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The new role of industrial food processing in food systems and its impact on nutrition and health – a perspective from the South

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Diets based on meals prepared with minimally processed foods and processed culinary ingredients

Diets based on ready-to-consume ultra-processed products (factory-to-table products)
Industrial food processing is now of the main shaping force of the global food system, and the main determinant of the nature of diets and related states of health and well-being.

Diets based on meals prepared with minimally processed foods and processed culinary ingredients.

Diets based on ready-to-consume ultra-processed products (factory-to-table products).
The new role of food processing in food systems and its impact on nutrition and health

- Types of food processing and potential impact on nutrition and health

- What is wrong with ultra-processing?

- Big Food going South: the `snack attack`

- The counterattack: public actions to promote traditional food systems and healthy diets


• Food processing: a series of methods employed by the industry to convert raw foods into:

✓ minimally processed foods which are less perishable and often require less time and effort with preparation and cooking; or

✓ processed culinary ingredients which are used in the preparation of food-based dishes and meals; or

✓ ultra-processed ready-to-consume products which are used to replace foods and freshly prepared food-based dishes and meals.
Types of food processing in the food chain

Type 2
Extraction and refinement
of substances from raw foods

Type 1
cleaning, drying, chilling ... raw foods

MINIMALLY PROCESSED FOODS (G1)

PROCESSED CULINARY INGREDIENTS

Raw foods
Types of food processing in the food chain

Type 1
Cleaning, drying, chilling ... raw foods

MINIMALLY PROCESSED FOODS (G1)

PROCESSED CULINARY INGREDIENTS

Type 2
Extraction and refinement of substances from raw foods

Culinary actions (preparation/cooking)

Freshly prepared dishes and meals

Raw foods
Minimally processed foods plus processed culinary ingredients when properly combined result in nutritionally balanced and highly palatable dishes and meals

**Extraction and refinement of substances from raw foods**

- **Raw foods**
  - cleaning, drying, chilling ...
  - Cleaned vegetables
  - chilled meat
  - pasteurized milk
  - dried grains

- **Fats, oils, flours, starches, sugar**

- **Culinary actions (preparation/cooking)**
Type 3: ultra-processing

Raw foods

Substances extracted and refined from raw foods

Substances derived from substances extracted from raw foods

Substances derived from substances extracted from raw foods

ULTRA-PROCESSED PRODUCT
No or minimal culinary actions

Raw foods

Oils, fats, flours, starches, sugars, milk whey, remnants of meat...

Preservatives, stabilisers, emulsifiers, solvents, binders, bulkers, sweeteners, sensory enhancers, flavours, colours, other additives, synthetic micronutrients

Hydrogenated oils, starch-modified sugars, hydrolyzed proteins, extruded meat extracts...

ULTRA-PROCESSED PRODUCT

Ready to consume snacks, drinks, and ready meals
Ultra-processing

Raw foods

Oils, fats, flours, starches, sugars, milk whey, remnants of meat ...

Hydrogenated oils, starch modified sugars, hydrolized proteins, extruded meat extracts ...

Preservatives, stabilisers, emulsifiers, solvents, binders, bulkers, sweeteners, sensory enhancers, flavours, colours, other additives, synthetic micronutrients

ULTRA PROCESSED PRODUCT

No or minimal culinary actions

Snacks
Ultra-processing

Raw foods

- Oils, fats, flours, starches, sugars, milk whey, remnants of meat ...

- Hydrogenated oils, starch-modified sugars, hydrolyzed proteins, extruded meat extracts ...

- Preservatives, stabilisers, emulsifiers, solvents, binders, bulkers, sweeteners, sensory enhancers, flavours, colours, other additives, synthetic micronutrients

ULTRA-PROCESSED PRODUCT

Drinks

No or minimal culinary actions
Ultra-processing

Raw foods

- Oils, fats, flours, starches, sugars, milk whey, remnants of meat...

- Hydrogenated oils, starch-modified sugars, hydrolyzed proteins, extruded meat extracts...

- Preservatives, stabilisers, emulsifiers, solvents, binders, bulkers, sweeteners, sensory enhancers, flavours, colours, other additives, synthetic micronutrients

ULTRA-PROCESSED PRODUCT

- No or minimal culinary actions

Ready meals
• ‘Ultra-processed products are food products manufactured from industrial ingredients resulting from the extraction, refinement and modification of constituents of raw foods with little or no whole food.’

• ‘Their composition and formulation create products which are accessible (cheap), convenient (long duration, ready-to-consume), and attractive (intense sensorial properties) to the consumers and highly profitable (low cost ingredients) to the industry.’

• But not a win-win game …
The new role of food processing in food systems and its impact on nutrition and health

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- The counterattack: public actions to promote traditional food systems and healthy diets
When compared to naturally ready-to-consume foods (fruits, milk, nuts) and dishes made up from foods and culinary ingredients, ultra-processed products have:

- less protein
- less dietary fiber
- more free sugar
- more total, saturated and trans fats
- more sodium
- higher energy density

Sources: Monteiro et al. PHN 2011 and Moubarac PHN 2013
Overall diet quality according to the caloric share of ultra-processed products (quintiles). **Brasil 2009**

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Share of ultra-processed products</th>
<th>Goal</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>&lt;15</td>
<td>15-24</td>
</tr>
<tr>
<td><strong>Protein</strong> (% total calories)</td>
<td>19.3</td>
<td>18.1</td>
</tr>
<tr>
<td><strong>Fiber</strong> (g/1,000 kcal)</td>
<td>13.1</td>
<td>12.3</td>
</tr>
<tr>
<td><strong>Free sugar</strong> (% total calories)</td>
<td>11.7</td>
<td>13.5</td>
</tr>
<tr>
<td><strong>Total fat</strong> (% total calories)</td>
<td>24.4</td>
<td>25.2</td>
</tr>
<tr>
<td><strong>Saturated fat</strong> (% total calories)</td>
<td>7.8</td>
<td>8.3</td>
</tr>
<tr>
<td><strong>Energy density</strong> (kcal/g)</td>
<td>1.4</td>
<td>1.5</td>
</tr>
</tbody>
</table>

Source: Lousada ML. Doctoral thesis in preparation * p < .001 for linear trend
Overall diet quality according to the share of ultra-processed products (quintiles). **Canada 2001**

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Q1</th>
<th>Q2</th>
<th>Q3</th>
<th>Q4</th>
<th>Q5</th>
<th>Goal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protein (% of calories)</td>
<td>14.9</td>
<td>14.1</td>
<td>13.8</td>
<td>13.4</td>
<td>11.6*</td>
<td>10-15</td>
</tr>
<tr>
<td>Fiber (g/1,000 kcal)</td>
<td>11.2</td>
<td>10.1</td>
<td>9.7</td>
<td>9.1</td>
<td>8.0*</td>
<td>&gt; 12.5</td>
</tr>
<tr>
<td>Free sugars (% of calories)</td>
<td>9.2*</td>
<td>11.6</td>
<td>12.0</td>
<td>13.5</td>
<td>15.1*</td>
<td>&lt; 10</td>
</tr>
<tr>
<td>Sodium (mg/1,000 kcal)</td>
<td>1.1</td>
<td>1.4</td>
<td>1.5</td>
<td>1.6</td>
<td>1.6*</td>
<td>&lt; 1</td>
</tr>
<tr>
<td>Energy density (kcal/g)</td>
<td>1.8</td>
<td>2.0</td>
<td>2.1</td>
<td>2.1</td>
<td>2.3*</td>
<td></td>
</tr>
</tbody>
</table>

Source: Moubarac J-C et al PHN 2012. * p < .001 for linear trend
Ultra-processed products harm gastric and brain structures which regulate satiety, appetite and energy balance, and induce overeating and obesity.

- High energy density (all solid products)

- Liquid calories (all sugared drinks)

- Hyper-palatability (all products)

- **Habituation/addiction** (some products)

- Super size servings (many products)
  Report of the DGAC on the *Dietary Guidelines for Americans* 2010

- Mindless eating (all products)

- **Aggressive marketing** (all products)
The marketing of ultra-processed products promotes compulsive overeating. It is one after the other! The name says it all. Non-stop is simply irresistible.

New brand of ultra-processed products in Brazil

It is one after the other!

Non-stop is simply irresistible.
1 bite it
2 peel it
3 enjoy it
The new role of food processing in food systems and its impact on nutrition and health

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• What is wrong with ultra-processing?

• Big Food going South: the `snack attack`

• The counterattack: public actions to promote traditional food systems and healthy diets
The Snack Attack

In the second decade of this century the time for collective action in the public interest has come once again. Transnational food and drink companies will respond in ways that can help to slow, stop, or even reverse the current global deterioration of public health, after they are obliged to do so by laws that change the rules of their game in favor of fairness, equity, and a better future.

Among other things the Strategy recommends that food and drink manufacturers limit levels of saturated fats, trans-fatty acids, free sugars, and salt in current products; formulate new products with better nutritional profiles; and reduce their promotion and marketing of processed products, especially to children. The initial response to the Strategy in its draft stages by transnational industries was to force its dilution and to imped its approval by WHO member states. The hardest pressure came from industry sectors whose profits depend on products high in sugar and salt, and also from the US government. Later, after approval of the Strategy and in response to pressure from several European governments, food and drink companies voluntarily stated that they would avoid all products high in sugars and salt in media targeted to children and in primary schools. However, the "EU Pledge" applies only to advertisements in media vehicles with an audience of at least 50% of children younger than 12 years. It does not restrict use of licensed characters, games, and toys on packaging or at points of sale. It exempts all products that conform to nutrition criteria devised by the individual companies themselves. It allows promotion in primary schools "where specifically requested by or agreed with the school administration for educational purposes."

Examination of the criteria used to exempt products from any voluntary restriction suggests to us that the EU Pledge can also be seen to be a damage limitation exercise, designed to deter statutory
The Impact of Transnational “Big Food” Companies on the South: A View from Brazil

Carlos A. Monteiro¹*, Geoffrey Cannon¹,²

¹ Center for Epidemiological Studies in Health and Nutrition, School of Public Health, University of São Paulo, Brazil, ² Editor, World Nutrition, World Public Health Nutrition Association, Rio de Janeiro, Brazil

This article was commissioned for the PLoS Medicine series on Big Food that examines the activities and influence of the food and beverage industry in the health arena.

Summary Points

- Traditional long-established food systems and dietary patterns are being displaced in Brazil and in other countries in the South (Africa, Asia, and Latin America) by ultra-processed products made by transnational food corporations (“Big Food” and “Big Snack”).
- This displacement increases the incidence of obesity and of major chronic diseases and affects public health and public goods by undermining culture, meals, the family, community life, local economies, and national identity.
- The penetration of transnational companies into Brazil has been rapid, but the tradition of shared and family meals remains strong and is likely to provide protection to national and regional food systems.

Introduction

Throughout human history, traditional food systems and dietary patterns have been intrinsic to social, cultural, and economic life, and to personal, commu-
Policy Forum

Manufacturing Epidemics: The Role of Global Producers in Increased Consumption of Unhealthy Commodities Including Processed Foods, Alcohol, and Tobacco

David Stuckler\textsuperscript{1,2,3\dagger}, Martin McKee\textsuperscript{2}, Shah Ebrahim\textsuperscript{3}, Sanjay Basu\textsuperscript{2,4,5}

\textsuperscript{1}Department of Sociology, University of Cambridge, Cambridge, United Kingdom, \textsuperscript{2}Department of Public Health and Policy, London School of Hygiene & Tropical Medicine, London, United Kingdom, \textsuperscript{3}South Asian Chronic Disease Network, Public Health Foundation of India, New Delhi, India, \textsuperscript{4}Department of Medicine, University of California San Francisco, San Francisco, California, United States of America, \textsuperscript{5}Division of General Internal Medicine, San Francisco General Hospital, San Francisco, California, United States of America

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consumption of unhealthy foods, as risks initially most prevalent among the wealthiest shift to and become embedded among the lowest-income groups \cite{5,6,7}. Paradoxically, these findings indicate that poverty not higher income may be a net profit margins, for example, are about one-quarter of the retail price, making soft-drink production, alongside tobacco production, among the most profitable industrial activities in the world. Indeed, transnational corporations that manufac-
Non-Communicable Diseases 4

Profits and pandemics: prevention of harmful effects of tobacco, alcohol, and ultra-processed food and drink industries

Rob Moodie, David Stuckler, Carlos Monteiro, Nick Sheron, Bruce Neal, Thaksaphon Thamarangsi, Paul Lincoln, Sally Casswell, on behalf of The Lancet NCD Action Group

The 2011 UN high-level meeting on non-communicable diseases (NCDs) called for multisectoral action including with the private sector and industry. However, through the sale and promotion of tobacco, alcohol, and ultra-processed food and drink (unhealthy commodities), transnational corporations are major drivers of global epidemics of NCDs. What role then should these industries have in NCD prevention and control? We emphasise the rise in sales of these unhealthy commodities in low-income and middle-income countries, and consider the common strategies that the transnational corporations use to undermine NCD prevention and control. We assess the effectiveness of self-regulation, public–private partnerships, and public regulation models of interaction with these industries and conclude that unhealthy commodity industries should have no role in the formation of national or international NCD policy. Despite the common reliance on industry self-regulation and public–private partnerships, there is no evidence...
### Annual growth rate (%) of volume consumption per person between 1997 and 2009.

<table>
<thead>
<tr>
<th>Product</th>
<th>Low –income and middle-income countries</th>
<th>High-income countries</th>
</tr>
</thead>
<tbody>
<tr>
<td>Packaged food</td>
<td>1.9%</td>
<td>0.4%</td>
</tr>
<tr>
<td>Soft drinks</td>
<td>5.2%</td>
<td>2.4%</td>
</tr>
<tr>
<td>Processed food</td>
<td>2.0%</td>
<td>1.4%</td>
</tr>
<tr>
<td>Snacks/snack bars</td>
<td>2.4%</td>
<td>2.0%</td>
</tr>
<tr>
<td>Alcohol</td>
<td>2.8%</td>
<td>1.1%</td>
</tr>
<tr>
<td>Tobacco</td>
<td>2.0%</td>
<td>0.1%</td>
</tr>
</tbody>
</table>

The marketing of UPF targets low income families in emerging economies by using door-to-door vendors recruited in the communities and offering products in smaller packages (“more accessible”) and “fortified” with micronutrients (“popularly positioned products”)
Nestle to Sail Amazon Rivers to Reach Emerging-Market Consumers

From a Nestlé press release:
Vevey, February 21, 2008

“Popularly positioned products (PPPs). Products aimed at lower income consumers in the developing world, will continue to grow strongly in 2008 and beyond. Nestlé PPPs, which mostly consist of dairy products, Nescafé and Maggi culinary products, grew by over 25% to reach around CHF 6 billion in sales in 2007. The overall market for such products in Asia, Africa and Latin America is estimated at over CHF 80 billion.”
Changes in the share of food groups in urban household food acquisitions. Brazil: 1996-2009

Share of food groups in total household food acquisitions in Brazil

- **Processed culinary ingredients**: 37.5% (2002-3) vs 31.8% (2008-9)
- **Ultra-processed products**: 20.0% (2002-3) vs 27.7% (2008-9)
- **Whole or minimally processed foods**: 42.5% (2002-3) vs 40.5% (2008-9)

Source: Monteiro et al 2010 and Moubarac et al (2013) based on Brazilian Household Budget Surveys
Prevalence (%) of obesity in the adult populacion of all 27 state capitals in Brazil: 2006-2012

Source: VIGITEL Brazil (http://portal.saude.gov.br/)
Prevalence (%) of obesity in the adult population of all 27 state capitals in Brazil: 2006-2012

How many years to reach the USA figures (27.8%)?

Sources: VIGITEL for Brazil (http://portal.saude.gov.br/) and BRFSS for USA
Caloric share (%) of ultra-processed products in the national food basket *

<table>
<thead>
<tr>
<th>Country</th>
<th>Year</th>
<th>Caloric Share (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Colombia</td>
<td>2006</td>
<td>18.4</td>
</tr>
<tr>
<td>Brasil</td>
<td>2008-9</td>
<td>27.7</td>
</tr>
<tr>
<td>Mexico</td>
<td>2010</td>
<td>47.7</td>
</tr>
<tr>
<td>Chile</td>
<td>2007</td>
<td>55.4</td>
</tr>
<tr>
<td>Canada</td>
<td>2001</td>
<td>61.7</td>
</tr>
<tr>
<td>UK</td>
<td>2008-9</td>
<td>63.4</td>
</tr>
</tbody>
</table>

* Estimated from national household food expenditure surveys: Brasil (HBS), UK (LCF), Canada (FOODEX), Chile (EPF), Colombia (ENIG), and Mexico (ENIGH).
Obesity (%) and the caloric share (%) of ultra-processed products

$y = 0.2701x + 9.7782$

$R^2 = 0.6582$

Obesity (%) and the caloric share (%) of ultra-processed products
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Business as usual (industry-driven product reformulation, self regulation etc)
Public actions to incentive, support, and protect traditional food systems and healthy dietary patterns.
Consumption of human milk (unprocessed food) in Brazil

Source: Venancio and Monteiro 1998; PNDS 2007
Breast-feeding increased from 3 to 14 months with incentive, support, and protection …

Mass media campaigns, extended maternal leave, baby-friendly hospitals, code of marketing of infant formulas …

Median duration of breast-feeding in months

Source: Venancio and Monteiro 1998; PNDS 2007
Public actions to incentive, support, and protect traditional food systems and diets: learning from breast-feeding!

<table>
<thead>
<tr>
<th>ACTION</th>
<th>HUMAN MILK</th>
<th>MINIMALLY PROCESSED FOODS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incentive</td>
<td>Information/education</td>
<td>Information/education (health, environment, and culture arguments)</td>
</tr>
<tr>
<td>Support</td>
<td>Maternal leave, baby-friendly hospitals, human milk banks</td>
<td>Subsidies and taxes, family agriculture support, government food procurement</td>
</tr>
<tr>
<td>Protection</td>
<td>Code to regulate the marketing of infant formulas</td>
<td>Code to regulate the marketing of ultra-processed products</td>
</tr>
</tbody>
</table>
THE FOOD SYSTEM

The big issue for nutrition

Carlos Monteiro, Geoffrey Cannon
Renata Bertazzi Levy, Rafael Claro, Jean-Claude Moubarac
Ana Paula Martins, Maria Laura Louzada, Larissa Baraldi, Daniela Canella, Regina Rodrigues

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