

# **IBFAN Statement**

## ***Infant and Young Child Feeding and Chemical Residues***

*Parents, carers and health professionals are rightly concerned about all the problems in infant and young child feeding in a contaminated world. The repeated failures in systems to protect the safety of children's food and the presence of toxic substances and chemical residues in food can all have harmful effects on children's health.*

*In this context, parents, carers and health professionals need objective and independent information on the risks and dangers of environmental pollution. IBFAN's 2013 Statement on Infant and Young Child Feeding and Chemical Residues provides this information, based on up-to-date evidence of peer-reviewed scientific research.*

International Baby Food Action Network (IBFAN), established in 1979, consists of more than 250 public interest groups working around the world to reduce infant and young child morbidity. IBFAN aims to improve the health and well-being of babies and young children, their mothers and their families through protection, promotion and support of breastfeeding and optimal infant feeding practices. IBFAN works for universal and full implementation of the International Code and Resolutions. IBFAN is the recipient of the 1998 Right Livelihood Award.

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**Key points:**

1. Every human body is estimated to contain up to 200 man-made chemicals. All human beings and wildlife carry this 'body burden' of industrial chemicals. They are persistent and accumulate in organisms as they move higher up the food chain.
2. Both men and women carry this body burden from exposure to chemical substances. Many of these are fat soluble, meaning they dissolve in body fat, and so their levels can be measured in body tissues and fluids: blood, serum, urine, sperm, human umbilical cord blood and breastmilk.
3. Research has shown that these chemicals can have a harmful impact in humans and wildlife. Some of them are known to cause cancer, some are neurotoxic, some impair the immune and endocrine system, are associated with the development of chronic diseases and may even have inter-generational effects on reproduction. Little is known about how they interact in combination with each other.
4. Infants and young children are particularly vulnerable to the effects of exposure to chemicals because they are at the most sensitive stages of human development. Prenatal exposure to chemicals, when a baby is in its mother's womb, is of greater concern than postnatal exposure, when a baby is exposed after birth to residues of chemicals found in breastmilk or to chemicals in formula and feeding bottles.
5. Breastmilk contains protective agents and helps the child develop a strong immune system. Breastfeeding can mitigate the effects of chemical exposure in the womb, whereas formula feeding does not afford any protection or mitigation.
6. Formula feeding leaves a heavy carbon footprint and contributes significantly to contamination of the environment with these chemicals. Policy-makers should be alerted to the need to legislate to reduce the waste and contamination caused by the production, distribution and disposal of non-biodegradable formula feeding products.
7. Infant, follow-up and toddler formula, as well as all sorts of industrial baby foods, let alone industrial foods for older children and adults, can be contaminated, often at higher levels, by the same chemical residues found in breastmilk. Exposure to some of these substances can occur also through the polycarbonate plastic bottles and cups used to give these foods and drinks to infants and young children, or by their transfer to foods and beverages from feeding bottles, and the lining of tin cans and packages.
8. Powdered infant formula can be intrinsically contaminated with bacteria. Reconstituted powdered infant formula can be contaminated by the same and different bacteria through incorrect preparation, handling and storage. To avoid damage caused by these sorts of contamination, it is important to follow thoroughly the WHO recommendations for the preparation of powdered infant formula.<sup>1</sup>
9. Except in cases of industrial disasters and of exceedingly high levels of dangerous residues after industrial disasters, IBFAN emphasises the recommendation to protect, promote and support breastfeeding. This holds true even when there is evidence of the presence of chemical residues in breastmilk because the benefits of breastfeeding far outweigh any possible harm. Furthermore, IBFAN recommends that the debate about the detection of chemical residues in breastmilk should not unduly influence a mother's decision to breastfeed.
10. Future parents and carers of children should be informed of practical ways to reduce exposure to toxic chemicals. All of us should campaign to reduce the amount of chemicals in our environment and to counter the powerful lobby of the plastics and chemical industries.

**Key IBFAN messages**

- Breastfeeding is the norm for feeding infants and young children; any other feeding mode is inferior. Early (within one hour from birth), exclusive (for six months) and then continued (with adequate and safe complementary foods) breastfeeding for two years and beyond, provides optimal, unique and perfectly balanced nutrition for a baby even in a contaminated environment.
- Breastfeeding affords many irreplaceable positive health effects for both mother and child, economic advantages for families, communities, societies and health systems, and ecological advantages for the environment.
- Pregnant women and breastfeeding mothers have the right to receive full and unbiased information. They should thus be alerted to the problems caused by chemical contaminants in their body fluids, and should fight, in alliance with breastfeeding support and environmental groups, for the reduction of chemical residues in food and the environment.
- All citizens should work to raise awareness of the dangers of environmental pollution, including that brought about by formula and bottle feeding and by the undue use of industrial baby foods, and should demand their governments to act in their best interest.

<sup>1</sup> [http://www.who.int/foodsafety/publications/micro/pif\\_guidelines.pdf](http://www.who.int/foodsafety/publications/micro/pif_guidelines.pdf)

Much more is now known about chemical residues in breastmilk, formula, feeding bottles and baby foods than when the first IBFAN<sup>2</sup> Statement on Breastfeeding and Dioxins was published in 2000. As a consequence, the scope of this revised statement extends beyond dioxins to cover other chemical residues that can be found in breastmilk. It also covers those that may contaminate infant formula and baby foods, as well as be found in feeding bottles and teats.<sup>3</sup>

Further research has emphasised the potential for harm due to chemical exposures during pregnancy, at a time when the tissues and organs of the unborn child are developing rapidly. There is now far greater understanding of the beneficial effects of breastfeeding and its role in mitigating the harmful effects of exposure to chemicals in the womb. Conversely, the risks of contaminated infant formulas and feeding products are better known, as is the fact that formula feeding does not afford any protection to babies exposed to chemicals in the womb.

In revising IBFAN's 2000 Statement, the potential harm to the present generation of mothers and children caused by exposure to industrial chemicals is not the only factor to be taken into account. We must consider also the ecological footprint and the consequences for future generations of using formula. These consequences will only be aggravated if breastfeeding is discouraged when chemical residues are detected in breastmilk. In parallel, we have to look not only at the direct - early or late - toxic effects of all these compounds. We must also note their more subtle effects as endocrine disrupting chemicals, that is the way in which they mimic the female hormone oestrogen. We need to examine the possible effects of endocrine disruptors on generations to come and on our evolution as a species. Most importantly, we have to acknowledge the fact that the burden of chemical contamination, as shown by the presence of residues in breastmilk, has been and is rapidly moving from the high- to the low-income populations in our planet. This is due to two interdependent factors: the redistribution of industry and the weak environmental regulations in the new industrial locations.

All chemical residues found in humans and wildlife are xenobiotics<sup>4</sup> manufactured by industry, or pollutants dispersed into the biosphere and food chains. These chemicals constitute the 'body burden' that is measured in all human beings, and not only in breastmilk which is

<sup>2</sup> IBFAN is a global network comprising more than 250 health and consumer groups in over 168 countries. Its aim is to protect, promote and support breastfeeding, to monitor the appropriate marketing and distribution of breastmilk substitutes and complementary foods, and to promote and support timely complementary feeding practices using adequate local foods.

<sup>3</sup> Appendix 1 lists, individually or in groups, the chemical residues covered by this Statement and provides some information on each of them. Appendix 2 lists all the documents consulted to write this Statement.

<sup>4</sup> A xenobiotic is a chemical found in an organism but one which is not normally produced or expected in it, or is present in much higher than usual concentrations.

regularly used to measure the 'body burden' in mankind. Some of these man-made chemicals are products intended for different purposes: compounds to be used in agriculture (e.g., pesticides, fertilizers) or in industries and trades (e.g., food packaging, electric and electronic appliances), intermediaries in other chemical processes (e.g., production of paints, additives, preservatives), ingredients and additives for other products (e.g., gasoline, rocket fuel, cleaning fluids, cosmetics). Some others are unintended by-products of some industrial processes; dioxins and furans, for example, are by-products of various high-temperature processes used for the production of steel or cement, or for the incineration of waste. Most of these chemicals find their way into the food chain and are thus absorbed by humans; they may also be absorbed through the skin and the respiratory system. We find them in blood and in several body tissues, including cord blood and placenta during pregnancy. They are particularly dangerous when they contaminate germ cells that give rise to spermatozoa and eggs, thus possibly interfering with reproduction and the health of future generations. Some of these toxic compounds, dioxins among them, tend to concentrate in body fat and are extremely persistent in our bodies and in the environment: it may take several decades to get rid of them.

Breastmilk is sometimes cited as a source of dioxins and other chemical residues. This is because breastmilk has a high proportion of fat and because fat soluble contaminants are relatively easily measured in it. It is not because breastmilk is any more contaminated than other parts of the body or because residues in breastmilk cause more harm than those in other parts of the body. In fact, most researchers agree that exposure to chemical residues via the placenta is much more dangerous for the health of the newborn than exposure via breastmilk. For example, a high level of contamination by pesticides, PCBs or dioxins during pregnancy can lead to the impairment of foetal<sup>5</sup> and child growth and interfere with the correct development of many tissues and organs, mainly of the psycho-neuro-endocrine and immune systems. However, breastfeeding has been shown to mitigate or minimise the effects of some of the damage caused by exposure to these substances during foetal life. Formula feeding has no protective or mitigating effect. Breastfeeding, on the other hand, has been shown to mitigate or minimize the effects of some of the damage caused by exposure to these substances during foetal life. Breastfeeding, even in a contaminated environment and after adjusting for varying levels of exposure to chemicals during pregnancy, has such a positive impact on nutrition, health and development of children that most health authorities recommend that it should be protected, promoted and supported.

<sup>5</sup> Foetal or fetal development is the development during pregnancy of the unborn child in the womb.

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"Given that breastfeeding reduces child mortality and has benefits that extend into adulthood, every effort has been made to protect, promote and support breastfeeding in the context of these studies [...] Human milk –though still the best food for infants – has been unintentionally compromised by unwelcome chemicals from our environment, as a result of eating, drinking and living in a technologically advanced world. However, the mere presence of an environmental chemical in human milk does not necessarily indicate that a serious health risk exists for breast-fed infants. Few, if any, adverse effects have been documented as associated solely with consumption of human milk containing background levels of environmental chemicals, and none have been clinically or epidemiologically demonstrated. Only in very rare situations involving high levels of contamination have effects on infants occurred through human milk consumption. In contrast, epidemiological studies have demonstrated that human milk and the practice of breastfeeding confer significant measurable health benefits to infants and to nursing mothers."<sup>6,7</sup>

### IBFAN endorses international health recommendations

Except in cases of industrial disasters and of exceedingly high levels of dangerous residues after industrial disasters, IBFAN fully supports the recommendation to protect, promote and support breastfeeding, even when there is evidence of the presence of chemical residues in breastmilk as the benefits of breastfeeding far outweigh any possible harm. Furthermore, IBFAN recommends and cautions that the debate about the detection of chemical residues in breastmilk should not unduly influence a mother's decision to breastfeed. However, IBFAN urges that biomonitoring of breastmilk and of other body tissues be regularly undertaken in countries and regions affected by environmental contamination by these substances, and that mothers and the general public be transparently informed of the findings. This process will help enforce stricter regulation for the protection of the environment and of breastmilk, and will eventually benefit everybody, not only mothers and children.

Infant, follow-up and toddler formula, as well as all sorts of industrial baby foods, let alone industrial foods for older children and adults, can also be contaminated, often at higher levels, by the same chemical residues found in breastmilk. Exposure to some of these substances can occur also through the polycarbonate plastic bottles and cups used to give these foods and drinks to infants and young children, or by their transfer to foods and beverages

from the lining of bottles, tin cans and packages. In addition, the mass production of formula and baby foods contributes to environmental pollution through the amount of:

- land, water, fertilisers, pesticides and waste used and produced (often after destroying forests) to breed and feed cows and the dairy industry;
- paper, plastics, glass, rubber and raw materials needed for packaging and marketing;
- water, chemical processes and energy needed for production and transport;
- water, materials, utensils, chemicals and energy needed for home preparation and administration to infants and children;
- non-biodegradable waste often disposed of by merely dumping on land or landfill sites, simple burning or incineration, or, hopefully and where possible, recycling.

All this is an unnecessary use of scarce resources that contributes to increase our land, water, raw materials and carbon footprints, with the well known consequences on global warming, climate change, agriculture, food safety, nutrition and health. Moreover, as some of these processes emit dangerous substances in the environment, a decision not to breastfeed because of chemicals in breastmilk may ironically lead to an increase in environmental levels of these chemicals.

### IBFAN calls for action

IBFAN urgently calls upon decision makers in industry and politics to adopt environmentally-friendly initiatives in production and waste-disposal, to promote awareness of ecological dangers, and to create the appropriate legal framework to prevent the harmful contamination of our environment and to protect the health of our children, both present and future generations. The global application of the Stockholm Convention on Persistent Organic Pollutants (POPs), which bans production and use of several particularly persistent and toxic compounds, will hopefully lead to a world free of chemical residues. The initial number of banned compounds was 12; the number is being periodically revised based on evidence of harm. The strict control applied by some countries on the emission into the air, soil and water of chemical pollutants has led to a progressive reduction of their environmental load, as shown by the most recent survey coordinated by WHO and UNEP. This reduction, aiming at an environment, and thus breastmilk, totally free of chemical residues, is possible also in newly industrialised countries, if the right political commitment is stimulated by pressure from citizens, women and mothers at the frontline.

<sup>6</sup> Fourth WHO-Coordinated Survey of Human Milk for Persistent Organic Pollutants in cooperation with UNEP. Guidelines for Developing a National Protocol. Revised 1 October 2007.

<sup>7</sup> For a review of relevant studies, see Cattaneo A, Lehnert M. Letter published in Environmental Health Perspectives, September 2004: [http://www.ibfan.org/prents\\_corner-residues-more-letter.html](http://www.ibfan.org/prents_corner-residues-more-letter.html)

**Note.** The list of chemical residues, or families of chemical residues, in this appendix is not exhaustive as we have decided to consider only substances for which there is ample research literature and that are the target of important policies and regulations worldwide. In addition, the appendix reports only facts considered relevant for the purpose of this document. For details on included substances, or for substances not included in this appendix, readers are invited to read the articles cited in Appendix 2 or to consult other articles and documents.

### Benzo(a)pyrene and PAHs

Like benzene, toluene, naphthalene and many other compounds, benzo(a)pyrene belongs to the large family of so called polycyclic aromatic hydrocarbons (PAHs). Its metabolites are mutagenic and highly carcinogenic, and it is listed as a Group 1 carcinogen by the IARC. The compound is one of the benzopyrenes, formed by a benzene ring fused to pyrene, and is the result of incomplete combustion at temperatures between 300 °C (572 °F) and 600 °C (1,112 °F).

**PAHs** are the by-product of incomplete combustion or burning of organic items, e.g., cigarettes, gasoline, wood, food, waste. They are thus found in cigarette smoke, grilled and broiled foods, exhaust gases, fumes during wood burning and waste incineration, and as by-products of many industrial processes (coke ovens, metal processing plants). PAHs are mostly found in air, but can be found also in some food and water sources. As a consequence, they are mostly absorbed through air, but also via skin contact and food. Many PAHs are associated with damage to the bone marrow, changes in blood cells, alterations to sperm, abnormal development (reduced foetal growth, altered foetal blood formation, delayed ossification), alterations of the immune system and cancer (leukaemia). Infants can be exposed in utero through the placenta, and after birth through breastmilk, formula and industrial baby foods. The amount of PAHs found in infant formula and baby food, almost always below the level considered as dangerous by health authorities, is similar or higher, sometimes 2-3 times higher, compared to the amount found in breastmilk, which is therefore safer.

**Benzene** is also found in gasoline vapours and exhaust gases where gasoline is not regulated to contain low levels. It is a notorious cause of bone marrow failure: epidemiologic, clinical, and laboratory data link benzene to aplastic anemia, acute and chronic leukemia, bone marrow abnormalities, myelodysplastic syndrome (MDS).

### Endocrine disruptors

Many of the chemicals in this appendix act as endocrine disruptors. This means that they interfere with the endocrine system and with the effects of the hormones that are responsible for our development, behaviour, fertility,

and for the maintenance of normal cell metabolism. Exposure to endocrine disruptors has consequences on all the human (and animal) tissues that are regulated by hormones. They may affect the reproductive system of males and females, with masculinization of females and feminization of males, and with alterations of puberty, menstrual cycles and fertility. Exposure to endocrine disruptors has been associated with increased risk of cancers in reproductive and related organs (e.g. testicles, ovaries, breast, prostate), and with the development of obesity and related disorders later in life. They may affect brain development and cause learning and cognitive disabilities, as well as birth defects. Finally, they may act on germ cells that develop into spermatozooids and eggs, altering their DNA and thus the health of future generations. The younger the exposed human, the more likely and severe the effect; foetal life is thus the most sensitive period, followed by infancy and childhood. Unlike other toxic substances, the effect of endocrine disruptors is not dependent on the amount of exposure; even small levels of contamination may in fact interfere with our endocrine system by suppressing, mimicking or altering the function of our hormones, and, a fortiori, on embryo-foetal development.

### Dioxins and furans

Dioxins and furans are among the most toxic compounds known (they are measured in picograms, one trillionth of a gram) and the only effective way of dealing with them is to prevent their production. Acute intoxication can cause death, birth defects and severe damage to several tissues and organs, as shown during the Vietnam War and after industrial accidents in Italy and Japan. Chronic exposure is associated with a higher incidence of many types of cancer, with birth defects and with impairment of mental and neurological development. In addition to these effects, dioxins and furans act as endocrine disruptors. These two families of chemicals have never been produced as such, but are unwillingly produced in very small but dangerous quantities in most combustion (e.g., foundries, incineration and burning of waste of chlorinated substances and plastics, petrol and plastics industry) and in a few chemical processes (e.g. production of pesticides and herbicides and the chlorine bleaching of wood pulp), and then released in the atmosphere. From there, as a result of prevailing winds, they can be carried short or long distances and fall on soil or water, where they accumulate and persist for many years, and are then absorbed by plants and animals, ending up in edible products, especially those with plenty of fat (e.g., some sea foods, milk, cheese). Dioxins and furans get into human bodies mainly through the food chain (90-95%), but also through the air (5-10%) and through skin contact, especially as a result of occupational exposure. Mothers transfer them to the foetus and the infant through placental blood and breastmilk. Dioxins and furans have been found in infant formula as well, but at lower

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concentrations than in breastmilk because cow's milk, the main ingredient of infant formula, is usually less contaminated than breastmilk, as cows are herbivorous and come at a lower level in the food chain. However, it does not make sense to replace breastmilk with formula; first because research has shown that, adjusting for prenatal exposure, babies breastfed with breastmilk containing dioxins develop anyway better than formula fed babies, second because formula and bottle feeding produce waste that may then be burned or incinerated thus producing more dioxin and maintaining the toxic cycle. **It is most important to emphasise that in the past three decades the levels of dioxins in the environment and in food, including breastmilk and infant formula, have decreased, at least in countries applying the strict industrial rules of the Stockholm POPs Convention, confirming that the alternative is not replacement of breastmilk but prevention of dioxin production.**

### PCB

Polychlorinated biphenyls (PCBs) were widely used in electric devices before their production was banned by the United States Congress in 1979 and by the Stockholm Convention on Persistent Organic Pollutants in 2001. However, due to their long persistence and as a result of uncontrolled disposal, PCBs are still found in the environment, may still enter the food chain, and can therefore still be found in cord blood and breastmilk, deriving most often from the consumption of contaminated foods of animal origin. PCBs act as endocrine disruptors. Exposure to PCBs in utero and after birth may also lead to low birth weight, and is associated with neurological and developmental disorders (e.g., lower IQ, anomalies of behaviour, impaired memory), and with immune deficiencies. PCBs can be found also in infant formula, especially certain types such as the so-called hypoallergenic formula, and in baby foods, although at much lower levels than those reported from some studies on breastmilk. However, since the benefits of breastfeeding far outweigh the possible harmful effects of PCBs, health authorities recommend that there should be no change to existing advice in support of breastfeeding.

### Flame-retardants

These chemicals are widely used in electronics (e.g. TV sets, computers, mobile phones), electric appliances, carpets, textiles, furniture, building materials and plastic products to delay the development of fires and thus reduce damage and burns. Some of them, for example the so called polybrominated diphenyl ethers (PBDE), are not chemically bound to products and can thus be released in the environment and persist in homes and workplaces, eventually entering the food chain; they can also be inhaled with dust and absorbed through the skin. Flame retardants have been found in animals and humans throughout the world. Infants can be exposed in utero, then via breastmilk where these substances can concentrate, being lipophilic. They can be found also in other foods (e.g., fish, meat, oil, milk) and even in infant formula, where their levels,

however, are usually lower than in breastmilk. The levels measured in the USA are much higher than in Europe as much more products are treated with them, but without giving better protection in case of fire. Flame retardants impair the development of the brain, starting from foetal life, with consequences on motor activity, learning, memory, and social and emotional development. They act also as endocrine disruptors.

### Pesticides

DDT and other organochlorine pesticides, as well as their metabolites (e.g. hexachlorobenzene), are among the first chemical residues found in breastmilk where they accumulate due to their affinity with fats and to their long half-lives (because they are difficult to metabolise and eliminate). Although banned globally under the Stockholm Convention on persistent organic pollutants, they can still be found in humans and other mammals; their levels, however, are decreasing. Many pesticides act as endocrine disruptors. In addition, they may cause headache, irritability, dizziness, nausea, vomiting, tremors, excitation, convulsions, loss of consciousness, respiratory and central nervous system depression, and death. Organochlorine pesticides can occasionally be found also in infant formula (including soy-based formula) and baby foods, though usually at a lower concentration than in breastmilk.

### Bisphenol A

Bisphenol A (BPA) has been used since the 1960s to make hard polycarbonate plastic bottles and cups, and for the linings of metal and plastic food and beverage cans, including those containing liquid infant formula and soft drinks. As the compound leaches out easily, it was often found in infant formula, partly derived from polycarbonate plastic bottles, partly from the linings of the can. This continued until very recently, when major manufacturers of baby bottles, teats and formula started making products without BPA, even before legislation in some countries banned it. Such legislation is late to arrive in many other countries because the safety of BPA has been discussed for years by food safety authorities worldwide without reaching a conclusion. The baby food industry has decided to avoid using BPA under pressure from consumers and for fear of a fall in sales, not because of a ban in the legislation. Because of its omnipresence, BPA easily enters the food chain and can be found in urine, blood, including the blood of pregnant women, the umbilical cord and breastmilk; fetuses and infants can therefore be exposed to BPA even if they are not fed contaminated formula with a contaminated bottle. BPA is an endocrine disruptor mimicking estrogens. A 2008 report by the U.S. National Toxicology Program expressed concern for effects on the brain, behaviour, and prostate gland in fetuses, infants, and children at current human exposures to BPA (via placenta, breastmilk, bottle feeding and feeding with contaminated foods and beverages).

### Phthalates

Commonly used to soften plastic consumer products and

make them more flexible, phthalates can be found in baby bottles, in other tools and toys for babies, and in materials used for health and personal care. As they are not chemically bound to the plastic, they are relatively easily released by evaporation and abrasion, and thus have the potential to enter the food chain and contaminate even breastmilk. Phthalates have adverse effects on the liver, kidneys and on the reproductive system in particular as they act as endocrine disruptors. Studies have shown that the intake of phthalate in formula-fed infants is of the same magnitude or up to four times higher than in exclusively breastfed infants. Also, the intake via breastmilk is generally low and unlikely to pose any significant health risk, at least in the short term. Nevertheless, other sources of contamination in infancy have to be considered and should be avoided. Many countries are considering legislation to phase out and eventually ban phthalates from the market.

### Metals

Mercury, lead, arsenic and cadmium are carcinogenic, pro-carcinogenic and toxic for the brain, with effects on cognitive development and intelligence. Severe mercury intoxication can result in congenital and/or postnatal cerebral palsy, as in the famous Minamata disaster, in Japan, in the late 1950's. Cadmium is toxic also for the kidney. The main source of mercury in the maternal diet is fish and sea mammals from polluted waters. Exposure to lead can be related to occupation (e.g. paint, explosives, batteries, building, metal melting, mining), housing (renovation generating paint dust, hobbies like painting lead figurines or soldering electronics), water (old lead pipes, contamination by mines or industry) and tradition (folk remedies and cosmetics containing lead); until recently, tooth fillings were also a source of lead. Excess arsenic can be ingested when its level is high in ground water, either naturally or due to use of arsenic-based pesticides and fertilisers; rice grown in contaminated water may be an important source. The most common source of cadmium is cigarette smoke; less important sources are occupational contacts (batteries, plastics, pigments, metal coatings) and diet (fish, animals and plants grown in cadmium polluted waters and soils). Mercury, lead, arsenic, and cadmium, if present in the mother's blood, cross the placenta and may affect the development of the foetal brain during the late gestation and in early infancy. The level of these contaminants is highest at birth. The level of mercury in cord blood can be 1.5 higher than the level in maternal blood, while the levels of lead, arsenic, and cadmium are usually lower than those of the mother. All the birth levels tend to decrease after birth because metals are secreted in small quantities in breastmilk. The level of mercury, for example, falls by about 60% at about three months of age, as compared to the level at birth, in exclusively breastfed babies. These metals, especially mercury and lead, are frequently found in infant formula as well, often at higher levels than in breastmilk, and without the protection provided by it. The ingestion via formula feeding can be even higher if the powder is mixed with water contaminated

by metals. Reports of formula contaminated by metals have been published in Germany, Australia, Canada, Sweden and, more recently, China. Cow's milk, the basic ingredient in the production of infant formula, contaminated by heavy metals has been reported from countries worldwide, from Italy to Nigeria. Thus, interrupting or suppressing breastfeeding and replacing it with cow's milk-based formula are not an option to counter contamination.

### Melamine

Melamine is a synthetic product added to fertilizers to improve the growth of crops; it is also an ingredient of different plastics and as such it is found in many industrial goods. In 2007 a Chinese company deliberately added melamine to diluted raw milk used to make powdered infant formula to boost its apparent protein content. As melamine is not degraded in humans and the main route of excretion is through the kidneys, infants taking tainted formula suffered from acute renal failure, leading to death or to chronic disease, and from kidney stones. The Chinese health authorities initially reported 432 cases of intoxication with one death; it was probably an underestimate later corrected to at least 6 deaths and about 300,000 cases. It was then found that other formula manufacturers had added melamine to their products and that these were not only consumed in China but exported to many other countries in Asia and Africa. The rush to produce and sell more and more infant formula, even when the raw material is scarce (much of the raw milk used by the Chinese manufacturers came from New Zealand), is pushed by the rapidly falling rates of breastfeeding in China, where women are increasingly recruited by an industry hungry to work under conditions that hinder breastfeeding (in the absence of adequate legislation), while there is little obstacle to the aggressive marketing of breastmilk substitutes by local and foreign companies.

### Mycotoxins

Mycotoxins are toxic metabolic products of moulds and are therefore found in foods and feeds, cereals in particular, contaminated by moulds. The most studied group of mycotoxins are the aflatoxins, well known as carcinogens. Aflatoxins can be found in breastmilk in population groups that consume large quantities of contaminated cereals, especially in low income tropical countries where moulds grow faster and foods are rarely tested for them. It is uncommon to find mycotoxins in food, and hence in breastmilk, in high income countries; however in these countries they can be found in industrial ready-to-eat baby foods (formula, meat-based infant foods) derived from animals fed contaminated cereals. It is very likely that stricter legislation and control will progressively reduce this risk in high income countries, while loose controls and legislation will allow the risk to increase in emerging economies, such as China.

**Appendix 2****Documents consulted for this statement**

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### IBFAN's Seven Principals

1. Infants and young children everywhere to have the right to the highest attainable standard of health.
2. Families, and in particular women and children, to have the right to access adequate and nutritious food and sufficient and affordable and water.
3. Women have the right to breastfeed and to make informed decisions about infant and young child feeding.
4. Women have the right to full support to breastfeed for two years or more and to exclusively breastfeed for the first six months.
5. All people have the right to access quality health care services and information free of commercial influence.
6. Health workers and consumers have the right to be protected from commercial influence which may distort their judgement and decisions.
7. People have the right to advocate for change which protects, promotes and supports basic health, in international solidarity.

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