



The Disproportionate Impacts of Chemicals in Food Packaging on Communities that Lack Access to Fresh Food – an Environmental Justice Issue

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I. Introduction

The UNWRAPPED conference (June 12-14, 2019)[i] – a collaboration between environmental health scientists and plastic pollution and toxic exposure advocates and science communication experts – explored the types of food packaging and food contact chemicals that threaten human health. The conference revealed how these chemicals make their way into foodstuffs and the types of health hazards they pose. It also focused on the threats posed by plastics, a subset of packaging materials, to human health.

The conference drew participants from across the globe. Day two of the conference highlighted environmental justice issues related to plastics and packaging, including chemical exposure in fence-line communities throughout the lifecycle of plastics –from oil and gas extraction to petrochemical and plastics processing, and from waste incineration, recycling, and litter picking. These are issues that impact low income communities across the globe.

One environmental justice issue specific to the U.S., however, is the link between food deserts and higher levels of exposure to health-harming chemicals in fast foods, processed foods, and their packaging. This issue is being investigated by leaders in environmental health research. Here, we review the research and highlight the concerns that will be shared in the UNWRAPPED project.

II. Food Contact Chemicals - Exposure via Food and Food Packaging

In the U.S., more than 10,000 chemicals are allowed to be added to food and food contact materials, such as packaging, either directly or indirectly, as sanctioned by the 1958 Food Additives Amendment to the 1938 Federal Food, Drug, and Cosmetic Act. Many of these chemicals were grandfathered in when the law was enacted. Industry political influence has resulted in a federal regulatory program that is tantamount to hardly any regulation at all.

Among the total number of chemicals used in food contact, an estimated 1,000 chemicals are used without any regulatory review under a “Generally Recognized as Safe” (GRAS) designation program. The GRAS regulations enable chemical producers to self-determine whether any safety issue is posed by a given chemical. [ii] GRAS was intended to be for benign substances like olive oil. But in the last few years, most new food additives have been introduced with GRAS designation; the FDA often received no notice from chemical producers that they have self-approved under GRAS, so the use of a new chemical is often unknown to the FDA. Most of the GRAS determinations are made by employees of, consultants to, or panels selected by the manufacturer of the additive.[iii]

In addition, the FDA lacks the authority to acquire data to determine whether food contact chemicals on the market are safe.[iv] The risk assessment evaluations required for chemicals to be approved for use fail to require the type of exposure and toxicity data that most environmental health experts believe are necessary, such as feeding studies (i.e. feeding lab animals the chemical to replicate human ingestion).

Risk assessments are not required to evaluate for potential reproductive or developmental harm. Nor do the assessments evaluate effects of low dose exposures (now recognized as having significant health implications), impacts to the endocrine system, impacts of mixtures and cumulative impacts, or the protection of children and vulnerable populations.[v]

The outcomes of the federal government's and food industry's failures to protect public health from food contact chemicals is becoming clear. A large and increasing body of evidence from laboratory and human epidemiologic studies suggests that direct food additives (colorings, flavorings, and chemicals that increase shelf life) and indirect food additives (adhesives, dyes, coatings, plasticizers, paper, paperboard, plastic, and other polymers that may migrate into food as part of packaging or processing equipment) may contribute to disease and disability in the population.[vi]

Since UNWRAPPED is a project that focuses on the impacts of plastics and other single-use food and beverage packaging to human health, it is the indirect additives – i.e., chemicals used in food packaging, that is of most interest here. There is ample evidence that food packaging is a source of chemicals in foodstuffs due to the migration of indirect food additives into food and beverages.[vii]

III. Health Effects of Chemicals of High Concern

Some of the key classes or groups of chemicals that cause most alarm among research scientists are known to migrate out of food packaging and into food. The main chemicals cited in the literature include two groups of plasticizers – **bisphenols** and **phthalates** – as well as **per- and polyfluoroalkyl substances (PFAS)**, and **perchlorate**.[viii]

- **Bisphenols** are used in the manufacture of polycarbonate plastic to harden the material. They are also used as an additive in epoxy resin coatings to line metal food and beverage cans and on thermal paper receipts. Bisphenol-A (BPA) is classified as an “endocrine disrupter,”[ix] and disruption of the endocrine system can cause adverse developmental, reproductive, neurological, and immune effects in both humans and wildlife. Research shows that endocrine disruptors may pose the greatest risk during prenatal and early postnatal development, when organ and neural systems are forming.[x] While bisphenol-A (BPA) has been banned by the FDA from use in infant bottles, sippy cups, and formula cans,[xi] the bisphenols that manufacturers use as replacements, like bisphenol-S, show similar toxicity and health impacts to BPA.[xii]
- **Phthalates** are used in a variety of consumer products. Low-molecular weight phthalates are frequently used in personal care products to preserve scent, whereas high molecular weight phthalates are used to produce vinyl plastics for flooring, food wrap, and flexible plastic tubing.[xiii] In food packaging, phthalates are used in the production of polypropylene and poly vinyl chloride (PVC) plastics and have been found in glass jar metal closures with PVC gaskets; plastic containers with foiled lidding; paper/foil/plastic laminate (beverage cartons); foil lined pouches; and several plastic bags in carton boxes.[xiv] The human health effects of phthalates include reproductive toxicity in adults as well as insulin resistance and type II diabetes, obesity, allergies, asthma, cancer, and epigenetic modulation.[xv]
- **PFAS** are synthetic organic fluorinated compounds whose carbon-fluorine bonds are so stable and thermal resistant that they have been named “forever chemicals,” as once manufactured, they will persist indefinitely. These chemicals are used to create grease- and moisture-proof barriers in products such as Teflon™, Gortex™, carpet stain-proofing, and in food containers and papers. Consumption of contaminated food is the main route of exposure for most people.[xvi] Exposure to PFAS has resulted in reduced immunity, decreased birth weight, reduced fertility, and thyroid alterations.[xvii]

- **Perchlorate** is used in food packaging, in sealing gaskets, and as an anti-static agent for dry foods in plastic packaging.[xviii] It is known to disrupt thyroid hormone production by interfering with the uptake of iodide in the thyroid gland. The thyroid hormone is critical for early brain development and can cause long-term cognitive impairment. Exposure to perchlorate among pregnant women raises significant concerns for the developing fetus, which is entirely reliant on maternal thyroid hormone during the first trimester of pregnancy[xix]

IV. Disproportionate Impacts on those who lack access to fresh food

- **Food deserts and health in low income communities and communities of color**

A “food desert” is defined by the U.S. Department of Agriculture differently depending on demographics. In an urban environment, a food desert is an area with no access within one mile to a store with fresh and nutritious food options. In rural America, lack of access is defined as being ten miles or more from the nearest fresh food store. It’s estimated that more than 23 million people, more than half of them low income, live in food deserts in the U.S.[xx]

National and local studies across the U.S. suggest that residents of low-income, minority, and rural neighborhoods are most often affected by lack of access to supermarkets and healthful food. People who have better access to supermarkets and limited access to convenience stores tend to have healthier diets and lower levels of obesity. In contrast, the prevalence of fast-food restaurants and high fat and high sugar “value” meals and/or convenience stores has been found to be greater in lower-income and minority neighborhoods.[xxi] Examples include urban areas, such as Baltimore, where it has been shown that predominantly black and lower-income neighborhoods have less access to healthful foods as compared to white and higher income neighborhoods, primarily due to the lack of grocery stores offering fresh, unpackaged, unprocessed food.[xxii] In Detroit and New Haven, produce quality is lower in low-income communities of color compared to more affluent or racially mixed neighborhoods.[xxiii] In Mississippi, which has the highest obesity rate of any state, over 70 percent of food stamp eligible households travel more than 20 miles to reach a supermarket.[xxiv]

- **Evidence of Higher Levels of Exposure via Race, Location, and Type of Foods Eaten**

Racial and ethnic differences in food additive exposures are well documented.[xxv] Higher urinary concentrations of BPA have been documented in African Americans, and people with lower incomes show higher body burdens of BPA. [xxvi] Given that obesity is well recognized to be more prevalent among low-income and minority children in the U.S.,[xxvii] disproportionate exposures to chemicals that cause obesity, such as BPA, partially explain sociodemographic disparities in health.[xxviii]

Those who eat a diet comprised mainly of fast and packaged food are more significantly exposed to toxic chemicals from food and food packaging. In a study of 9,000 people, fast food consumers were more likely to be male, under age 40, and non-Hispanic black, and to have higher total calorie and total fat intake from fast food, compared with the general population. They also exhibited higher levels of phthalates than the non-fast food consumers[xxix] Another study showed food eaten away from home to be associated with increased exposure to phthalates, although away from home establishments included full service restaurants and cafeterias in addition to fast food restaurants. [xxx] Research also shows that people who eat packaged food in take-out food containers, including those designed for compost, can have higher levels of PFAS exposure. The study examined 400 food packages and papers collected from U.S. fast food restaurants (primarily large fast food chains with ≥100 U.S. stores) and found PFAS chemicals in 46 percent of food-contact papers and 20 percent of paperboard samples.[xxxi]

V. An Environmental and Social Justice Issue

The research tells us that those who cook meals at home, rather than eating out, can reduce not only sugar and unhealthy fats, but also exposure to harmful chemicals that are used in food packaging. But

those who lack access to stores to purchase food to cook at home, primarily low-income, and often people of color, do not have the means to avoid packaged, processed, food purchased at convenience stores and fast food restaurants. These may be their only options. This makes higher levels of exposure to chemicals in food packaging among those living in food deserts – primarily people of color and low income residents – an issue of environmental and social justice.

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