A new benchmarking tool: OBSERVED vs EXPECTED levels of empirical antibiotic usage in hospitals based on the WHO AWaRe book

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Background

Expected levels of antibiotic use (AMU) in hospitals vary with patient characteristics and local resistance patterns. To enable hospitals to benchmark their antibiotic use, we aimed to develop a new tool to determine expected antibiotic use when prescribing is guided by the WHO AWaRe antibiotic book.

Method

- We developed a decision tree model for empiric antibiotic treatment in hospital settings of 16 common infections based on the WHO AWaRe book.
- Input data: disease diagnosis and case severity (proportion of patients admitted to ICU) from the Global Point Prevalence Survey (Global-PPS) and country-specific antimicrobial resistance (AMR) data from the WHO GLASS dashboard.
- A sensitivity analysis was performed assuming: i) 50% increased in case severity, and ii) empiric use of second-choice antibiotics where the country-specific prevalence of resistance to the first-choice is > 20%.

Figure 1. Simple illustration of part of the decision tree based on the WHO AWaRe antibiotic book for empirical prescription for mild-moderate community acquired pneumonia in hospital settings
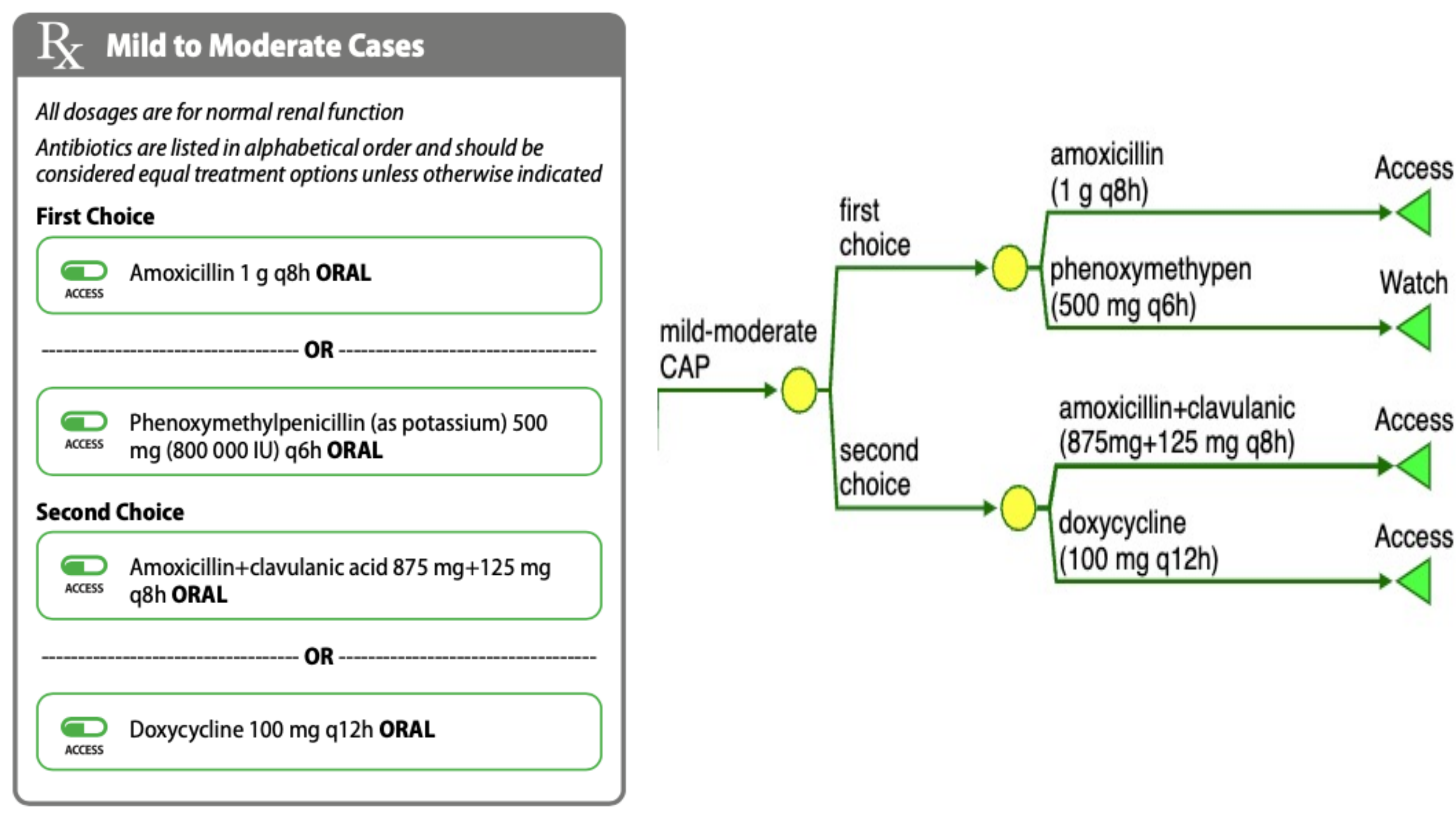

Table 1. Prevalence of country-specific antimicrobial resistant (AMR) organisms referenced from the WHO GLASS dashboard

	Philippines	Brazil
Extended spectrum beta-lactamase(**ESBL**) producing organisms	40%	28%
Methicillin-resistant *Staphylococcus aureus* (**MRSA**)	51%	21%

Notes:
1. ESBL was considered for hospital acquired pneumonia, intra-abdominal infection, acute pyelonephritis, sepsis, and febrile neutropenia
2. MRSA was considered for skin and soft tissue infections, bone and joint infection, and sepsis.

Figure 2. Observed versus expected age-stratified patterns of empirical AMU in the Philippines. Numbers on bars represent number of defined daily doses (DDD) in adults and days of therapy (DOT) in children and neonates on the day of point prevalence survey.
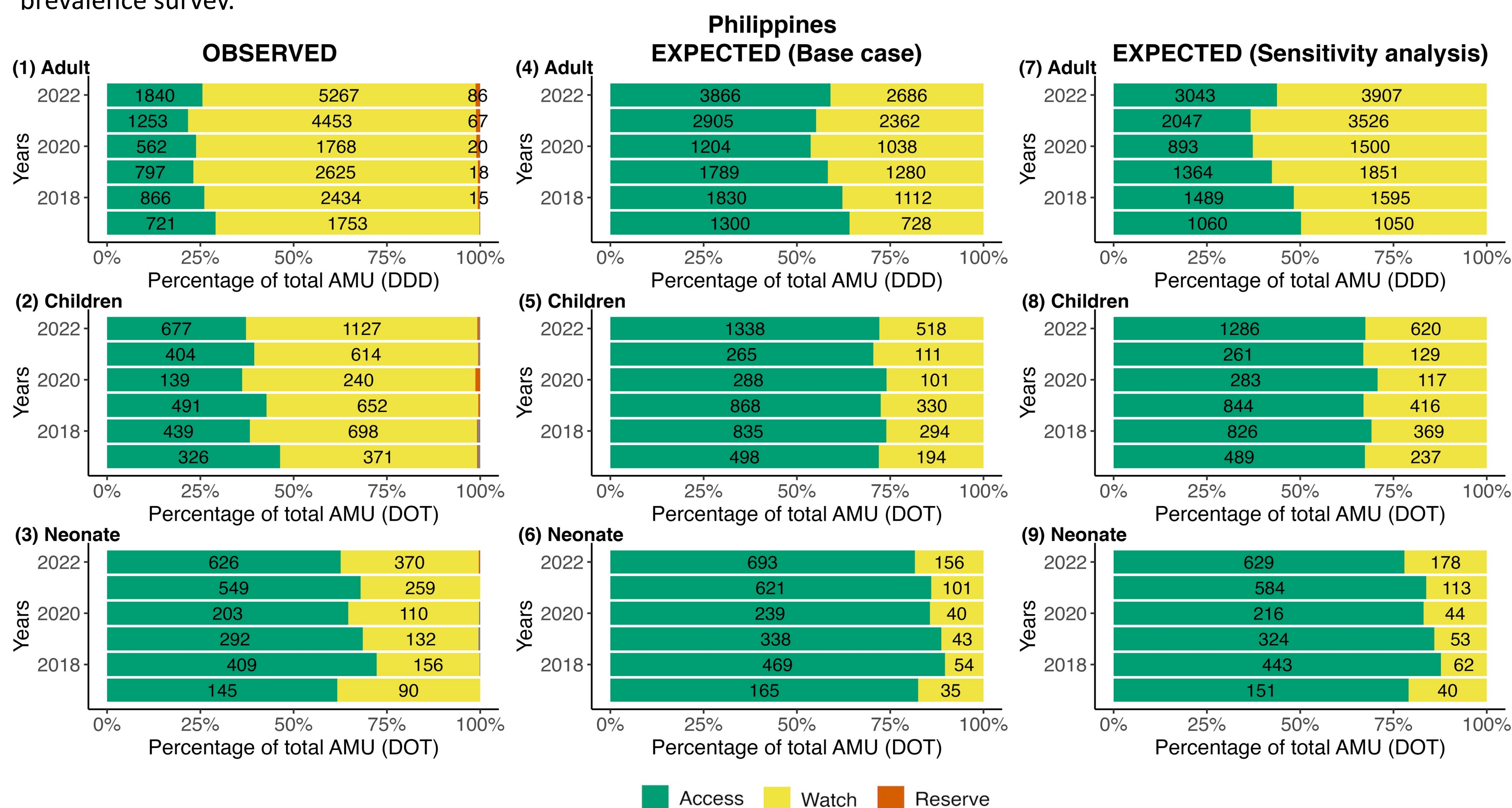

Results

- **62** hospitals in the Philippines and **15** hospitals in Brazil (2017 - 2022) were included in the analysis.
- Observed usage of Watch group antibiotics was higher than expected in all age groups in both countries under both the base case assumptions and the sensitivity analysis.

Conclusion

- The new tool found a higher level of *Watch* group antibiotics usage compared against expected based on the WHO AWaRe book.
- The tool will be further refined and validated across countries participating in the Global-PPS and the ADILA network.

Figure 3. Observed versus expected patterns of empirical AMU in Brazil. Details as for Figure 2.
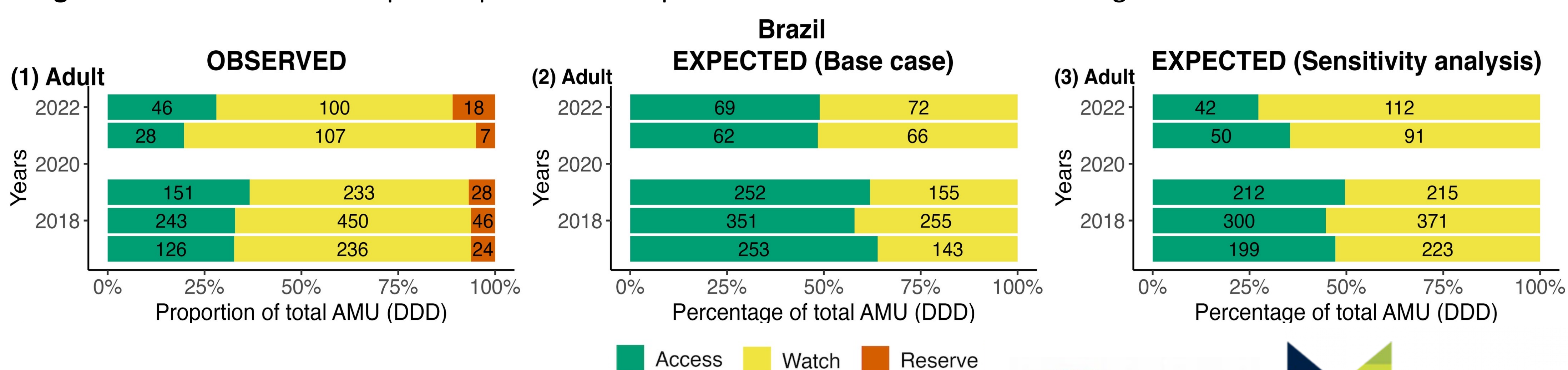
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