Energy & Environment Practice
Gender Mainstreaming *Guidance Series*
Chemicals Management

Chemicals and gender

UNDP Environment & Energy Group

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> Wherever we look - and especially if we look through the lens of poverty - we see that women still bear the greatest burdens.
>
> *United Nations Secretary-General Ban Ki-moon*

WHY is the sound management of chemicals important TO economic and social development?

Chemicals bring a number of benefits to modern societies. Chemicals are used in life-saving medicines, purification agents for treating drinking water supplies, and agricultural chemicals (e.g. pesticides and fertilisers) that boost on-farm productivity, among other uses. However, despite these important economic, social, and health benefits, chemicals can be extremely harmful if they are not properly managed. Effects on human health and the environment can be immediate and catastrophic, as in the case of oil spills, large accidental releases of industrial chemicals, and acute pesticide poisonings. In the longer term, extended exposure to toxic chemicals in water, food, air, and soil, as well as to chemical products, can cause or exacerbate many serious human health issues, including damage to reproductive and neurological systems, as well as cancer.

There is an established link between poverty and the increased risk of exposure to toxic and hazardous chemicals. Exposure of poor people to toxic chemicals is often strongly correlated to geography. In urban settings, low-income or minority populations typically reside in neighborhoods considered undesirable, such as areas adjacent to industrial zones. These places can be major sources of environmental exposure to toxic chemicals, originating from factories, landfill sites, incinerators, and/or hazardous waste dumps.

In rural areas, where three-quarters of the world's poor live, most chemical exposure is linked to pollution brought by polluted water sources as well as the use of pesticides in agriculture. The improper use, management, and storage of pesticides and chemical fertilisers can result in contamination of air, food, soil, and drinking water (e.g., through pesticide and nitrate run-off), leading to increased human exposure and associated health risks.

A strong chemicals management regime in place will contribute towards the achievement of the Millennium Development Goals (MDGs). The sound management of chemicals ties to the MDGs in a number of ways. While most linkages between the sound management of chemicals and the MDGs have focused on MDG 7 (Environmental Sustainability), SMC contributes to the achievement of all the MDGs, particularly to MDG 3 (Gender Equality) and MDG 5 (Maternal Health).

WHY is gender relevant to policymaking and programming in the area of sound management of chemicals?

While policymakers are beginning to understand the important role played by the sound management of chemicals (SMC[1]) in economic and social development, it is also important to recognize the significant linkages between gender and chemicals.

Levels of exposure to toxic chemicals–as well as the resulting impacts on human health–are determined by social as well as biological factors. Determined by social roles, women, men, and children are exposed differently to toxic chemicals in daily life. The differences include the kinds of chemicals encountered as well as the level and frequency of such exposures. In addition men, women, and children vary in their physiological susceptibility to the effects of exposure to toxic chemicals.

For instance, in agricultural communities in developing countries, men may be at higher risk of direct exposure to chemical pesticides during application, while women (and sometimes children) may be more likely to be indirectly exposed during planting and harvesting. At the same time, biological factors–notably size, physiological, hormonal, and enzyme differences between women and men, and between adults and children–also influence susceptibility to health damage from exposure to toxic chemicals. Many examples also show that there are certain especially sensitive periods to specific chemicals during fetal and child development.

What is gender mainstreaming?

'Gender' refers to the socially constructed rather than biologically determined roles of women and men as well as the relationships between them in a given society at a specific time and place. These roles and relationships are not fixed, but can and do change.

'Gender mainstreaming' has been defined by the United Nations Economic and Social Council as 'a strategy for making women's as well as men's concerns and experiences an integral dimension of the design, implementation, monitoring and evaluation of the policies and programmes in all political, economic and societal spheres so that women and men benefit equally and inequality is not perpetuated'. The relative status of women and men, the interaction between gender and race, class and ethnicity, and questions of rights, control, ownership, power, and voice–all have a critical impact on the success and sustainability of every development intervention.

In practice, gender mainstreaming means identifying gaps in gender equality through the use of sex-disaggregated data; developing strategies to close those gaps; putting resources and expertise into implementing strategies for gender equality; monitoring implementation; and holding individuals and institutions accountable for results. Gender mainstreaming is not an end in itself; it is a process whose ultimate goal is to achieve gender equality (Millennium Development Goal 3).

Expanded freedoms for all–women and men, girls and boys–is UNDP's goal, both because it is necessary for development effectiveness and because equality is a core value of the UN Charter, a value all UNDP staff have pledged to protect as representatives of the UN system.

[1] Sound management of chemicals (SMC) is the application of best management practices throughout the life cycle of chemicals to minimise, and where feasible eliminate, the potential for exposure of people and the environment to toxic and hazardous chemicals, as well as those chemicals suspected of human and/or environmental toxicity.

Cadmium scenario

A small village was situated at the river side. The river was a blessing. Not only was the water used to irrigate the rice fields, but it also served the village with drinking water and fish. Women washed clothes in the river and children played in the water. Most women worked in the rice field while the men worked at the zinc mine that was situated up-streams of the village. The production of zinc was high and there were employment opportunities for all of the men who could work.

After several years, the older women started to complain about back and leg bone pain, and problems with their kidneys. They visited a doctor, who found proteins in their urine. Some of the women suffered from multiple bone fractures, and their skeleton became deformed. Eventually, it was determined that the river water was contaminated with cadmium, which is a by-product in zinc production. Consequently, large amounts of cadmium were released into the river, and the river water contaminated the rice fields. Rice efficiently accumulates cadmium as it grows, and consequently, the population was exposed to cadmium through food intake over a long period of time. The cause of the symptoms that the women suffered from is not yet fully understood, but the combination of long-term cadmium exposure with general malnourishment and low body iron stores are some of the key factors of the disease.

Cadmium has many uses including: the plating of iron and steel to protect from corrosion, in pigments and paints, batteries, and many electronic applications. Increasing levels of cadmium on agricultural land is often the result of atmospheric deposition and the use of fertilizers and sewage sludge, which often contain cadmium. Leaking and burning of wastes can add to increasing cadmium levels in soil. Once in the soil, cadmium is taken up by the growing crop. People are exposed mainly through food, especially rice, wheat and other crops, and smokers are exposed through tobacco smoking. The absorption of cadmium in the gastrointestinal tract is quite low (less than 5 percent), however, at low body iron stores, the uptake is much higher, at about 20 percent. Since low body iron stores are common among women of childbearing age all over the world, women constitute a risk group for cadmium exposure.

Cadmium has a very long half-life within the body (about 30 years), and therefore accumulates over time. Negative health effects are typically experienced after long-term low-level cadmium exposure. The kidney and bone are the primary targets of cadmium toxicity.

Conventional agriculture chemicals cause about 20,000 deaths per year, most of which occur in developing countries, where regulatory, health, and education systems are the weakest (FAO 2007). Here poor people routinely face unacceptably high risks of poisoning because of their occupations, living conditions, lack of knowledge about the chemicals they handle, and limited access to sources of uncontaminated food and drinking water. Given that women represent about 70% of agriculture labour force in developing counties, they share the burden of injuries. Exposure to lower levels of pesticides can also cause long-term effects, such as cancer or damage to the reproductive system. Most human pesticide exposures are involuntary, unknowing and unwilling.

A number of toxic chemicals[2] have been identified as being of particular concern and which impact men and women differently. These chemical substances can be divided into three key groups:

- **Persistent, bioaccumulative, and toxic (PBT) substances**: such as Persistent Organic Pollutants (POPs)
- **Heavy metals**: include elements such as cadmium, lead, mercury, etc.
- **Endocrine Disrupting Chemicals (EDCs)**: substances that can cause adverse effects by interfering in some way with the body's hormones.

Factors justifying a gender-differentiated approach in sound chemicals management

Differences in Physiological Susceptibility and Health Effects of Toxic Chemicals

Women, men and children vary in their physiological susceptibility to the effects of exposure to toxic chemicals. Women may have different susceptibility to the impacts of toxic chemical exposure, e.g. due to differences in physiology and in connection with their reproductive cycles. With generally a higher proportion of body fat, women are also more likely to store more environmental pollutants in their tissues. At particular stages of their lives, such as pregnancy, lactation, and menopause, women's bodies undergo rapid physiological changes that also may change their vulnerability to health damage from toxic chemicals. Studies suggest that women's exposure to pesticides can cause miscarriages, premature births, birth defects, and low birth weight (WHO 2004).

In addition, a substantial portion of a woman's chemical burden can be passed on to the unborn child through the placenta, as well as during breast-feeding. For maternal and infant health protection, exposure of girls and women prior to and during childbearing years to chemicals poses risks to the future generations and thus must be minimized to the extent possible.

Men also have unique vulnerabilities based on their physiology that are prone to interference by chemical substances. Trends showing a worldwide increase in incidents of testicular cancer and a conspicuously high prevalence of this disease and other reproductive disorders in men in more industrialized countries are currently not fully explained. One major hypothesis is that endocrine disrupting chemicals and pollutants affect foetal testis development, and maternal exposure to EDCs may increase the risk of cancer, defects to external genitalia, as well as, impaired sperm function.

Children are generally at greater risk of health damage from toxic exposures because their rapid development and dynamic periods of growth (with which chemical exposure can interfere) increases their physiological sensitivity. Fetal exposure at critical times may have harmful effects that do not become evident until in school, at puberty or adulthood. Small children may absorb chemicals more efficiently and excrete them more slowly, resulting in greater body burdens of toxic contaminants. Moreover, children's intake of proportionally greater amounts of these environmental contaminants via water, air and food (relative to body size) further magnifies the risks.

Factors Influencing Human Exposure to Toxic Chemicals

The factors influencing women's exposure to toxic chemicals may be grouped into two categories: workplace and household.

Differences in workplace exposures. The level and type of chemical exposure at the workplace often differs by gender because women and men generally perform different tasks. The International Labour Organisation (ILO 2005) estimates that hazardous substances kill about 438,000 workers annually, and 10% of all skin cancers are estimated to be attributable to workplace exposure to hazardous substances. Especially in developing countries, health and safety standards often are lax or poorly enforced, with severe consequences for worker health.

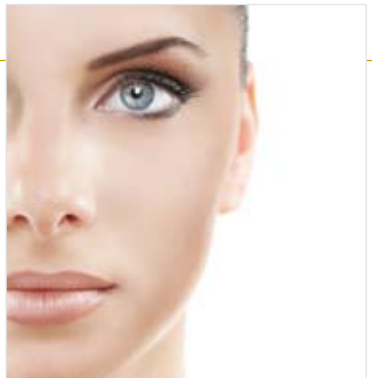
[2] A list of substances of concern with use and exposure routes and associated health effects can be found in Table 1.

Persistent Organic Pollutants (POPs)

Persistent organic pollutants (POPs) are a group of chemicals which have been intentionally or inadvertently produced and introduced into the environment. Due to their stability and transport properties, they are now widely distributed around the world, and are even found in places where they have never been used or produced, such as the arctic region. The POPs include pesticides, industrial chemicals, and chemicals in articles as well as substances formed as by-products. Given their long half-lives and fat solubility, POPs tend to bioaccumulate up the food chain, especially in the fatty tissue of older animals. POPs appear at higher concentrations in fat-containing foods, including fish, meat, eggs and milk. POPs are also present in the human body and relatively high levels are found in human breast milk.

As a group, POPs are of concern for both environmental and human health reasons, most notably, because of their potential effects on the endocrine system, but also because of how they affect the immune system, liver, cognitive ability, the reproductive system (including low birth weight), and their ability to cause cancer. Of particular concern for humans, is chronic low-level exposure to POPs during fetal development, infancy and childhood. This exposure can impact critical and vulnerable windows of development with lifelong negative consequences. Infants and children are more vulnerable to POPs than adults, because while they are developing and growing, they have higher intake than adults (based on body weight) and the developing brain, immune system, endocrine system and reproductive organs are very sensitive during this period of life.

Heavy metals



Heavy metals such as lead, cadmium, arsenic and mercury are highly toxic, affecting cognitive, neurological and reproductive functions, and are associated with negative effects in many organs and tissues, including kidneys, brain, bones, and the cardiovascular and respiratory systems. They are also highly bio-accumulative, and health effects may occur after long-term