

Stages and events of a Market-Driven Epidemic: Tobacco, Sugar, Opioids

STAGE	TOBACCO	SUGAR	PRESCRIPTION OPIOIDS
<p>1. Market development</p> <p><i>A highly desirable product becomes available to a large population through discovery (e.g., tobacco, sugar) or innovation (e.g., prescription opioids). Aggressive marketing increases product consumption through various strategies that make it more appealing, socially desirable, or addictive.</i></p>	<p>6000 BCE – Native Americans cultivate tobacco for ceremonial use [1]</p> <p>1492 – Tobacco introduced to Europeans following Christopher Columbus’ voyage to North America [1]</p> <p>1531 -- Europeans start cultivation of tobacco in Central America [1]</p> <p>1869 - Cigarette manufacturing begins by hand rolling [2]</p> <p>1876 – Bonsack develops the first cigarette-rolling machine [3]</p> <p>1884 - W. Duke Sons & Company, based in Durham, North Carolina, makes deal with Bonsack for their rolling machine, replacing the need of human rollers [2]</p> <p>1886 - W. Duke Sons & Co. sells colorful collectible cards in cigarette packs. [2]</p> <p>1890 - W. Duke Sons & Company forces 4 other major cigarette producers to join the American Tobacco Company, controlling 90% of US cigarette market sales [2]</p> <p>WWI 1914-1918 - Cigarettes first donated, then provided, to soldiers on the frontlines. Tobacco companies also market cigarettes to women under the guise of gender liberation and equality.[4] (These same tactics are done under WWII, even more effectively.) Tobacco use increases 346% by 1920. [4]</p>	<p>Circa 400 BCE – Sugarcane discovered in India [8]</p> <p>1600s-1800s – Sugarcane mass production in Americas [9]</p> <p>1850s – Sugar refined into purified white product with longer shelf life [10]</p> <p>1850s-1950s – Appealing, widely available sugary drinks and dessert foods lead to 8-fold increase in per person sugar consumption [11]</p> <p>1950s – General Mills leads marketing shift to convenience by bringing together processed food companies. [12]</p> <p>1980s - Industrialized food companies start using “variety” as a marketing tool to get consumers to buy more food. This exploits human biology’s idea of satiation. Evolutionarily, people who ate from more variety of food had better nutrition. [13]</p> <p>1980s – Food industry starts producing food with “Bliss point” amount of sugar, that drives increased consumption [13,14]</p>	<p>1975 – Creation of “McGill Pain Questionnaire,” allowing patients to specify pain experience [15]</p> <p>1986 – WHO calls for regular painkiller treatment regimens for cancer and postoperative patients [16]</p> <p>1990s - Professional societies and journals amplify the pain treatment message [17]</p> <p>1996 - Purdue introduces OxyContin to the market, stating that their long controlled-release opioid has an abuse rate of less than 1%. [18]</p> <p>1996 - Purdue Pharma creates pay system for sale reps where commission is based on milligrams, incentivizing higher doses [19]</p> <p>1996-2001 – Purdue hosts 40+ conferences for physicians and nurses on pain management and speaker-training [18]</p> <p>Late 1990s- early 2000s - Physicians begin prescribing OxyContin to nonmajor post-operative patients and patients requesting pain treatment. [18,20].</p> <p>1999 - The Veterans Administration hospital system’s introduction of ‘Pain as the 5th Vital Sign’[21]</p> <p>2000 - The hospital accreditation by the Joint Commission and funding become</p>

	<p>1930s - Niche marketing begins to popularize menthol flavored cigarettes called “Kools” among Black people, sponsors local shops and advertises at culturally Black events and magazines [5]</p> <p>1929 - Lucky Strike popularizes cigarettes among women with modern politics and weight-loss promises [4]</p> <p>1955 - Marlboro Man campaign launches, targeting men with rugged, outlaw male models [6]</p> <p>1987 - Joe Camel cartoon campaign markets specifically to children, to hook a new generation on cigarettes [7]</p>		<p>dependent on patient satisfactory pain treatment [22]</p> <p>2001 - Over 34,000 free coupons redeemed from PP, providing patients with a 7- to 30-day supply of OxyContin</p> <p>2002 - Purdue uses marketing data on physicians to identify those with a) highest opioid prescription rate b) those with highest number of chronic pain patients [18,23]</p>
<p>2. Evidence of harm</p> <p><i>Astute clinicians, public health researchers, whistleblowers, or others suspect harm. Diligent epidemiology and clinical research provide compelling evidence confirming harm.</i></p>	<p>1912 – Dr. Isaac Adler shows lung cancer cases increase with increased cigarettes consumption. [24]</p> <p>1950 – First major case control study linking smoking to lung cancer [25]</p> <p>1953 -- Smearing smoke tar on mice shown to causes tumors. [26]</p> <p>1954 – Landmark Doll and Hill study tying smoking to lung cancer [27]</p> <p>1954 - American Cancer Society, the Public Health Cancer Association, and six other nations’ medical authorities adopt the official view that smoking causes lung cancer [3]</p>	<p>1907 - Physicians hold symposium on increased type 2 diabetes among the rich, possibly due to sugar consumption [28]</p> <p>1924 – Epidemiological study links refined sugar intake with diabetes [29]</p> <p>1934, 1935 - Elliot Joslin blames diabetes on “overnutrition” and lack of exercise [30,31]</p> <p>1954 – Symposium on Coronary Heart Disease causes held as mortality rises [32]</p> <p>1957 – John Yudkin’s first major article on sugar [33]</p> <p>1960s - John Yudkin blames added sugars, while Ancel Keys blames fat and cholesterol for CHD [32]</p> <p>1972 – Yudkin’s Pure, White and Deadly book is published [34]</p>	<p>1997 – Van Zee, Vince Stravino, and other physicians start noticing pattern of OxyContin misuse in users</p> <p>1998 – Survey of drug users and sellers in Canada on the street value and use of Purdue Pharma’s MS Contin [35]</p> <p>2004 - Article raises concern for patients with chronic pain and history of substance abuse receiving opioid treatment. [36]</p> <p>2005 - Report raises concern about opioid oversedation rising [21]</p> <p>2005 – Survey of patients in opioid programs shows 89% had misused OxyContin in their lifetime [17]</p>

<p>3. Corporate resistance</p> <p><i>Deaths, ill-health, and economic and other impacts accumulate. At the same time, companies deny harm, seek to discredit accusers, commission counter-science, “manufacture doubt” with distracting alternative explanations, and mount legal and public relations challenges to mitigation efforts. These corporate tactics aim to forestall action to reduce product harm.</i></p>	<p>1939 - Philip Morris uses physicians to create science in their favor, advertises in medical journals [37]</p> <p>1946 - “More doctors smoke Camels than any other cigarette” slogan poses Camels as the healthiest cigarette [37]</p> <p>1954 – Tobacco companies form “The Tobacco Industry Research Commission” to fund studies on tobacco as a public relations strategy. [38]</p> <p>1953 - Research done internally at tobacco companies shows that cigarettes are carcinogenic [3]. Executive will testify for decades (into the 1990s) after saying there is no proof for this, only hypotheses. [38]</p> <p>1960s - Companies lower tar to advertise safer cigarettes. Companies employ physicians on ads for “healthier” cigarettes. [39]</p> <p>1963 – Research done internally at tobacco companies conclude that nicotine is addictive in addition to carcinogenic [38]</p> <p>1972 – ‘Smoking and Health: The Need to Know’ film made by big tobacco is distributed to high school and college students, downplaying carcinogenic effects of smoking [3]</p> <p>1993 - Philip Morris founds fake grass-roots movement to advocate for smoking in public places [40]</p>	<p>1943 - The sugar industry creates the Sugar Research Foundation to cast doubt on hazards of sucrose [41]</p> <p>1967 – NEJM review, with undisclosed SRF funding, blames fats and exonerates sugar as CVD risk [41]</p> <p>1971 – The Sugar Research Foundation shuts down their studies that indicate that sugar intake raises CHD risk. [41]</p> <p>1977 – The first draft of the U.S. Dietary Goals mentioning sugar is rejected due to pressure from food lobbyists. The revised and republished Dietary Goals for U.S. urges consumers to choose “leaner options” [42]</p> <p>1978 - Companies respond to revised dietary guidelines by making “fat-free” alternatives with higher levels of sugar. [42]</p> <p>2016 - 2016 review found that only 1 in 26 industry-funded studies significantly linked SSBs to obesity and diabetes, while 33 out of 34 independently funded studies found adverse health effects of SSBs [43]</p>	<p>Late 1990s-early 2000s McKinsey develops a plan for Purdue Pharma to pay “kickbacks” to distributors of OxyContin for every overdose of a prescribed user [44]</p> <p>1990s - The opioid industry funds research by Russell K. Portenoy, consultants, and other researchers called the “Pain Management Movement” to spread notion that opioid treatment of pain does not lead to high levels of misuse [45,46]</p> <p>1999 - Purdue Pharma infiltrates medical literature, medical education, and professional medical societies [18]</p> <p>2001 – Purdue Executives testify to U.S. Congress that there is not enough evidence on prescription opioid misuse [47]</p> <p>2002 – Purdue Pharma funds over 20,000 pain-related educational programs through direct sponsorship or financial grants [48]</p> <p>2011 - Lobbyists block legislation requiring specialized training to be able to prescribe painkillers prone to abuse [45]</p>
<p>4. Mitigation</p> <p><i>A tipping point for concerted action is reached whereby legal, regulatory,</i></p>	<p>1900-1909 – US State bans on cigarettes enacted, vary from sale of cigarettes to minors to total ban. Enacted due to belief of cigarette</p>	<p>1984 – NEJM (where research funded by the sugar industry undisclosed was previously published) now requires</p>	<p>2001 - FDA pressures Purdue into adding black box label to OxyContin [45]</p>

<p><i>political, social, and other mitigation measures are taken at the local, national and/or global levels. Consumption of the MDE product decreases due to the public health forces outweighing the corporate, consumption-increasing forces.</i></p>	<p>smoking being immoral and laziness-inducing [2]</p> <p>Mid-1950s-- public perception of cigarettes plummet, as do the stocks of cigarette manufacturers. [3]</p> <p>1964 - The first Surgeon General's report on smoking formally acknowledges the link between smoking and lung cancer. [49]</p> <p>1966 - Congress passes putting health warning on the covers of cigarettes, reading "Caution—cigarette smoking may be hazardous to your health."</p> <p>1969 – In response to fairness doctrine, tobacco industry offers to end all television advertising [2]</p> <p>1975 – The first statewide law goes into effect that requires separate areas for smoking in public indoor areas (Minnesota Clean Air Act). [50]</p> <p>1975 – The military suspends cigarette rations [51]</p> <p>1979 - Surgeon general concludes in 12th report on smoking that nicotine is addictive [38]</p> <p>1986 – Health impact to nonsmokers of secondhand smoke officially recognized by U.S. General Surgeon general [50]</p> <p>1988 – US Congress prohibits smoking on all domestic flights [50]</p> <p>1989 - Surgeon General's report states that cigarette smoking is a major cause of cerebrovascular disease (stroke) [52]</p>	<p>disclosure of all conflicts of interest [32]</p> <p>1995 - Sugar Busters! Cut Sugar to Trim Fat book is published [56]. Becomes a bestseller later in 2001.</p> <p>1998 - Flegal et al. paper [57] makes the CDC and medical community aware of the obesity epidemic</p> <p>1999 - Public health response to Flegal paper culminates in a widely endorsed petition to FDA to change sugar labelling, distinguishing between natural and added sugars [58]</p> <p>2001 - Surgeon General's Call to Action to Prevent and Decrease Overweight and Obesity outlines a public health response to reverse widespread overweight and obesity [59]</p> <p>2002 – Multiple NYT cover articles blaming obesity on carbs, also specifically HFCS [60,61]</p> <p>2003 – Kraft foods initiative led by Michael Mudd stops marketing in schools and reduced portion sizes [62]</p> <p>2003 - Fat Land bestseller book by Greg Critser criticizes company's use of cheap HFCS with larger amounts and portions [63]</p> <p>2004 – Bray, Nielsen, and Popkin publish the first research article that began the “demonization” of HFCS. [64]</p> <p>2005 - Panel formed at UNC from nutritionists to recommend guidelines for SSBs [65]</p>	<p>2003 - FDA states that Purdue Pharma's ads “omit and minimize the serious safety risks associated with OxyContin” [74]</p> <p>2007 – Purdue Pharma pleads guilty in Federal Court to three felonies, paying \$654 million [44]</p> <p>2011 – RCT with chronic pain patients finds that escalating dose of prescription has a significant risk of opioid misuse [75]</p> <p>2011 – CDC report on opioid overdoses due to over prescribing [76]</p> <p>2016 – 49 US states have Prescription Drug Monitoring Programs [77]</p> <p>2016 – LA Times articles expose financial incentive system for higher doses of OxyContin and debunks long-acting painkiller theory, prompts Congressional investigation [19]</p> <p>2016 - CDC released a “Guideline for Prescribing Opioids for Chronic Pain” for safer opioid use [78]</p> <p>2017 – FDA study finds that OxyContin misuse was same or higher after 2010 reformulation plausibly created to avoid patent expiring rather than decrease use [79]</p> <p>2017 – US Health and Human Services department announced a 5-point strategy to combat the opioid crisis [80]</p> <p>2018 - Purdue announced that they would not send out sales reps to doctors anymore to promote Oxycontin</p>
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<p>5. Market Adaptation</p> <p><i>In response to mitigation efforts to reduce consumption, companies and consumers seek alternatives through global expansion (geographic shifts in marketing and consumption), product evolution (development of similar or new products), or product substitution (switching company marketing or consumer buying to alternatives that provide similar psychological or physiological benefits).</i></p>	<p>1960s - Tobacco’s earliest product evolution was filtered or low-tar cigarettes, which the industry touted as “healthier,” often employing physicians for their advertisements [37].</p> <p>1963 - Tobacco companies developed electronic nicotine delivery systems (referred to commonly as e-cigarettes or vapes) [84], which they planned to switch if cigarette smoking declined [84].</p>	<p>1984 - Pepsi and Coca-Cola both start using HFCS instead of sugar [65]</p> <p>2014 – Diabetes prevalence is increasing more rapidly in LMICs than in high-income countries (HICs) [88]</p> <p>1990-2015 - Sugar-Sweetened Beverage consumption is highest in the Latin America and Caribbean [89]</p> <p>1990 – 2017 - Global deaths due to obesity rose from 4.5% to 8% [73]</p>	<p>2010 – Purdue Pharma reformulates OxyContin as original patent expires, claiming the new formula is more misuse-resistant [91]</p> <p>2013 - Americans turn to deadlier illicit narcotics, such as heroin and fentanyl, after the rate of opioid prescriptions decline in 2012. [92]</p> <p>2016 - The Sackler-owned Mundipharma uses the same tactics at Purdue did in the US: awareness</p>

	<p>2007 - Sale of electronic nicotine delivery systems (ENDS) (also called e-cigarettes or vaping products) begins [85]</p> <p>2019 – U.S. national data survey found that 1-in-4 high schoolers and a total of 6.2 million middle- and high schoolers were tobacco product users [86], gaining attention from mass media and the U.S. Congress</p> <p>2019 - Around 1.1 billion people aged 15 and over smoke, with 80% living in low- and middle-income countries (LMICs) [87]</p> <p>2005-2030 - It is estimated that tobacco will have killed 135 million people in the developing world, over 3 times more than in the developed world. [87]</p>	<p>2017 – 15% of deaths were attributed to obesity in middle-income countries: high prevalence, but poorer overall health and healthcare systems [73]</p> <p>2020 – 80% of CVD deaths occur in LMICs [90]</p>	<p>campaigns, seminars to doctors, downplaying risks of addiction, video campaigns [93]</p> <p>2009 - 2019 – While opioid consumption dropped in the US, Germany, and Canada, it increased in other HICs, upper-middle income countries (UMICs), and LMICs [94]</p>
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