Photo: World Obesity Federation

If endocrine disruptors promote obesity, what should we do?

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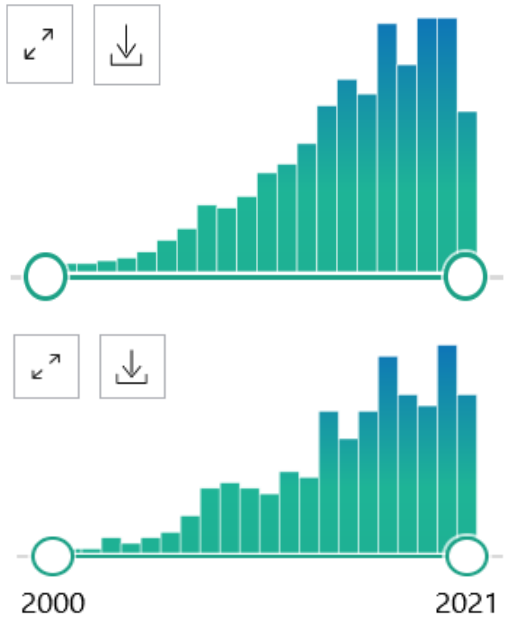
Over 30 years and over 200 national and international policy documents…

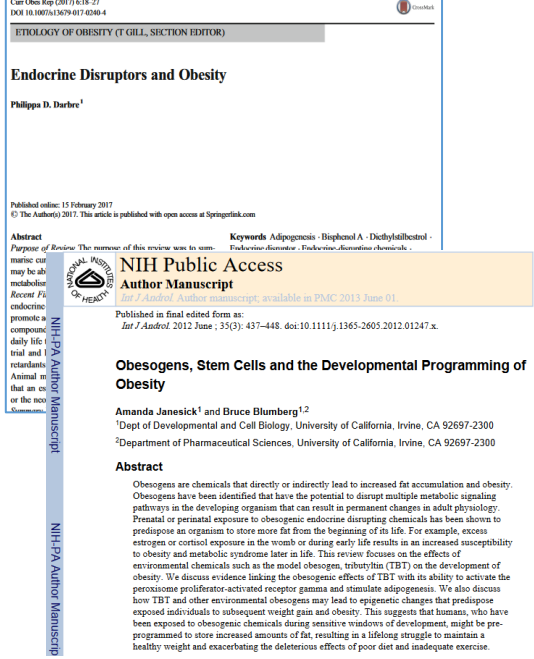
but no really successful strategies to reduce obesity prevalence

Over 650 papers in PubMed specifically on EDCs and obesity/adiposity since 2000,

and

over 200 reviews/meta-analyses





EDCs can act to …

- stimulate appetite
- block satiation
- enhance adipocyte formation
- enhance lipid storage

EDCs act outside the ‘**calories-in-calories-out’ model** assumed in governmental policies and strategies for obesity prevention

Two questions:

1. Are EDCs' obesogenic effects significant *vs* other recognised risk factors?

and

2. What policies should we recommend?

1. Are EDC effects significant *vs* well-recognised risk factors?

- Children TV watching: increased odds 13% per hour watched /day
- Maternal obesity: up to 20% increased risk of obesity in child
- Unhealthy diets: increased risk 5% - 14%
- Soda consumption: 12-15% increased risk of obesity per 200ml or 250ml /day
- [Diet soda consumption: 21% increased risk obesity per 250ml /day]

EDCs meta-analyses

- Children (USA): Lowest quartile urinary BPA = 10% obesity prevalence, all higher quartiles for BPA had 17-23% obesity prevalence
- Every 1ng/ml urinary BPA increased odds of obesity 15% (adults), 17% (children) -- [US population range >1ng/ml to >10ng/ml]

Conclude: EDC effects are non-trivial, but a formal attempt to estimate the attributable fractions is badly needed.

2. What policies should we recommend?

63 systematic reviews with applicable recommendations (excluding ‘more research needed’). Three types of recommendation:

1**. Individual action**: Personal choice, advice to patients, public awareness raising (suggested in 26 reviews)

2. **Medical interventions**: Treatments to counter EDCs, testing for genetic susceptibility (suggested in 11 reviews)

3. **Population-level interventions:** Regulation, chemical risk assessments and restricted product licensing (suggested in 42 reviews)

2. What policies should we recommend?

1. Individual action: Personal choice, advice to patients, public awareness raising (suggested in 26 reviews)

Cannot avoid invisible obesogens, passes responsibility to victims, increases potential stigma

2. Medical interventions: Treatments to counter EDCs, testing for genetic susceptibility (suggested in 11 reviews)

Testing for EDC effects on patients not easily available, no EDC-specific treatment regimes?

3. Population-level interventions: Regulation, chemical risk assessments and restricted product licensing (suggested in 42 reviews)

60 major policy documents for obesity policies and strategies 2010 – 2020

Two that nod in the right direction but make no specific recommendations:

- WHO Commission on Ending Childhood Obesity (2016)
  '… maternal hyperglycaemia, smoking or exposure to toxins can increase the likelihood of obesity…'
- CDC Adult Obesity Causes and Consequences (2020)
  'Research continues on the role of other factors in energy balance and weight gain such as chemical exposures…'

United Nations **Sustainable Development Goals** have several targets for polluting chemical impact in health, in cities, in marine ecosystems, but not obesity. In fact *the SDGs have very little to say about obesity at all*.

A serious policy gap – and an opportunity to link **obesity prevention** with **environmental improvements**:
i.e. obesity prevention and …

- Reduced agro-chemical use
- Reduced petro-chemical fuel use
- Reduced plastic use
- Clean water supplies

What do we need for policy development?

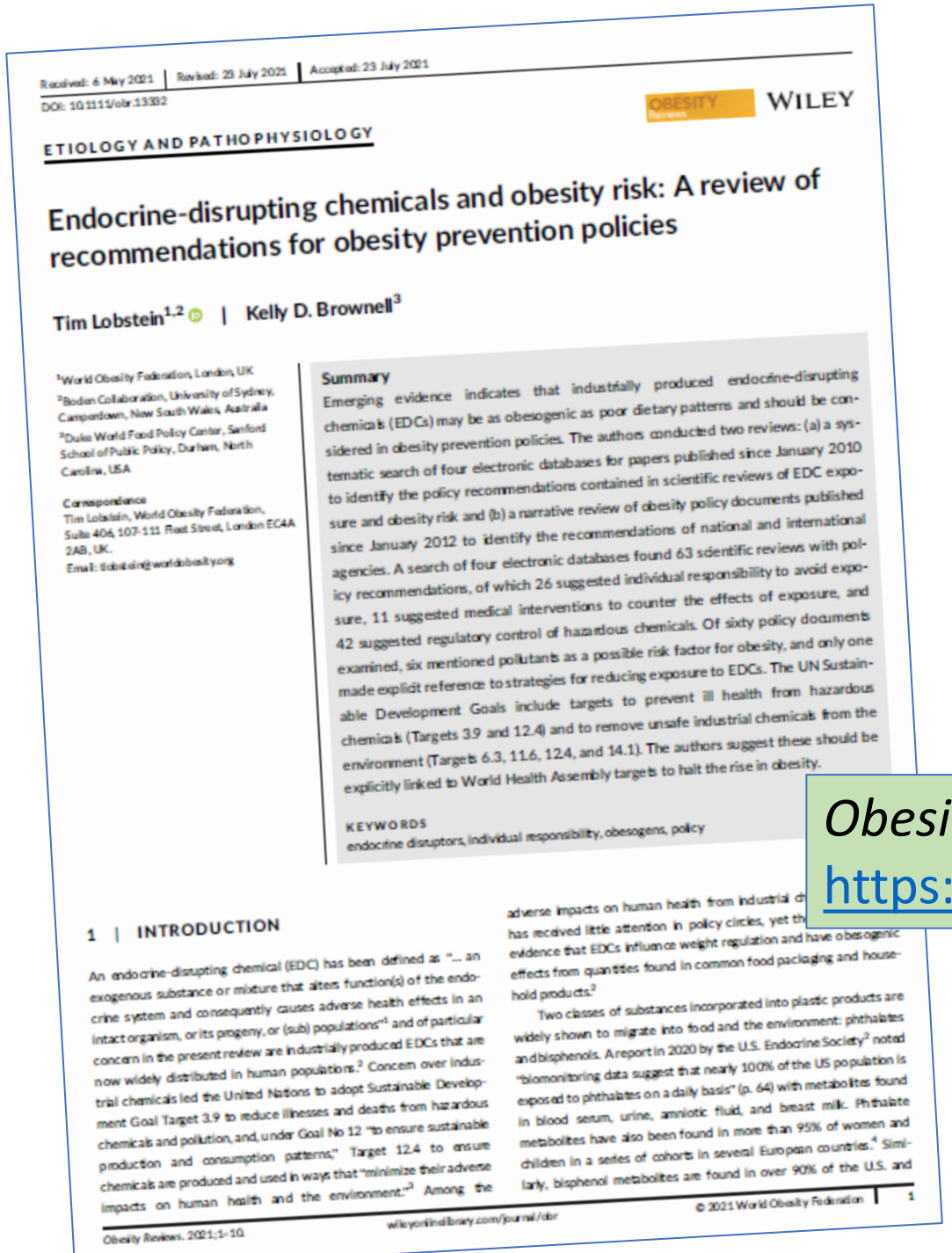
Convincing facts

- Robust assessment of **attributable fraction** ranking EDCs against other obesogens (EDCs singly and in combination…)
- Identification of the **most potent and widespread** EDC obesogens (where is the greatest risk arising: food, traffic, water…?)

What do we need for policy development?

Followed by

- Stronger and more frequent **statements from professional bodies**
- Citizen demands for **labelling of products** containing EDC-obesogens
- (USA) Citizen or DA **legal threats** to major EDC producers
- International **collaboration and regulation**: the Stockholm Convention on Persistent Organic Pollutants (USA not signed)



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ETIOLOGY AND PATHOPHYSIOLOGY

Endocrine-disrupting chemicals and obesity risk: A review of recommendations for obesity prevention policies

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Summary
Emerging evidence indicates that industrially produced endocrine-disrupting chemicals (EDCs) may be as obesogenic as poor dietary patterns and should be considered in obesity prevention policies. The authors conducted two reviews: (a) a systematic search of four electronic databases for papers published since January 2010 to identify the policy recommendations contained in scientific reviews of EDC exposure and obesity risk and (b) a narrative review of obesity policy documents published since January 2012 to identify the recommendations of national and international agencies. A search of four electronic databases found 63 scientific reviews with policy recommendations, of which 26 suggested individual responsibility to avoid exposure, 11 suggested medical interventions to counter the effects of exposure, and 42 suggested regulatory control of hazardous chemicals. Of sixty policy documents examined, six mentioned pollutants as a possible risk factor for obesity, and only one made explicit reference to strategies for reducing exposure to EDCs. The UN Sustainable Development Goals include targets to prevent ill health from hazardous chemicals (Targets 3.9 and 12.4) and to remove unsafe industrial chemicals from the environment (Targets 6.3, 11.6, 12.4, and 14.1). The authors suggest these should be explicitly linked to World Health Assembly targets to halt the rise in obesity.

KEYWORDS
endocrine disruptors, individual responsibility, obesogens, policy

1 | INTRODUCTION

An endocrine-disrupting chemical (EDC) has been defined as "… an exogenous substance or mixture that alters function(s) of the endocrine system and consequently causes adverse health effects in an intact organism, or its progeny, or (sub) populations"[1] and of particular concern in the present review are industrially produced EDCs that are now widely distributed in human populations.[2] Concern over industrial chemicals led the United Nations to adopt Sustainable Development Goal Target 3.9 to reduce illnesses and deaths from hazardous chemicals and pollution, and, under Goal No 12 "to ensure sustainable production and consumption patterns," Target 12.4 to ensure chemicals are produced and used in ways that "minimize their adverse impacts on human health and the environment."[3] Among the adverse impacts on human health from industrial ch… has received little attention in policy circles, yet th… evidence that EDCs influence weight regulation and have obesogenic effects from quantities found in common food packaging and household products.[2]

Two classes of substances incorporated into plastic products are widely shown to migrate into food and the environment: phthalates and bisphenols. A report in 2020 by the U.S. Endocrine Society[2] noted "biomonitoring data suggest that nearly 100% of the US population is exposed to phthalates on a daily basis" (p. 64) with metabolites found in blood serum, urine, amniotic fluid, and breast milk. Phthalate metabolites have also been found in more than 95% of women and children in a series of cohorts in several European countries.[4] Similarly, bisphenol metabolites are found in over 90% of the U.S. and

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Thankyou

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