"A Chesapeake Parasite is Killing Fish and Making People Ill"

Adapted from a news report published September 7, 1997

Problem Summary

On September 7, 1997, a brief report in the press described a problem of disease among fish and illness among watermen (commercial fishermen) working along the Eastern Shore of the Chesapeake Bay. The report cited the case of an experienced fisherman who after two days working on the Potomac River was ill with nausea, vomiting, and stomach cramps. Other workers reported small, itchy, red, circular skin rashes, memory loss, and respiratory tract problems. Fish, reported to have bloody sores, died by the thousands. The fisherman mentioned above said he found sores on as much as 90% of his catch. Maryland officials say that because of publicity, the loss in retail fish sales could be as high as $20 million.

Some scientists attributed the human symptoms to contact with toxin released by a microorganism called *Pfiesteria piscicida*, which was first identified in the early 1990s, but is thought to have existed for centuries. Some researchers believe this one-celled organism normally exists in a non-toxic form and that animal waste and fertilizers from farms discharged into waterways helped the *Pfiesteria* to multiply. Concerns about the problem caused the states of Maryland and Virginia to prohibit activities such as swimming, boating, and fishing in a seven-mile stretch of the affected area. In North Carolina, where problems linked to *Pfiesteria* have recurred for years, officials planned to carry out studies similar to those in Maryland.

Questions

1. Explain why you might consider this situation in the Chesapeake Bay region an important problem and give at least three general reasons why you should respond.

2. Briefly describe the initial steps of an investigation to respond to this problem. For example, develop a "case definition," determine the data needed for the initial steps, and give some examples of possible sources of such data in a community.

3. Develop and specify probable hypotheses to explain the cause, source, and spread of the outbreak.

4. Develop suitable recommendations and/or interventions for controlling the problem; if recommendations already have been made, then evaluate the advantages and disadvantages of the recommendations.

Answer Key: A Chesapeake Parasite is Killing Fish and Making People Ill

1. **Explain why you might consider this situation in the Chesapeake Bay region an important problem and give at least three general reasons why you should respond.**

   Suggested Answer
   Reports of a severe disease in fish and illness in watermen (commercial fishermen) in the Chesapeake Bay region resulted in the loss of sales of fish and caused officials to prohibit recreational uses of some nearby bodies of water. Some scientists believe this problem is caused by a microorganism that secretes a disease-causing toxin. Important concerns include, but are not limited to

   - The potential of the microorganism and its toxin to kill large numbers of fish, a food staple that is promoted because of its healthfulness
   - Concerns about the possible occurrence of disease in humans who handle or eat fish
   - The potential for the problem to spread (at present, fish are dying in a localized area, but could the outbreak spread to other areas?)
   - The economic impact on the watermen and the fishing industry.

2. **Briefly describe the initial steps of an investigation to respond to this problem. For example, develop a "case definition," determine the data needed for the initial steps, and give some examples of possible sources of such data in a community.**

   Suggested Answer

   Step 1: Confirm that the watermen have all had a similar syndrome—that is, a set of symptoms and signs and not a variety of unrelated illnesses. Sources of data include interviewing affected fishermen and contacting local doctors and hospital emergency room staff. However, consider the possibility that commercial fishermen may be reluctant to be interviewed since identification of illness with their occupation could adversely affect their livelihood.

   Step 2: Confirm that an outbreak of illness really has occurred among fishermen—that is, that the number of fishermen with this illness is higher than would normally be expected. Sources of data include checking health records of the watermen from previous months and years to determine if such illness is seasonal or has occurred in the past and simply has not been recognized. Note that the time lag between the first reports of illness in humans and the subsequent detection of fish kills may complicate the determination of whether the number of illnesses is excessive and whether the illnesses and fish kills are linked.

   Step 3: Identify and count cases of illness.

- First, develop a case definition. For example, a case could be defined as the onset of a combination of at least three of the following: acute gastrointestinal symptoms (e.g., diarrhea, cramps, and vomiting); skin lesions (itch and red); respiratory symptoms; and short-term memory loss occurring in commercial fishermen working the Eastern Shore of the Chesapeake Bay during 1996-1997 and residents of the area during that time.
- Second, conduct an interview survey of all commercial fishermen in the area
- Third, contact area physicians, clinics, and hospital emergency rooms
- Fourth, conduct an interview survey of selected area residents (e.g., people living in waterfront communities). Note, however, that early media coverage of a problem such as this could influence responses to the survey, especially because many of these symptoms are common to a large variety of illness having no association with the current problem.

3. Develop and specify probable hypotheses to explain the cause, source, and spread of the outbreak.

Suggested Answer

The newspaper account suggests a chain of causative events—

- The microorganism secretes a toxin that affects fish, and the fish, in turn, affect the watermen.
- An as-yet-unidentified toxin(s) (perhaps of industrial origin) in the river is causing disease in the fish and/or in watermen.
- The watermen were exposed through some other workplace-related source of toxin.
- This is a community outbreak unrelated to the fish. Many people in the surrounding area are involved, but to date only the watermen have been identified.

4. Develop suitable recommendations and/or interventions for controlling the problem; if recommendations already have been made, then evaluate the advantages and disadvantages of the recommendations.

Suggested Answer

In this report, interventions already included closing of beaches to swimming, boating, and fishing and an advisory to avoid eating fish with characteristic lesions. Advantages of these recommendations are that if hypotheses regarding water, fish, or both as a source of illness for humans are confirmed, then the risk of further illness among exposed watermen and residents has been dramatically reduced. However, if the hypotheses are not subsequently confirmed, these recommendations may result in several adverse consequences: for example, some watermen may suffer an unnecessary loss of livelihood, tourism may be reduced, and community residents may become unnecessarily alarmed.