THE VACCINATION GAME

by Eve Krakow

When deciding whether or not to vaccinate their child, parents weigh the benefits against the risks. Yet their choice is also influenced by other people's choices. For example, if everyone around them is vaccinated, they may be tempted not to vaccinate thinking that their child is protected through herd immunity.

"In this case, even a slight perceived risk can tip the scales in favour of non-vaccinating behaviour and cause a decline in vaccine uptake," says Chris Bauch, a mathematician at the University of Guelph, Ontario.

Bauch and David J.D. Earn, a mathematician at McMaster University, Ontario, used "game theory" to analyze human behaviour when it comes to making decisions on vaccinating their child. They believe such modelling could be of use to policy-planners.

Game theory involves understanding strategic interactions in a group. "The best example is a game like poker, where you pick your strategies according to what you think other people will do," explains Bauch. "You try to maximize your payoff."

The key prediction made in this research is that vaccination coverage levels will tend to recover more slowly after a scare than the rate at which they initially dropped. More generally, the authors want to emphasize that when vaccination is voluntary, high coverage levels are inherently unstable. "Voluntary policies are victims of their own success," says Bauch. "Once coverage is sufficiently high, people get complacent."

Edward Kaplan, a professor of public health at the Yale School of Management, specializes in the use of mathematical modelling to help make better decisions. He suggests one way to counter the problem raised by this study would be to provide incentives for people to vaccinate, such as reductions in insurance premiums. "When individuals act in their own interests, one rarely arrives at a result that is best for the group."

Bauch believes this kind of research could influence policy-makers. However, it will take more time before a model can be developed to answer specific policy questions.