



Vaccine Non-Specific Effects: A Solution to the Antibiotic Resistance Crisis



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Introduction

- Antibiotic resistance is rising around the world and could lead to several pathogenic strains that medicine is unable to treat
- The largest contributor to this crisis is misuse of antibiotics especially in countries like Vietnam where they are available over the counter
- To counter act this, there needs to be a reduction in antibiotic use
- Vaccines, particularly those given orally, have been shown to have non-specific effects, effects outside the disease of interest
- One of the more recent discoveries is that certain vaccines may reduce the rate of all kinds of infections. This would reduce the need for antibiotic use making vaccinations a possible solution to the rising antibiotic resistance rates.

Objective of the Study

With the rise in global antibiotic resistance, the study aims to see if there is a correlation between introducing vaccinations into a population and a reduction in antibiotic resistance as measured by reduced antibiotic use in the Vietnam population

Data

- Demographic Health Surveys (DHS) are nationally-representative household surveys that are funded by USAID to monitor global health indicators
- Vietnams DHS surveys included data on basic demographic information, vaccine history, antibiotic use, and other illness indicators

Methods

- From the surveys, the information regarding vaccine administration, illness symptoms (such as cough and fever), and antibiotic usage was compared through R analysis
- Complex Survey Analysis: The data was in the form of a complex survey. This meant households were randomly chosen but the probability of being chosen was not consistent and had to be taken into account.
- Odds Ratio: Odds ratios were calculated for the various variables to evaluate the impact of vaccines on the likelihood (odds) of developing an illness or using antibiotics.
- Controls: Since vaccine efficacy and health decisions are affected by other factors, controls, such as sex and education level were accounted for.

Results

Vaccine	Odds Ratio	2.5% CI	97.5% CI
Measles	0.3452211	0.2146196	0.5552972
BCG	0.3700329	0.231564	0.5913022
Polio (full dose)	0.355588	0.2227377	0.5676758

Table 1 *Odd Ratios of Developing Diarrhea After Vaccination in the Subset of Higher Educated Individuals*

All three ratios indicated that vaccinations reduce the chance of developing diarrhea almost threefold in vaccinated children when analyzing families with higher education

Discussion

- The subset of the population above shows significant effects of vaccinations since the confidence intervals do not include the value of 1.
- This particular subset provided significant results for all three vaccines where as other comparisons did not always have significance even if they had lower odds ratios. This means that for other population confounders additional stratification is needed such as age and region.

Conclusion

- In the higher educated portion of the Vietnamese population, vaccines are associated with lower occurrence of diarrhea, a symptom unrelated to the targeted disease.

Further Research

- Determine what other factors influence the relationship
- Determine the economic benefits of vaccinations reducing resistance

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Additional Projects

Background Research for Systematic Review of Antibiotic Campaigns Targeting General Public

- Conducted searches on PubMed, Cochrane Library, Web of Science, and EBSCO to create a framework for the future completion of the systematic review

Antibiotic Picture Cards

- Created informational cards regarding what symptoms require antibiotic use based on the Mayo Clinic and NIH guidelines for distribution to the general public
- Explained the implications of overuse of antibiotics in lay terms