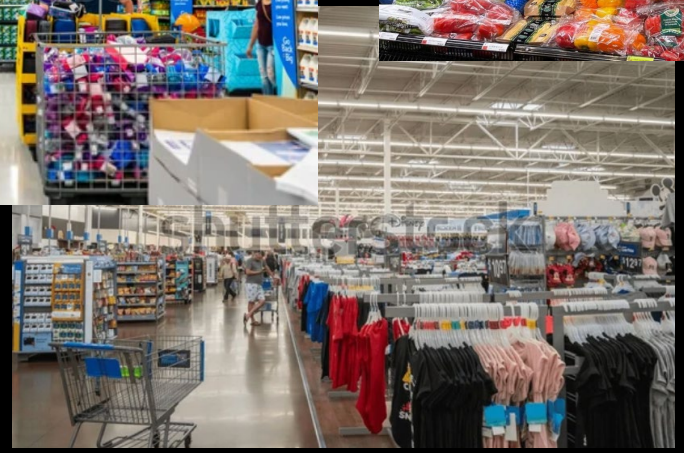
PLASTICS, MICROPLASTICS, AND PLASTICS CHEMICALS

What to know and how to protect yourself

HOW MUCH PLASTIC DO YOU BUY OR USE IN A DAY???

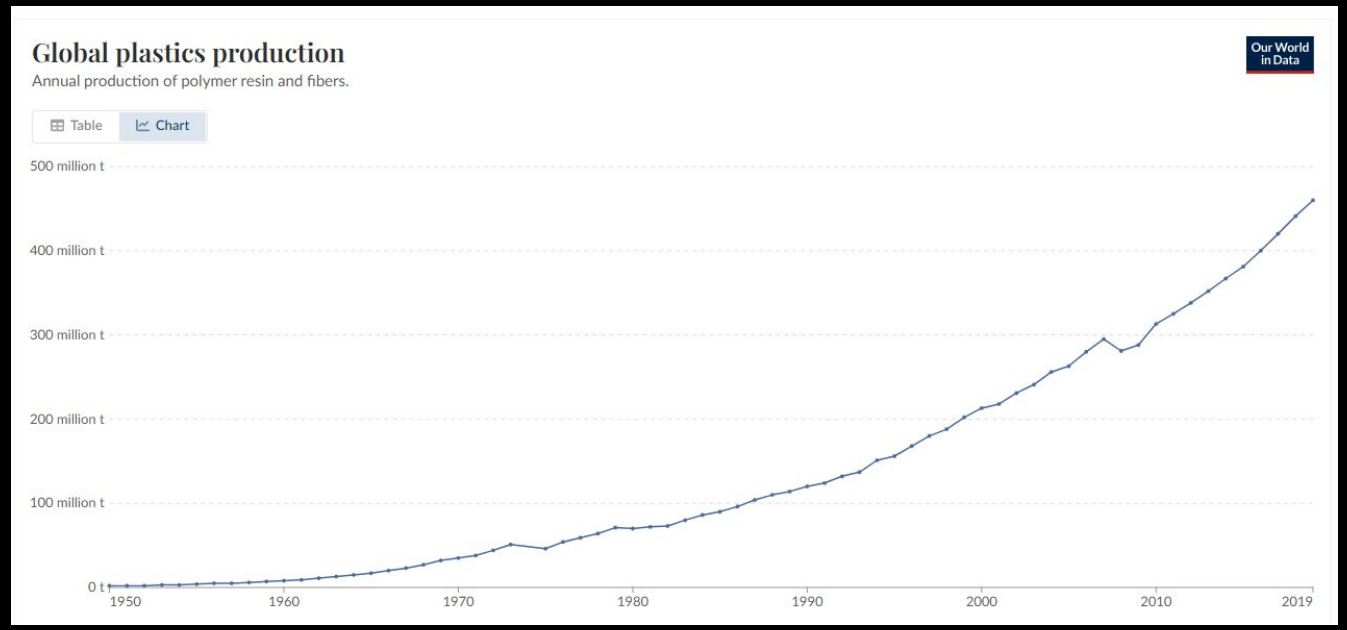


How many different plastic items do you use in a day? How many are disposable or single-use?

WHAT IS PLASTIC?

- Moldable, synthetic materials
- Most plastic is made from petroleum and other fossil fuels, plus diverse additives.
- Based on polymers (e.g., POLYethylene, POLYstyrene, etc).
- Incredible diversity of products and materials

HOW MUCH PLASTIC DOES THE WORLD USE EACH YEAR?

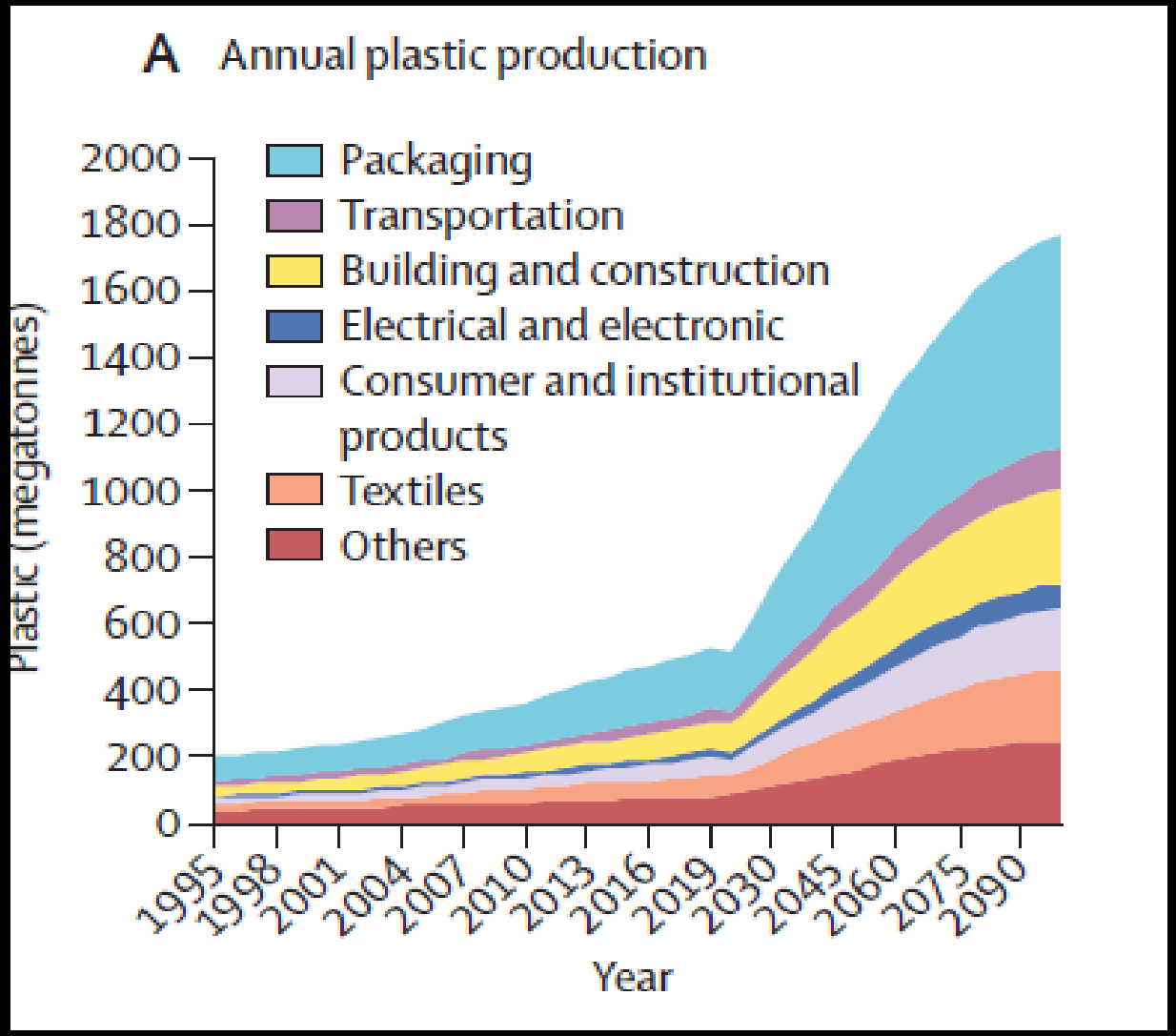


https://ourworldindata.org/grapher/global-plastics-production

- Almost every piece of plastic ever made is still on the planet.
- 40-50% produced are single use
- 100 billion plastic bags used in U.S./yr equally 12 million barrels of oil.
- More than 300 million tons of plastic are produced worldwide per year.

76% of all plastic waste is disposed of, 14% incinerated, less than 10% is recycled

AND WHAT IS FORECAST FOR THE FUTURE?



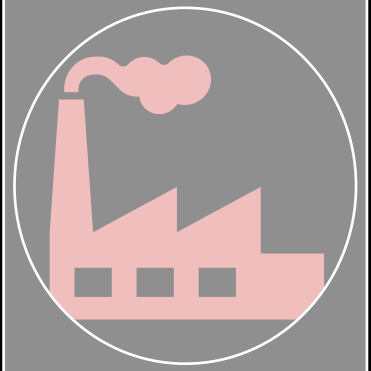
Most forecasts predict massive growth in plastic production across multiple sectors

(graphic credit:
Landrigan et al, 2025 The Lancet.)

PLASTIC LIFECYCLE AND HARMFUL EXPOSURE

Resource Extraction

- Particulate matter
- VOCs
- GHG
- Fencline communities, workers, communities in line of transport



Plastic production

- Bisphenols , Phthalates, PFAS, ethylene oxide, flame retardants
- Fencline communities, workers, communities in line of transport

Plastic use

- Bisphenols, PFAS, phthalates, flame retardants
- Microplastic particles
- Product users
- Release to environment: exposure through air, water, food.

Landfilling

- PFAS, flame retardants
- Microplastic particles
- Fenceline communities, workers, communities in line of transport

Plastic incineration

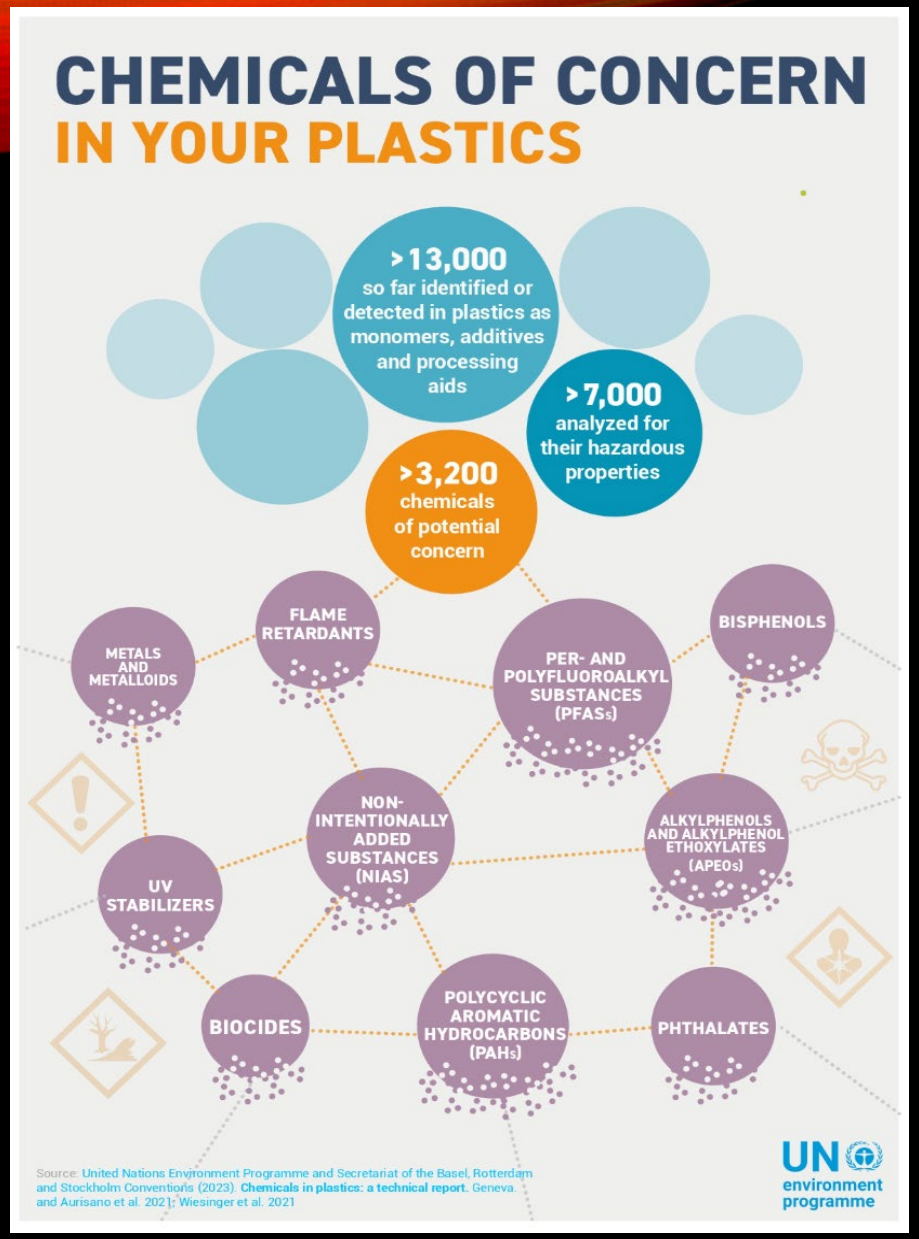
- PM, VOCs, metals, dioxins/furans
- Microplastic particles
- Fenceline communities, workers, communities in line of transport

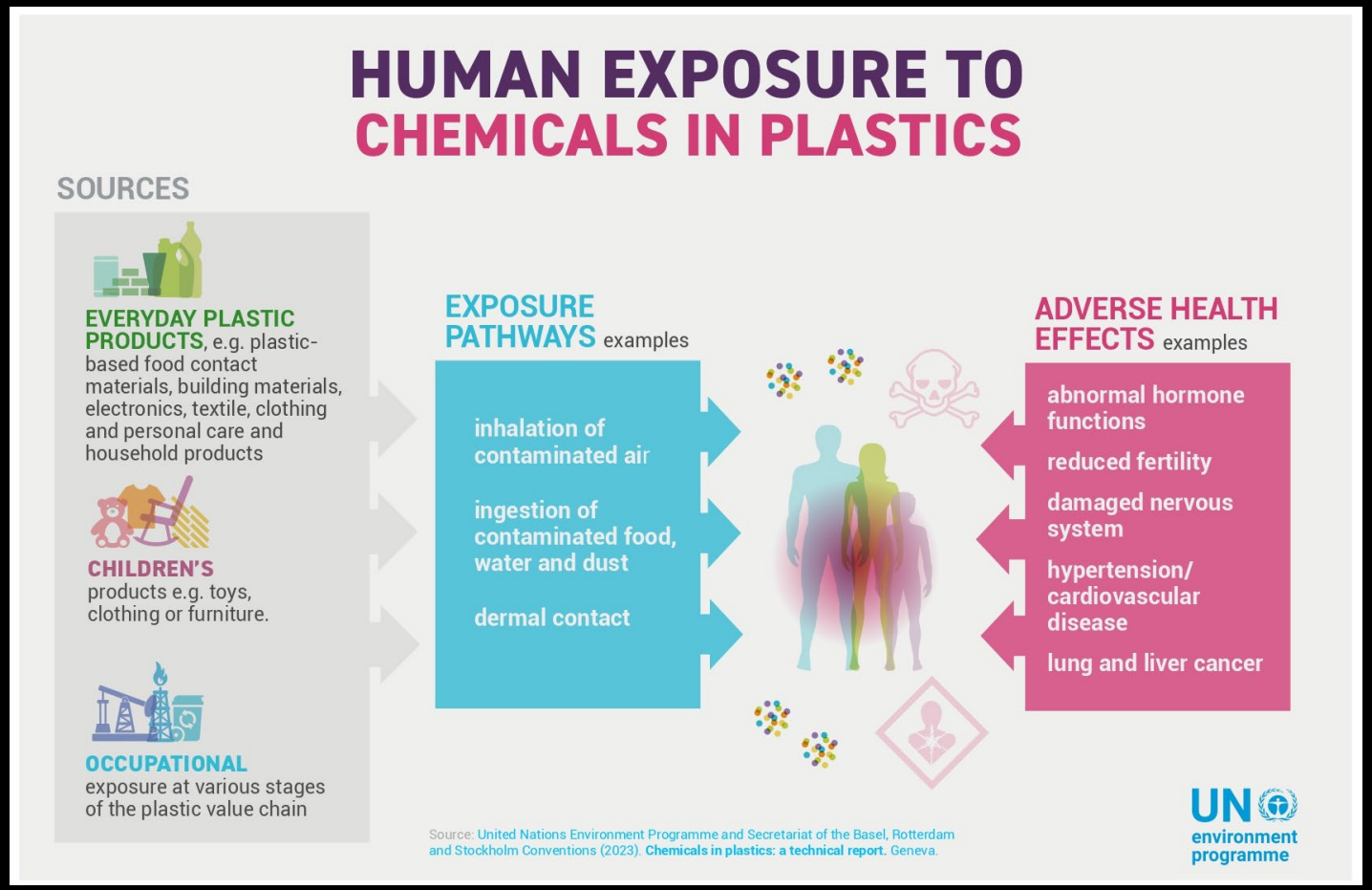
Plastic Recycling

- Microplastics
- Flame retardants, PM, VOCs
- Fenceline communities, workers, communities in line of transport

Human Health Concerns

WHY ARE WE CONCERNED?





PLASTICS AND CHILDREN'S HEALTH

Prenatal exposures

Studies have documented these negative health effects

Birth and infancy
- Miscarriage
- Preterm birth
- Decreased birthweight
- Decreased birth length
- Genital structure
- Bronchitis
- Increased BMI

Childhood
- Childhood cancer
- Poorer psychomotor development
- Lower IQ
- ADHD in girls
- Obesity
- Increased BMI
- Asthma
- Allergic rhinitis
- Atopic dermatitis

Childhood exposures

Studies have documented these negative health effects

- Lower IQ
- Vector-borne diseases
- Precocious (early) puberty in girls
- Abnormal timing of breast development
- Higher systolic blood pressure
- Obesity
- Allergic rhinitis
- Thyroid function
- Insulin resistance
- Increased waist circumference

Source: Symeonides et al., "An Umbrella Review of Meta-Analyses Evaluating Associations between Human Health and Exposure to Major Classes of Plastic-Associated Chemicals", (2024) & Landrigan et al., "The Minderoo-Monaco Commission on plastics and human health" (2023).

Children are particularly vulnerable to toxic chemicals

Rapid development of body systems

Child-specific behaviours

Eat, drink and breathe proportionally more

Cognitive immaturity and dependence on adults

Longer life expectancy

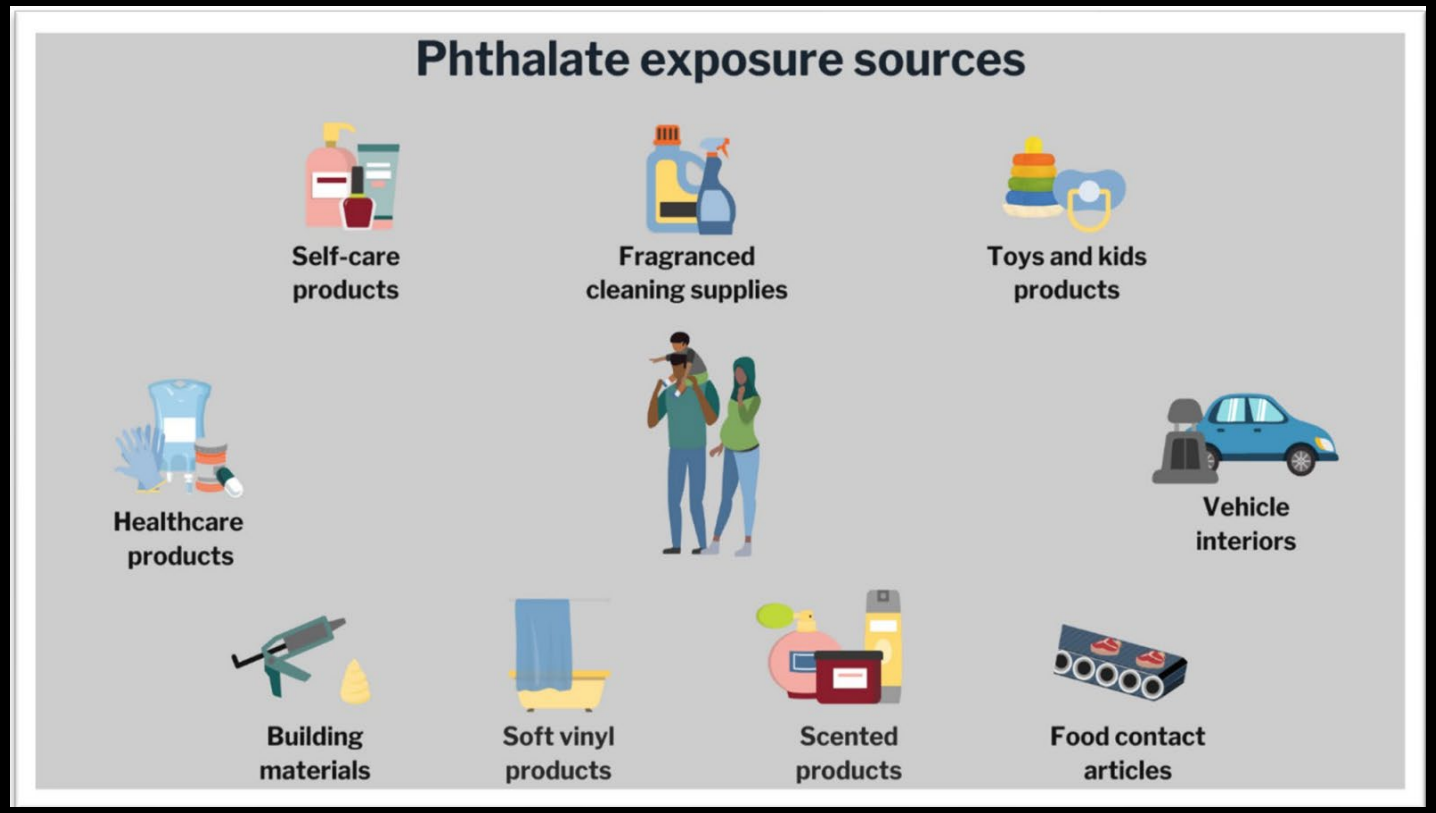
https://ceh.unicef.org/sites/default/files/2024-11/Generation%20Plastic_Unpacking%20the%20impact%20of%20plastic%20on%20children.pdf

EXAMPLE: PHTHALATES

- Group of chemicals that share part of their structure.
- Used primarily as plasticizers and to dissolve fragrance
- Change the properties of polyvinyl chloride plastics

Health Concerns:

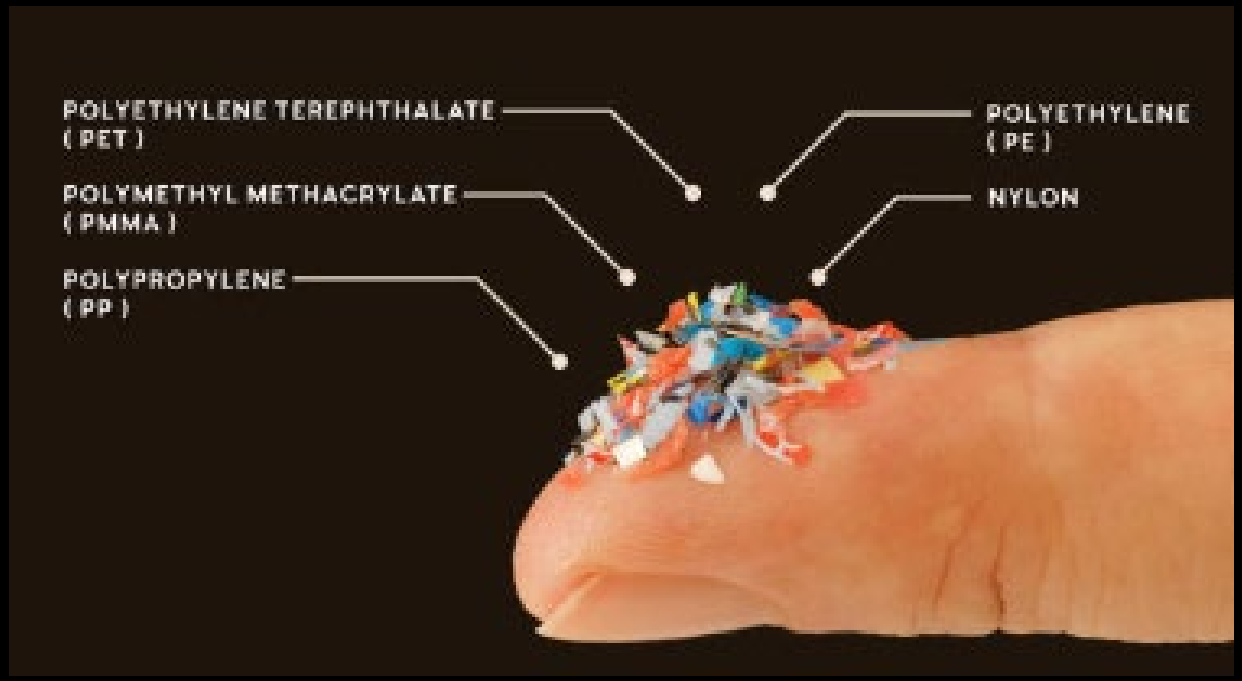
- Phthalates are found in nearly everyone's bodies
- We can breathe them, eat/drink them, and get them on our skin when we handle PVC products.
- Affect fertility, reproductive health, male developmental reproductive anatomy, brain development.
- Metabolic disturbances, obesity
- Possibly allergic airways disease.



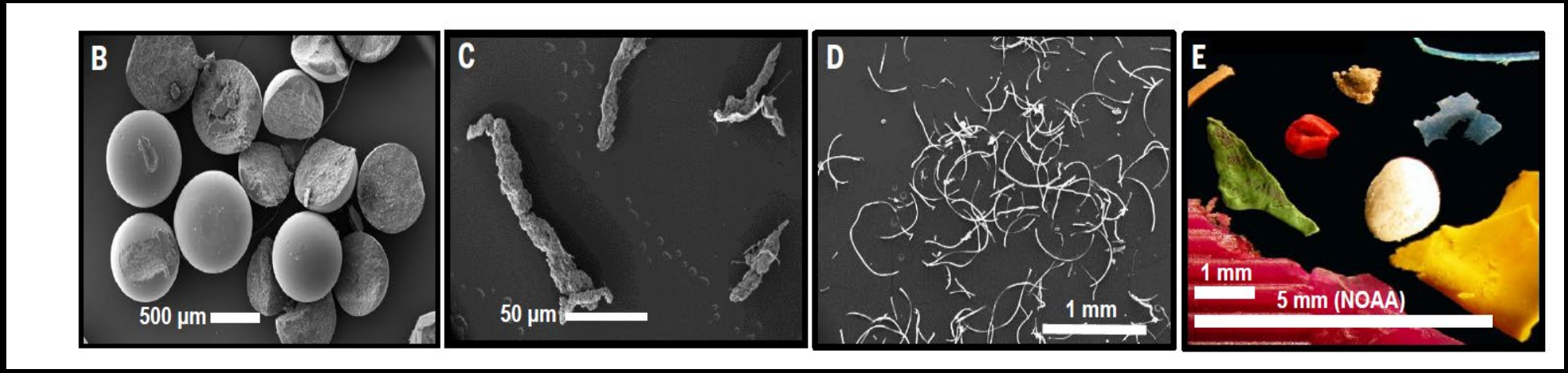
Microplastics as a focus of concern

WHAT ABOUT MICROPLASTICS?

Microplastics: extremely small pieces of plastic debris in the environment resulting from the disposal and breakdown of consumer products and industrial waste.

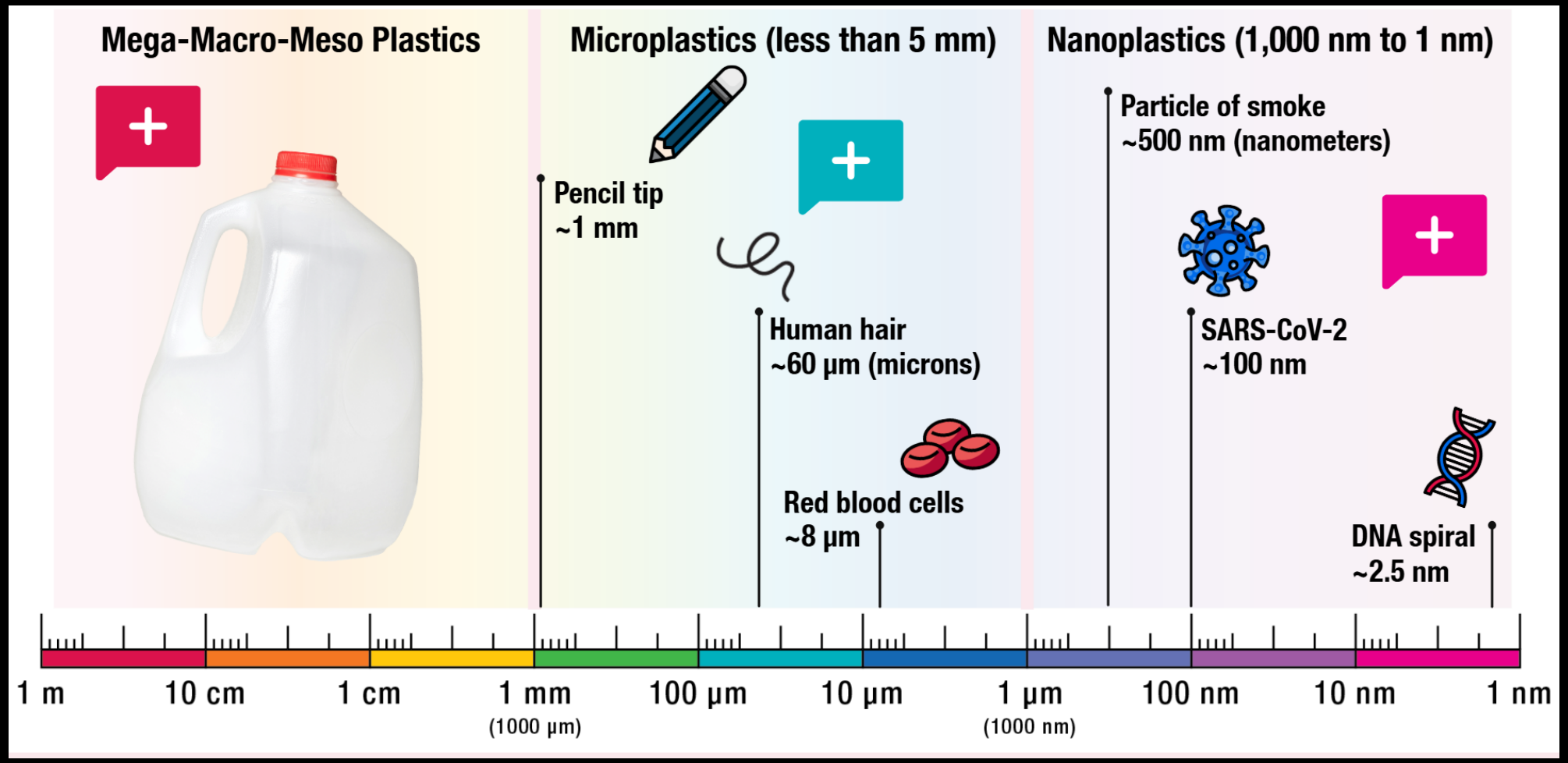


WHAT DO MICROPLASTICS LOOK LIKE?



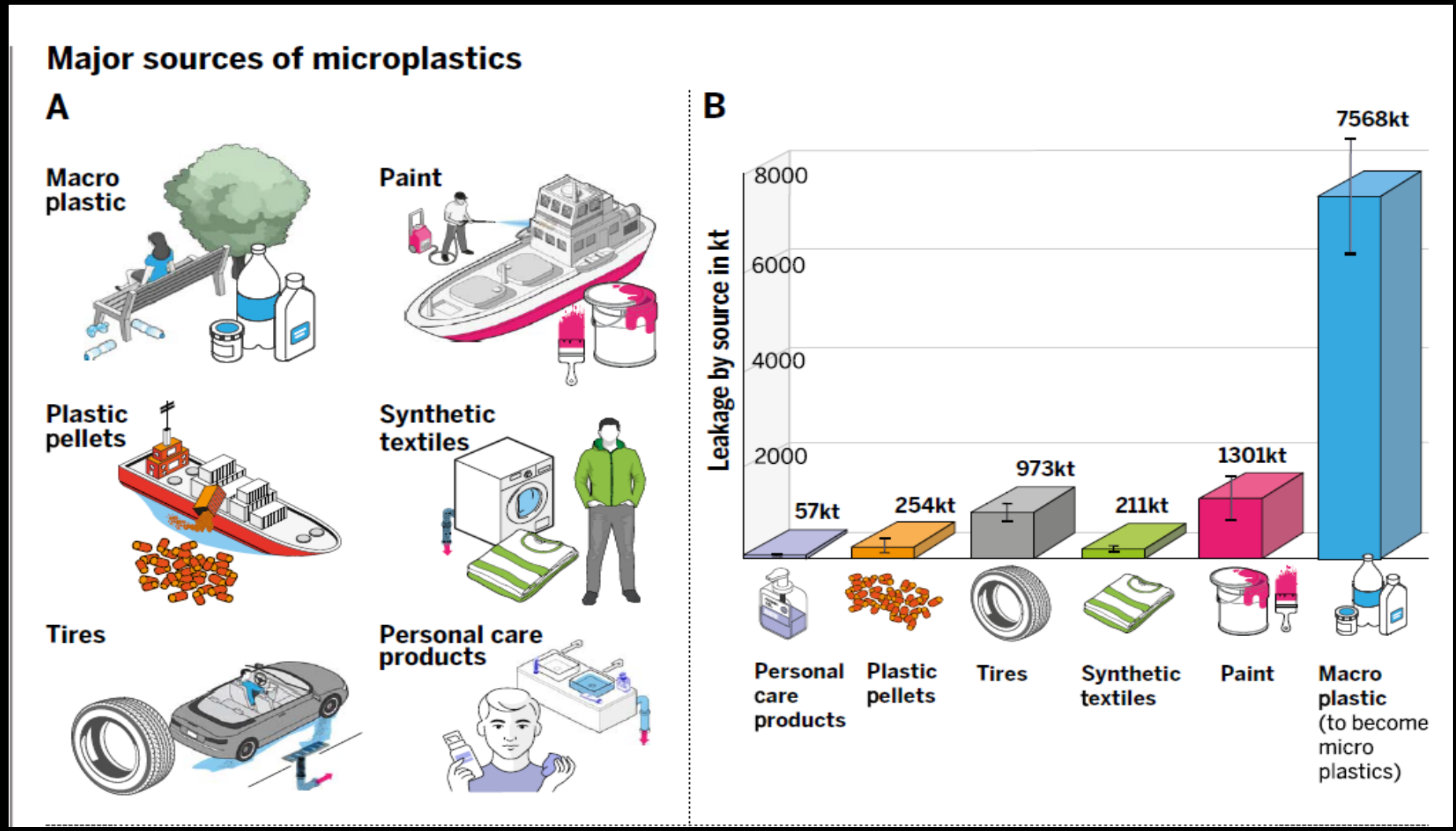
Credit: Thompson et al., Science 386, eadl2746 (2024) 25 October 2024

SIZE CHECK



Credit: UCSF Magazine, Summer 2025

KEY SOURCES OF MICROPLASTICS



Credit: Thompson et al., Science 386, eadl2746 (2024) 25 October 2024

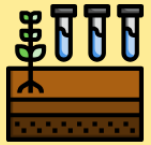
WHERE DO MICROPLASTICS GO?

Air

A cubic meter of air can contain over 1,000 particles of microplastic, especially indoors.

Water

While bottled water generally contains more microplastics, they also show up in tap water.



Soil

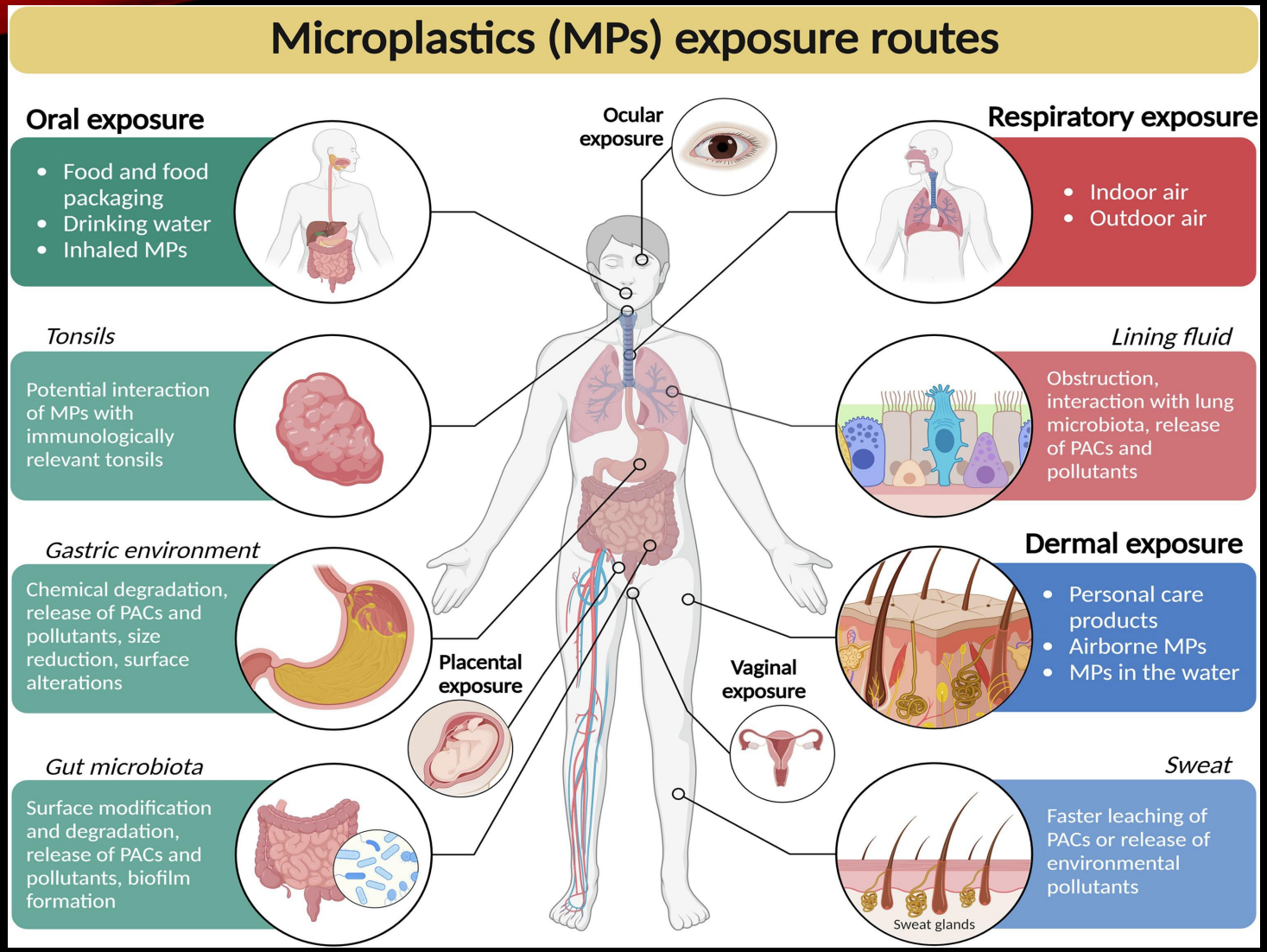
Microplastics have been detected in many types of soil – in cities, farms, and elsewhere.

Food

Microplastics have turned up in fruits, vegetables, salt, rice, and proteins, especially in highly processed foods.

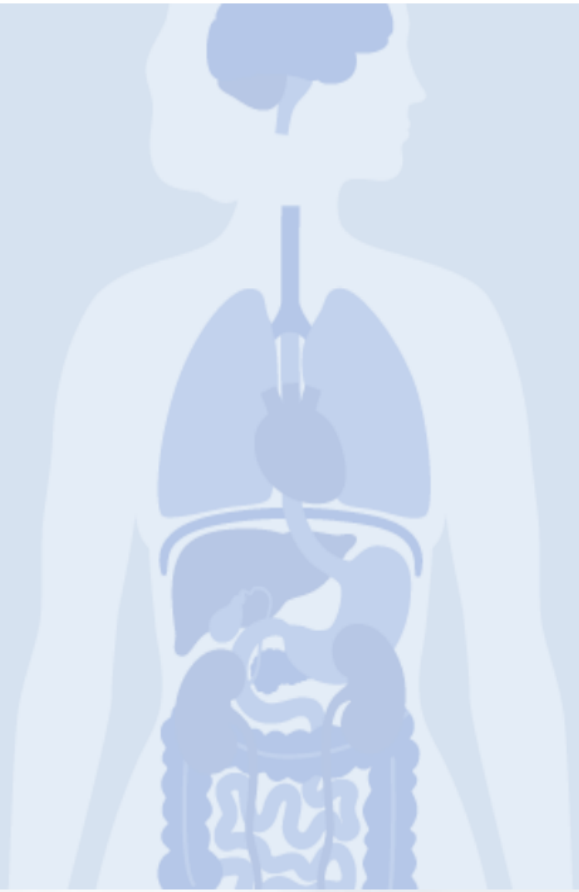
Credit: UCSF Magazine, Summer 2025

HOW DO THEY GET INTO OUR BODIES?



Alijagic et al., 2024 Environment International, Volume 188, June 2024,108736

WHAT CAN MICROPLASTICS DO?



Why Should We Be Concerned?

Microplastics aren't just tiny, they are toxic. Microplastics act like tiny toxic time bombs, carrying harmful chemicals wherever they go, and putting our health at risk in ways scientists are just beginning to understand.

- **They contain harmful chemicals.** Many plastics are made with toxic additives like plasticizers, toxic flame retardants, and stabilizers. These chemicals stay in microplastics and in the environment.
- **They absorb toxic chemicals.** Microplastics can absorb toxic pollutants from the air, water, and soil.
- **They contaminate the body.** Researchers have found microplastics in nearly every part of the human body, including our heart, lungs, liver, kidneys, intestines, spleen, blood, placenta, breast milk, stool, urine, and even testicles. Once inside the body, microplastics can move into our tissues and organs, where they've been shown to cause cellular damage.
- **They pose serious health risks.** New research suggests links between microplastics and increased risk of Alzheimer's disease, cardiovascular disease, stroke, infertility and reproductive harm, hormone disruption, certain cancers, and premature death.

https://www.saferstates.org/microplastics/

POSSIBLE CARDIOVASCULAR EFFECTS

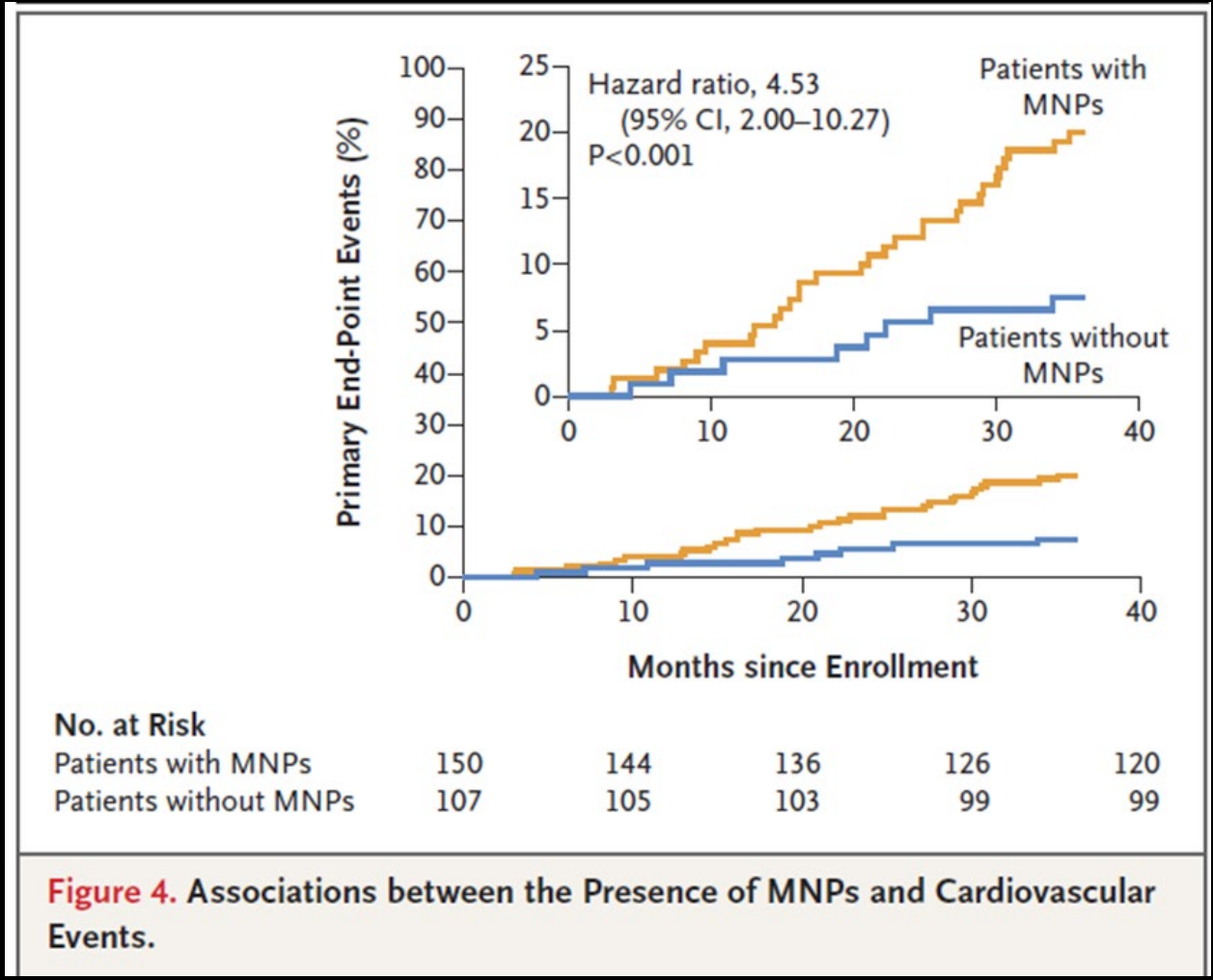
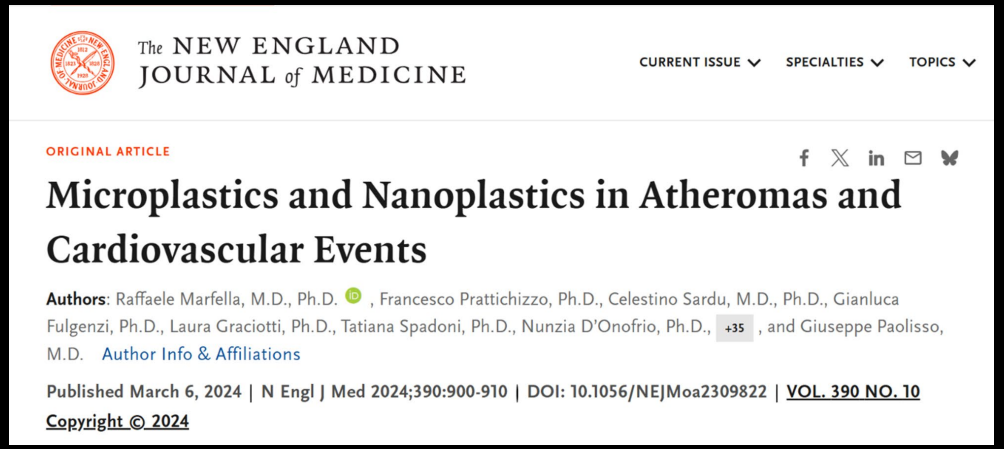


Figure 4. Associations between the Presence of MNPs and Cardiovascular Events.



The NEW ENGLAND JOURNAL of MEDICINE

CURRENT ISSUE SPECIALTIES TOPICS

ORIGINAL ARTICLE

Microplastics and Nanoplastics in Atheromas and Cardiovascular Events

Authors: Raffaele Marfella, M.D., Ph.D., Francesco Prattichizzo, Ph.D., Celestino Sardu, M.D., Ph.D., Gianluca Fulgenzi, Ph.D., Laura Graciotti, Ph.D., Tatiana Spadoni, Ph.D., Nunzia D'Onofrio, Ph.D., +35, and Giuseppe Paolisso, M.D. Author Info & Affiliations

Published March 6, 2024 | N Engl J Med 2024;390:900-910 | DOI: 10.1056/NEJMoa2309822 | VOL. 390 NO. 10

- Study found that people whose atherosclerotic plaque contained MNPs were at greater risk for future cardiac events.
- The MNPs observed were mostly jagged fragments.
- No conclusions about whether plastic caused the cardiac events, the study is considered suggestive.

What can be done?

WHAT CAN GOVERNMENTS DO?

UN Global Plastics Treaty: to develop an international legally binding instrument on plastic pollution

- Since 2022 there have been 6 Intergovernmental Negotiating Committee (INC) Meetings

CNN Climate Solutions Weather Watch Listen Live TV Subscribe Sign In

Global plastic treaty talks end in failure as countries remain bitterly divided over how to tackle the crisis

AUG 15, 2025

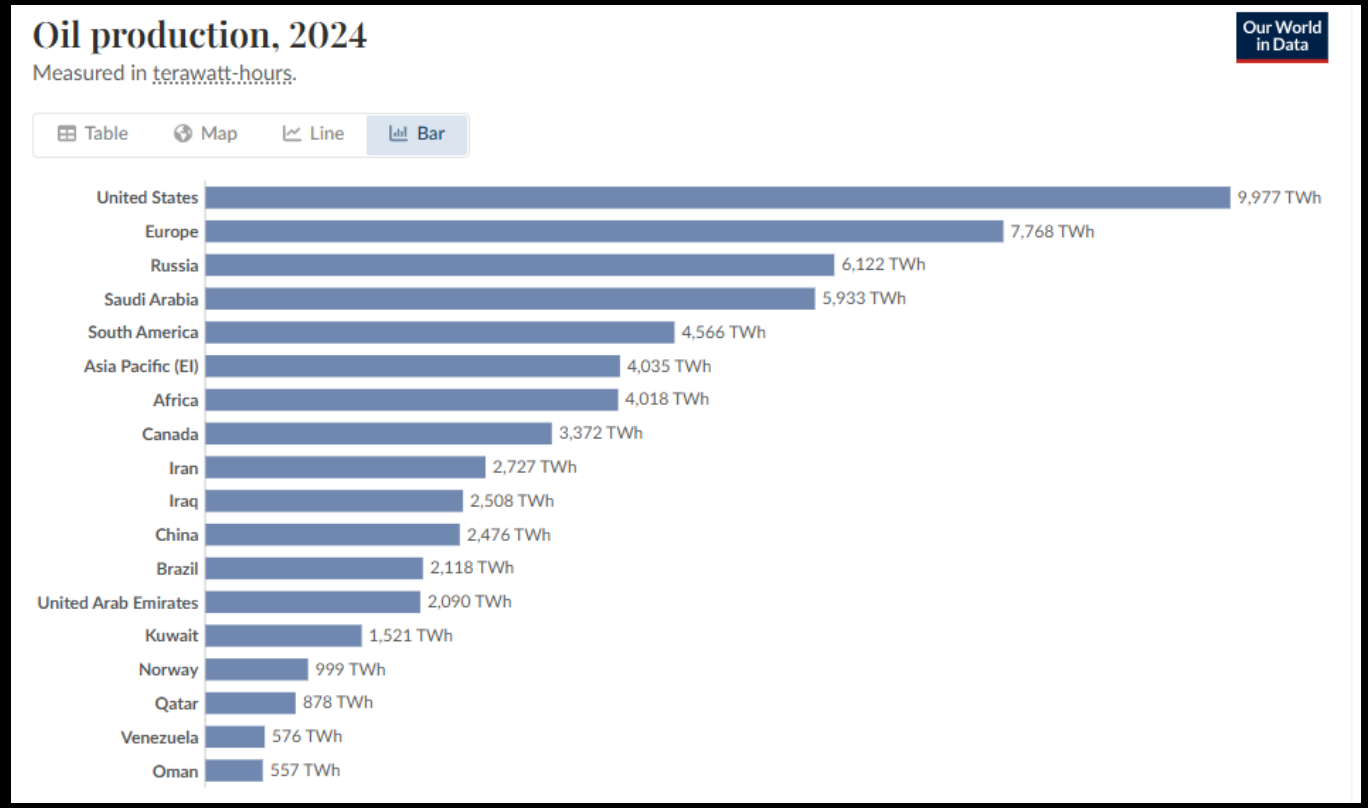
By Laura Paddison

Comment

An artwork by Canadian artist, activist, and photographer Benjamin Von Wong in front of the United Nations Offices in Geneva on August 12, 2025. *(Fabrice Coffrini/AFP/Getty Images)*

Talks to finalize the world's first **treaty on plastic pollution** in Geneva, Switzerland collapsed in failure Friday as countries remained bitterly

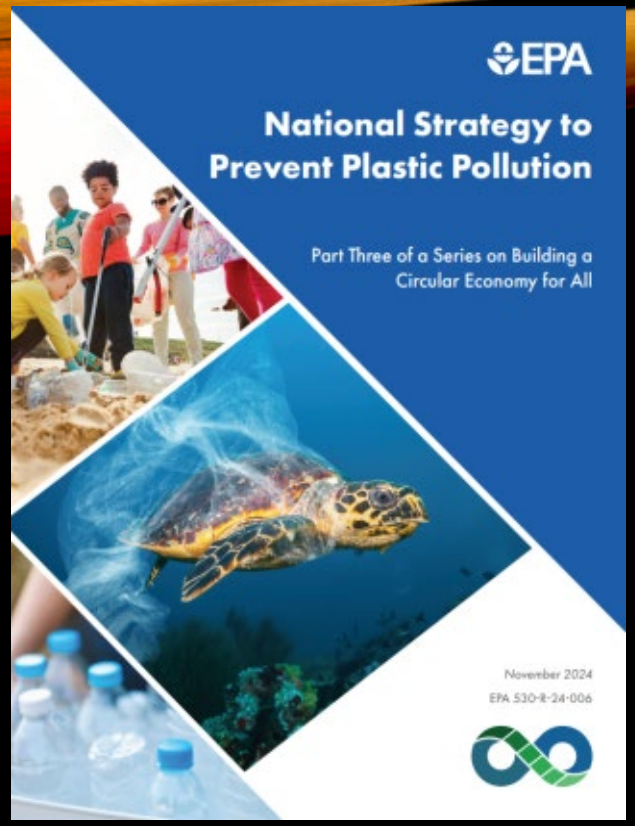
PLASTICS ARE HEAVILY LINKED TO OIL



https://ourworldindata.org/grapher/oil-production-by-country?tab=discrete-bar&time=latest&country=QAT~OMN~SAU~NOR~IRQ~USA~ARE~RUS~OWID_EUR~OWID_SAM~Asia+Pacific+%28EI%29~OWID_AFR~CAN~IRN~CHN~BRA~KWT~VEN

Powerful oil and gas producing countries pushed back strongly – pushing focus on recycling, reuse and redesign than production caps or a phase-out of chemicals.

US FEDERAL GOVERNMENT



https://www.epa.gov/circulareconomy/national-strategy-prevent-plastic-pollution

UNLEASHING AMERICAN ENERGY

- Reconsideration of regulations on power plants (Clean Power Plan 2.0)
- Reconsideration of regulations throttling the oil and gas industry (OOOO b/c)
- Reconsideration of Mercury and Air Toxics Standards that improperly targeted coal-fired power plants (MATS)
- Reconsideration of mandatory Greenhouse Gas Reporting Program that imposed significant costs on the American energy supply (GHG Reporting Program)
- Reconsideration of limitations, guidelines and standards (ELG) for the Steam Electric Power Generating Industry to ensure low-cost electricity while protecting water resources (Steam Electric ELG)
- Reconsideration of wastewater regulations for oil and gas development to help unleash American energy (Oil and Gas ELG)
- Reconsideration of Biden-Harris Administration Risk Management Program rule that made America's oil and natural gas refineries and chemical facilities less safe (Risk Management Program Rule)

EPA Launches Biggest Deregulatory Action in U.S. History

Administrator Zeldin Announces 31 Historic Actions to Power the Great American Comeback

March 12, 2025

Contact Information
EPA Press Office (press@epa.gov)

WASHINGTON – U.S. Environmental Protection Agency (EPA) Administrator Lee Zeldin announced the agency will undertake 31 historic actions in the greatest and most consequential day of deregulation in U.S. history, to advance President Trump's Day One executive orders and Power the Great American Comeback. Combined, these announcements represent the most momentous day in the history of the EPA. While accomplishing EPA's core mission of protecting the environment, the agency is committed to fulfilling President Trump's promise to unleash American energy, lower cost of living for Americans, revitalize the American auto industry, restore the rule of law, and give power back to states to make their own decisions.

"Today is the greatest day of deregulation our nation has seen. We are driving a dagger straight into the heart of the climate change religion to drive down cost of living for American families, unleash American energy, bring auto jobs back to the U.S. and more," ***said EPA Administrator Zeldin.***

STATES ARE DRIVING ACTION ON PLASTICS

1) Plastic bag bans

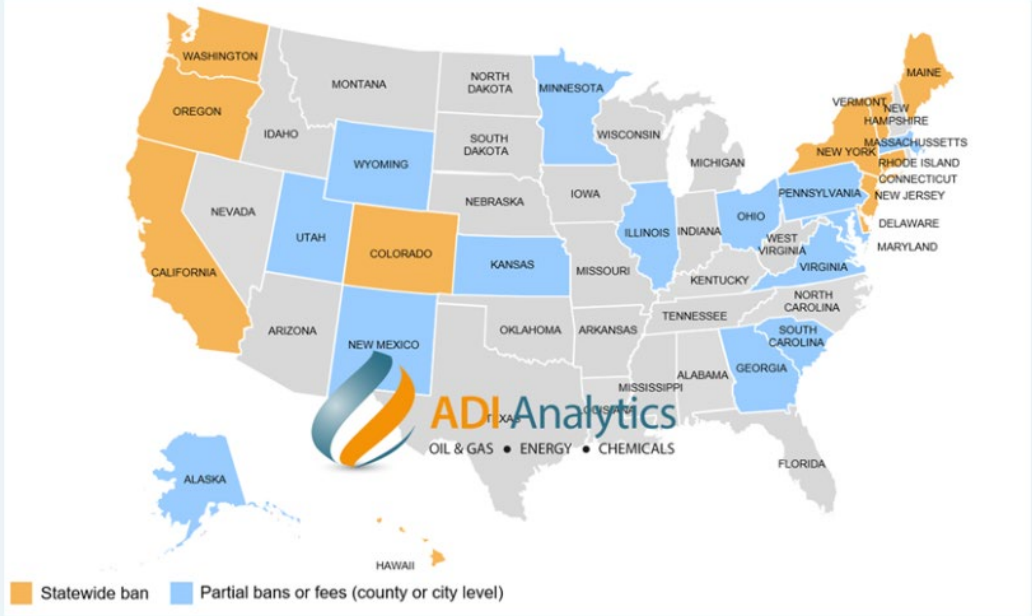


Exhibit 1: Single-use plastic bag restrictions enacted in the U.S.

2) Post-consumer recycled (PCR) content mandates

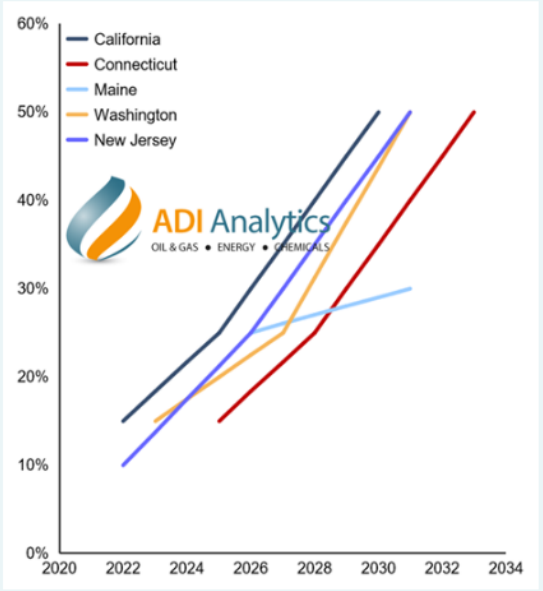
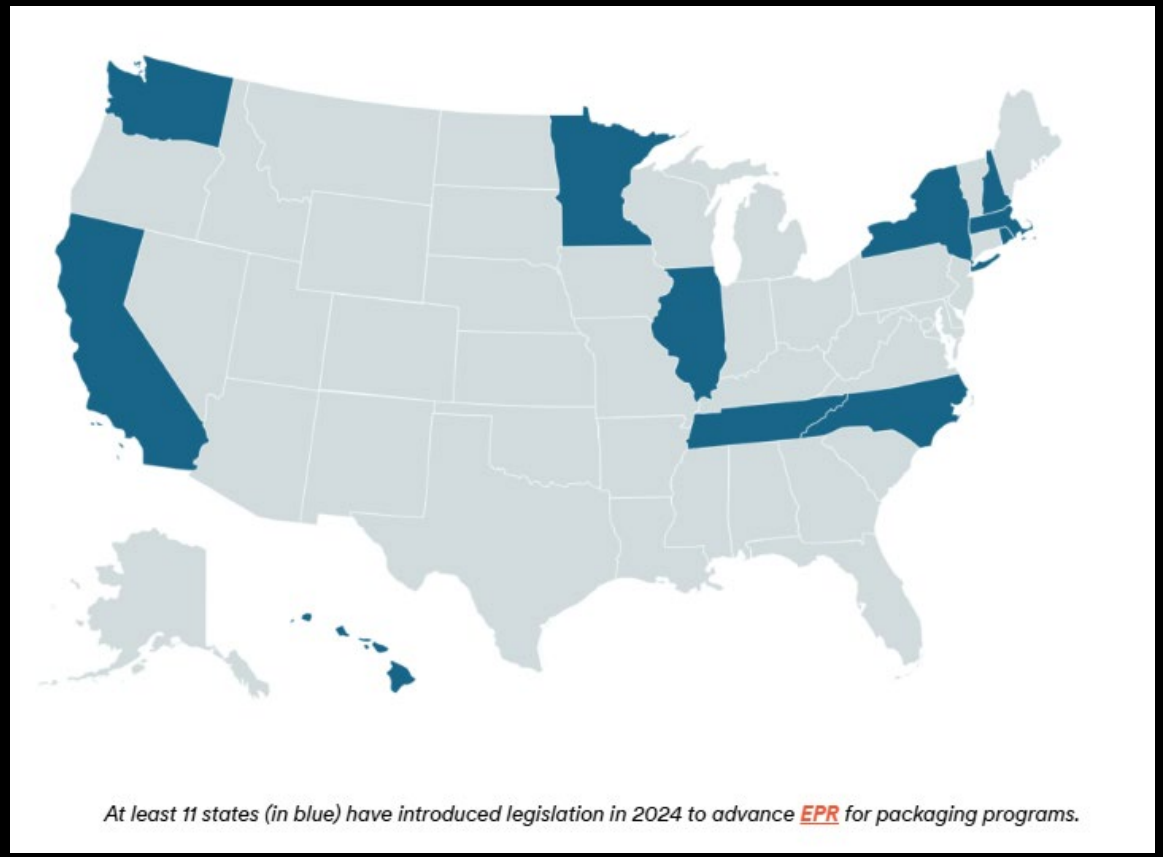


Exhibit 2: PCR content mandates in various plastic products. (Percentage)

https://adi-analytics.com/2024/10/01/how-u-s-states-are-reshaping-plastic-waste-management/

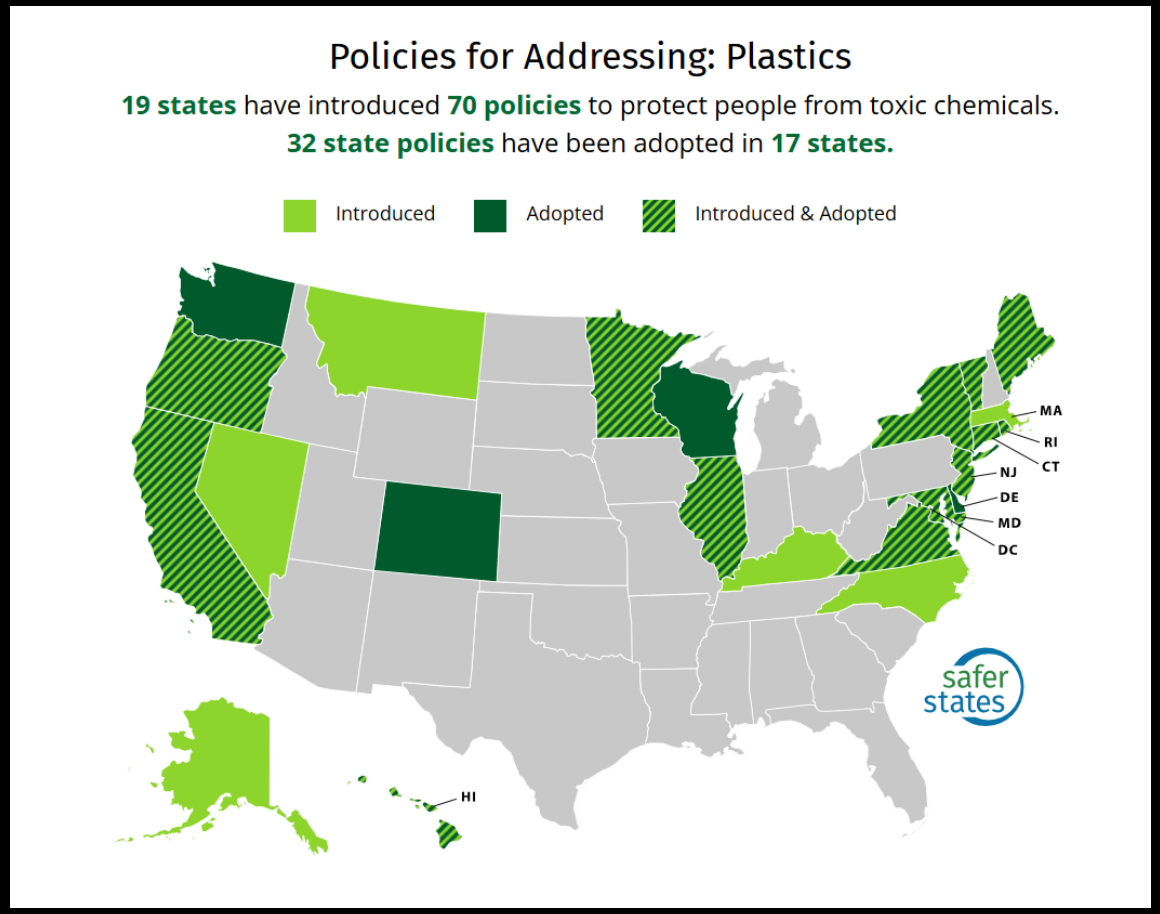
STATES ARE DRIVING ACTION ON PLASTICS

3) Extended Producer Responsibility (EPR) – laws that mandate that manufacturers develop plans to make products and processes more sustainable and recyclable.



https://ncelenviro.org/articles/producer-responsibility-for-plastics-2024-state-policy-trends/

STATES ARE DRIVING ACTION ON PLASTICS

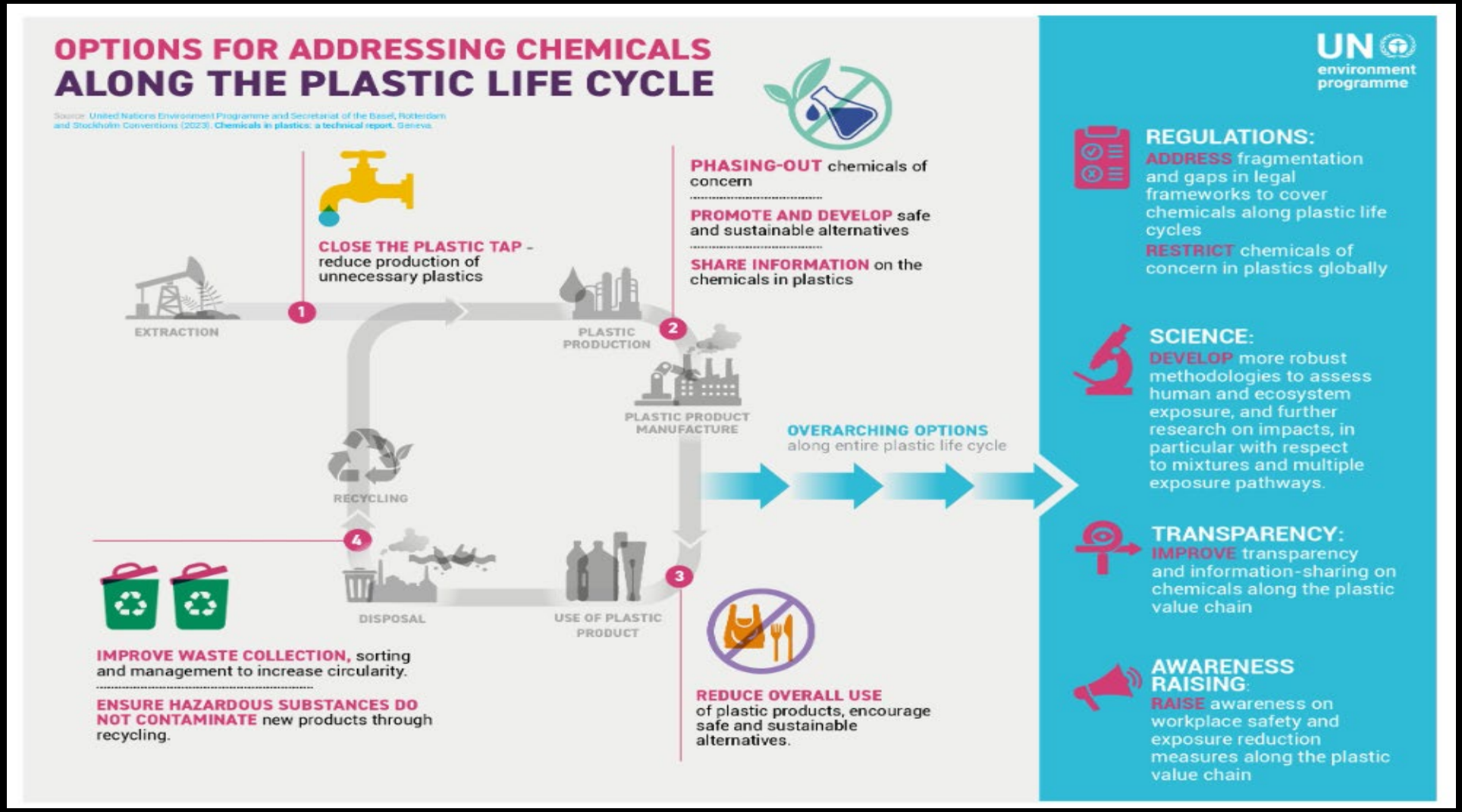


EXAMPLES:

- **California** is advancing a groundbreaking policy that would ban microplastics in products such as cleaning supplies, cosmetics, and fertilizers. The state also proposed to list microplastics as a toxic substance, paving the way for future regulation.
- **North Carolina** prohibited the toxic chemical DEHP and other phthalates from IV tubing and bags.
- **Oregon** adopted a policy prohibiting restaurants and retailers from providing single-use checkout bags.
- **Washington** took multiple steps to prevent exposure: it proposed regulations on PFAS in 12 product categories through its *Safer Products for Washington* program, and finalized a new list of priority products including plastic PVC/PVDC packaging to evaluate safer alternatives.

https://www.saferstates.org/priorities/plastics/

WHAT NEEDS TO BE DONE?



https://www.genevaenvironmentnetwork.org/resources/updates/plastics-and-health/

Individual Actions

WHAT INDIVIDUALS CAN DO TO PROTECT THEMSELVES?

- Choose foods with minimal prior processing
- Store food in glass, ceramic, or stainless steel
- Minimize dust exposure by wet mopping and dusting
- Keep air in home fresh or filtered
- Select housewares made without plastic
- Avoid inhaling dryer lint and vacuum dust
- Push for regulations on the production, use, and disposal of plastic at all levels of government

WHAT INDIVIDUALS CAN DO TO PROTECT THEMSELVES?

https://www.facebook.com/groups/uoflsustainability/posts/2442216141072404 1/

For more ideas go to:

https://myplasticfreelife.com/plasticfreeguide/

100 steps to eliminating plastic

THANK YOU!!!

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Q&A