

## THE SOIL HEALTH AND HUMAN HEALTH NEXUS

Ian Pepper

The University of Arizona

### ABSTRACT

The thin veneer of material that covers much of the earth's surface is known as soil. This fragile skin is frequently less than a meter thick, and yet it is absolutely vital for human life as we know it. Soil is the most complicated biomaterial on the planet other than perhaps humans themselves. Interestingly, the zone of maximum life, activity, and diversity in terrestrial environments is where soils and humans meet at the surface of the earth. Upward or downward movement away from this interface results in a decrease in all three parameters. Based on these facts, perhaps it is not surprising that soils affect human health, and that humans affect soil health. Soil health can, and has been defined in numerous ways, but most importantly soil health can be thought of as analogous to human health. Both soil and humans must be in a state of well being with respect to their physical, chemical and biological properties. Likewise neither should be diseased nor compromised, and ideally, both should function sustainably at maximum potential. Much is known and has been written about how human activity can beneficially improve or detrimentally destroy soil health, but in contrast, less has been documented on how soils can beneficially or adversely impact human health. Therefore here, we will examine the soil health: human health nexus. To do this, we will evaluate soil from the perspective of: what infects us; what we breathe; what we eat; what we drink; what we think; and what medicates us. Specifically, recent research at The University of Arizona has focused on aspects of both soil and water that affect public health. These include the incidence and fate and transport of emerging contaminants such as prions, *Naegleria fowleri*, endocrine disruptors and bioaerosols. Finally at the global level we can consider how soils affect global warming and the catastrophic events that result from global warming. Overall, the influence of soil on human health is immense. For example, currently millions of people have died from drinking water contaminated with soilborne arsenic in Bangladesh, and over 2 billion people are infected with soilborne helminths. On the positive side, soils provide food and nutrition for humans and animals worldwide, and are a treasure chest of natural products that ubiquitously save human lives. On balance, soil health is vital for human health and life on Earth without earth would be impossible.