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Overall Notable Health Challenges about the Toxicity of Pesticides Concerning to End Users

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Abstract

Pesticides are one of the five worst threats to human's health, whereas, the other four are lead, air pollution, environmental tobacco smoke and drinking-water contamination. Particularly, insecticides are intended to control insect pests, but these may also be toxic or poisonous to humans including desirable plants and animals. Some insecticides are so highly toxic that in very small quantities these may kill a person and nearly any insecticide can make to peoples punishing if these are exposed to a sufficient amount. For the reason that even fairly safe insecticides can irritate the skin, eyes, nose, or mouth, it is a good idea to understand how pesticides can be toxic and to follow practices to eliminate exposure to them. This manuscript, therefore, describes how pesticides work on living organisms and guides to learn in what way to lessen or abolish human exposure. Toxicity refers to an ability of a substance to produce adverse effect, and insecticides work by altering normal body functions and adverse effects may range from slight symptoms such as headaches to severe symptoms like coma, convulsions, or death. Insecticides can enter the body orally (through mouth and digestive system), dermally (through skin) or by inhalation (through nose and respiratory system). Some poisons cause irreversible (permanent) damage, however, most toxic effects are naturally reversible and do not cause permanent damage if prompt medical treatment is sought. Toxicology is the science of insecticides, which are poisons, there is none which is not a toxic and their right dose absorbed through skin, inhaled or ingested, differentiates a poison and a remedy. Toxicity is species-specific, and a central concept of toxicology is that toxic effects are dose-dependent; even water can lead to water intoxication when taken in too high a dose, whereas for even a very toxic substance such as snake venom there is a dose below which there is no detectable toxic effect. Since the basic purpose of conducting toxicity studies is to provide an accurate prediction of potential adverse effects of a chemical in non-target as well as in test species, it needs to ask whether the methodology that is used both for testing and interpreting the test results is yielding answers that protect both the environment and public health. Use insecticides safely, read and follow directions on the manufacturer's label and do not take delaying chances if any one becomes contaminated, however, it is necessary to wash body infected immediately.

Keywords

Toxicology, Exposure, Risk, Poison, Children's Vulnerability

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1. Introduction

Pesticides are poisons and if they are not so, these could not be effective in controlling pests. However, generally pesticides are far more poisonous to pests than they are to humans or domestic animals. Pesticides vary greatly in the toxicity hazards that they represent to humans and domestic animals. The generally true and a very important concept is

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that there are no harmless substances and only harmless ways of using substances exist. Many substances that are harmless or even beneficial in limited quantities or with some exposure routes could be considered poison via an alternative exposure route.The right dose differentiates a poison and a remedy, and few substances that can be absorbed through the skin, inhaled, or ingested are truly inert. For instance, thousands of gallons of water are harmless when swimming in them for an hour, but if anyone consumes as little as two gallons of water in that same hour, the water becomes a toxic poison that probably can kill a person. Salt that tastes the food becomes a poison if taken in excessive quantities. Even oxygen, which is a necessity of life, becomes toxic at extreme concentrations (Levine, 2007; Sarwar, 2015 a; 2015 b).

Generally, modern vector and pest control operations emphasize the use of pesticides that are the least hazardous to non-target organisms and regulatory agencies place great stress on means of reducing human hazards to pesticides. Globally, hazard classification looks at three areas, physical hazards (explosions and pyrotechnics), health hazards, and environmental hazards. Data from poison control centers show that deaths resulting from poisonings from pesticide exposure represent a relatively small proportion of the total number of poison-related deaths. Nevertheless, each year some pesticide-related poisonings do occur in certain states, and some have major medical consequences, including death. Because of this, it is essential that everyone involved in pesticide use must understand the principles of pesticide poisoning, and role of safe use of pesticides in avoiding poisoning incidents (David and Linda, 2000; Sarwar, 2015 c; 2015 d; 2015 e).

2. Toxicity and Hazard of Pesticide

Toxicity is the degree to which a substance can damage an organism and it can refer to the effect on a whole organism, such as an animal, bacterium, or plant, as well as the effect on a substructure of the organism such as a cell (cytotoxicity) or an organ such as the liver (hepatotoxicity). By extension, the word may be metaphorically used to describe toxic effects on larger and more complex groups, such as the family unit or society at large. In the context of pesticide safety, there is a significant dissimilarity between the terms toxicity and hazard. Toxicity mentions to inherent poisonous potency of a material, it is evaluated in toxicology laboratories and is always expressed in quantitative terms such as LC_{50} (lethal concentration-50, the concentration at which a material will kill 50% of some reference organism). On the other hand, hazard depends not only on the toxicity of a material, but also on the risk of toxic exposure when used. In simple terms, remember that toxicity is the capacity of a substance to produce illness or death, while hazard is a function of toxicity and exposure. Collectively, toxicity and hazard information can be used to determine risk (Alavanja et al., 2004).

There is a greater potential for harmful effects to humans from highly toxic pesticides than from pesticides that are less toxic. However, the concentration of the pesticide in a formulation, the length of human exposure to a pesticide and the route of entry into the human body are equally important in the potential for poisoning. Although a pesticide applicator will have little control over the toxicity of a pesticide, yet anyone will have significant control over hazards associated with pesticide uses. A sealed container of a very toxic pesticide presents little hazard to a pesticide technician before the seal is broken. Even when the container is opened, the hazard or risk may be small if the technician is wearing protective clothing, gloves and eye protection. However, if the container is leaking, or if the technician is not using protective gear, the hazard can be high (Fishel, 2005).

3. Types of Toxic Agents

Generally, there are three types of toxic entities like chemical, biological and physical as exemplified in the ensuing section (Gilden et al., 2010; Decourtye and Devillers, 2010; Mridula et al., 2013; Sarwar, 2015 f; 2015 g; 2015 h).

3.1. Chemical Toxicants

Chemical toxicants include inorganic substances such as lead, mercury, hydrofluori acid and chlorine gas, and organic compounds such as methyl alcohol, most medications and poisons from living things. While some radioactive substances are also chemical toxicants, many are not, and radiation poisoning results from exposure to the ionizing radiation produced by a radioactive substance rather than chemical interactions with the substance itself.

3.2. Biological Toxicants

Biological toxicants include bacteria and viruses that can induce diseases in living organisms. Biological toxicity can be difficult to measure because the ‘threshold dose’ may be a single organism. Theoretically one virus, bacterium or worm can reproduce to cause a serious infection. However, in a host with an intact immune system the inherent toxicity of the organism is balanced by the host's ability to fight back, and the effective toxicity is then a combination of both parts of the relationship. A similar situation is also present with other types of toxic agents.

3.3. Physical Toxicants

Physical toxicants are substances that due to their physical nature interfere with biological processes. Examples include dust, asbestos fibers or finely divided silicon dioxide, all of which can ultimately be fatal if inhaled. Corrosive chemicals possess physical toxicity because they destroy tissues, but these are not directly poisonous unless they interfere directly with biological activity. Water can act as a physical toxicant if taken in extremely high doses because the concentration of vital ions decreases dramatically if there is too much water in the body. Asphyxiant gases can be considered physical toxicants because they act by displacing oxygen in the environment, but they are inert and not toxic gases.

4. Acquaintance to Various Types of Toxicity

Generally, any poison is more toxic if ingested by mouth than if inhaled, and more toxic if inhaled than if by dermal (skin) exposure. Toxic effects can range from slight symptoms like minor skin irritation or hay-fever like symptoms to headaches or nausea. Organophosphate pesticides and some herbicides can cause severe symptoms like convulsions, coma, possibly even death. Pesticide toxicity in humans can be classified by the nature of exposure, by the route through which exposure occurs, or by the body function or system affected. Poisons work by altering normal body systems or functions. Thus, toxicity can occur in as many ways as there are body functions. Poisons can affect just one particular organ system or they may produce generalized toxicity by affecting a number of systems. Some toxic effects are quickly reversible and do not cause permanent damage. Others may cause reversible damage, but complete recovery may take a long time. Still other poisons may cause irreversible damage, even if the exposure is not fatal (Gosselin et al., 1984).

5. Classification of Toxicity

For regulating and handling substances to be appropriately, these must be properly classified and labelled. Classification is determined by approved testing measures or calculations and have determined cut off levels set by the scientists (Hall, 1991; Adams, 1995; Ecobichon, 1996).

5.1. Classification by Route of Entry

There are four common ways in which pesticides can enter to the human body, for instance, through the skin, the mouth, the lungs and the eyes. The chances of pesticide's entry into the body is affected by the state of the chemical i.e., as a solid, liquid, or gas. Liquids or gasses can penetrate to the body via any of the four routes, while, solids tend to have a lower chance of entry through the lungs or eyes, but if solid particles are small enough or if they remain on the skin long enough, entry is possible in the same ways that liquids or gasses can enter.

5.1.1. Dermal Exposure

Dermal (skin) exposure accounts for about 90% of exposure, the pesticide users receive from non-fumigant pesticides. It may occur any time a pesticide is mixed, applied, or handled, and it often goes undetected. Absorption through the skin is the most common route by which pesticide applicators are poisoned by pesticides and other chemicals. Dermal absorption may occur as a result of a splash, spill, or drift when mixing, loading or disposing of pesticides. It may also result from exposure to large amounts of residue. The degree of dermal absorption hazard depends on the dermal toxicity of the pesticide, the extent of the exposure, the way the pesticide is formulated and the part of the body contaminated. In general, wettable powders, dusts, granular pesticides and dry materials are not as readily absorbed through the skin and other body tissues as are the liquid formulations such as the emulsifiable concentrates, which contain a high percentage of the toxicant in a relatively small amount of solvent. Absorption continues to take place on all of the affected skin area as long as the pesticide is in contact with the skin. Certain areas of the body, such as the male scrotum, are more susceptible to pesticide absorption than other areas of the body. Absorption through the skin in the genital area is rapid enough to approximate the effect of injecting the pesticide directly into the bloodstream.

5.1.2. Oral Exposure

Oral exposure may occur accidently, but is more likely to occur as a result of carelessness, such as blowing out a plugged nozzle with mouth, smoking or eating without washing hands after using a pesticide and eating fruit that has been recently sprayed with a pesticide containing residues above the tolerance for the commodity. When enough pesticide gets into the mouth, it may cause serious illness, severe injury, or even death. Pesticides may be consumed through negligence or they may be consumed by individuals who are intent on personal harm. The most frequent cases of accidental oral exposure are those in which pesticides have been transferred from their original labeled container to an unlabeled bottle or food container, frequently by someone other than the person who is eventually poisoned. There are many cases where peoples, especially children, have been poisoned by drinking pesticides put in a soft drink bottle. In other cases, peoples have been poisoned after drinking water stored in pesticide-contaminated bottles. The seriousness of the exposure depends upon the oral toxicity of the material and the amount swallowed.

5.1.3. Respiratory Exposure

Inhalation exposure results from breathing pesticide vapors, dust, or spray particles. Pesticides are sometimes inhaled in sufficient amounts to cause serious damage to nose, throat and lung tissues. The hazard of respiratory exposure is great because of the potentially rapid absorption of pesticides through this route. Vapours and extremely fine particles have the greatest potential for poisoning via respiratory exposure. Pesticide exposure is usually relatively low when dilute sprays are being applied with conventional application equipment because larger droplet sizes are produced. When low volume equipment is being used to apply concentrated material, the potential for a respiratory exposure is increased because smaller droplets are being produced. Application in confined spaces also contributes to increase potential for respiratory exposure. Respirator and gas masks can provide protection from respiratory exposure. Like oral and dermal exposure, inhalation exposure is more serious with some pesticides than with others, particularly fumigant pesticides, which form gases.

5.1.4. Eye Exposure

Eyes are particularly absorbent and therefore getting any pesticide in the eye presents an immediate threat of blindness, illness, or even death. Eye protection is always needed when measuring or mixing concentrated and highly toxic pesticides. Eye protection also should be used when there is a risk of exposure to dilute spray or dusts that may drift into the eyes. Granular pesticides may present a special hazard to eyes because of the size and weight of the individual particles. If applied with power equipment, pellets may bounce off from vegetation or other surfaces at high velocity and can cause significant eye damage as well as poisoning to an applicator if struck in the eye. Protective shields or goggles should be used whenever there is any chance of pesticides coming into contact with the eyes.

5.2. Classification by Type of Exposure

Toxicity may be divided into four types, based on the number of exposures to a poison and the time it takes for toxic symptoms to develop. These four types may be combined with the classification based on route of exposure as deliberated below:-

5.2.1. Acute Toxicity

While a person is exposed to a single dose of a pesticide, it is referred to as an acute exposure. Further, if the exposure is by contact with skin, it would be regarded as an acute dermal exposure. Acute oral refers to a single dose taken by mouth, and acute inhalation refers to a single dose that is inhaled.

5.2.2. Chronic Exposure

Once there is repeated or continuous exposures to a pesticide by a person, it is called chronic exposure. This toxicity can be described in terms of chronic dermal, chronic oral or chronic inhalation toxicity.

5.2.3. Subchronic Exposure

After there has been a repeated or continuous exposure to a pesticide, but no measurable toxic effects have resulted, a person is said to have been subjected to subchronic exposure.

5.2.4. Delayed Toxicity

Delayed toxicity may occur many years after exposure to a chemical and is most often only discovered in retrospective epidemiological studies (studies done after the fact). Epidemiological studies are crucial to the detection of further occurrences of delayed toxicity.

5.3. Classification by Body System Affected

Cutaneous toxic reactions are most often associated with petroleum based products, pyrethroids, and some herbicides. These reactions account for approximately one-third of all pesticide-related occupational illnesses. Dermatitis is the term used to describe any skin rash associated with inflammation and redness. There are many different types of dermatitis and they differ in appearance and in how they are caused. Among agricultural workers, dermatitis may be caused by exposure to non-work related irritants or to crops, plants, or pesticides. Cutaneous toxicity can be further categorized by specific response of the skin.

5.3.1. Primary Irritant Dermatitis

This type of dermatitis is caused by chemical substances that directly irritate the skin (such as acids or bases). Its effects may be relatively minor with only minor irritation or may be very severe, with blisters or ulcerations. Areas directly contacted by the irritant are usually most severely affected. Herbicides are the pesticides that most frequently cause this type of dermatitis. Few herbicides causing this type of dermatitis are used in vector control, with the exception of refined petroleum products, or formulations that use refined petroleum as a carrier. Exposure to pyrethroids can cause a crawling or tingling sensation in the skin and may irritate mucus membranes.

5.3.2. Allergic Contact Dermatitis

This type of dermatitis is caused by chemical substances that stimulate development of an allergic reaction. Workers may handle an allergenic substance for years before this dermatitis develops, or it may develop after a single exposure. Symptoms vary from redness and itching to large painful blisters.

6. Factors Prompting Toxicity

Toxicity of a substance can be affected by many different factors, such as the pathway of administration (whether the toxin is applied to the skin, ingested, inhaled, injected), the time of exposure (a brief encounter or long term), the number of exposures (a single dose or multiple doses over time), the physical form of the toxin (solid, liquid, gas), the genetic makeup of an individual, an individual's overall health, and many others. Several of the terms used to describe these factors are acute exposures wherein a single exposure to a toxic substance which may result in severe biological harm or death, is usually characterized as lasting no longer than a day. While other is chronic exposure in which continuous exposure to a toxin over an extended period of time, is often measured in months or years that can cause irreversible side effects.

7. Testing and Measurement of Toxicity

Modern analytical methodologies have made it possible to test for minute amounts of pesticide, in some instances down to the parts per trillion (ppt) levels. Expression like parts per million (ppm) are usually used to describe very dilute concentrations of something, typically in soil or water. Nevertheless, a concentration of 1 ppm of a liquid insecticide in water would represent 1 microliter of some product in 1 liter of water, or in short hand, 1 µl/ liter. One part per million would be the equivalent of a drop of a liquid pollutant in about 13 gallons of water. One part per billion would be the equivalent of about one drop of a liquid pollutant in 25055 gallons chemical drums. One part per trillion would be the equivalent of about one drop of a liquid pollutant in 20 Olympic-sized 6-foot-deep swimming pools. The term commonly used to describe acute toxicity is LD_{50}, which is lethal dose (deadly amount) and the subscript 50 means that the dose is acutely lethal to 50% of the animals to whom the chemical is administered. The test animals are given specific amounts of the chemical in either one oral dose or by a single injection and are then observed for a specified time. Lower the LD_{50} value, the more acutely toxic the pesticide is. Therefore, a pesticide with an oral LD_{50} of 500 mg/ kg would be much less toxic than a pesticide with an LD_{50} of 5 mg/ kg. LD_{50} values are expressed as milligrams per kilogram (mg/ kg), which means milligrams of chemical per kilogram of body weight of the animal, and it is the same measure as parts per million. For example, if the oral LD_{50} of the insecticide parathion is 4 mg/ kg, a dose of 4 parts of parathion for every million parts of body weight would be lethal to at least half of the test animals. For example, if a pesticide has an oral LD_{50} value of 10 mg/ kg, and the test animals each weigh 1 kg, 50% of the animals would die of poisoning if each ate 10 mg of the pesticide. If the test animals weigh 25 kg each, the lethal dose to kill 50% of these animals would be 10 mg/ kg × 25 kg = 250 mg each. Humans, obviously, cannot be used as test subjects, so toxicity testing is done with animals and plants. Different species of animals respond differently to chemicals, and a new chemical is generally tested in mice, rats, rabbits and dogs. The results of these toxicity tests are used to predict the safety of the new chemical to humans. Acute inhalation toxicity is measured by LC_{50}, which means lethal concentration instead of dose because the amount of pesticide inhaled in the air is being measured and its values are measured in milligrams per liter. There is no standard measure like the LD_{50} for chronic toxicity, however, chronic toxicity of chemicals is studied depending upon the adverse effect being studied that may include carcinogenic effects (cancers), teratogenic effects (birth defects), mutagenic effects (genetic mutations), hemotoxic effects (blood disorders), endocrine disruption (hormonal problems) and reproductive toxicity (infertility or sterility). Chronic toxicity is tested using animal feeding studies; the pesticide under investigation is incorporated into the daily diet and fed to animals from a very young to a very old age (Nesheimet al., 2014).

8. Pesticides and Children

Although everyone is at risk from pesticides exposure, the most vulnerable groups are children, pregnant women, the elderly, patients undergoing chemotherapy, and peoples with compromised immune systems. Children can be particularly sensitive to exposure to chemicals due to their small body size, immature immune systems and rapid growth cycles. There is now considerable scientific evidence that the human brain is not fully formed until the age of 12, and childhood exposure to some of the most common pesticides on the market may greatly impact the development of the central nervous system. Children have more skin surface for their size than adults, absorb proportionally greater amounts of many substances through their lungs and intestinal tracts, and take in more air, food and water per pound than adults (Herman-Giddens et al., 1997; Zahm and Ward, 1998; Stahl, 2002).

9. Safety Factors

The following section summarizes information about the protection of health and environmental risks that peoples who are exposed to pesticides face owing to toxicity (Council on Scientific Affairs, 1997; McCauley et al., 2006; Mascarelli, 2013):-

9.1. Understand Pesticide Toxicity

This is the inherent ability of a pesticide to cause injury or death, indicating how poisonous the chemical is. The tests for acute and chronic toxicity are usually done on rodents, which may not always accurately predict effects on humans, so, keep poisons out of reach of children. All labels include the warning or signal words which give an idea of the pesticide's toxicity or corrosiveness. 'Danger' indicates a highly corrosive pesticide, it may severely injure the eyes or respiratory and digestive tracts, may also cause severe skin burns, and takes 1 teaspoon chemical in concentrated form to kill an adult. 'Warning' indicates a moderately toxic or corrosive pesticide. On average, it takes 1 teaspoon to 1 ounce of the chemical in concentrated form, taken through the mouth to kill an adult. 'Caution' indicates relatively low toxicity or corrosiveness, and it takes more than 1 ounce in a single dose of the concentrated chemical to kill the 'average' adult.

9.2. Read the Pesticide Label

It is the most valuable time spent in pest control to read the pesticide label before buying a pesticide to determine it is the right pesticide for the task, pesticide can be used safely under application conditions, there are any restrictions on the pesticide, how much pesticide should buy for treating the area and when to apply the pesticide. Before mixing and applying a pesticide, read the label to determine what protective clothing to use and safety measures to follow, whether the chemical can be mixed with others, how much pesticide to mix, the mixing process, how to apply the pesticide, and how long should wait after application to reenter the area, harvest the crop, or plant another crop. Before store or dispose of a pesticide, read the label to determine where and how to store the pesticide, how to clean and dispose of the chemical container, and how to dispose of surplus pesticide. The label must list the active ingredient and the ingredient that actually kills or inhibits the pest. Inert ingredients, such as carriers or solvents, do not have to be specified, but their concentrations must be listed. The label indicates the level of toxicity with one of three signal words: danger, warning, or caution. The precautionary statement describes the hazards to the applicator, children, domestic animals, wildlife, and the environment, and mentions about necessary precautionary clothing and equipment.

9.3. Apply Insecticides Accurately and Safely

To understand how pesticides can be applied with the least wastage and the least risk of exposure, keep in mind how large areas are treating and how much pesticide is needed, and where to find emergency response numbers in case of an accident. Prepare pesticide mixtures outdoors where there is plenty of fresh air and good lighting. Keep pets, children, food and dishes away from the area where are mixing, and use measuring cups and tools that have been designated exclusively for pesticide use. Make sure to have soap, towels and other supplies available in case of a spill. While mixing pesticides, keep the sprayer in a containment device, such as a rubber tub to contain any spills. When to spray, make sure that application equipment is in working condition and that the hoses and connections do not leak. Inform neighbors about pesticide application plans, keep pets away from the area, and never eat, drink, or smoke while handling pesticides. When applying pesticides, the clothing essentials are hat, long-sleeve shirt, long-leg trousers or a coverall garment, unlined rubber or neoprene gloves, socks and unlined boots. When mixing pesticides, wear the same equipment suggested for pesticide application. The pesticide concentrates are more toxic than the diluted spray, so wearing a respirator, goggles and rubber apron may also be advised. Apply pesticides on a calm day, preferably in the morning when there is less wind; make applications as close to the pest as possible and when temperatures are between 60 and 85 degrees. When cleaning application equipment, wear the same protective gear recommended for pesticide mixing, with one exception of the respirator that is usually not necessary. Immediately after use, clean the equipment from in and outside, after handling pesticides always wash hands thoroughly with soap and water, change clothes and take a shower and wash contaminated clothing separate from other laundry.

9.4. Store Hazardous Chemicals Safely

An average household generates hazardous waste including home maintenance products, auto items, cleaners, hobby materials, cosmetics, drugs, batteries and yard products. There are four major classifications of hazardous materials. Corrosive materials can dissolve or wear away materials and most can harm the skin and eyes. Flammable materials pose a serious threat of fire if stored improperly and can produce toxic gases. Explosive or reactive materials can explode when combined with other substances. Toxic materials are those that in sufficient quantities, pose a hazard to human health that are sometimes identified with the symbol of a skull and crossbones. Store hazardous materials in their original containers, buy only the amount that needs for the task at hand, and keep these out of the reach of children. Because of flammability, store liquid pesticides containing a petroleum-based carrier or solvent in a garage in a locked cabinet.

9.5. Dispose of Insecticides Safely

Take special care when disposing of leftover pesticide

concentrate, leftover pesticide mix, rinse water used to clean the sprayer after application, rinse water used to clean empty pesticide containers, and empty pesticide containers. Dispose of adhesives, aerosols, household cleaners and other hazardous waste safely as these contain solvents and other toxic chemicals. As a last resort, dry the adhesive flammable, combustible or petroleum distillates in a well-ventilated area away from children, pets and sources of heat or flames preferably outside.

10. Conclusion

All pesticides are associated with some risks or harms to human health and the environment. For decades peoples have believed that harmful chemical pesticides are the only true way to get rid of gardens and crop fields from pests. Soil pollution and air pollution have occurred from the use of pesticides, and it takes years and sometimes decades for some of these chemicals to break down. These pesticides are also harmful to animals, plants as well as human health. Peoples need to break the habit of using harmful pesticides and switch to rising organic ones that breakdown quickly in the sunlight and in the soil. The faster a chemical breaks down, the sooner the soil can return to a healthy state. Children are particularly susceptible to the hazards associated with pesticide use, while, other vulnerable groups are pregnant women and the elderly patients. Health effects of pesticides can cause both acute and chronic problems. Acute health effects appear shortly after exposure to these pesticides and can include skin and eye irritations, headaches, dizziness and nausea, weakness, difficulty in breathing, mental confusion and disorientation, seizures, coma, and death. Chronic health effects may not be apparent until months or years after exposure. Such health aliments include nervous, reproductive and immune system disorders, and cancer. In conclusion, insecticides can cause harm to humans, animals, or the environment because these are designed to adversely affect living organisms. Anyone who uses pesticides or is present at site when pesticides are sprayed is at risk for dangerous exposure. The findings suggest that consumption of eggs and meat is also a significant source of exposure to the majority of organochlorine chemicals studied. Using pesticides safely depends on many important factors including selection of an appropriate product and using that product according to the label guidelines to minimize the risk of problems.

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