



Mini Review

Volume 11 Issue 4 - September 2017  
DOI: 10.19080/ARTOAJ.2017.11.555819

Agri Res & Tech: Open Access J

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# The Linkage between Human Health and Soil under Different Farming Practices, a Systematic Review



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**Submission:** August 28, 2016; **Published:** September 14, 2017

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## Abstract

Soil health is a major component of sustainable agriculture. A considerable amount of research has been published on soil health role on environment and agroecosystems. However, the link between the soil and human health has not been studied in detail. The present review focused on systematic review of existing studies in order to determine the link between soil and human health. It is theorized that soil health has a significant impact on human health in different aspects. To achieve these aims, interactions of soil properties and elements with microbial properties, GHG emissions, crop diseases, illnesses and other human health risk indicators need to be determined.

## Introduction

Recently, the attention about the connections between soil and human health has been developed due to the concept of discovery of reality and scientific explanation of medical issues. Even though the exact connections between soil and human health is still and strongly demanded, soils are important to human health is not necessarily a new approach. Brevik [1] determined a fundamental concept of soil health and human health under historical perspective. For instance, in 1947, "The Soil and Health: A Study of Organic Agriculture" had been published by Sir Albert Howard which took a critical look at modern production agriculture and at the link between soil fertility and health. Similarly, many other studies focused on the link between soil and human health [2,3].

Conventional farming and organic farming comparison is also an increasing attention in both science and public. It is claimed by organic food advocates that organically produced foods are feeder and healthy which produced by healthy soils. This concept brings concerns in to food security and human health Oliver and Gregory [4,5], published a definition for food security terminology, which indicated a safe and healthy food for sufficient nutrition needed by everyone, everywhere and always. In many aspects scientists and public believe in addition of fertilizers in complex system to increase crop production. However, quality and quantity of these fertilizers are still a big

topic to discuss. Especially inorganic sources of fertilizers, which reported to be hazardous for human body in an indirect way since those chemicals contaminate the soil and water Barrett and Bevis [6]. The chemicals used in farmland accumulate in the plants, leach into groundwater, or discharge to surface waters through runoff and ultimately reach to the human body Gleeson [7]. Pesticides cause problems in neurologic and endocrine systems, birth defects, cancer Garry [8], and other diseases for the human being. Because of these problems, a new approach to agricultural production, organic farming, was altered to conventional agriculture. Productivity of food by fertility practices had been determined to be affective on our health indirectly by Gregory [9]. Similarly, chemical fertility had been reported to break down soil aggregates by NH<sub>4</sub><sup>+</sup> movement into soil colloids Ozlu [10]. Therefore, soil degradation, environmental impact, food security, and human health should be considered carefully and together.

Another aspects is heavy metals which are metallic elements, have high densities and cannot be degraded into non-toxic forms, but possible to make them not biologically available Brevik [1]. Some of the heavy metals are mercury, lead, cadmium, chromium, iron, copper, tin, and arsenic. For example, lead contamination is a serious issue. It has been documented that much of the units for cleaning contaminants has been devoted to relatively inexpensive ways to reduce risk from lead-contaminated soils in small areas. This shows that we can challenge with this issues.

First of all, Public Awareness! because heavy metals bond with sulfhydryl groups on enzymes, which cannot function normally and hence, impact human health. For instance, Brevik [1] reported that they could damage the central nervous system, coordination, eyesight, and sense of touch, bone deterioration, gastro-intestinal damage, and lowering of IQ.

Discussing chemical inputs in agroecosystems and human health is directly referring the influences of soil by using these chemicals and elements to produce crops. These crops will in turn feed animals and hence humans. Is this all? The answer is NO! We have many ways that soil impacts human and their environment.

### Approach and Methods

The present study focus on a systematic determination of published studies to answer two main questions: 1) what is the link between soil and human health? 2) What is the most crucial way of soil health degradation affect human health? To achieve these aims, we theorized that soil health has a significant impact on human health in different aspects that are influenced by the management. Therefore, evaluation of relations and interactions between soil and human health in agroecosystems and environmental prospectus is determined by this study. Search terms and combinations (in no particular order): soil health, soil quality, human health, dust, heavy metals, life cycle assessments, diseases, soil and human health, waste water, nitrogen toxicity, and soil biodiversity and human health. These might include subject areas of agriculture, plant sciences, environmental sciences, medical sciences and ecology.

### Findings and Discussion

The soil health is directly or indirectly associated with human health Oliver [2]. Many intensive or inappropriate agricultural or environmental management practices may cause significant influences on human health in physical, biological or even psychological perspectives. The present study under considers some intensive and inappropriate practices effective between soil and human health. There is several ways that human health can be influenced by changes in soil health. Food security is an important concept in soil and human interactions under health or hazardous perspectives. Systems that comprise producing, processing, packaging and distributing food, and retailing and consumption underpin food security, in a sustainable way Ericksen [11]. The soil is at the core of food production, markedly affecting its availability and quality. Soil must be protected and preserved from degradation for plants and animals to thrive FAO [12]. It is a basic concept; soil produce crops and feed animals and human eat both animals and crops. In this way soil influenced human health by providing health or unhealthy food. Infection gateways, airborne dust (particle sizes), geophony, organic pollutants in soil, toxic materials in fertilizers, intensive inorganic fertilizer uses, GHG emissions, nutrient imbalances, heavy metals, soil pathogens, prions, medicines from soil, antibiotics, etc. As exemplated above many ways of soil health

impacts on human health can be documented. However, one of the direct impact, heavy metals, is increasingly being concerned. Some of organisms and heavy metals cause hazardous affects to human body are tabulated on Table 1. Heavy metals originate from the weathering of rocks or sediments, as a by-product of mining ores, and transport through the atmosphere as metal-containing gases or when the metals are suspended on particles such as dust. Many heavy metals in the atmosphere are linked to the burning of fossil fuels or industrial waste products. Several heavy metals cause concerns from a human health perspective Brevik [1].

**Table 1:** Organisms and elements from soil cause health issues to people.

Organism Groups	Disease-Causing Organisms	Heavy Metals
Helminths	Cancer	Arsenic
Protozoa	Kaposi's sarcoma	Aluminum
Archeozoa	Lung cancer	Cadmium
Fungi	Leukemia	Chromium
Actinomycetes	Deficiencies	Cobalt
Viruses	Anaemia	Copper
Parasites	Iodine deficiency disorders	Fluorine
Cyclosporiasis		Iodine
Toxoplasmosis		Manganese
Nematode infections		Lead
Bacteria		Molybdenum
Bacterial infections		Selenium
Leptospirosis		Thallium
Q fever		Zinc
Legionnaires' disease		Iron
Mycoses		
Fractures and height loss		

### Conclusion

The present review concluded that soil health is strongly linked to the human health. In agricultural perspective chemical use can be one of the biggest concern. Soil degradation might occur by breaking down soil structure of accumulation of heavy metals and influence human health.

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DOI: [10.19080/ARTOAJ.2017.11.555819](https://doi.org/10.19080/ARTOAJ.2017.11.555819)

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