



The case for developing a cohesive systems approach to research across unhealthy commodity industries

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ABSTRACT

Objectives Most non-communicable diseases are preventable and largely driven by the consumption of harmful products, such as tobacco, alcohol, gambling and ultra-processed food and drink products, collectively termed unhealthy commodities. This paper explores the links between unhealthy commodity industries (UCIs), analyses the extent of alignment across their corporate political strategies, and proposes a cohesive systems approach to research across UCIs.

Methods We held an expert consultation on analysing the involvement of UCIs in public health policy, conducted an analysis of business links across UCIs, and employed taxonomies of corporate political activity to collate, compare and illustrate strategies employed by the alcohol, ultra-processed food and drink products, tobacco and gambling industries.

Results There are clear commonalities across UCIs' strategies in shaping evidence, employing narratives and framing techniques, constituency building and policy substitution. There is also consistent evidence of business links between UCIs, as well as complex relationships with government agencies, often allowing UCIs to engage in policy-making forums. This knowledge indicates that the role of all UCIs in public health policy would benefit from a common approach to analysis. This enables the development of a theoretical framework for understanding how UCIs influence the policy process. It highlights the need for a deeper and broader understanding of conflicts of interests and how to avoid them; and a broader conception of what constitutes strong evidence generated by a wider range of research types.

Conclusion UCIs employ shared strategies to shape public health policy, protecting business interests, and thereby contributing to the perpetuation of non-communicable diseases. A cohesive systems approach to research across UCIs is required to deepen shared understanding of this complex and interconnected area and also to inform a more effective and coherent response.

Key questions

What is already known?

- Most premature deaths from non-communicable disease are preventable and largely caused by the consumption of the products of unhealthy commodity industries (UCIs), including tobacco, alcohol, gambling and ultra-processed food and drink products.
- Public health governance is characterised by an increasingly diversified and complex system of decision-making with close relationships between state and UCIs.
- Evidence indicates that UCIs have deliberately and collectively pushed for these forms of governance in order to prevent public health policies that might threaten profits.

What are the new findings?

- There is a convergence of strategic approaches across UCIs aimed at shaping public health policy.
- There is evidence of business links between UCIs, complex inter-relationships between the public and private sectors, and across UCIs, and commonalities in corporate political strategies.

What do the new findings imply?

- A systems approach is required to study UCIs, the linkages between them and the way in which they collectively influence policy.

INTRODUCTION

Over 70% of premature deaths worldwide can be attributed to non-communicable diseases (NCDs), notably cardiovascular disease, cancer, diabetes, dementia, chronic respiratory disease, mental health problems and related conditions such as obesity. The majority of premature NCD deaths are preventable, being principally caused by the consumption of the products of the tobacco, alcohol, gambling and ultra-processed food

and drink products industries.^{1–3} These have been collectively referred to as the unhealthy commodity industries (UCIs), defined as industries or groups of corporations where a significant share of their product portfolio comprises unhealthy commodities with high profit margins aimed at, and easily accessible to, large numbers of consumers.^{4–6} The gambling industry has received less attention than other UCIs as a driver of NCDs, but research is expanding rapidly showing that gambling is associated not just with alcohol and drug problems, but also depression and anxiety.^{2 3 7–9} The harm from gambling is now comparable with that associated with alcohol misuse in high-income countries.¹⁰ The United Nations (UN) and the World Health Organization (WHO) have coordinated global commitments to NCD prevention over recent decades.¹¹ However, implementation of effective solutions remains limited. A key barrier has been the continued close involvement of UCIs in public health policy-making.^{12 13}

Public health governance is broadly defined as the set of functions ensuring authority (including scientific knowledge), resources, policy development, continuous evaluation and improvement, and effective collaboration on public health issues.¹⁴ This policy arena is characterised by an increasingly diversified and complex system of decision-making,¹³ with an often symbiotic relationship between states and non-state actors, including corporations.¹⁵ One rationale for the involvement of UCIs in public health governance is that those affected by policies should be allowed to contribute to their formulation.¹⁶ This may be problematic for a number of reasons. First, it is based on the premise that the power to influence policy debates is reasonably equally distributed across interest groups; this cannot be assumed where multinational corporations have vast influence, often with annual turnovers exceeding those of many national economies.¹⁷ Second, evidence indicates that corporations whose products are damaging to health have deliberately and collectively pushed for these forms of governance, encouraging policy-making structures that embed corporate influence and a reliance on corporate evidence specifically in order to prevent public health policies that might threaten profits.^{18–20} Evidence also shows how they have used those systems, for example, to overwhelm public consultations and to submit misleading evidence.^{21 22} Any potential benefits of UCI involvement in public health policy are therefore strongly contested due to the differences between their corporate interests and public health goals.⁴

This study sits within the overarching domain of, and contributes to research on, the ‘commercial determinants of health’, variously defined as adverse health impacts attributable to commercial activities and strategies employed by UCIs to promote products which can damage health.^{23–25}

There is growing evidence of convergence of strategic approaches between UCIs themselves,^{26 27} and the need for a systems approach to conducting research on UCIs’

influence of public health policy. Doing so would conceptualise poor health as the result of many factors—such as UCIs’ shaping of policy—as interconnected elements working together to bring about change throughout the system.²⁸ A complex systems approach to understanding the commercial determinants of health draws upon a range of methods to design, implement and evaluate interventions at a systems level to improve public health;²⁹ it can help explore how UCIs position themselves in the complex process of public health decision-making and how they legitimise their presence there. It can encourage public health researchers to integrate mixed methods from a variety of sources and disciplines including quantitative and qualitative traditions.^{30 31} A systems approach to research on UCIs offers an analytical framework within which to explore not only the conditions and factors shaping the commercial determinants of health, but also, importantly, the way in which these factors relate to each other and how they generate environments which negatively affect health.²⁵

This paper explores the links between UCIs, analyses the extent of alignment across their corporate political strategies and proposes a cohesive systems approach to research across UCIs.

METHODS

First, an international meeting of researchers was organised in February 2016 on ‘Analysing the Involvement of Unhealthy Commodity Industries in Public Health Policy’. The event convened 50 researchers in the areas of food, alcohol, tobacco and gambling research from 20 academic institutions representing a range of relevant disciplines.³² One of the conclusions of the meeting was the acknowledgement of a shared experience in UCI research, highlighting common challenges, prompting a move out of ‘disciplinary bunkers’,³³ and the formulation of a more integrated research agenda. Another important output of the meeting was agreement on the need for appropriate conceptual and methodological tools for analysing the role of UCIs in public health, such as complex systems approaches. This paper is written as a response to the aims and challenges set out during that initial event.

Second, we conducted a narrative review to analyse the business links between UCIs, defined here as investments, either ownership of companies or strategic investments such as equity stakes in a company. We focused on the activities of prominent alcohol, ultra-processed food and drink products, tobacco and gambling industries, while acknowledging that neither the list of UCIs, nor the literature reported, is exhaustive. We analysed publicly available information authored by, or on the subject of, business links between UCIs, sourced from peer-reviewed and grey literature. We employed terms reflecting UCIs (for example alcohol, food), terms related to network links between corporations and across industries (such as connection, relationship, partnership, ‘revolving doors’

and ‘interlocking directorates’) to guide the search.²⁶ We conducted searches on company websites themselves to characterise and identify links between businesses. Due to the number of potential links it was not possible to produce an exhaustive list of links.

Third, we searched for taxonomies of corporate political activities (CPAs) employed by UCIs. The CPAs of the UCIs are typically designed to support market goals by leveraging political and social influence to affect policy.^{2 33–41} CPAs are defined as corporate strategies to shape government policy in ways favourable to them⁴²; their use by individual UCIs has been extensively documented.^{38–40 43 44} We referred to these taxonomies to collate and compare CPAs across the four selected UCIs, to identify the degree of similarity between them. The taxonomies of corporate political strategies that we drew on in this research were themselves developed from systematic reviews of large bodies of evidence, starting with the early versions of the tobacco³⁹ and alcohol³⁸ taxonomies, followed by taxonomies of food industry CPA⁴⁵ and combined with other work.⁴⁶ The systematic literature reviews and resulting taxonomies thus enabled comparisons of CPA between UCIs, suggesting similarity in tactics.^{38 39 43} We used the taxonomies to code our examples, seeking evidence of commonalities across industries. The included examples are intended to be illustrative but not exhaustive.

RESULTS

Business links across UCIs

There is consistent evidence of business links across UCIs.^{26 35 36 41 47–49} These links can be expressed as business investments, ownership of companies, strategic investments such as equity stakes in a company, or other affiliations such as via presence on a board of directors (interlocking directorates). The benefits achieved from these links include the establishment of synergies across marketing strategies and sharing of data on consumer characteristics.⁵⁰

For example, Nguyen *et al* report on the tobacco industry’s early diversification into food and drink, highlighting Philip Morris’ and RJ Reynolds’ stakes in the sugar-sweetened beverage market, acquiring or developing brands such as Kool Aid from the 1960s.⁵⁰ Currently, the tobacco company Altria (formerly Philip Morris Companies) owns Ste Michelle Wine Estates⁵¹ and has a considerable stake (about 10%) in alcohol giant ABInBev.⁵² In 2016, ABInBev acquired the South African brewer SABMiller, which until recently bottled and distributed Coca-Cola across many African countries.^{51 53} ABInBev still owns a company which distributes Pepsico products including Pepsi, 7Up and Gatorade.⁵⁴ Since 2018 Altria has also owned a 45% stake in Cronos Group, a cannabis company.⁵⁵ Similarly, British American Tobacco is a corporate partner of Aristocrat Leisure, a major poker machine manufacturer, and Tabcorp, a major gambling operator.⁵⁶ Many of these business links

also take the form of ‘interlocking directorates’, when a person affiliated with one organisation sits on the board of directors of another.⁵⁷ A recent social network analysis of the links across the top six transnational manufacturers of tobacco, alcohol and ultra-processed food and drink products found that alcohol companies provided bridges between tobacco and food companies, and highlighted how these links bolstered influence with political elites and health agencies.²⁶

‘Revolving door’ between the public and private sectors, and across UCIs

The relationship between UCIs and the government is characterised as complex and dynamic.¹³ The ‘revolving door’ phenomenon is one where individuals will move from the public to the private sector and vice versa, in various capacities, so that industry is able to acquire inside information on how policy works and gain privileged access to policy fora; conversely, private actors are recruited into public service posts and can then help make public policy.^{13 58} The anticorruption organisation Transparency International explains that this works to ‘undermine trust in government, because of the potential for real or perceived conflicts of interests brought about by the risk of clouded judgements and actions motivated by the prospect of future careers, either in public office or in the private sector.’⁵⁹

One example of this phenomenon is a former director-general of the WHO who, having previously publicly defended the WHO publication of evidence-based sugar intake guidelines⁶⁰ against direct threats from The Sugar Association to lobby Congress to remove US funding to the WHO,⁶¹ took a role as consultant to PepsiCo.⁶² During the same period, the executive director responsible for the prevention of chronic disease, and an early champion of the Framework Convention for Tobacco Control, also followed his WHO tenure with a spell at PepsiCo. Supported by a 12-year funding commitment from Philip Morris International of \$1 billion, he then launched the Foundation for a Smoke-Free World in supporting ‘tobacco harm reduction’ and identifying alternative livelihoods for tobacco farmers.⁶³ Additional examples include the chief executive of the UK Wine and Spirit Trade Association having previously been deputy director of European Union Affairs and International Agriculture Policy within the Department for Environment, Food and Rural Affairs.⁶⁴ Moreover, in the context of the UK Department of Health’s Public Health Responsibility Deal (RD), a public–private partnership with the food, alcohol and other industries in England, with the stated goal of improving health,⁶⁵ the UK Government Cabinet Office official formerly responsible for the RD alcohol network then took on a leadership role in the Portman Group, a UK body representing the alcohol industry, and with The International Alliance for Responsible Drinking, the industry’s global social aspects and public relations organisation. Such behaviour may have contributed to the RD including measures which were largely ineffective

(and would have been known to be in advance, based on the evidence at the time).^{66 67} The US provides a range of examples of the ‘revolving door’ between the public and private sectors,⁶⁸ including a Center for Science in the Public Interest lawyer moving to become a lobbyist for The Sugar Association.⁶⁹ A recent study on the ‘revolving door’ in Australia found that a significant proportion of lobbyists were previously government representatives, citing several examples of government employees going to work directly for alcohol, food or gambling industries, often in roles directly related to their previous employment in government.⁷⁰

Commonalities of corporate political strategies across UCIs

As illustrated in the [table 1](#) below, UCIs commonly employ a range of CPAs, most notably shaping the evidence, framing techniques, constituency building and policy substitution, to promote their interests within public health policy debates. The following section elaborates on commonalities of CPAs across UCIs.

UCIs often use common resources to help shape the narrative about their products and behaviours and to protect their interests, including the same legal, public relations and marketing firms, as well as think-tanks and lobbyists^{71 72}; examples of the latter include authors of publications attempting to discredit the evidence underpinning harms related to, and regulation required to control, gambling,⁷³ food,^{74 75} tobacco^{76 77} and alcohol.⁷⁸

UCIs join forces to promote non-regulatory initiatives³⁸ which might include financial or non-financial transactions. Common examples include self-regulation codes, such as the UK Code of Non-Broadcast Advertising, Sales Promotion and Direct Marketing which covers alcohol and e-cigarette marketing,⁷⁹ and the Australian Advertising Standards Bureau and Association of National Advertisers and related organisations (alcohol, food and gambling), including a self-regulation code on gambling advertising and aspects of alcohol promotion.⁸⁰

UCIs also align their efforts in forming alliances with other sectors, organisations or the public to create an appearance of larger support for industry’s position.^{38 40 45} This is commonly done through the promotion and sponsoring of efforts beyond the core or immediate business. For example, most UCIs have environmental sustainability programmes or commitments, and though many businesses have made significant changes toward environmentally sustainable working and production practices, the mission of sustainability is now also about market advantage^{81 82}: as explained in a recent Massachusetts Institute of Technology study about ‘eco-business’, ‘when sustainability burst onto the scene (...) it was in the responsibility category (...) but now it is equally about saving money.’⁸¹ UCIs either create or voluntarily join existing sustainability initiatives; one such example is the CEO Water Mandate, a water stewardship commitment platform for business leaders asking them to voluntarily commit to six action areas, including contributing to public policy.

The CEO Water Mandate is established by the UN’s Global Compact, itself criticised for compromising the integrity of the UN by using corporate engagement as an instrument of global governance.⁸³ The Mandate’s Steering Committee includes ABInBev (alcohol), Nestlé (food), Broken Hill Proprietary Company (mining and petroleum) and Dow Chemicals. Global initiatives are supported by industry-specific strategies, such as International Game Technology’s (a word leading gambling company) sustainability strategy,⁸⁴ multinational alcoholic beverage company Diageo’s Water Stewardship Strategy,⁸⁵ food giant Nestlé’s Water Policies and Stewardship⁸⁶ and British American Tobacco’s commitment to environmental sustainability.⁸⁷

UCIs also shape scientific processes, often resulting in the production of misinformation, research agendas favourable to their interests and subtle influencing of the scientific evidence³⁸; often through mechanisms such as the provision of academic funding, sponsorship or scholarship programmes. Thus SpiritsEUROPE, an organisation supporting the interests of the European alcoholic spirits sector, claims explicitly that ‘to control the science agenda is to (partly) influence the policy agenda’.⁸⁸ Other examples include UCI coalitions with research funding councils, such as a coalition of major food and beverage industries and UK Research Councils entitled the Diet and Health Research Industry Club, jointly financing nutrition research⁸⁹: the industry partners provide only 10% of the funding but shape the research agenda to their advantage. Supportive researchers are also invited to play down adverse health effects of unhealthy products in scientific publications by, for example, writing rebuttals of research that might harm industry interests.² Thus a researcher was offered £10 000 by the gambling industry to report that gambling problem was a minor issue.²³³ Philip Morris’ former Worldwide Scientific Affairs Program spent about US\$200 million to fund medical schools to conduct research on tobacco smoking⁹⁰; the programme was closed in 2007, but the tobacco industry continues to influence research, such as via the RJ Reynolds Chair of Medicine at Duke University, funded by the RJ Reynolds tobacco company.⁹¹ The alcohol industry-funded Foundation for Advancing Alcohol Responsibility sponsors a \$3.3 million endowed chair at Harvard Medical School’s Cambridge Health Alliance.⁹²

UCIs often exploit narratives of a suboptimal evidence base to undermine, and create doubt about, public health interventions that have been shown to be effective by demanding forms of causal proof that are not possible to achieve in public health.^{93 94} The best known example is the tobacco industry’s decade-long attempt to undermine the evidence on smoking and cancer, by calling for ever stronger causal evidence, for instance from randomised trials, when no such evidence could be produced ethically. Similar strategies can also be seen by other industries, including gambling, food and alcohol, which advance the idea that the complexity of the causes of public health problems is such that the

Table 1 Strategies (and examples) commonly employed by unhealthy commodity industries (UCIs) to promote their interests within public health policies

UCIs	Ultra-processed food and drink products	Alcohol	Gambling	Tobacco
<i>Shaping the evidence</i>				
Lobbying for example, via front groups	The Center for Consumer Freedom ¹²⁶ (CCF) International Life Sciences Institute ¹²⁷	The CCF ¹²⁶ Competitive Enterprise Institute ¹²⁸ Alcohol industry directly lobbying government about minimum unit pricing (MUP) ¹²⁹	Competitive Enterprise Institute ¹³⁰ Gambling industry funds Republican campaigns ¹³¹	The CCF ¹²⁶ Big Tobacco funds Republican campaigns ¹³¹
Shaping research and funding priorities	Diet and Health Research Industry Club (DRINC) ⁸⁹ The International Study of Childhood Obesity, Lifestyle and the Environment and Coca-Cola ¹³²	International Alliance for Responsible Drinking (IARD) ¹³³	Industry sponsors' annual National Association for Gambling Studies Conference in Australia. Gambling industry part of consultative process to decide on Australian government funding priorities for gambling research ¹³⁴	Centre for Substance Use Research in Scotland ^{135 136}
Financing university programmes and chairs	Unilever Graduate Scholarship in the Sciences; St Cross College, University of Oxford ¹³⁷	Foundation for Advancing Alcohol Responsibility (ie, Diageo, Bacardi, etc) sponsors a \$3.3 million endowed chair at Harvard Medical School's Cambridge Health Alliance ⁸²	University of Nevada International Gaming Institute, includes research on 'responsible' gambling ¹³⁸	RJ Reynolds Chair of Medicine at Duke University ⁹¹
<i>Employing narratives and framing techniques</i>				
Focusing on youth, often directly in schools	Coca-Cola's The Real Experience 'flagship education programme for secondary schools, colleges and universities in Great Britain' ¹³⁹	'Smashed'—educational plays in schools funded by Diageo ¹⁴⁰ Community Alcohol Partnerships (CAPs) ¹⁴¹	GamCare's 'Big Deal' website (eg, 'Are you feeling lucky?') ¹⁴²	Philip Morris (PM) International Youth Smoking Prevention ¹⁴³ British American Tobacco's (BAT) cooperation with night clubs ¹⁴⁴
Focus on the individual for example, 'problem' behaviours, individual responsibility, personal choice and 'nanny state' rhetoric	Consumer choice ¹⁴⁵ 'Tackling obesity: choice and information' ¹⁴⁶	'Is your drinking a problem?' (Drinkaware) ¹⁴⁷	'Problem' gambling ³³ Institute of Public Affairs' (IPA) 10 worst nanny state policies: increasing gaming rates ⁴⁸	IPAs 10 worst nanny state policies: plain packet cigarettes ⁴⁸ Hands off our packs campaign ¹⁴⁹
Being 'part of the solution'	The Obesity Awareness and Solutions Trust (lobby group financed by weight loss industry) ¹⁵⁰	SpiritsEurope (industry group) 'Reducing alcohol related harm in Europe' ¹⁵¹	GamCare, Gambling Therapy and Gordon Moody Association, supported by industry-funded GambleAware	Tobacco industry funded youth smoking cessation programmes ¹⁵² Foundation for a Smokefree World ¹⁵³
Focus on 'sustainability' and strategic use of corporate social responsibility (CSR)	Coca-Cola Company's commitment to sustainability ¹⁵⁴	Diageo's commitment to sustainability ¹⁵⁵ ABInBev, Stella's buy a lady a drink programme. ¹⁵⁶	Strategic use of CSR by gambling industry for example, the Senet Group, a voluntary watchdog set up by the industry to 'promote responsible gambling standards' and the Industry Group for Responsible Gambling (IGRG) ¹⁵⁷	PM International's commitment to sustainability ¹⁵⁸ BAT Sustainable Tobacco Programme ¹⁵⁹
<i>Constituency building</i>				
Promoting or sponsoring efforts beyond their core business	The Coca-Cola Cycling Club ¹⁶⁰ McDonald's sponsorship of the 2012 Olympics	National Organisation for Fetal Alcohol Spectrum Disorder (FASD) (supported by Diageo) ¹⁶¹ Large spend on legal challenges to Scottish MUP legislation	In the 2019–2020 season, gambling companies sponsor the shirts of 10 out of 20 teams in the Premier League and 17 out of 24 teams in the Championship. ¹⁶²	PM contributes to alleviating hunger and extreme poverty ¹⁶³ Eliminating Child Labour in Tobacco Growing Foundation ¹⁶⁴ BAT, PM, Imperial and other tobacco companies are members RJ Reynolds' sponsorship of NASCAR Winston Cup Series and Vantage Gold Championship ¹⁶⁵

Continued

Table 1 Continued

UCIs	Ultra-processed food and drink products	Alcohol	Gambling	Tobacco
Strategies				
Financial and non-financial partnerships with charities or health-related/education-related foundations	UNICEF and McDonald's (Ronald McDonald Foundation) ¹⁶⁶ Britvic and Diabetes UK ¹⁶⁷	Addaction has undertaken alcohol misuse projects funded by Heineken ¹⁶⁸	GamCare, ¹⁴² GambleAware Young Gamblers' Education Trust ¹⁶⁹	PM China partnership with the China Youth Development Foundation to build schools ¹⁷⁰
<i>Policy substitution, development and implementation</i>				
Partnerships or voluntary agreements with government	More industry-led voluntary pledges than government regulations worldwide on food advertising to children ¹⁷¹ Public Health Responsibility Deal (RD) ¹⁷²	RD ¹⁷³⁻¹⁷⁵ CAPs ¹⁴¹	IGRG voluntary codes on advertising, ¹⁷⁶ Voluntary levy paid by bookmakers to GambleAware, the charity which funds education, prevention and treatment services and commissions research.	Voluntary agreement on sponsorship on sport by tobacco industry ¹⁷⁷
Contributing to health policy consultations and participating in drafting relevant policies	Sugar industry contributes to European Food Safety Authority nutrition guidelines (suggests no link between sugar and obesity) ¹⁷⁸	IARD and SABMiller influence on several African countries' alcohol policies ^{179, 180}	Levy Board, government-appointed bodies from horseracing and betting, collect funds from bookmakers, use to improve horseracing, and veterinary science and education ¹⁸¹	Action on Smoking and Health's 'The smoke-filled room: How big tobacco influences health policy in the UK' ¹⁸²

Source: table design adapted from Savell *et al.*,^{39, 38} Ulucanlar *et al.*,⁴³ Mialon *et al.*,⁴⁰ Scott *et al.*,⁴⁵ Capewell and Lloyd-Williams⁴⁶ and McCambridge *et al.*,⁹⁷

correct solutions are sufficiently unclear that nothing can or should be done until more and better evidence is produced.^{95 96}

Table 1 uses the taxonomies of CPA^{38-40 43 45 46} to code examples of CPA across UCIs.

DISCUSSION

There are clear commonalities across UCIs' strategies in their attempts to shape policy-relevant evidence, promote favourable policy narratives, frame debates, and engage in constituency building and policy substitution. Our findings support existing studies in demonstrating strong business links across different UCIs, complex inter-relationships between UCIs and public sector actors which lead to UCI engagement in policy-making forums, and clear commonalities in CPA employed across UCIs.^{4 38 39 97-101}

Our study echoes others in calling for a unified approach to research on UCIs^{25 36 102} and argues for a complex systems approach to analyse the linkages between UCIs and the way in which they collectively influence policy.¹⁰³ Complex systems thinking has long been recommended as a powerful tool for the analysis of UCIs, but has been underused to date.¹⁰⁴ It allows for the impact of UCIs on health to be conceived not so much as an aggregation of individual 'choices' but more a result of the interactions between diverse actors, factors and their environments.^{29 105} This entails acknowledging that UCIs' actions, and interactions between them, are greater than the sum of their parts, producing change across the system.^{31 67 103}

A systems approach provides tools to help understand how a system is functioning, and what might be the leverage points at which to make desired changes.¹⁰⁶ Given that the drivers of public health governance are shaped by broad political, institutional, economic and cultural factors, such a methodology can encompass the numerous, varied actors involved, the dynamism and non-linearity of behaviour and effect, and the impact of feedback in the system. It encourages the investigation of complex research questions,¹⁰⁷ including: What are the intended and unintended consequences of UCIs' efforts? What effects emerge from interactions between UCIs to affect policy change, and how do the effects change over time, and why? Are the effects of cross-UCI influences over policy supported or suppressed by other aspects of the system? Operationalising such research could, in the first instance, include generating causal loop diagrams^{31 67} and social network analyses¹⁰⁸ to capture the range of actors involved, the connections between them and the pathways through which they influence public health-related policy-making. Such research could lead to the development of a theoretical framework for understanding and studying UCIs, individually and collectively; for conducting comparative research across industries and settings; and for analysing the role of UCIs

in shaping public health policy processes, content and evidence use in public health policy.

Adopting a complex systems approach, partnered with an understanding of the interplay and links between industries and their strategies, reduces the risk of siloed working. It can elucidate ways in which public health actions taken to address specific industry strategies can potentially lead to changes in others parts of the system and industry behaviour that ultimately undermine any benefits intended to be gained from that initial public health intervention.

The risk of conflict of interest emerging from the involvement of UCIs in public health is considerable and complex. Thus the study of how to mitigate conflict of interests related to UCI engagement in public health would also benefit from a complex systems approach.^{71 109-112} This allows moving away from the predominantly individualistic lens, such as how a person's financial interests might affect their decision-making.^{113 114} While individual risks should also be managed, a complex systems approach allows for more fundamental questions to be explored, including the institutional or structural implications of conflicts between the interests of UCIs and health goals.¹¹⁴ Interactions between public health policy stakeholders and UCIs carry systemic risks, including bias in research priorities and conduct, and interpretation of findings, leading to ineffective or delayed public health policy.^{89 115-119} Many agencies and individuals, including researchers, do not adequately recognise the risks of these interactions and few have policies in place to reduce them. Where UCIs are involved in areas of research or policy relevant to their interest, such as supply chains or implementation of market controls, effective safeguards are needed to manage conflict in the agendas.^{109 114 120} Again, here, a systems approach can provide a way of conceptualising these multiple factors, actors and interactions.

This analysis has also shown that there is a shared strategy across UCIs to shape both scientific evidence and narratives about a sub-optimal public health evidence base, to suit their interests. The production of evidence should therefore be supported by procedures that render public health policy-making more transparent and less subject to these tactics.¹²¹ To support this, a broader conception of what constitutes 'good' or 'good enough' evidence in this field is required, one which embraces a wider range of research. This will require the integration of mixed methods from diverse sources and disciplines including quantitative and qualitative traditions³¹ to provide insight into UCI engagement in public health policy-making, and into how networks across sectors create the circumstances under which public health and political actors operate.¹²²⁻¹²⁴ Innovative methods such as framing analysis of social media would be useful for tracing the trajectory of policy ideas, and investigating concepts such as 'responsibility', 'moderation' and 'nanny state', and how they are transmitted through policy communities of interest.³²

Finally, it is important to emphasise that this approach does not obviate the need for single-commodity industry research. Rather, researchers need to be comfortable at both levels, and to be mindful of the need to compare and contrast findings to evidence of UCI activity within and across topics. Single-industry enquiry can elucidate fissures and differences in strategy both between and within industries, that may be important to understand in order to achieve public health gains. Further, there will always be a need to evaluate policies which apply to a single commodity, because these are particularly well understood and exploited by UCIs¹²⁵ and because of the likelihood that controls on one commodity may positively or negatively influence use of another. A cross-UCI programme of research would support single UCI research as well as encouraging greater recognition of the commonalities of corporate strategies.

The policy implications of the research reported here include the need for: clarity on processes and governance structures of public health policies; frameworks to understand the nature of relationships and accountability among policymakers or others influencing policy; guidelines and tools to gauge the extent to which the stated primary public health aims of policies may be compromised by corporate political strategies for example, as a result of explicit or hidden conflicts of interest; and ultimately more effective public health policy mechanisms.³²

CONCLUSION

The global NCD epidemic is largely driven by the consumption of harmful commodities such as alcohol, tobacco, gambling and UPP. There is conspicuous consistency across the UCIs that produce, promote and sell these goods employing corporate political strategies to maintain commercial interests through their involvement in public health policy-making. Given the magnitude of the NCD challenge and the similarity of strategies employed by UCIs, there is a strong rationale for researchers to investigate the links between these industries more systematically, taking a systems approach to do so. A convergent strategy taking a systems approach to research across UCIs is required to deepen shared understanding of this complex and interconnected area and also to inform a more effective and coherent response. Understanding common processes will allow for the identification and implementation of more effective interventions to regulate and manage the activities of UCIs. Taking a systems approach to conduct cross-UCI, multinational comparative analyses using appropriate and rigorous methodologies across a range of disciplines will also provide the opportunity for enhancing and supporting analyses of individual industries in single countries. Such an endeavour will not only deepen collective understanding of this complex area but also inform the development of more effective public policies related to one of the principal public health challenges in the world.

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