

Minimizing Arsenic in Fruits and Vegetables in Cambodia¹

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Arsenic is naturally found in soil and minerals; and it may enter the air, water, and land through wind-blown dust and water run-off.³

It has been used both in human and animal medication, care products, glass-making, leather tanning, and electronics manufacturing.⁴ For centuries, manufacturing companies have also used arsenic compounds as ingredient of rodent poisons, insecticides, biocides, and weed killers.

Entry through plants, waters, and fish

Plants absorb arsenic fairly easily; as such, high concentrations of arsenic may be present in food. The concentrations of the dangerous

inorganic arsenics that are currently present in surface waters are mostly in the form of particles and sediments.

These enhance the chances of genetic material alteration in fish, mainly caused by arsenic accumulation in the bodies of plant-eating freshwater organisms. Birds that eat fish, which already contain eminent amounts of arsenic, eventually die as a result of arsenic poisoning.

Arsenic in Cambodia

Groundwater. Cambodia is listed by the Food and Agriculture Organization (FAO) as one of the 12 countries whose groundwater is contaminated by arsenic. It was found that 9,047 among

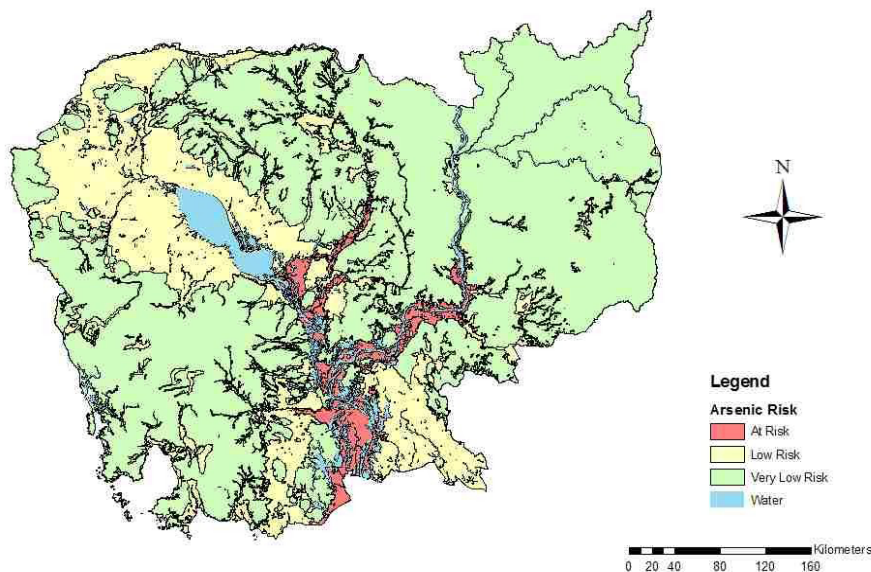
47,950 tested tube wells contain a concentration of more than 0.05 mg/L of arsenic, which is the standard acceptable level for drinking water in Cambodia.

Four provinces namely Kandal, Kampong Cham, Prey Veng, and Kratie were found to be the most affected areas with 35, 33, 19, and 15 % of tested tube wells containing arsenic higher than 0.05 mg/L, respectively. There are 290 cases of arsenicosis⁵ and few cases of cancer in the highly affected areas.

Cambodia's Ministry of Rural Development (MRD) has been actively working with various partners on appropriate mitigation to provide safe drinking water to the population living in the arsenic affected areas.

Crops. Initial research has confirmed the presence of arsenic in food crops. However, the average arsenic content in various crops sampled in the most contaminated areas was below the 1 mg/kg acceptable limit of World Health Organization (WHO)/FAO.

Only Chinese broccoli and cabbage contain higher arsenic level mean at 1.09 and 1.34 mg/kg dry weight, respectively. The values seem high, but are low when the arsenic content is calculated against the actual weight of these vegetables, which have high moisture.



Arsenic Risk Map for Cambodia



A man in Cambodia shows his hands affected by arsenicosis, a chronic illness resulting from drinking water with high levels of arsenic.

The results show that the level of arsenic accumulation varies by crop type, season, climate, and method of cultivation. The key factor that accounts for high accumulation is the arsenic level in soil and irrigated water. Intensive use of arsenic-contaminated water for irrigation may increase the arsenic accumulation in crops.

The level of arsenic accumulation in crops grown in risk areas has not reached the threat level yet. However, continuous consumption of these contaminated crops increases the arsenic uptake of rural people in addition to the present arsenic uptake through drinking water.

The incidence of arsenicosis in Cambodia increased over the last two years with around 330 patients suffering from the disease. Moreover,

arsenicosis manifests slowly -- in some provinces, it was only after drinking tubewell water for around five years when the disease was detected.

Recommendations and Policy Implications

The main sources of arsenic uptake among Cambodian rural people are crops as well as water from tube wells, which are the secondary drinking water source of people living in arsenic contaminated areas. However, the study shows that arsenic in crops was lower than the acceptable value set by the WHO/FAO.

The following recommendations will be useful for minimizing the risk of arsenic accumulation:

- decrease the consumption of arsenic polluted water by using

surface and rainwater with microbial treatment or arsenic treatment plant;

- conduct more research to get data on arsenic in crops in other locations for efficient planning;
- develop cultivation methods for minimizing arsenic accumulation using particular soil mixture, arsenic free water for irrigation and/or ingredients to limit arsenic solubility;
- identify the arsenic non/low accumulation crops to grow in the arsenic-contaminated areas; and
- increase the awareness of rural people on the arsenic issue.

¹ SEARCA Seed Fund for Research and Training (SFRT) grant winning proposal 2008-2009

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³ Arsenic. Available at <http://www.lenntech.com/periodic/elements/as.htm>

⁴ Health Effects Information: Arsenic. Available at <http://www.oregon.gov/DHS/ph/dwp/docs/fact/arsenic.pdf>

⁵ Arsenicosis can cause various health effects including skin problems, skin cancer, and diseases of the legs' and feet's blood vessel.