

Health effects

Pesticides can be dangerous to consumers, workers and close bystanders during manufacture, transport, or during and after use.[36]

The American Medical Association recommends limiting exposure to pesticides and using safer alternatives:[10]

Particular uncertainty exists regarding the long-term effects of low-dose pesticide exposures. Current surveillance systems are inadequate to characterize potential exposure problems related either to pesticide usage or pesticide-related illnesses...Considering these data gaps, it is prudent...to limit pesticide exposures...and to use the least toxic chemical pesticide or non-chemical alternative.

Farmers and workers

The World Health Organization and the [UN Environment Programme](#) estimate that each year, 3 million workers in agriculture in the developing world experience severe [poisoning from pesticides](#), about 18,000 of whom die.[8] According to one study, as many as 25 million workers in developing countries may suffer mild pesticide poisoning yearly.[37] There have been many studies of farmers intended to determine health effects of occupational pesticide exposure. Associations between non-Hodgkin lymphoma, leukemia, prostate cancer, multiple myeloma, and soft tissues sarcoma have been reported in studies, with less associations found for other cancers.[38]

[Organophosphate](#) pesticides have increased in use, because they are less damaging to the environment and they are less persistent than organochlorine pesticides.[39] These are associated with acute health problems for workers that handle the chemicals, such as abdominal pain, dizziness, headaches, nausea, vomiting, as well as skin and eye problems.[40] Additionally, many studies have indicated that pesticide exposure is associated with long-term health problems such as respiratory problems, memory disorders, [dermatologic](#) conditions,[41][42] cancer,[43]

depression,[44] neurological deficits,[45][46] miscarriages, and birth defects.[47][48][49][50][51][52][53][54][55][56] Summaries of peer-reviewed research have examined the link between pesticide exposure and neurologic outcomes and cancer, perhaps the two most significant things resulting in organophosphate-exposed workers.[57][58]

According to researchers from the National Institutes of Health (NIH), licensed pesticide applicators who used chlorinated pesticides on more than 100 days in their lifetime were at greater risk of diabetes. One study found that associations between specific pesticides and incident diabetes ranged from a 20 percent to a 200 percent increase in risk. New cases of diabetes were reported by 3.4 percent of those in the lowest pesticide use category compared with 4.6 percent of those in the highest category. Risks were greater when users of specific pesticides were compared with applicators who never applied that chemical.[59][60]

Consumers

There are concerns that pesticides used to control pests on food crops are dangerous to people who consume those foods. These concerns are one reason for the organic food movement. Many food crops, including fruits and vegetables, contain pesticide residues after being washed or peeled. Chemicals that are no longer used but which are resistant to breakdown for long periods may remain in soil and water and thus in food.[61]

The United Nations Codex Alimentarius Commission has recommended international standards for Maximum Residue Limits (MRLs), for individual pesticides in food.[62]

In the EU, MRLs are set by DG-SANCO. In the US, levels of residues that remain on foods are limited to tolerance levels that are established by the U.S. Environmental Protection Agency and are considered safe.[63] The EPA sets the tolerances based on the toxicity of the pesticide and its breakdown products, the amount and frequency of pesticide application, and how much of the pesticide (i.e., the residue) remains in or on food by the time it is marketed and prepared.[64] Tolerance levels are obtained

using scientific risk assessments that pesticide manufacturers are required to produce by conducting toxicological studies, exposure modeling and residue studies before a particular pesticide can be registered, however, the effects are tested for single pesticides, and there is little information on possible [synergistic](#) effects of exposure to multiple pesticide traces in the air, food and water.[65]

A study published by the [United States National Research Council](#) in 1993 determined that for infants and children, the major source of exposure to pesticides is through diet.[66] A study in 2006 measured the levels of [organophosphorus](#) pesticide exposure in 23 school children before and after replacing their diet with [organic food](#) (food grown without synthetic pesticides). In this study it was found that levels of [organophosphorus](#) pesticide exposure dropped dramatically and immediately when the children switched to an organic diet.[67]

To reduce the amounts of pesticide residues in food, consumers can wash, peel, and cook their food; trim the fat from meat; and eat a variety of foods to avoid repeat exposure to a pesticide typically used on a given crop.[61] Since organic food use pesticide, purchase of organic food does not mean one can avoid exposure. [61]

Strawberries and tomatoes are the two crops with the most intensive use of soil fumigants. They are particularly vulnerable to several type of diseases, insects, mites, and parasitic worms. In 2003, in California alone, 3.7 million pounds (1,700 metric tons) of [metam sodium](#) were used on tomatoes. In recent years other farmers have demonstrated that it is possible to produce strawberries and tomatoes without the use of harmful chemicals and in a cost effective way.[68]

The public

Exposure routes other than consuming food that contains residues, in particular pesticide drift, are potentially significant to the general public.[69]

The [Bhopal disaster](#) occurred when a pesticide plant released 40 [tons](#) of [methyl isocyanate](#) (MIC) gas, a chemical intermediate in the synthesis of

some carbamate pesticides. The disaster immediately killed nearly 3,000 people and ultimately caused at least 15,000 deaths.[70]

In China, an estimated half million people are poisoned by pesticides each year, 500 of whom die.[71]

Children have been found to be especially susceptible to the harmful effects of pesticides.[72] A number of research studies have found higher instances of brain cancer, [leukemia](#) and birth defects in children with early exposure to pesticides, according to the [Natural Resources Defense Council](#).^[73] Often used for ridding school buildings of rodents, insects, pests, etc., pesticides only work temporarily and must be re-applied. The poisons found in pesticides are not selectively harmful to just pests and in everyday school environments children (and faculty) are exposed to high levels of pesticides and cleaning materials. "No testing has ever been done specifically pertaining to threats among children"^[74]

Peer-reviewed studies now suggest [neurotoxic](#) effects on developing animals from [organophosphate](#) pesticides at legally tolerable levels, including fewer [nerve cells](#), lower [birth weights](#), and lower [cognitive scores](#).^[citation needed] The [United States Environmental Protection Agency](#) finished a 10 year review of the organophosphate pesticides following the 1996 [Food Quality Protection Act](#), but did little to account for developmental neurotoxic effects, drawing strong criticism from within the agency and from outside researchers.^{[75][76]}

Some scientists think that exposure to pesticides in the [uterus](#) may have negative effects on a [fetus](#) that may manifest as problems such as growth and behavioral disorders or reduced resistance to pesticide toxicity later in life.^[77]

A new study conducted by the [Harvard School of Public Health](#) in Boston, has discovered a 70% increase in the risk of developing [Parkinson's disease](#) for people exposed to even low levels of pesticides.^[78]

A 2008 study from Duke University found that the Parkinson's patients were 61 percent more likely to report direct [pesticide application](#) than were healthy relatives. Both insecticides and herbicides significantly increased

the risk of Parkinson's disease. [79]

One study found that use of pesticides may be behind the finding that the rate of birth defects such as [missing](#) or [very small eyes](#) is twice as high in rural areas as in urban areas.[80] Another study found no connection between eye abnormalities and pesticides.[80] In the USA, increase in birth defects is associated with conceiving in the same period of the year when agrichemicals are in elevated concentrations in surface water.[81]

Pyrethrins, insecticides commonly used in common bug killers, can cause a potentially deadly condition if breathed in.[82]

Regulation

In most countries, in order to sell or use a pesticide, it must be approved by a government agency.[24] For example, in the [United States](#), the [Environmental Protection Agency](#) (EPA) does so. Complex and costly studies must be conducted to indicate whether the material is safe to use and effective against the intended pest. During the registration process, a label is created which contains directions for the proper use of the material. Based on acute toxicity, pesticides are assigned to a [Toxicity Class](#).

Some pesticides are considered too [hazardous](#) for sale to the general public and are designated [restricted use pesticides](#). Only certified applicators, who have passed an exam, may purchase or supervise the application of restricted use pesticides.[24] Records of sales and use are required to be maintained and may be audited by government agencies charged with the enforcement of pesticide regulations.

In Europe, recent EU legislation has been approved banning the use of highly toxic pesticides including those which are [carcinogenic](#), [mutagenic](#) or toxic to reproduction, those which are endocrine-disrupting, and those which are persistent, [bioaccumulative](#) and toxic (PBT) or very persistent and very bioaccumulative (vPvB). Measures were approved to improve the general safety of pesticides across all EU member states. [25]

Though pesticide regulations differ from country to country, pesticides and products on which they were used are traded across international borders.

To deal with inconsistencies in regulations among countries, delegates to a conference of the United Nations [Food and Agriculture Organization](#) adopted an International Code of Conduct on the Distribution and Use of Pesticides in 1985 to create voluntary standards of pesticide regulation for different countries.^[24] The Code was updated in 1998 and 2002.^[26] The FAO claims that the code has raised awareness about pesticide hazards and decreased the number of countries without restrictions on pesticide use.^[3]

Two other efforts to improve regulation of international pesticide trade are the [United Nations London Guidelines for the Exchange of Information on Chemicals in International Trade](#) and the [United Nations Codex Alimentarius Commission](#)^[citation needed]. The former seeks to implement procedures for ensuring that prior informed consent exists between countries buying and selling pesticides, while the latter seeks to create uniform standards for maximum levels of pesticide residues among participating countries.^[27] Both initiatives operate on a voluntary basis.^[27]

Reading and following label directions is required by law in countries such as the US and in limited parts of the rest of the world.

One study found pesticide self-poisoning the method of choice in one third of suicides worldwide, and recommended, among other things, more restrictions on the types of pesticides that are most harmful to humans.^[28]

Environmental effects

Main article: [Environmental effects of pesticides](#)

Pesticide use raises a number of environmental concerns. Over 98% of sprayed insecticides and 95% of herbicides reach a destination other than their target species, including non-target species, air, water and soil.^[8]

[Pesticide drift](#) occurs when pesticides suspended in the air as particles are carried by wind to other areas, potentially contaminating them. Pesticides are one of the causes of [water pollution](#), and some pesticides are [persistent organic pollutants](#) and contribute to [soil contamination](#).

In addition, pesticide use also reduces biodiversity and results in lower soil quality,[29] reduced [nitrogen fixation](#),[30] contribute to [pollinator decline](#),[31][32][33][34] can reduce habitat, especially for birds,[35] and can threaten [endangered species](#).^[8]

Continuing development

Pesticide safety education and pesticide applicator regulation are designed to protect the public from [pesticide misuse](#), but do not eliminate all misuse. Reducing the use of pesticides and choosing less toxic pesticides may reduce risks placed on society and the environment from pesticide use.^[16] [Integrated pest management](#), the use of multiple approaches to control pests, is becoming widespread and has been used with success in countries such as [Indonesia](#), [China](#), [Bangladesh](#), the US, [Australia](#), and [Mexico](#).^[8] IPM attempts to recognize the more widespread impacts of an action on an [ecosystem](#), so that natural balances are not upset.^[6] New pesticides are being developed, including biological and botanical derivatives and alternatives that are thought to reduce health and environmental risks. In addition, applicators are being encouraged to consider alternative controls and adopt methods that reduce the use of chemical pesticides.

Pesticides can be created that are targeted to a specific pest's life cycle, which can be environmentally more friendly.^[83] For example, [potato cyst nematodes](#) emerge from their protective cysts in response to a chemical excreted by potatoes; they feed on the potatoes and damage the crop.^[83] A similar chemical can be applied to fields early, before the potatoes are planted, causing the [nematodes](#) to emerge early and starve in the absence of potatoes.^[83]

Alternatives

Alternatives to pesticides are available and include methods of cultivation, use of [Biological controls](#), such as pheromones and microbial pesticides, and [genetic engineering](#), and methods of interfering with insect breeding.^[8]

Application of composted yard waste has also been used as a way of controlling pests.[84] These methods are becoming increasingly popular and often are safer than traditional chemical pesticides. In addition, EPA is registering reduced-risk conventional pesticides in increasing numbers.

Cultivation practices include [polyculture](#) (growing multiple types of plants), [crop rotation](#), planting crops in areas where the pests that damage them do not live, timing planting according to when pests will be least problematic, and use of [trap crops](#) that attract pests away from the real crop.[8] In the US, farmers have had success controlling insects by spraying with hot water at a cost that is about the same as pesticide spraying.[8]

Release of other organisms that fight the pest is another example of an alternative to pesticide use. These organisms can include natural [predators](#) or [parasites](#) of the pests.[8] [Biological pesticides](#) based on [entomopathogenic fungi](#), [bacteria](#) and [viruses](#) cause disease in the pest species can also be used.[8]

Interfering with insects' reproduction can be accomplished by [sterilizing males](#) of the target species and releasing them, so that they [mate](#) with females but do not produce offspring.[8] This technique was first used on the [screwworm fly](#) in 1958 and has since been used with the [medfly](#), the [tsetse fly](#),^[85] and the [gypsy moth](#).^[86] However, this can be a costly, time consuming approach that only works on some types of insects.[8]

Another alternative to pesticides is the thermal treatment of soil through steam. [Soil steaming](#) kills pest and increases soil health.

In India, traditional pest control methods include using [Panchakavya](#), the "mixture of five products." The method has recently experienced a resurgence in popularity due in part to use by the organic farming community.^[citation needed]

Effectiveness

Some evidence shows that alternatives to pesticides can be equally effective as the use of chemicals. For example, [Sweden](#) has halved its use of pesticides with hardly any reduction in crops.[8] In Indonesia, farmers

have reduced pesticide use on rice fields by 65% and experienced a 15% crop increase.[8] A study of **Maize** yields in northern Florida found that the application of composted yard waste with high **carbon to nitrogen ratio** to agricultural fields was highly effective at reducing the population of plant-parasitic **nematodes** and increasing crop yield, with yield increases ranging from 10% to 212%; the observed effects were long-term, often not appearing until the third season of the study.[84]

For the first half of this article, which describes Pesticides and the extensive references, go to:

<http://en.wikipedia.org/wiki/Pesticide>

For more information about cancer and potential causes and helpful advice on cancer, go to <http://www.aspirationsws.com/online.html>

Go to the Being Healthy section.

Also, it is my personal opinion, which I feel is supported by research, that ADD, ADHD, Bipolar disorder, Autism, mood and personality, as well as learning problems that currently plague our society far worse than ever before are as a direct result of the chemicals in pesticides, steroids and other chemicals that we as a society give to the animals, fruits and vegetables we then eat! I personally buy canned and processed veggies and fruits and try to buy organic (which unfortunately is more expensive) whenever possible for meats, veggies, and fruits. Please do your own research and be careful what you put into your body...