21

Economic Epidemiology

Comprehension Questions

Indicate whether the statement is true or false, and justify your answer. Be sure to cite evidence from the chapter and state any additional assumptions you may need.

1. The ratio of a disease's prevalence to its incidence is constant.

   FALSE. Prevalence refers to the proportion of a population that has a disease, while the incidence is the rate of new infections. Imagine a highly infectious disease that is just starting to emerge in a population; the incidence will be high relative to the prevalence. Once everyone is infected and no new cases are emerging, the prevalence is much higher than the incidence.

2. The expense of opening a secret offshore bank account is an example of the excess burden of U.S. income taxes.

   TRUE. The excess burden of a tax is the sum of all costs that people incur to avoid it.

3. A disease that has been eradicated necessarily imposes no welfare loss in the present. (Be sure to include at least one example disease to illustrate your explanation.)

   TRUE. Smallpox is a disease that has been eradicated. It imposes no epidemiological costs, because no one actually suffers from smallpox anymore. It also imposes no economic costs, because no one has to spend money or time trying to avoid it. This is not a prefect example, because smallpox strains do

exist in government laboratories in the United States and Russia, and those governments need to pay money to secure the laboratories so that a strain is not stolen and released onto an unvaccinated public.

4. A disease that is very uncommon necessarily imposes very little welfare loss.

   FALSE. Ebola virus is very uncommon but imposes a huge excess burden. Whenever an ebola case is isolated, governments and health organizations go to great lengths to limit its spread.

5. If a disease is shown to have a surprisingly high prevalence elasticity of demand for self-protection, policymakers should conclude that an eradication campaign is going to be more difficult than expected.

   TRUE. Suppose a disease with a high prevalence elasticity of demand for self protection is nearly eradicated. Prevalence will be very low, and demand for its vaccine, say, will be correspondingly low. This could prevent complete eradication and allow the disease to rebound.

6. Public health models that do not take economic epidemiological principles into account often make the mistaken assumption that the prevalence elasticity of demand is essentially infinite.

   FALSE. Models that neglect prevalence elasticity of demand are implicitly assuming that it is zero.

7. In the SIR model of infectious disease, a high value of β for a disease indicates that people are very fearful of catching it and protect themselves more.

   FALSE. A high β indicates that a disease is highly contagious.

8. The 1988-89 measles epidemic induced parents in states with a high measles prevalence rate to inoculate their children at earlier ages.

   TRUE. This is considered good evidence of prevalence elasticity of demand for self-protection.

9. The version of the SIR model discussed in Section 21.2 is flawed because it does not account for the possibility of prevalence elasticity.

   FALSE. The SIR model does incorporate prevalence elasticity considerations because the vaccination rate is a function of I_t, the prevalence of disease.

10. For a given disease (with all else equal), if a vaccine has a higher prevalence elasticity of demand, a vaccine subsidy will be a *more* effective tool to control

the equilibrium number of people infected with the disease.

FALSE. Vaccine subsidies are more effective if people have a lower prevalence elasticity of demand for the vaccine.

11. In the steady-state SIR model, the number of susceptible people is not affected by changes in vaccine price.

    TRUE. We proved that the steady-state number of susceptible people is only a function of the infectivity of the disease β and the rate at which people exit the infected population $\lambda_{IR} + \lambda_{d_I}$.

$$S^* = \frac{\lambda_{IR} + \lambda_{d_I}}{\beta}$$

12. Most economists believe that the smallpox eradication campaign was not cost-effective because it required so many up-front costs and smallpox was already eliminated in much of the developed world.

    FALSE. Present-value calculations show that the eradication campaign was a bargain because it both epidemiological costs and the excess burden of smallpox for all time.

13. The phenomenon of herd immunity makes disease eradication difficult because it ensures that diseases will survive until vaccination rates reach 100%.

    FALSE. Herd immunity allows unvaccinated people to share some of the benefits of vaccination and acquire some second-hand immunity. This means that a disease can be eradicated even if a small percent of the population remains unvaccinated.