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Short note on Economic Epidemiology

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Commentary

Economic epidemiology is a branch of epidemiology that combines economics with epidemiology. Its aim is to better understand how diseases are transmitted by including incentives for healthy behaviour and their associated behavioural reactions into an epidemiological setting. This approach could aid in improving policy responses to epidemic diseases by providing explicit tools for policymakers and health-care providers to consider how particular behaviours can influence disease transmission.

The theory of prevalence-dependence, or disinhibiting, which argues that people change their behaviour as the prevalence of an illness varies, was the main framework in which this area arose. The impact of externalities, global disease commons, and how people' incentives might influence the outcome and cost of health interventions are all topics covered by economic epidemiology.

Strategic epidemiology is a branch of economic epidemiology that examines the relationship between individual behaviour and population-wide disease dynamics using an explicitly game theoretic approach.

Prevalence-dependence

The spread of an infectious disease is a population-level phenomenon, but decisions to prevent or treat a disease are typically made by individuals who may change their behaviour over the course of an epidemic, especially if their perception of risk changes based on available epidemic information [1] - their decisions will then have population-level consequences. For example, someone may choose to engage in risky sexual behaviour, or a doctor may provide medications to someone who does not have a diagnosed bacterial illness. In both circumstances, the individual's choice may be sensible, but it is undesirable from a societal standpoint.

Limiting the spread of a disease at the population level necessitates changing individual behaviour, which is dependent on the level of risk information available to them. When the risk is low, people are more likely to overlook it. Individuals are more inclined to take preventive action if the danger of infection is higher. Furthermore, the more transmissible the virus, the greater the motivation to engage in personal control [2].

Individuals may enhance their risk-taking behaviour if the risk of sickness is reduced, either through vaccination or because the disease is less prevalent. This effect is similar to the introduction of safety regulations, such as seatbelts in cars, which, because they reduce the cost of an accident in terms of expected injury and death, may lead people to drive with less caution, resulting in injuries to non-occupants and increased nonfatal crashes, which may offset some of the benefits of seatbelt use [2].

When the prevalence of an illness rises, prevalence-dependent behaviour introduces a significant change in how people respond. If behaviour is exogenous, or if behavioural responses are believed to be inelastic in relation to illness prevalence, the susceptible population's per capita risk of infection rises as disease prevalence rises. When behaviour is endogenous and elastic, however, hosts can take steps to lower their risks. They can reduce the average per capita risk and offset the increased risk of transmission associated with increasing prevalence if their reactions are strong enough [3-6].

Alternatively, a decrease in perceived danger, whether due to a decrease in prevalence or the introduction of a vaccine, could lead to an increase in risky behaviour. Models suggested, for example, that the introduction of highly active antiretroviral therapy (HAART), which lowered the morbidity and mortality associated with HIV/AIDS, could lead to an increase in the prevalence of HIV as the perceived risk of HIV/AIDS dropped [7].

According to a recent study, an individual's likelihood of engaging in unprotected sex is linked to their personal risk assessment, with those who believe that receiving HAART or having an undetectable viral load protects against HIV transmission or who have reduced concerns about engaging in unsafe sex given the availability of HAART being more likely to engage in unprotected sex regardless of HIV status [8].

Because prevalence and public subsidies may compete to promote protective behaviour, this behavioural response could have significant implications for the timing of public interventions [9]. To put it another way, if prevalence induces the same protective behaviour as public subsidies, the subsidies become irrelevant because people will choose to protect themselves regardless of the subsidy when prevalence is high, and subsidies may not be useful at the times when they are typically applied.

Although STDs are a reasonable target for investigating the impact of human behaviour in a modelling framework, personal activities are also crucial for other infectious diseases. During an outbreak of a highly transmissible disease, the speed with which individuals reduce their contact rate with others can have a substantial impact on the disease's transmission [10]. Small reductions in the contact rate, especially for infections like influenza or severe acute respiratory syndrome, can make a big difference (SARS). However, this could have an impact on policy preparation in the event of a biological assault involving a disease like smallpox.

Individual behavioural reactions to non-sexually transmitted illness therapies are also significant. For example, mass spraying to prevent malaria transmission can reduce the vexing effects of nuisance mosquito bites, resulting in a reduction in personal bed net use [6]. To improve a model's utility in evaluating control measures, economic epidemiology tries to incorporate these forms of behaviour reactions

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into epidemiological models.

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Conflict of Interest

None

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