

Chapter 6

Health Effects of Pesticides on Pregnant Women and Children

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ABSTRACT

Pesticides, along with hybrid seeds and fertilizers, are an integral part of the green revolution and are used to control and eradicate disease vectors for the improvement of agricultural production. Pesticides is an umbrella term for insecticides, nematocides, fungicides, herbicides, fumigants, repellents, and attractants. Pesticides are used against unwanted plants and animals to control diseases and losses. Efforts at different levels may help to reduce the impact of pesticides on newborn babies and on pregnant women. Different efforts can be considered at clinical, educational, and policymaking institutes. Use of risk assessment tools, encouragement of organic diets, educating parents working in agricultural fields from hazards of pesticides particularly in pregnancy and breast feeding, implementation of integrated pest management (IPM) programs, and encouraging policies supporting IPM can help in tackling the menace of pesticide hazards.

INTRODUCTION

Drinking water is classified among the most precious resources of the earth, however by anthropogenic activities both the quality and quantity of available water is continuously deteriorating (Benner *et al.*, 2013). A large part of world's population is forced to use contaminated drinking water (WHO, 2010). Millions of deaths mostly in developing countries could be prevented if people adhere to reliable safe

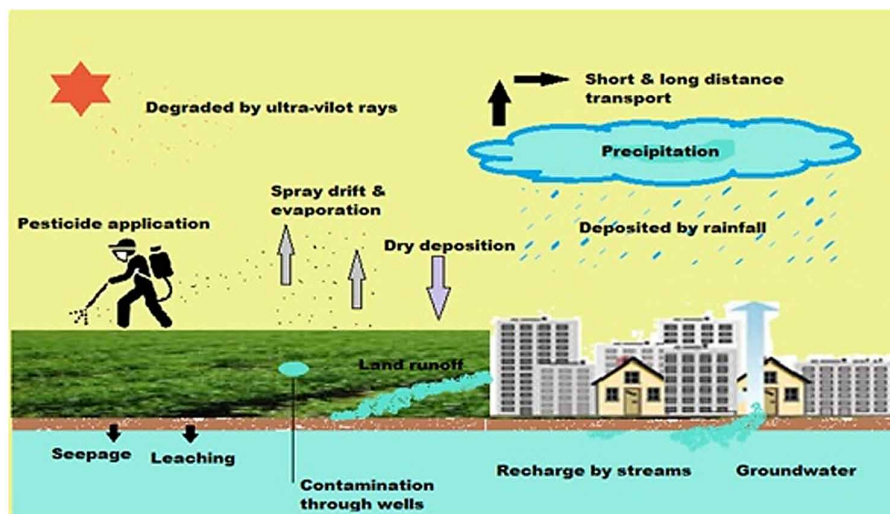
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drinking water sources. Around 2.4 million deaths occur annually, mostly in developing countries by living in unhygienic conditions and having no access to potable water (Pruss-Ustun *et al.*, 2008). Among the two basic drinking water sources, surface water receives high extent of pollutants as compared to groundwater which is less exposed though groundwater can act as pollution source for decades due to higher residence times of pesticides and lower microbial activity as compared to surface water (Rodrigo *et al.*, 2014). With the varying pollutants and contaminants, the traditional water testing and monitoring processes and techniques (for microbial contamination) have also shifted to include the health risks of chemical contaminants, mostly when associated with chronic exposures (Fawell & Nieuwenhuijsen, 2003; Thompson *et al.*, 2007).

Due to widespread distribution, toxicity and persistence, pesticides are now the important class of water pollutants, even at very low concentrations pesticides can be hazardous to aquatic life because of bioconcentration process. Out of 22 identified POPs, 15 of them are pesticides mainly aldrin, dieldrin, endrin, chlordane, DDT, hexachlorobenzene, mirex, heptachlor, toxaphene, etc. Considering the severity of POPs a separate international environmental treaty (Stockholm conference) was signed in 2001 to eliminate or restrict the production and use of POPs (Xu *et al.*, 2013; Ali *et al.*, 2014). Properties like persistence in degradation process, ability to travel long distances, bioaccumulation, carcinogenic, hormone disruption and causing immunological and reproductive disorders has increased public concerns towards POPs (Vos *et al.*, 2000; Buccini, 2003; Sanpera *et al.*, 2003). Across the globe, 884 million people (13% of the world's population) depend on unprotected and distant water sources for drinking water collection and 3.6 billion people have well developed piped water system. However, in many low and middle-income countries, piped water system work for few hours and also are not safe, for example in Asian cities, more than one in five water supply schemes fail to meet national water quality standards (Bartram and Cairncross, 2010).

Pesticide contamination of surface water and groundwater can occur from both point sources (spill sites, disposal sites) and non-point sources which are the dominant source of pesticide pollution includes agricultural or urban runoff, infiltration from application sites, etc. (Fig. 1).

Figure 1. Schematic diagram depicting possible routes of pesticides into streams and groundwater Thodal et al., 2009.



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