

## MODES OF TRANSMISSION

### Part 1. Basic Framework of Infectious Diseases

The table below organizes the basic information of some of the diseases introduced in the reading. For each disease, identify 1) the mode of transmission; 2) the agent type (bacterium, virus, fungus, parasite, or prion); 3) host(s); 4) any characterizing symptoms, and 5) any aspects of the environment that inform the presence of the disease in a community OR where in the world the disease is most prevalent. Using the clues already provided for you, complete the remaining entries in the table.

Disease Name	Mode of Transmission	Agent Type	Host(s)	Symptoms	Environment / Location
malaria	vector	parasite	humans, mosquitoes	fever, chills, anemia	tropical areas; sub-Saharan Africa
influenza	airborne	virus	humans	fever, aches	worldwide
hepatitis A	fecal-oral	virus	humans	jaundice, fever, nausea	child daycare centers
cholera	fecal-oral	bacteria	humans	diarrhea	developing countries with poor sanitation

### Part 2. Mortality from Infectious Diseases

Below is a short list of infectious diseases introduced in the reading that can be very deadly. For each one, write down the estimate of global mortality associated with the disease in a single given year. Then, circle the top three killers.

① Tuberculosis (TB):

1.8 million deaths/year

② HIV/AIDS:

2 million deaths/year

3. SARS:

774\* deaths/year (\*2003 outbreak)

④ Malaria:

1.5–2.7 million deaths/year

## TRANSMISSION BY DIRECT CONTACT (HIV vs. COLD)

1. *Disagree*  
Direct contact through closed-mouth kissing is not a risk for transmission of HIV. The risk of acquiring HIV during open-mouth kissing is very low, although the potential contact with blood from open sores or cuts in the mouth may pose a slight risk.
2. *Agree*  
Having sex with many different people is not in itself a risk factor for acquiring HIV. Having unprotected sex with an infected person is a risk factor. Proper condom use can significantly reduce the risk of infection for people who are sexually active.
3. *Strongly disagree*  
HIV does not survive well in the environment, making the possibility of environmental transmission very unlikely. The virus is instead found in blood, semen, vaginal fluid, and breast milk, and is unable to reproduce outside its living host.
4. *Strongly disagree*  
There are no known cases of HIV infection via toilet seats. Again, the virus does not survive well in the environment since it is sensitive to changes in temperature and the presence of oxygen. The virus can, however, survive outside the host in drug injection needles and syringes that are often airtight and that may contain blood from the drug user.
5. *Strongly agree*  
These are all ways that HIV can be transmitted from one person to another. Transmission through transfusions of infected blood is less common than the other modes of transmission since most countries now screen blood for HIV antibodies.
6. *Disagree*  
You will only be exposed to HIV if the needle or syringe is contaminated with HIV by prior use, and not all exposures cause infection.
7. *Agree*  
HIV has been found in saliva and tears in very low quantities from some AIDS patients. However, this does not mean that HIV can be transmitted by these body fluids. Contact with saliva or tears have never been shown to result in transmission of HIV.
8. *Disagree*  
It does not matter how healthy or unhealthy you are. If you engage in behaviors such as unprotected sex and injecting drug use, you put yourself at risk of being infected with HIV.
9. *Disagree*  
This depends on the partners in the relationship and whether they engaged in risky behavior before they became sexually active together, and whether either has unprotected sex outside the marriage or injects drugs with contaminated needles or syringes. In some countries, marriage can be a risk factor for HIV infection because women are expected to reproduce and have unprotected sex with their husbands, while their husbands may have unprotected sexual relations outside the marriage, become infected, and bring the virus into the home.
10. *Disagree*  
Many forms of contraception, such as the birth control pill, do not protect from HIV or any other sexually transmitted infection (STI). Condoms offer women protection when used properly, though they cannot offer complete safety.
11. *Disagree*  
There is no definitive way to tell if someone is infected with HIV. First, most people with HIV look perfectly healthy. Second, just because you know someone well does not mean

they are HIV-negative. It is important that both partners be tested for HIV at a doctor's office or health clinic to be absolutely sure.

12. *Agree*

Latex condoms, when used consistently and correctly, are highly effective in preventing sexual transmission of HIV, but they are not 100 percent effective.

13. *Strongly agree*

This is true. The lining of the rectum is very thin and the virus can enter the body this way during anal sex. Either sexual partner can become infected with HIV during anal sex. Anal sex is equally risky regardless of whether it occurs between two men or a man and a woman.

14. *Disagree*

The risk of transmitting HIV through oral sex is much lower than that of anal or vaginal intercourse, but studies have shown that unprotected oral sex can result in the transmission of HIV and other sexually transmitted infections. Since the virus is present in both semen and vaginal secretions, both men and women are at risk from oral sex.

15. *Strongly agree*

The virus that causes the common cold is present in mucus from the nose and throat and thus can spread from one person to another by kissing. Note how this is different from HIV. Nose and throat secretions are not a high-risk fluid for HIV infection, and HIV is not transmitted through kissing.

16. *Strongly agree*

This is true. The rhinovirus is the most common type of virus that causes colds.

17. *Strongly agree*

Rhinoviruses can live up to three hours on your skin or in the environment. Touching a contaminated surface can transmit the common cold. Note how this is different from HIV, which does not survive in the environment.

18. *Strongly agree*

Symptoms of the common cold include sore throat, sneezing, coughing, stuffy or runny nose, etc. Avoid close contact with someone who exhibits these symptoms, and if you have these symptoms, avoid close contact with healthy people. Note how this is different from HIV, for which there are no evident signs of infection.

19. *Disagree*

Most colds do occur during the fall and winter, but not necessarily because of exposure to cold weather. Rather, more indoor activity puts people in close contact and increase the chances that a virus will spread from one person to another. It is also thought that cold-causing viruses survive better in the environment when humidity is low—the colder months of the year. Also, cold weather may dry up the inside lining of your nose, making you more vulnerable to viral infection.

20. *Disagree*

Though colds are quite common, there are various ways you can protect yourself. Because germs on your hands can easily enter your body through your eyes and nose, practice good hand hygiene, and keep your hands away from your face. Avoid being too close to people who have a cold. If you have a cold, avoid being too close to healthy individuals. Cover your mouth with a tissue or the inside of your elbow instead of your hands when you sneeze or cough. Disinfecting surfaces may also help prevent spread of infection. Taking vitamins such as echinacea or vitamin C has not been shown to prevent the common cold.

## IDENTIFYING MODES OF TRANSMISSION

### Scene A: Vector-borne Transmission

Students may recognize the following about the presented scene:

- *Malaria, a protozoan infection transmitted by mosquitoes, is an example of a vector-borne disease that may occur in this situation.*
- *The tropical / subtropical setting indicates the appropriate habitat for mosquitoes.*
- *The standing water, which may be the result of rainfall, provides a good place for mosquitoes to breed.*
- *Tires can be sources of stagnant water, which are good places for mosquitoes to breed.*
- *Humans are the susceptible hosts, especially children.*
- *Only the person under the bed net would be protected, but in this case, the bed net seems worn and does not completely enclose the sleeping person. This is important because the mosquitoes that transmit malaria are active at night and would be able to enter into the space that should be protected by the bed net.*
- *The thatched roof shelter can harbor insects, including mosquitoes.*
- *There is no evidence of symptoms in this scene.*

### Scene B: Fecal-Oral Transmission

Students may recognize the following about the presented scene:

- *The use of an outhouse nearby a common water source for a village or community indicates contamination of that water source with human feces. Nearby soil may also be contaminated.*
- *Cholera is an example of a waterborne bacterial disease that is spread by fecal-oral transmission.*
- *Hookworm is an example of a human parasitic infection that may occur by accidentally ingesting contaminated soil (or when walking barefoot in contaminated soil).*
- *Community members who use the river to bathe, wash clothes, or collect water for cooking or drinking are at risk for many waterborne infections.*
- *There are no indications of symptoms in this illustration.*

### Scene C: Direct or Indirect Contact Transmission

Students may recognize the following about the presented scene:

- *The common cold is an example of a disease that may be spread by direct or indirect contact transmission.*
- *There are over 200 viruses that cause the common cold and any one could be present in this scenario.*
- *Long-sleeved sweaters indicate it may be the winter season, meaning the cold virus is better able to survive in the environment and children are more often in close contact indoors.*
- *A child is sneezing, which may be a symptom of a cold.*
- *An infected child sneezes into the air, allowing cold viruses present in respiratory droplets to land on a surface in the environment, such as a desk or pencil. Another person may then touch the contaminated surface and then touch his or her eyes, nose, or mouth and become infected.*
- *The girl sneezing is not covering her mouth, expelling cold viruses into the environment.*

- *The boy next to her is putting his pencil in his mouth and possibly contracting the virus in this way.*
- *The bathroom is indicative of the importance of good hand hygiene in reducing the probability of direct or indirect transmission.*

### **Scene D: Airborne / Respiratory Transmission 1**

Students may recognize the following about the presented scene:

- *Tuberculosis, a bacterial infection that affects the lungs, is an example of an illness that can be transmitted by airborne / respiratory droplets.*
- *This family is living in poverty in an overcrowded home, two conditions that increase the risk of tuberculosis transmission.*
- *People living with HIV are at an elevated risk for TB infection. The prescription bottles in the illustration indicate possible co-infection.*
- *A person whose TB infection has developed into TB disease is infectious and can release the bacteria into the air by coughing. A susceptible person in close proximity may then breathe in the bacteria and become infected.*

### **Scene E: Airborne / Respiratory Transmission 2**

Students may recognize the following about the presented scene:

- *Tuberculosis, a bacterial infection that affects the lungs, is an example of an illness that can be transmitted by airborne / respiratory droplets.*
- *A person whose TB infection has developed into TB disease is infectious and can release the bacteria into the air by coughing. A susceptible person in close proximity may then breathe in the bacteria and become infected.*
- *The overcrowded bus has poor ventilation, which increases the risk of respiratory disease transmission.*
- *People with weakened immune systems are at an elevated risk for TB infection. This includes homeless individuals, pregnant women, young children, and the elderly.*
- *A couple people are coughing, which may be a symptom of a respiratory infection.*