Research Guide on
Potential Health Impact of Menstrual Products

Appendix C:

Planet-Positive Periods: A Toolkit for Sustainable Menstruation

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Chemicals Detected in Disposable Pads & Tampons

STUDY	KEY TAKEAWAYS

"Phthalates, bisphenols, parabens, and triclocarban in feminine hygiene products from the United States and their implications for human exposure"
 	
Gao & Kannan, 2020
Environmental International
	• Measured 24 endocrine-disrupting chemicals (EDCs) in disposable period pads, panty liners & tampons sold in USA
	  ○ EDCs = chemicals that can mimic or interfere with the body's hormones; include phthalates, parabens, etc. (National Institute of Environmental Health Sciences, 2022)
	  ■ Phthalates = type of EDC; studies in people & rats suggest a *possible* link between phthalate exposure & reproductive & cardiovascular health (Mariana et al., 2016)
	  ○ *In other contexts*, high exposure to EDCs has been linked to endometriosis, early puberty, breast cancer & other reproductive health issues (Benjamin et al., 2017; Jagne et al., 2016; Jefferson et al., 2010; Miao et al., 2004; Reddy et al., 2006; Smarr et al., 2016)
	• 7 different EDCs were found in ALL pads, panty liners & tampons studied
	• Because they come in direct contact with the vulva & vagina, EDCs in pads, panty liners & tampons can be easily absorbed into the body
	• More research is needed to understand how much EDC exposure comes from pads, panty liners & tampons & what the short- & long-term health impacts may be

"Volatile organic compounds in femine hygiene products sold in the US market: A survey of products and health risks"
 	
Lin et al., 2020
Environmental International
	• Measured levels of volatile organic compounds (VOCs) in scented & unscented disposable pads & tampons sold in USA & *estimated potential health risks* using mathematical modeling
	  ○ VOCs = chemicals emitted from some fragrances, adhesives & other substances present in some disposables; may also be inadvertently present in packaging
	  ○ *In other contexts*, high or long-term exposure to some VOCs has been linked to skin, eye & nose irritation; damage to the respiratory system, liver & kidney; reproductive effects & risk of cancer (Anderson et al., 2007; Wolkoff et al., 2000; Wolkoff et al., 2006)
	• Found *low levels* of some VOCs in pads & tampons, including benzene, styrene, chloroform, n-heptane & tetrachloride
	  ○ Benzene - long-term exposure to high levels increases cancer risk (CDC, 2015)
	  ○ Styrene - "reasonably anticipated" to increase cancer risk (CDC, 2014)
	  ○ Chloroform - "reasonably anticipated" to increase cancer risk (CDC, 2015)
	  ○ N-heptane - can cause skin irritation (ILO, 2015)
	  ○ Tetrachloride - associated with skin irritation (Williams, 2013)
	• Estimate of potential cancer risks associated with all pads & tampons tested were insignificant (i.e., fell below protective reference level)
	• Estimate of potential non-cancer health risks were highest for pads, suggesting need for research
	• VOCs were not disclosed on product labels

Chemicals Detected in Disposable Pads & Tampons *(continued)*

STUDY	KEY TAKEAWAYS

"Sanitary pads and diapers contain higher phthalate contents than those in common commercial plastic products"
 	
Park et al., 2019
Reproductive Toxicology
 	
NOTE: Title overzealously interprets findings!
	• Measured phthalates & VOCs in disposable pads from USA, Greece, France, Korea, Japan & Finland
	• Phthalate & VOC contents varied widely across pad brands studied
	  ○ For some phthalates, *the highest amount found in any pad* was greater than that found in package film, plastic cups, microwaveable boxes, cereals & some other commercial plastic products
	  ■ **NOTE:** Not all brands had high levels!
	  ○ VOC levels were *less than* the reference dose (RfD), an EPA estimate of how much daily exposure is *not* likely to be harmful
	• More research is needed to determine the *possible health risks* of using pads with high phthalate &/or VOC contents

"Product Testing Results: Always Pads"
 	
Women's Voices for the Earth, 2014
	• Independent lab STAT Analysis Corporation tested 4 types of Always pads for VOCs
	• Found low levels of styrene, chloromethane, chloroethane, chloroform & acetone
	  ○ Chloromethane - can cause skin irritation; impact on cancer risk is unclear (CDC, 2022)
	  ○ Chloroethane - long-term exposure can cause cancer *in mice*; impact on human cancer risk is unclear (CDC, 2011)
	  ○ Acetone - can cause dryness, irritation & cracking of skin (CDC, 2021)

"2018 Tampon Testing Results"
 	
Women's Voices for the Earth, 2018
	• Tested U by Kotex Fitness, Seventh Generation, Playtex Sport (scented), Safe & Soft, Natracare & Tampax Pearl (scented) tampons for 8 chemicals with *potential* for health impacts
	• Detected at least 1 chemical in 4/6 brands (none in Seventh Generation or Natracare), including carbon disulfide, methylene chloride & ethyl acetate
	  ○ Carbon disulfide - neurotoxin when breathed at very high levels (CDC, 2011)
	  ○ Methylene chloride - probably increases cancer risk (CDC, 2014)
	  ○ Ethyl acetate - vapor form irritates eyes, nose & throat (NLM, n.d.)

"Risk assessment of volatile organic compounds (VOCs) detected in sanitary pads" Kim et al., 2019 *Journal of Toxicology and Environmental Health*	• Measured 74 VOCs in pads from South Korea & estimated *possible health risks* using mathematical modeling • In total, low levels of 50 VOCs were found in the pads tested • Estimates of cancer & non-cancer health risk were below reference levels → does not suggest adverse health impacts according to model used

Chemicals Detected in Disposable Pads & Tampons *(continued)*

STUDY	KEY TAKEAWAYS

"Risk assessment study of dioxins in sanitary napkins produced in Japan"
 	
Ishii et al., 2014
Regulatory Toxicology and Pharmacology
	• Measured levels of dioxins (type of EDC) in pads produced in Japan & estimated *possible exposure levels* using mathematical modeling
	  ○ Dioxins = persistent environmental pollutants (POPs) everyone is exposed to in small amounts (WHO, 2016)
	  ○ Significant long-term exposure to dioxins is linked to issues with the endocrine, immune & reproductive systems (WHO, 2016)
	• Various dioxins were found, but estimated risk of exposure via pads was negligible

"Analysis of Polychlorinated Dibenzo-p-dioxins and Dibenzo-furans in Sanitary Products of Women" Shin & Ahn, 2007 *Textile Research Journal*	• Tested pads & tampons from Korea, Japan, Germany, China & USA for various forms of dioxins & furans (type of VOC) • Overall, dioxins & furans were detected at similar levels in both pads & tampons • Presence of dioxins & furans varied by product ○ All tampons from all countries contained at least 3 specific chemicals, while pads from Korea & USA had none

"Survey of hazardous chemical substances in feminine hygiene products"
 	
Swedish Chemical Agency, 2018
	• Analyzed 62 chemicals of potential concern in 35 menstrual products sold in Sweden (tampons, pads, panty liners & cups) → found 21 chemicals total
	• Found low amounts of 10 chemicals in some pads, including 1 phthalate (48 chemicals tested)
	• Found low amounts of 13 chemicals in some liners, including 1 phthalate (47 chemicals tested)
	  ○ *All* liners contained abietic acid, a potential skin irritant
	• Found low amounts of 5 chemicals in some tampons (52 chems tested)
	• Found formaldehyde in *all* tampons, pads & liners
	  ○ Can cause allergic skin reaction; long-term exposure to very high levels increases cancer risk (CDC, 2016)
	• Did *not* find glyphosate or AMPA (pesticide residues) in any pads, tampons or panty liners
	• Conducted risk assessments for 18/21 chemicals detected & concluded *low health risks* for all

"Menstrual Products as a Source of Environmental Chemical Exposure: A Review from the Epidemiological Perspective" Upson et al., 2022 *Current Environmental Health Reports*	• Reviewed studies of menstrual products & chemical exposure conducted thus far • Noted conflicting conclusions on exposure risks • Calls for more research on health impacts since environmental chemicals *have* been detected in tampons & pads

Chemicals Detected in Disposable Pads & Tampons *(continued)*

STUDY	KEY TAKEAWAYS
"Systematic Review on Sanitary Pads & Female Health" Woo et al., 2019 *The Ewha Medical Journal*	• Reviewed studies on pads & health risks (many of those included here) • More research is needed on specific health impacts of chemical exposure *through pads*

Skin Irritation & Disposable Pads

STUDY	KEY TAKEAWAYS
"Development and application of a novel method to assess exposure levels of sensitizing and irritating substances leaching from menstrual products" Marcelis et al., 2021 *Emerging Contaminants*	• Tested 15 total commercially-available pads, panty liners & tampons for 9 well-known skin sensitizers & skin irritants (mostly fragrances) • 6/15 products contained at least 1 sensitizer or irritant, which were not disclosed on packaging
(1) "Allergic contact dermatitis to colophonium in a sanitary pad - an overlooked allergen?" Wujanto & Wakelin, 2012 *Contact Dermatitis* (2) "Allergic contact dermatitis to a sanitary pad" Rademaker, 2004 *Australasian Journal of Dermatology*	• Described cases of allergic contact dermatitis of vulva due to colophonium in pads ○ Colophonium = allergen present in cellulose components of some pads (if they're derived from pine)
"Allergic contact dermatitis from methyldibromo glutaronitrile in a sanitary pad and review of Australian clinic data" Williams et al., 2007 *Contact Dermatitis*	• Described cases of allergic contact dermatitis (rash) of the vulva caused by presence of methyldibromo glutaronitrile (MDBGN) in pad adhesives
"Comparative Study of Satisfaction and Acceptability between Using Menstrual Cup versus Sanitary Pads in Health Care Personnel: A Randomized Crossover Trial" Weerawotsopon et al., 2021 *Journal of the Medical Association of Thailand*	• Conducted a study in Thailand of user satisfaction for menstrual cups vs. pads among health care workers who menstruate • Contact dermatitis was statistically significantly less common among menstrual cup users vs. pad users

Urogenital Infections & Disposable Pads

STUDY	KEY TAKEAWAYS
"Do panty liners promote vulvovaginal candidiasis or urinary tract infections?: A review of the scientific evidence" Farage et al., 2007 *European Journal of Obstetrics & Gynecology and Reproductive Biology*	• Found no association between use of panty liners & yeast infections or UTIs

Chemicals Detected in Period Underwear

STUDY	KEY TAKEAWAYS

"Report: 65% of Period Underwear Tested Likely Contaminated with PFAS Chemicals"
 	
Mamavation, 2021
	• Independent EPA-certified lab tested period underwear from 17 brands for fluorine, a chemical that reveals per- or polyfluoroalkyl substances (PFAS) are present
	  ○ PFAS = group of chemicals that may have negative health effects (CDC, 2021)
	  ○ High levels of certain PFAS *may* lead to higher cholesterol levels, changes in liver enzymes, higher risk of kidney or testicular cancer, lower infant birth weights, decreased vaccine response in kids & higher risk of high blood pressure or pre-eclampsia in pregnant women (CDC, 2020)
	• ⅔ of the products tested had detectable fluorine
	• 59% of the brands tested had detectable fluorine
	• Underwear from 3 brands - Thinx, Knix & Proof - had >100 ppm of fluorine, the standard used to decide if food packaging can be composted
	• Underwear from 9 brands - Knix, Joyja, Red Ruby Box, Saalt Wear, Sustain Natural, Victoria's Secret, Thinx, Cora & Panty's - had 10-100 ppm of fluorine
	• Underwear from 7 brands - Lilova, Aisle, Bambody, Intimate Portal, Period, Modibodi & Revol - had no detectable fluorine (0-9 ppm)

Chemicals Detected in Menstrual Cups

STUDY	KEY TAKEAWAYS

"Test: Menstrual cups"
 	
Danish Consumer Council THINK Chemicals, 2018
	• Tested 7 menstrual cups for potential chemicals of concern (phthalates, nitrosamines, polyaromatic hydrocarbons (PAHs), heavy metals, naphthalene, latex proteins, chlorinated paraffins & VOCs)
	  ○ Nitrosamines - may increase cancer risk (Robles, 2014)
	  ○ Latex proteins - may cause allergic reaction (Safety Monitor Research Foundation, 2020)
	• Insignificant amounts some chemicals were detected in some cups - phthalates (1 cup), latex proteins (2), nitrosamines or PAHs (3) & VOCs
	  ○ Lunette Clear cup contained lowest level of VOCs & no other chemicals tested for
	• Due to presence of VOCs in some menstrual cups, advises all cup users to boil them before use (as directed) to release VOCs

"Survey of hazardous chemical substances in feminine hygiene products"
 	
Swedish Chemical Agency, 2018
	• Analyzed 62 chemicals of potential concern in 35 menstrual products sold in Sweden (tampons, pads, panty liners & cups) → found 21 chemicals total
	• Of the 8 chemicals tested in menstrual cups, low amounts of 7 were found in most cups
	  ○ Includes D4, a chemical "suspected of damaging fertility" (European Chemicals Agency, 2020)
	  ○ The 2 menstrual cups made of TPE (instead of silicone) contained 0/8 chemicals
	• Estimated health risks for 4/7 chemicals (could not estimate for D7, D8 & D9) → concluded *low health risks* for all 4 chemicals
	  ○ No current evidence to indicate D7, D8 or D9 would pose health risk

See the complete **Planet-Positive Periods Toolkit** by PERIOD., AIsle, and Green Periods.