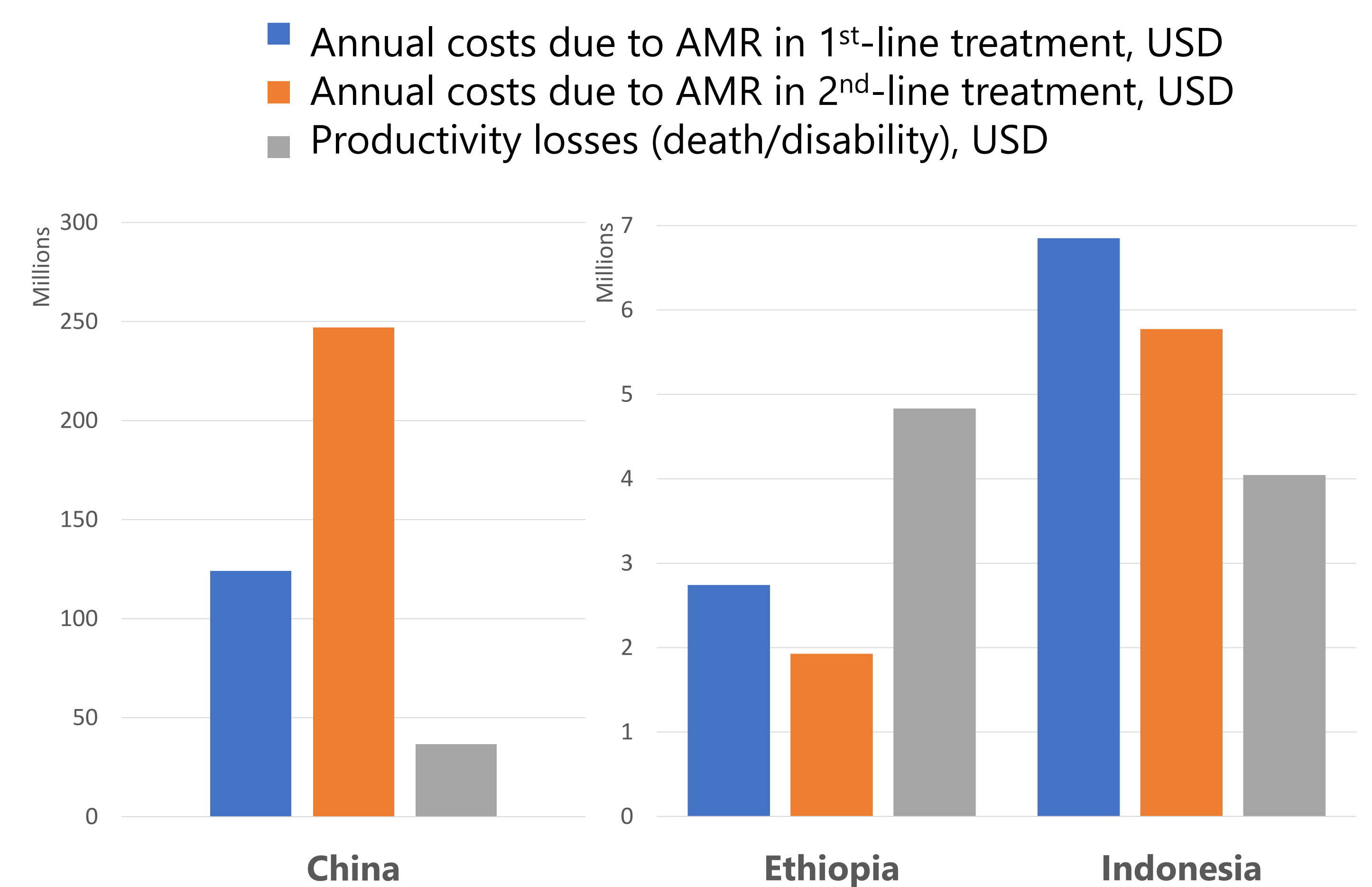
Economic and Health Impact of Pneumococcal Vaccination in Controlling the Growth of Antimicrobial Resistance in Ethiopia, China, and Indonesia

Background: Antimicrobial resistance (AMR) poses a global health threat by diminishing the effectiveness of existing antimicrobials, leaving individuals prone to prolonged hospitalization and death.

Figure 1: Pneumococcal Conjugate Vaccine (PCV) coverage resulted in decreases in AMR against amoxicillin

Incremental Change in Outcome	Ethiopia	China	Indonesia
	(Coverage increased from 0% to 68%)	(Coverage increased from 0% to 99%)	(Coverage increased from 8% to 80%)
AMR against amoxicillin, %	- 14.77	- 10.93	- 6.91
Annual overall treatment failures due to AMR, n	- 102,585	- 618,728	- 78,326
Pneumonia, n	- 7,118	- 67,223	- 13,439
Meningitis, n	- 133	- 735	- 79
AOM, n	- 95,334	- 550,899	- 64,870
Proportion of treatment failure, %	- 6.63	- 0.13	- 1.37

Figure 2: PCV vaccination reduced AMR-related medical costs and productivity loss for caretakers



Methods

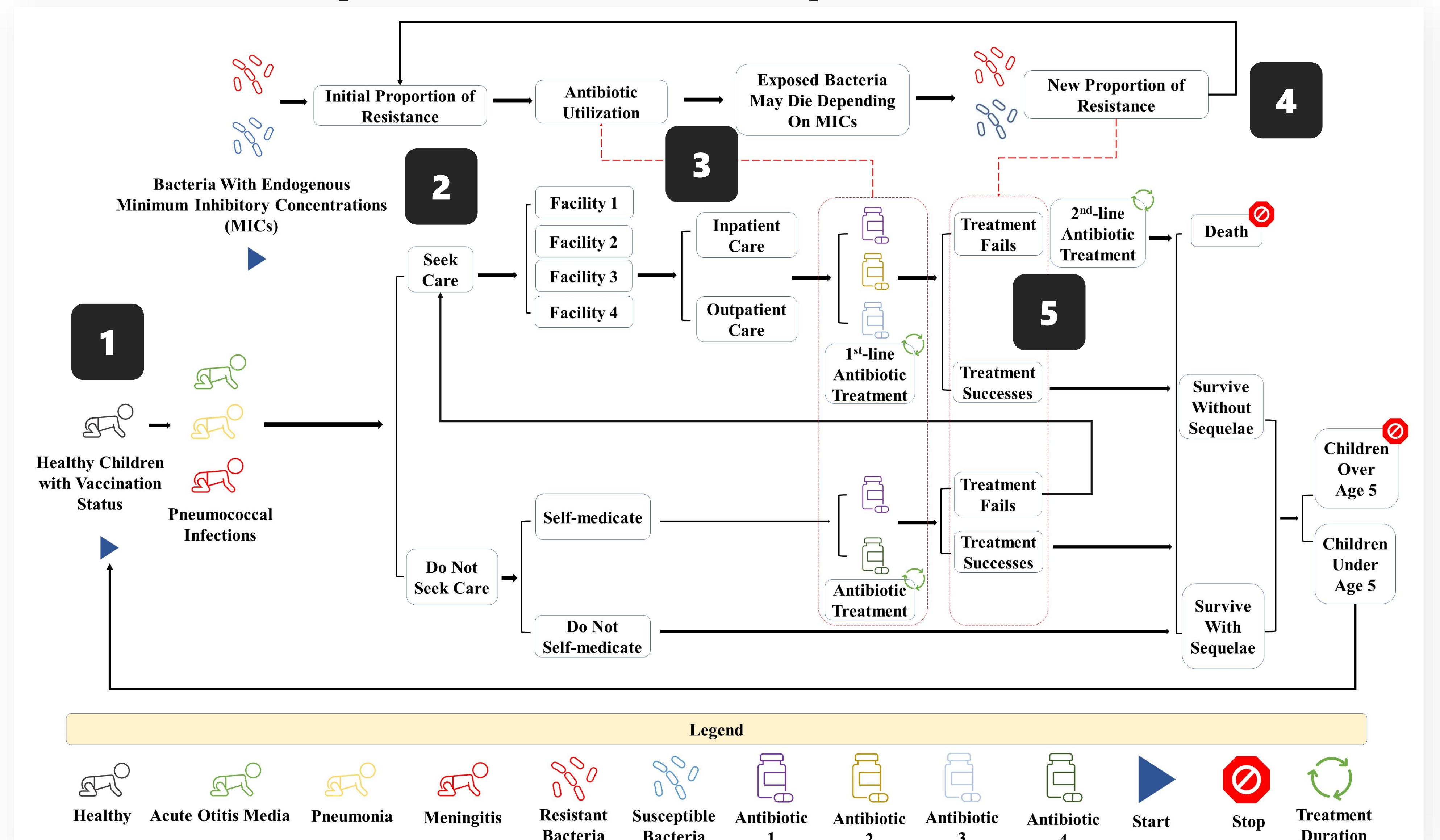
Agent-based model

PCV vaccination

Children under 5 years

DREAMR (Dynamic Representation of the Economics of AMR) Model

- 1 Agent characteristics: age, vaccination status, incidence of disease
- 2 Care-seeking behavior
- 3 Antibiotic utilization
- 4 AMR development based on pharmacokinetics of antibiotics, magnitude of antibiotic exposure, *S. pneumoniae* colonization proportion
- 5 Treatment failures, costs



AMR-related costs or treatment failures averted due to PCV vaccination were associated with country-specific pneumococcal disease burden, levels of AMR, levels of antibiotic utilization, and population size.



Hui-Han Chen, Arden Bui, Ember (Yiwei) Lu,
Sachiko Ozawa
ozawa@unc.edu



ESHELMAN SCHOOL OF PHARMACY



IMMUNIZATION ECONOMICS.ORG