Single-Use Plastics, Friend or Foe?

By Chuck Dinerstein, MD, MBA — October 27, 2020

There's growing concern about plastics' ultimate fate, as that kind of waste continues to fill our oceans, landfills, and ourselves. It seems logical that banning single-use plastics would help stem the tide. But a new review finds that to be not quite as true, as advocates argue.

Plastics are ubiquitous and critical to our lifestyle - infinitely shapeable in their form, strength, and use. But they are, for the most part, not biodegradable and represent a dead-end when it comes to transforming into something else of value when their current use is done. The bans on single-use plastic bags currently involve eight states [1] and 127 countries, all seeking to reduce our use of the 5 trillion bags made annually.

The review argues that a ban on single-use plastics is myopic because it only optimizes disposal and does not consider the substitutes' environmental costs. The basis of their analysis is a material's life cycle – from extraction to manufacture, use, and disposal. Parenthetically, the authors point out that "plastics "properly captured and disposed" through our municipal waste systems pose "minimal risk;" we are taking more about plastics casually tossed away. They identify five misconceptions and the reality that a more encompassing life cycle analysis identifies.
"The product inside the package is usually responsible for greater environmental impact than the packaging."

Food packaging is the poster child here, although the same argument can be easily made for electronics and the so craftily designed packaging of our iPhones. The environmental costs in the production of beef, cheese, chicken, or vegetables are more significant than those of the packaging. Packaging that protects food against loss or spoilage, like single-use plastic egg cartons, reduces their contents' environmental impact. Overall, they reduce the green-house-gases associated with food production but generate more solid waste. Considering the life-cycle of both the container and its agricultural or electronic contents, single-use plastic is not "the largest contributor to the product's environmental impact."

"Plastic is often responsible for fewer environmental impacts than many common packaging materials."

I would have thought that cardboard was the great Satan here, especially with the upcoming online shopping season; I was wrong. When compared to cardboard/paper packaging, plastic gets mixed reviews. Plastic's malleability to cushion at a lower weight than cardboard, making emissions associated with its production and subsequent use in transporting contents a reasonable tradeoff, at least in some circumstances. Here the problem arises from our substitutes for plastic containers, single-use glass, or metal containers. These substitutes require more energy to produce, and their additional weight increases transportation associated emissions. In the case of single-use glass, "it is logistically and energetically prohibitive to remanufacture into new glass products." It is not recycled but at best repurposed as construction material when it doesn't find itself in a landfill.

"Reusable products have lower environmental impacts only if they are actually reused a sufficient number of times to compensate for their greater materials intensity."

It requires more material to create a durable multi-use container, like a water bottle or a shopping bag. Those more significant extractions and manufacturing environmental impacts result in net savings only when used multiple times. One of the author's citations calculated that one cotton shopping bags needed to be used nearly three years to offset the agricultural emissions associated with its production. That is not to argue that we should not make the substitution, only that the term reusable may be longer interval than we suspect. Tossing aside the cotton bag because it is dirty may well increase its environmental impact compared to plastic.

"The environmental benefits associated with recycling and composting tend to be small compared to effects to reduce overall consumption."

This is the tough one, if not to grasp, then to do. The authors return the 3Rs, not reading, writing, and arithmetic, but reduce, reuse, and recycle. They point out that these 3Rs are not equivalent; reduction is far more effective than reuse, which is, in turn, more effective than recycling. The environmental benefits of recycling come from the reduced production costs of remanufacturing a new product. Those savings can vary, and as pointed out earlier single-use glass is not remanufactured but repurposed.
More importantly, as the value of recycling declines for a product, like plastic, its market disappears. China no longer wants or accepts our recycled plastics, we can economically reuse them, so it is off to the landfill they go. It is not that recycling is not beneficial; it’s just that reducing our consumption provides a much more significant benefit overall. Biodegradable plastics have been offered as an alternative; they could be placed in landfills. But most of these materials require specific environments for biodegradation to take place. On net, recycling is helpful but less so than long-term reuse or reduction in production.

"Well intended zero waste initiatives have the potential to create additional environmental impacts if not designed for holistic reduction of environmental impacts."

In the time of COVID-19, there are, of course, fewer events in general, let alone zero-waste events where special care is made to provide durable rather than single-use utensils and bags – giving everyone a water bottle to add to their at-home collection has a greater environmental impact than using a Dixie cup, no matter what the appearance. The authors point out that these zero-waste events give participants a false sense of their value when considered across a product’s life cycle. Their graph depicts the issue quite well.

But these events do provide virtue-signaling that "I care" about the environment. The same signaling comes from using that cotton shopping bag or carefully "recycling" our glass and plastic bottles so that they wind up in a landfill.

"In summary, recycling and composting efforts have some value, but ultimately, mindful consumption that reduces the need for products and eliminates wastefulness, reducing the intensity of the supply chain, and trying to design products that will actually be reused by the consumer are more effective at reducing overall environmental impact. Nevertheless, it is fundamentally easier for consumers to recycle the packaging of a product rather than voluntarily
California, Connecticut, Delaware, Hawaii, Maine, New York, Oregon, and Vermont

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