

Trick or Trap 15

Unhealthy Water?



One summer, physicians in an East Coast town had an unusually large number of patients reporting nasty rashes. As with most new outbreaks of health problems, public health officials launched an investigation.

Specifically, they conducted an *after-the-fact* investigation to try to determine the cause of the rashes. After all, people already had the rashes (the fact), so the researchers attempted to do two things:

- (1) determine what the people with the rashes had in common, such as things they ate and activities they participated in, and
- (2) determine what things the people with rashes had in common that were *not* in common with other people without rashes.

Here's an example of how the statistical reasoning works: Suppose we found that all the people with rashes had eaten hot dogs (something they all had in common). This might point the finger at hot dogs. But also suppose that other patients who did *not* have rashes had also eaten the same brands of hot dogs. This would suggest that hot dogs did not cause the problem because both those with the rashes

and those without rashes had eaten them. This type of research is known in scientific circles as *ex post facto* research (meaning, of course, *after-the-fact*).

Now, let's return to our real example involving the rashes. After numerous interviews, the investigators determined that the people with the rashes had all been swimming at a local lake (something in common). In addition, those patients who did *not* have rashes had *not* gone swimming there. So it seems like an open-and-shut case, right? The evidence clearly points to the water as the source of the problem, so signs were posted, and the word was spread to avoid the water.

Still, a number of new people were getting rashes even though they had not gone swimming in the lake. These new people were interviewed, and the investigators found that what they had in common was *visiting* the lake in order to sunbathe, picnic, and do all the things people do near lakes in the summer *except* swim. A physical investigation at the lake revealed that there was an organism in the soil around the lake that was causing the skin irritation. The water was perfectly safe if people could get to it without coming in contact with the soil.

This example clearly illustrates an important danger in *ex post facto* research: An apparent cause (in this case, the water) may be merely associated with the true cause (in this case, the soil).

Of course, for many problems such as the one we just considered, researchers have no choice but to employ the *ex post facto* method when looking for causal agents. The lesson to be learned here is *not* that this type of research should be avoided. Rather, it should be carefully conducted and interpreted with caution.