CASE STUDY

Defeating the Fiery Serpent

Fighting back tears, an African child cradles her swollen foot as a thin, white worm emerges from an oozing sore. The unfortunate youngster has been infected by a guinea worm (*Dracunculus medinensis*). The pain is intense. Her whole leg feels like it’s on fire. It’s difficult to walk or work when you’re afflicted with one of these terrible invaders. The disease is known in Africa as “empty granary,” because the worms usually erupt during harvest season, making it impossible to work in the fields and harvest crops on which the whole family depends.

The infection cycle starts when someone suffering from the pain of an emerging worm (fig. 8.1) bathes their wound in a local lake or pond. The worm, sensing water, emerges to release thousands of larvae, which are ingested by freshwater copepods (“water fleas”). Inside the water fleas, the larvae develop into the infective stage in about two weeks. When villagers drink the contaminated water, the copepods are digested, but the worms survive and penetrate the wall of the intestine and move to the abdominal cavity. Over the next year, the worm grows to about a meter long (3 feet) and as thick as a spaghetti noodle. When fully grown, the worm migrates to the site where it will erupt, usually in the legs or feet—or even eye sockets—of victims. It takes several weeks for the worm to emerge completely. If you pull too hard on it, the worm breaks, and the part left in your body festers and decays. If the suffering host soaks the lesion in water to soothe the pain of an emerging worm (fig. 8.1) bathes their wound in a local pond can be treated with pesticides that are safe for human consumption but kill the worm larvae and copepods. Furthermore, families can be taught to pour their drinking water through a fine cloth filter to remove any remaining water fleas. The problem is simply to get the proper materials and information to remote villages. Having the prestige of a former American president has been a powerful tool in convincing local officials that the world cares, and that a cure is possible.

Progress has been spectacular. Only a few countries still are afflicted by this horrendous disease. Nigeria is an example of this remarkable success. In 1986, the country was the most Guinea-worm-plagued country in the world, with more than 650,000 cases in 36 states. By 2006, more than 99.9 percent of the infections had been eliminated, and only 120 people still suffered from infections. Worldwide, there are fewer than 12,000 cases, mostly in Sudan, where civil war has made public health intervention difficult. When guinea worms are finally eradicated, it will be only the second disease ever completely eliminated (smallpox, which was abolished in 1977 was first), and the only human parasite totally exterminated worldwide.

An encouraging outcome of this crusade is the demonstration that public health education and community organization can be effective, even in some of the poorest and most remote areas. Once people understand how the disease spreads and what they need to do to protect themselves and their families, they do change their behavior. And when the campaign is completed and guinea worms are completely vanquished, the health workers and volunteers will be available for further community development projects.

This case study reminds us of the importance of public health and how susceptible humans have always been to diseases and contaminants. In this chapter we’ll look at the principles of environmental health to help you understand some of the risks we face and what we might do about them.

Figure 8.1 A guinea worm emerges from a patient’s foot.