Toxic trespass

Sharyle Patton describes how a chemical invasion of women's bodies threatens the rights they have so recently won.

Unlike our great-grandmothers – who lived out their lives before the chemical revolution began to unfold in the mid-1950s – we have taken in hundreds of toxic substances. Many take up residence in our body fat, where they may remain for decades; others are absorbed into the body and quickly metabolized and excreted.

Biomonitoring provides a snapshot of these body burdens and constitutes ultimate proof of our exposure. The data it provides have profound implications for women everywhere.

The 1994 United Nations International Conference on Population and Development in Cairo and the United Nations Fourth World Conference on Women in Beijing the following year both upheld women's rights to enjoy the highest attainable standards of physical and mental health. These fundamental rights – including the right to security of the person, the right to bear a family and the right of all women to control all aspects of

their health, particularly their own fertility – are being seriously compromised by exposure to toxic chemicals.

Winds and air currents can carry persistent chemicals thousands of miles. Snow on the Swiss Alps holds DDT used for malaria control in the tropics. Indigenous communities living near the Arctic Circle carry in their bodies high levels of polychlorinated biphenyls (PCBs) used primarily as flame retardants far to the south. Whether we live in Johannesburg or Juneau, Rome or Rio de Janeiro, we all carry a sampling of the chemical soup created by an industrializing world.

Chemical diaries

Women's bodies also carry chemicals found in products and processes they use or to which they are exposed. Have they grown food with chlorpyrifos or DDT? Do they live next to a polluting factory, incinerator or busy traffic intersection? Have they washed their children's hair with products containing lindane? Have they used a particular solvent in cleaning, or a particular cosmetic containing phthalates and other chemicals? The answers are documented in their bodies, which become chemical diaries of their lives.

Genetic expression is mediated by a panoply of hormones, neurotransmitters and growth factors. Our neurological, immune, reproductive and endocrine systems all function by using these chemical messengers to trigger biological events.

Many man-made chemicals resemble these naturally occurring substances. They may initiate a cascade of deleterious events when the body mistakenly accepts and uses them as part of its messaging system. Many of the chemicals now found in women's blood, urine, bone, breast milk, adipose tissue or other biospecimens can deliver such unintentional messages, potentially changing how the body's intricate and fragile systems function. Such chemical hijacking can occur at very low levels of exposure, previously considered below standard safety thresholds.

Mother to child

Many chemicals can pass through the placental barrier during pregnancy and disrupt the development of the fetus during critical times of growth and cell differentiation. The effects may not be evident until puberty or even later.

Traditionally, epidemiologists have focused on the effects of high levels of chemical exposure on small populations. Now a revolution in toxicological research tells us that we need to be concerned about low-level doses to large populations and that we need to consider the effects of chemicals in combinations which may interact in unsuspected and untested ways. It demands that we also need to consider specially vulnerable populations such as children (who, kilo for kilo, are more exposed to chemicals than adults), the elderly (whose bodies may be less capable of metabolizing and excreting some chemicals) and women (whose monthly flux of hormonal activity and extra layer of epidermal fat may create particular vulnerability).

Thus classic regulatory toxicology is insufficient to guide public health standards, especially for women and their children, who worldwide are experiencing an increasing

incidence of a number of diseases, including some cancers and developmental disabilities.

Fundamental rights are being compromised by exposure to toxic chemicals

Breast cancer rates appear to be increasing in many regions, although mortality is declining or stabilizing in some countries. The linkage between breast cancer and chemical toxicants is unclear, but a number of studies indicate the need for precautionary action. It appears, for example, to be linked to lifetime exposure to oestrogen. The body recognizes many man-made chemicals as having oestrogenic properties, so exposure to them may be linked to breast cancer.

The ubiquitous dioxin is one such chemical. A new study has found that women exposed to high levels of one form of it after the 1976 industrial explosion in Seveso, Italy have an increased risk of breast cancer.

Infertility may also be increasing in many regions, though difficulties in data collection prevent a definitive analysis. The cause of approximately one third of all cases of infertility from the late teens to early 30s is unknown. Recent science indicates that toxic chemicals may play a role.

Wealth of evidence

Bisphenol A – used in polycarbamate and other plastics, the lining in tin cans, floorings, enamels and varnishes, adhesives, nail polish, compact discs, electric and electrical appliances – has been measured in the blood of pregnant women, in umbilical blood at birth and in placental tissue, at levels within the range shown to alter development.

Recent research on mice has associated it with aneuploidy, the chromosomal error that in humans causes many spontaneous miscarriages and birth defects, including Down's Syndrome. The mechanisms of cell division in mice are similar across a very broad range of living organisms, so the results are likely to be relevant to human health. Other studies indicate that exposure to the pesticide DDT also increases risks of premature birth and possibly miscarriage.

Meanwhile low sperm count and quality are associated with exposure to chemicals, including commonly used pesticides, such as alachlor, atrazine and diazinon.

We do not know the full impact chemical exposure may have on our health

Although the studies are not scientifically definitive, the weight of evidence indicates that our rights to reproductive health and to bear children successfully may be threatened by exposure to a wide range of chemicals.

Our right to reach our highest potential, and to fulfil our human genetic legacy, is threatened by exposures in the womb to many chemicals – including PCBs and the plasticizer DEHP – which seem to alter how we think and behave. For example children born with higher levels of PCBs (but still within the range considered 'normal') to women living around the Great Lakes who consumed two or three meals of game fish a month in the years leading up to and during pregnancy were found to have smaller head circumferences, lower IQs, shorter attention spans and weaker reflexes.

Meanwhile Dutch scientists have reported that boys with higher PCB exposures are more likely to engage in feminine patterns of play, while similarly exposed girls are more likely to engage in masculine play; more feminized behaviour was found in both boys and girls prenatally exposed to higher levels of dioxin. The study parallels findings from animal studies.

Troubling implications

Such studies are troubling in their implications for women's physical and emotional health, and for the health of their families. Yet very few of the thousands of chemicals now in use – or being produced as unintentional byproducts of industrial processes – have been tested for their impacts on human health. So we do not know the full impact chemical exposure may have on our health and basic human rights.

Recent agreements – especially the Stockholm Convention which mandates phasing out 12 of the most damaging persistent organic pollutants and includes a mechanism for adding further chemicals for action, and the proposed EU REACH legislative initiative – are solid first steps to ensuring that women's rights will not continue to be threatened by toxic trespass. Women around the world need to become better informed about these threats to their – and their families' – health, so that they may become part of a process that will find safer alternatives, support pre-market testing of all chemicals and integrate the precautionary principle into chemicals management policies. This will protect women's health and the health of future generations. And it will also help maintain what we have struggled for in the past decade, the ability of all women to live to their fullest potential

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PHOTOGRAPH: Branson