

Incorporating geographic context into intervention evaluation: cholera and malaria vaccine trials

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Abstract

The oral cholera vaccine and the RTS,S malaria vaccines show only moderate efficacy and do not work equally well in different populations. An oral cholera vaccine trial was conducted in Matlab, Bangladesh and a spatial database was used to determine whether the proportion of people who were vaccinated by neighborhood modified the effect of the vaccine. A substantial herd effect was found and therefore the effectiveness of the vaccine was better than originally thought. This ecological information was used to inform policy discussions about rolling out the vaccine into public health practice. The RTS,S malaria vaccine has also shown only moderate efficacy and its variability in different populations may be due to parasite, environmental, or host factors. Furthermore, any malaria vaccine will not be used in isolation, but rather as part of an integrated program leveraging other control measures. Therefore, understanding the combinations of factors which modulate the effectiveness of a malaria vaccine is essential to guide appropriate vaccine use and formulating next-generation vaccines. We are conducting a study to investigate ecological factors that may influence vaccine efficacy at three RTS,S trial sites in Malawi, Ghana, and Gabon. These data, in conjunction with Phase III trial data, geographic information system data, and a concurrent transmission intensity study, allow us to discern the impacts of individual and neighborhood factors on vaccine effectiveness in an “ecological” analysis of the trial.