The tobacco endgame: a qualitative review and synthesis

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ABSTRACT

The tobacco endgame concept reorients discussion away from the persistent control of tobacco toward plans for ending the tobacco epidemic, and envisions a tobacco-free future. A variety of policy approaches have been proposed, with many offered prior to the introduction of the unifying term 'endgame'. We conducted a qualitative synthesis of the literature on tobacco control endgames, and drew on media accounts and discussion of analogous ideas for illustrative purposes. We identified proposals focused on the product, user, market/supply or larger institutional structures. Research on public support for these proposals was limited, but suggestive of some public appetite for endgame ideas. Advocates should be encouraged to explore new policy options and consider the goal of a tobacco-free future.

INTRODUCTION

The tobacco 'endgame'[1–3] concept suggests moving beyond tobacco *control* (which assumes the continued presence of tobacco as a common, widely-available, ordinary consumer product) toward a *tobacco-free future* wherein commercial tobacco products would be phased out or their use and availability significantly restricted.[4] No single definition of the endgame (ie, the method or policy approach), or the end point (ie, the specific, measurable outcome) has emerged and the word 'endgame' carries translational challenges. Nevertheless, the idea—of seeking to end the tobacco epidemic, rather than control it—has become a focal point for national and international meetings and has spurred longer term planning. Identifying the full range of endgame thinking is challenging, as many relevant proposals were published prior to introduction of the unifying term 'endgame'. We conducted a qualitative synthesis of the literature on tobacco control endgame strategies, defining them as: *Initiatives designed to change/eliminate permanently the structural, political and social dynamics that sustain the tobacco epidemic, in order to end it within a specific time.*[5]

METHODS

The lack of index terms and variety of literature encompassed under the endgame term necessitated a 'snowball' retrieval approach. We started our search with the May 2013 *Tobacco Control* supplement on the tobacco endgame. The supplement contained 20 articles, including editorials, endgame proposals, commentaries and perspectives. We included those in our review, and searched their reference lists for additional relevant materials, finding 38 articles.

For articles published since the supplement went to press in February 2013 through March 2015, we searched the PubMed database using the search term 'tobacco AND endgame'. Exclusion criteria included non-English language and focus on a tobacco control issue other than endgame. This added eight articles. These articles suggested other search terms, including 'nicotine reduction', and 'e-cigarettes AND endgame'. Those searches added 7 articles, for a total of 73 articles. We included articles describing or discussing endgame-related ideas or proposals, and research related to such proposals, for example, measuring levels of public support for or modelling policy impacts of endgame scenarios. Reviewers suggested five additional sources of relevant public opinion data.

The endgame idea is still developing; much of the literature discussed here is exploratory. Thus, this is not a 'systematic review' that collates all empirical evidence in order to answer a particular research question;[6] instead, it represents the most thorough qualitative synthesis to date of tobacco endgame scholarship. In synthesising the literature, we categorised the articles as focusing on the product, the user, the market/supply, or larger institutional structures. We also drew on media accounts of endgame proposals and on discussions of analogous ideas for illustrative purposes. We integrated some material from published critiques (indicated via citations) and added our own assessments.

RESULTS

Product-focused endgame proposals

Regulate nicotine levels to make cigarettes non-addictive or less addictive

Nicotine levels in cigarettes or all combustible tobacco products could be regulated to reduce tobacco use among current smokers and prevent new smokers from becoming addicted.[7–9] Nicotine levels could be reduced gradually, over 10–15 years, to wean addicted smokers off nicotine,[7 10] or more abruptly.[11] Theoretically, nicotine levels could be established that maintained addiction in current smokers but minimised addiction among new smokers.[12] Simultaneously, cleaner nicotine products such as patches and gum could be promoted by reducing their cost and increasing their availability.[10] This approach would require determining the appropriate level and method and speed of administration of nicotine, and establishing regulatory authority over the tobacco industry. More stringent limits on marketing and availability of tobacco could ensure that 'clean' nicotine products dominated the market.[10]

Potential risks include the tobacco industry marketing reduced nicotine tobacco products as 'safer',

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or 'government approved', thereby promoting uptake and sustained use of these products among people who might otherwise not become addicted or quit smoking.[12] Using low nicotine combustible tobacco as 'starter' products and then switching to other products having higher nicotine levels would be another potential problem if nicotine levels were not reduced in all tobacco products.[13] A 'starter' effect could potentially occur with pharmaceutical nicotine products as well. In addition, individuals might find ways to add nicotine to tobacco products, and the tobacco industry might offer new, companion products to sustain nicotine addiction.[13] Robust product testing and enforcement would be needed to ensure manufacturer compliance.[14] Prohibition of products that added nicotine to cigarettes (eg, spray-on or injectable nicotine) would also be necessary.

Compensation is another concern. Smokers of reduced nicotine tobacco might smoke more or more intensively in order to maintain their usual nicotine level, increasing their exposure to toxic combustion products.[7] Research on reduced nicotine content cigarettes is limited, but shows that those who smoked such cigarettes in laboratory conditions (over two 8 h sessions), for 6 weeks and over 6 months did not compensate for the reduced nicotine yield by smoking more cigarettes or smoking more intensively.[15–20] Their level of exposure to toxic combustion products also remained stable,[15 19 20] or, in some cases, was reduced.[16 18] However, heavily addicted smokers may compensate more than others.[21] A comparison of two strengths of reduced nicotine content cigarettes showed that greater reductions in nicotine were associated with higher rates of abstinence 1 month after a 6-week trial.[9]

Redesign the cigarette to make it unappealing

Raising the pH of cigarettes to 8 or more (its level prior to 20th century methods of cigarette manufacturing) would make cigarettes harder to inhale.[22, p.553] A more acrid smoke that cannot easily be drawn deep into the lungs could reduce both smoking uptake and the risk of lung cancer.[23] Banning all non-tobacco cigarette ingredients would make cigarettes distasteful, discouraging uptake and encouraging cessation.[24] A ban on menthol, which masks the harshness of cigarettes and facilitates exposure to nicotine, has also been proposed,[25–27] as has banning filters, which provide no health benefit but reduce irritation and may make it easier for those experimenting with smoking to become regular smokers.[28 29]

There have been several attempts to ban menthol in cigarettes (eg, Brazil in 2012, Chile in 2013).[30–32] In February 2014, the European Parliament approved the European Union Tobacco Products Directive, which included a ban on characterising flavours in cigarettes and roll-your-own tobacco, including menthol; it will be phased in over 4 years.[33] In May 2015, the Canadian province of Nova Scotia became the first jurisdiction in the world to implement a ban on menthol-flavored tobacco.[34] It will be followed in September by the province of Alberta.[34] Banning particular constituents could lead the industry to add other ingredients to counter the effects of their removal, creating the need for additional scientific evidence about the effects of such new ingredients, which would be challenging to obtain.[35]

E-cigarettes

The popularisation of electronic cigarettes (e-cigarettes) and the rapid innovation in the category caused some endgame commenters to suggest that these may be part of an endgame scenario in which combustible cigarettes are made less appealing through nicotine reduction and addicted cigarette smokers switch to or use e-cigarettes to quit.[36–38] The intense controversy over these products' marketing and use, lack of long-term research on their health effects,[39 40] variability among the products themselves, introduction of novel next-generation products and the political dynamics of rapid acquisition by cigarette companies of e-cigarette companies and products complicate consideration of how they might figure in various endgame scenarios. A full consideration of the implications of e-cigarettes for endgame purposes is beyond the scope of this review. However, it is clear that jurisdictions undertaking endgame planning must consider the role of this rapidly growing market segment, and must do so in the context of limited scientific knowledge (particularly about longer term effects, dual use and the potential for these products to lead to use of tobacco products).

User-focused endgame proposals

Smoker's license

Under a smoker licensing scheme[41] those seeking to purchase tobacco from licensed retailers would obtain a 'smart swipecard' smoker's license, renewable annually, with purchase limits established by the user. Financial incentives to permanently relinquish the license could be offered, and new smokers seeking a license would demonstrate knowledge of tobacco's health and financial costs. The legal smoking age could be raised annually by 1 year; since smoking initiation usually occurs among those under 23 years of age, new requests for smokers' licenses would presumably decline rapidly after several years.

Critics of this proposal argue that it is financially burdensome to smokers.[42] Moreover, a knowledge test of smoking's dangers could reinforce the tobacco industry's framing of smoking as a choice made by fully informed consumers, deflecting attention from industry behavior;[42] new smokers could also have difficulty passing a test that assessed more than superficial levels of knowledge.[43] Given that smoking is increasingly concentrated among the poor, stigmatising them further as 'registered addicts' has social justice implications.[44] However, supporters consider the license to be akin to a prescription for access to pharmaceuticals,[41] or licenses to obtain medical marijuana.[45] As with driver's licenses, the issuing agency or other parties would likely provide study material and practice tests that would enable most applicants to pass the knowledge test. Requiring a license before accessing the products would send a stronger social message about their dangerousness than is conveyed through current practices.

Prescription to purchase tobacco

In Iceland in 2011, a former health minister sponsored a bill to limit cigarette sales to pharmacies and require purchasers (aged 20 and over) to obtain a prescription. A prescription would only be given after cessation efforts had failed.[46 47] Similarly, in the USA, an Oregon lawmaker proposed in 2013 that the state classify all nicotine products as controlled substances, available only by prescription.[48] It is unknown whether doctors would write prescriptions for cigarettes, or if pharmacists would fill them; however, clinicians would most likely have ethical objections. In addition, in jurisdictions where tobacco is still sold in such establishments, such a plan would directly conflict with policy efforts to end sales of tobacco products in pharmacies.[49–52]

Restrict sales by year born

Researchers in Singapore have proposed prohibiting the sale of tobacco to citizens born in or after a certain year (eg, the year

2000), thereby creating 'tobacco free generations' legally barred from purchasing tobacco at any age.[53 54] In effect, this would phase out the sale of tobacco: when the population is composed entirely of those born after the chosen year, tobacco would cease to be sold legally. Although there would presumably be some demand for illegal sales initially among those barred from purchasing tobacco, this might decline as the smoking population aged and smokers became undesirable youth role models.[53] Media campaigns could portray smoking as 'a 'last century' phenomenon'.[54, p i23] Jurisdictions might choose to sanction underage smokers (although focusing attention on smokers rather than the tobacco industry lets the industry off the hook).[53] A tobacco-free generation bill was introduced to the Australian state of Tasmania's parliament in November 2014; as of May 2015, a vote on the bill had been delayed.[55]

One objection to the proposal is that it denies adults the ability to 'take informed risks'.[41] However, consumer choices are frequently constrained, particularly regarding toxic products.[54] Moreover, because the majority of smokers begin smoking before age 18, a ban on the sale of cigarettes would constrain the choices of a small minority of adults.[54] An analysis of how the proposal would comport with the Universal Declaration of Human Rights, the International Covenant on Civil and Political Rights, and the Convention on the Rights of the Child concluded that it was consistent with all three; its support of rights to life, health and a healthy environment outweighed its relatively minor restrictions.[3]

Precedent for the licensing and tobacco free generation proposals occurred in Taiwan and British Ceylon in the early part of the 20th century.[54] Smoking opium was phased out by requiring smokers to display a license in order to purchase opium; after an initial registration period, no further licenses were granted.[54] The incrementalism of this proposal may appeal to governments, as it would have less immediate impact than, for example, a ban on sales of tobacco products; however, for the same reason, achieving an end point would likely take decades.

Market/supply-focused endgame proposals

Licensing, outlet restrictions, display bans and price controls

Researchers have proposed a variety of restrictions at the retail level that could be employed in a broader endgame strategy, starting with licensing of tobacco retailers.[56] Although existing licensing schemes are designed primarily to limit tobacco sales to adults, they could be designed to discourage them. For example, the number, location and opening hours of tobacco retailers could be limited, including prohibiting new outlets, barring outlets near schools or limiting sales to non-school hours, banning duty free sales or restricting all sales to government-controlled outlets (as is carried out with certain types of alcohol in some US states) or to one type of outlet.[1 14 56–59] The cost of licenses, typically low, could be raised,[58] along with the cost of violating licensure provisions (eg, the sanctions associated with underage or other illegal sales).[56] Retailers could also be incentivised to give up tobacco licenses.[58] Product display and point-of-sale advertising bans, already in force in numerous countries, could be a condition of licensing.[56] Minimum prices could be set (already the case in at least 24 US states and the District of Columbia)[60] to counteract manufacturer discounting.[56] Research in New Zealand suggests that various tobacco outlet reduction strategies, including the elimination of 95% of current outlets, could help reduce smoking rates, but would not, on their own, achieve dramatic reductions in the near term.[61] Opposition to such plans from the retail sector would be vigorous in the absence of appropriate incentives. However, considerable evidence suggests that ubiquitous availability is a factor in smoking initiation and relapse after quit attempts.[62–67]

Ban combustibles

The commercial sale of cigarettes (or all combustible tobacco) could be prohibited.[23 68 69] The ban could be announced well in advance of implementation, giving smokers time to quit.[24] Pre-existing bans on smokeless tobacco or other nicotine product alternatives could be lifted to offer smokers cleaner nicotine alternatives.[70] Opponents of a sales ban point to the failure of alcohol prohibition in the USA in the 1920s to suggest that a cigarette sales ban would be unpopular and ineffective.[71] However, Proctor argues that tobacco and alcohol are different: nicotine, unlike alcohol, is not a recreational drug, and most smokers do so to satisfy their addiction rather than for pleasure.[22, p 557] There is also precedent for governments to ban sales of products that are exceptionally harmful when used as intended. The majority of smokers want to quit;[72] ending sales could help them do so. Some might argue that this measure would create more hardship for less-educated and low-income people, among whom smoking is increasingly concentrated. However, communities could institute targeted cessation aid and provide other resources to offset impacts; easy access to deadly products cannot be regarded as a benefit.

Advantage cleaner nicotine products over combustibles

Combustible tobacco could be placed at a regulatory or market disadvantage compared to 'cleaner' nicotine products such as low nitrosamine smokeless tobacco, pharmaceutical nicotine and e-cigarettes.[73 74] For example, combustible tobacco could be subject to higher taxes, restricted availability and enhanced warning labels. To eliminate negative outcomes associated with wider availability and use of non-combustible products (eg, youth uptake, increased or sustained nicotine addiction among smokers who might otherwise quit, undermining public smoke-free laws, and remodelling smoking as a desirable activity), the marketing, design, distribution and use of such products could be regulated.[74] In addition, e-cigarettes could be required to look less like cigarettes and their use prohibited in places where cigarette smoking is banned.[74] Alternatively, tobacco companies could be permitted to market clean nicotine products, but only if they agreed to phase out manufacture and sale of combustible products.[75] This latter approach would require new legislation in most jurisdictions, which, given the political resources of the tobacco industry, would be challenging to pass. In addition, there remains some concern that nicotine itself may have negative effects on health,[76] although these could be far less harmful than the effects of using 'dirty' combustible tobacco.

Quota/'sinking lid'

A quota on tobacco manufacture and imports, to be regularly reduced under a 'sinking lid', is another approach.[77 78] Manufacturers and importers would bid at government-run auctions for shares of the market. As quotas were reduced, prices for the shares and consequently prices for tobacco products, would rise, until demand shrank. Revenues from share auctions (as well as tax revenues) could be applied to complementary tobacco control programmes. The sinking lid explicitly lays out a timeline for the cessation of all tobacco product sales. This idea is based on similar schemes in use to reduce carbon emissions (ie, 'cap and trade'),[79] and to control the catch taken from fisheries.[80] US Senator Mike Enzi (Republican, Wyoming)

introduced legislation in 2007 to create a cap and trade system for tobacco products, but it failed to pass.[81] The proposal has been critiqued as too complex and opponents have argued it would be easier to simply raise taxes.[82]

Price caps

Under the tobacco price cap proposal, a tobacco regulatory body would set the maximum wholesale price for cigarettes,[83 84] taking into account production costs and reasonable profit. The retail price would be the wholesale price, plus retailer-added costs, plus excise tax and sales tax/value added tax. Thus, tobacco manufacturers' profits would be reduced, while the consumer's price could be established by the government through excise taxes. This system prevents the industry from using tax increases as an opportunity to increase its profit; gives the government more control over the consumer price, allowing it, for example, to increase the excise tax while maintaining a price ceiling; ensures that price increases benefit the government (via tax revenues) rather than the industry; and ultimately reduces industry influence by reducing its lobbying fund. Price caps would also reduce the price differentials among brands (actual production cost differences are likely to be minimal), thus reducing the tendency of smokers to shift to lower-priced brands rather than quit in the face of price increases. This system does not necessarily imply an end to commercial tobacco sales; however, it gives government the ability to ultimately cause profit margins to shrink to levels unacceptable to the industry. The price cap system has been used in the UK to regulate utility prices.[85]

Institutional structure-focused

Tobacco control agency

Many aspects of tobacco production, marketing and sales are weakly regulated, in contrast to the controls put on other potentially harmful consumer products, such as alcohol and pharmaceuticals. For example, there are no restrictions on cigarette ingredients, no ingredient label requirements and varied regulations about sale (including many jurisdictions where no retail license is required) and promotion. The tobacco industry operates under a 'perverse incentive'[86, p 463] whereby "the more people it addicts and kills, the more money it makes". Owing to the unique qualities of tobacco, a new agency may be necessary to reverse the perverse incentive. Such an agency would manage products, marketing, development of less harmful/addictive products, price, sales and monitoring of the regulatory system. Thomson *et al*[87] endorsed this model for New Zealand, suggesting that it be funded by taxes on tobacco companies.

Regulated market model

Borland[88] suggested a regulated market model (RMM) under which an agency would be both regulator and sole purchaser of tobacco from manufacturers and importers. This agency could set standards for manufacturers (from whom it would buy) as well as for retailers (to whom it would supply products). This system could permit innovation (eg, the agency would buy demonstrably safer products) while controlling price, packaging and promotion. It could introduce plain packaging, ratchet down nicotine levels, raise prices or restrict outlets, to reduce tobacco use prevalence to near zero. Others have specifically suggested this proposal as a way to maintain the cigarette industry but compel production of a less harmful product, to be distributed in a better-controlled way.[89] A system like the RMM was established to regulate sales of marijuana in Uruguay in 2013;[90] however, implementation has been delayed.[91]

State takeover of tobacco companies

A similar scheme[92 93] suggests that tobacco companies be purchased and managed by a not-for-profit entity with a health promotion mandate, which could then use multiple strategies to meet mandated tobacco use reduction goals. The 'voluntary or legislated' purchase 'could be financed by industry assets and future revenue streams'.[92, p 282] This entity would be akin to public water systems or state-run alcohol distribution systems.[93] These parallels are not perfect, as they do not aim to eliminate usage of the relevant resource, whereas the goal here is 'the phasing out of tobacco use or its reduction to levels of minimal use'.[92, p 280]

Performance-based regulation

A simpler approach suggests that a public agency set goals for reductions in smoking prevalence that tobacco companies would be required to meet within a certain time frame, and measure whether those goals were met.[94–96] Failing to meet a target would result in substantial fines. Tobacco companies, not the state, would decide how to proceed—higher prices, media campaigns, plain packaging, etc. In the USA, performance-based regulation to reduce youth smoking rates was included in proposed legislation to end multiple state lawsuits against tobacco companies, and in suggested remedies in a federal civil suit.[95] In neither case were such regulations enacted.

Recently, a similar approach has been advocated in the UK, where a proposed 'Tobacco Companies Obligation' would legally require tobacco companies to pay a levy based on sales volume, which in turn would be managed by the Department of Health to fund tobacco control initiatives.[97] Based on a 'polluter pays' principle, such an approach would provide a consistent source of resources for tobacco control efforts, similar to a dedicated tobacco tax.

Each of these more structural solutions could have great advantages in allowing increased control of the supply-side apparatus—if implemented well and supported by a government committed to the endgame goal. However, given the US experience with tobacco products regulation at the national level—weak, ineffective and subject to multiple legal challenges[98]—the feasibility of implementing such a plan in the near term may vary widely across countries.

Integrated endgame strategies

Countries likeliest to adopt any of the strategies discussed here already have created the needed context with extensive tobacco control programmes. For example, comprehensively implementing the WHO Framework Convention on Tobacco Control (FCTC) recommendations would create an environment conducive to a combination of the Tobacco Free Generation proposal and a phasing out of combustible cigarettes, while allowing a strongly regulated market in electronic nicotine delivery devices and/or low-nitrosamine smokeless products, such as Swedish snus.[3] Other combinations and modifications of the proposals discussed here will likely be adopted in different jurisdictions.[1 14 99–104] Table 1 summarises these integrated proposals, as well as other endgame proposals discussed here.

Public support for endgame proposals

There is limited research on public perceptions of endgame proposals. In 2004, Canadians were asked whether 'governments should develop new ways to phase out smoking in 25 years'.[93, p 139] Seventy-six per cent of smokers strongly or somewhat agreed. Since then, two endgame proposals, enacting

Table 1 Examples of tobacco endgame proposals

Study	Definition of endgame goal	Approach	Caveats/drawbacks	Industry	Replacement product needed
Regulate nicotine levels to make cigarettes non-addictive or less addictive					
Benowitz and Henningfield[7]	Reduce tobacco use and prevent development of nicotine addiction	Regulate availability of nicotine in tobacco products to limit maximal obtainable dose; could be reduced gradually, over 10–15 year period	Potential for cheating; smuggling could be a problem	Regulated by Food and Drug Administration	No
Gray *et al*[10]	Safer products	1) Regulation of all nicotine delivering products; (2) improvement in spectrum of clean nicotine products and reduction in attractiveness of tobacco nicotine products; (3) progressive reduction in nicotine content of cigarettes with clean nicotine freely available as substitute	Food and Drug Administration regulation of tobacco	Regulated by Food and Drug Administration	Yes
Henningfield *et al*[12]	Less addictive products	Regulation to address addictiveness of tobacco products (not a ban on tobacco products; regulated products would retain capacity to sustain addiction)	Tobacco industry might use efforts to reduce toxicity as marketing tool	Regulated by Food and Drug Administration	No
Redesign the cigarette to make it unappealing					
Peters[24]	Eliminate smoking	Remove all cigarette additives; require cigarettes to have a maximal smoke pH and measured nicotine delivery to eliminate addiction	None mentioned	Regulated	No
Proctor[22]	Prevent tobacco death	Make cigarettes uninhalable by raising smoke pH	None mentioned	Regulated	No
Smoker's license					
Chapman[41]	Reduction in tobacco use	All smokers required to obtain yearly smart swipecard license to buy tobacco; maximum purchase limit chosen by licensee at time of application; maximum daily limit of 50 cigarettes per day; new smokers must pass test of risk knowledge; incentive to surrender license	Tobacco industry might find legal implications of informed consent to smoke attractive; difficult for impoverished nations to enact	Regulated	No
Restrict sales by year born					
Berrick[54]	Long-term phase in of total ban on tobacco sales/purchase	Individuals born in or after year 2000 prohibited from tobacco purchase	Does not address current smokers; denial of choice for adults; age discrimination	Ultimately phased out	No
Khoo *et al*[53]	Long-term phase in of total ban on tobacco	Individuals born in or after year 2000 prohibited from tobacco purchase	Does not address current smokers	Phased out; theoretically less urgency to lobby against policy whose impact will be felt in future	No
Ban combustibles					
Daynard[68]	Phase out cigarettes; permit non-smoked nicotine delivery devices	Not specified	Smuggling would be a problem, but manageable	Not specified	Yes
Park *et al*[69]	Ban on manufacture and sale of tobacco products	Legal prohibition on sale and manufacture; free cessation assistance; subsidy to farmers for switching crops; government purchase of manufacturing assets	Smuggling; damage to tourism industry	Eliminated or reorganised into different industry; compensated for assets	No
Proctor[23]	Ban combustible cigarettes	Establish bans in states or localities	None mentioned	Executives repeatedly stated that they would not sell cigarettes if they were proved harmful; proposal 'helps industry fulfill its promise'	No

Continued

Table 1 Continued

Study	Definition of endgame goal	Approach	Caveats/drawbacks	Industry	Replacement product needed
Advantage cleaner nicotine products over combustibles					
Gartner *et al*[74]	End of tobacco smoking	Regulate smokeless tobacco products and e-cigarettes to enhance their use as smoking cessation products (eg, lower taxes, limited marketing to current smokers, phase out of smoked tobacco products)	Public health opposition	Regulated	Yes
Hall and Gartner[75]	Elimination of tobacco-related harm	Regulate market to advantage low nitrosamine smokeless tobacco products (eg, lower taxes, reduction in nicotine content of cigarettes, tobacco companies that market smokeless tobacco required to phase out manufacture of combustible tobacco)	Illicit tobacco production and smuggling of smoked tobacco	Regulated	Yes
Sweanor *et al*[73]	Safer products	Regulate market to disadvantage higher risk products (ie, cigarettes)	Public health opposition to industry in general and tobacco industry in particular reduces likelihood of implementation	Regulated	Yes
Regulated market model					
Borland[88]	Regulating industry to encourage development of less harmful products; control commercial communication; move consumers to less harmful alternatives	Regulated market model to control tobacco marketing—monopsonistic agency set up to purchase and market tobacco products produced by manufacturer; control wholesale distribution to retailers	Agency would need an independent board; transparent deliberations. Smuggling could be a problem	Removed from control of market	Harm-reduced nicotine products
State takeover of tobacco companies					
Callard *et al*[92]	Phase out tobacco use or reduce to minimum use levels	Transfer supply of cigarettes to non-profit entity with public health mandate through voluntary or legislated purchase	None mentioned	Transformed; motivated to help smokers quit and prevent tobacco uptake	Less harmful nicotine sources
Tobacco control agency					
Liberman[86]	End of for-profit industry	Strong regulation of all aspects of industry with aim of minimising population harms	None mentioned	Regulated; ultimately dismantled	Probably
Thomson *et al*[87]	Reduce or remove tobacco-related harm by modifying products, changing marketing, offering substitutes, controlling prices, changing arena in which tobacco industry operates	Establish governmental Tobacco Authority to purchase tobacco from manufacturer, paid for by manufacturer (as recommended by Borland 2003)[88]	Will be attacked by tobacco industry and its allies	Removed from control of market	Possible concomitant regulation of alternative nicotine sources/devices
Performance-based regulation					
Sugarman[94 95]	Reduced tobacco-related disease and death	Public agency sets goals for reductions in smoking prevalence rates, measures whether goals are met; tobacco companies determine how to meet goals, face substantial penalties for failure	Performance levels and penalties for non-compliance must be set carefully; difficulties may also arise if other public health policies implemented by regulators at the same time	Regulated	No
Quota/'sinking lid'					
Thomson *et al*[78]	End of availability of commercial smoked tobacco; near zero smoking prevalence	Reduce smoked tobacco supply quotas to manufacturers and importers, coupled with smoking cessation support, mass media campaigns and stronger marketing and retailing regulations	Non-commercial system may be needed if tobacco industry exits or rigs market. Higher prices may result in smuggling, theft, illegal cultivation for commercial sales and short-term social inequalities	Regulated; ultimately dismantled	Clean nicotine products; limited home-grown product for personal use
Wilson *et al*[77]	End of availability of commercial smoked tobacco; near zero (<1%) smoking prevalence	Reduce smoked tobacco supply quotas to manufacturers and importers (through government mandates governing sales/import quotas, or available tradeable quotas, perhaps controlled by non-profit agency), coupled with mass media campaigns, price regulation	If governments wish to maintain constant revenue streams, other types of taxes may need to be raised as tobacco tax revenue starts to decline; risk of smuggling, theft and illegal sales as prices rise	Regulated; ultimately dismantled	Residual smokers switched to pharmaceutical grade nicotine products, self-grown tobacco, or government supplied tobacco (via smoker's license)

Continued

Table 1 Continued

Study	Definition of endgame goal	Approach	Caveats/drawbacks	Industry	Replacement product needed
Price caps					
Gilmore *et al*;[83] Branston and Gilmore[84]	Regulation to limit tobacco industry profits, use of price as marketing tool	Establish independent regulatory agency to set maximum wholesale prices (not retail price); increase taxes to maintain retail price	Counter to trend for less regulation and smaller government; reluctance to establish regulatory agency; increased government revenue might reduce incentive for tobacco control measures	Fewer financial resources for marketing and lobbying; subject to greater regulatory scrutiny	No
Integrated endgame strategy					
Beaglehole *et al*[104]	Phasing out the sale of tobacco products globally by 2040	Full and accelerated implementation of the Framework Convention on Tobacco Control; reductions in tobacco supply and product modifications; leadership from United Nations	None mentioned	Regulated	Yes
Fiore and Baker[99]	Elimination of smoking	Tax increases; access to cessation; national clean indoor air law; elimination of nicotine; graphic warning labels; counter marketing; ban on advertising, promotion and sponsorship	None mentioned	Regulated	No
Gartner and McNeill[105]	Ending smoking epidemic (not further specified)	Multiple: smoker licensing, regulated market model, harm reduction, reduced nicotine and reduced outlets	Reduced nicotine could increase exposure to toxicants; new regulatory structures difficult to enact	Regulated	Possible; low nitrosamine smokeless tobacco or high-dose recreational clean nicotine products
Hall and West[102]	De facto prohibition of combustibles	Cap and trade combined w/nicotine reduction to phase out smoked tobacco products	None mentioned	Regulated; may become focused on 'clean' nicotine products	Yes
Institute of Medicine[14]	Not specified	Strengthen tested approaches; increase federal regulations to require disclosure of product contents, improved warning labels, 'tombstone' style promotions, no industry contact with youth, fewer retail outlets and lower nicotine levels in cigarettes	None mentioned	Regulated	No
Laugesen *et al*[100]	Phase out sale of commercial cigarettes and smoking tobacco	Increase tax; cap and trade; reduced nicotine; safer nicotine products	Financial inequity; black markets; reliance on as-yet non-existent new products	Regulation of imports	Yes
Laugesen[70]	End of sale/use of smoked tobacco	Replacement with snus; toxicity-based taxation; reduction of nicotine content of cigarettes; encourage smokers to switch; declining smoked tobacco product quotas	Slight increased incidence of cancer compared to no tobacco use	Regulated	Yes
Malone[1]	Death and disease from tobacco virtually eliminated	Nicotine reduction in cigarettes; outlet restrictions; cigarette sales bans	Potential for lawsuits	Regulated	Possibly
Tobacco Advisory Group of the Royal College of Physicians[103]	End of smoking; subsequently, end of nicotine product use	Establish Nicotine Regulatory Agency to regulate products in line with their toxicity and to implement conventional tobacco control measures (eg, retail licensure, plain packaging, media campaigns)	None mentioned	Regulated; possibly redirected to low hazard products	Yes
van der Eijk[3]	The end of tobacco-related death and morbidity	Integrate ideas from harm reduction, the tobacco-free generation proposal, and the Framework Convention on Tobacco Control to create a cigarette-free state with regulated alternative nicotine products	Legal challenges, illicit cigarette markets	Regulated	Yes
Wilson *et al*[101]	Smoke-free New Zealand by 2025—children protected from exposure to tobacco and minimal risk of starting to smoke	Retailer licensing; plain packaging; sinking lid on sales; 100% smoke-free bars and restaurants; strengthen local government law-making powers; increase alcohol controls and de-linking drink and smoking	None mentioned	Regulated	No

a tobacco sales ban and reducing nicotine in cigarettes, have received the most research attention. Despite the absence of organised engagement of the public on these proposals, studies find some public support for both, with variations by smoking status, question wording and, in some cases, race or ethnicity and education level (tables 2 and 3). American public opinion on banning menthol cigarettes has also been explored;[106 107] perhaps due to differences in question wording, one study found majority support for a ban,[107] while the other found that the majority neither supported or opposed a ban.[106]

Research in New Zealand, one of a handful of countries with a deadline (2025) for becoming a smoke-free nation (smoking prevalence of 5% or less), has shown high levels of public approval of the smoke-free goal,[108–110] with support higher when respondents fully understood the goal, highlighting the importance of clear communication by governments.[111] Likewise, a majority of Singapore residents surveyed in 2007 backed the smoke-free generation proposal, although support was higher among non-smokers (72.7%) than smokers (60%).[53]

Critiques of endgame proposals

Most of these proposals have not been implemented, making it difficult to evaluate their practicality or legality. However, some overarching critiques of endgame thinking have emerged. There is concern that too much focus on novel approaches will diminish effort toward policies that have proven successful but may seem less exciting, such as cigarette tax increases.[128 129] Focusing on novel approaches may also leave behind regions that have not achieved baseline successes (eg, reductions in smoking prevalence or establishment of smoke-free laws) that might make endgame plans acceptable to the public.[4] Other critiques suggest that endgame proposals threaten fundamental values by empowering the state to take property from tobacco companies, or restrict the freedom of adults to purchase chosen products.[82] Other hazards include inadvertently increasing lethality to tobacco users through product changes, and creating unenforceable regimes which reduce confidence in law and government.[82]

Any proposal which reduces supply, substantially changes the product or restricts access also raises the potential for smuggling and black markets. In Bhutan, the only nation to ban tobacco sales (in 2004), cigarette smuggling is reportedly 'significant'.[130] However, currently, the most problematic black markets rely on the tobacco industry for their product;[131–133] thus, proposals that increase government authority over the industry or reduce or closely monitor production would likely have less potential to create such markets. In addition, although black markets are certainly a downside, endgame proponents should consider the likely size and specific consequences of their proposals in order to estimate whether they outweigh the potential benefits. The mere presence of a black market is not necessarily an argument against a particular policy.[134] Indeed, in 2009, only 2.8% of Bhutanese used combustible tobacco products, men (4.2%) more so than women (1%).[120]

DISCUSSION

This paper has offered a synthesis of the 'endgame' literature to date. The idea of the 'endgame' as such is still emergent and perhaps most useful as an organising concept to push governments toward setting, widely publicising and engaging the public in efforts to achieve specific, date-linked goals to end the epidemic. Until recently, most tobacco control goals were modest and expressed solely in terms of a foreseeably endless process of reducing uptake and aiding cessation, with little sense of an identifiable end point. Tobacco industry rhetoric about the failures of the American attempt at alcohol prohibition may have muted such discussion, as many tobacco control proponents were reluctant to be identified as 'prohibitionists' or more recently, 'nanny staters'.[135] However, as novel policy approaches are advanced, there appears to be a growing recognition that 'prohibition' is not the only model. Recent articles on point of sale interventions,[136] FCTC implementation[137] and the US Surgeon General's 50th Anniversary report[138] have been framed in terms of a tobacco endgame, suggesting that even in the absence of a unifying definition of endgame (or end point), the popularisation of endgame thinking has the potential to spur innovation. Advocates should be encouraged to explore new policy options and embrace the goal of a tobacco-free future.

Doing so requires leaders and governments willing to risk the political wrath of powerful tobacco industry interests. Encouragingly, more governments appear willing to do so, as

Table 2 Support for a tobacco sales ban* by country or region

Country/region (Year)	Time frame	Percent supporting tobacco sales ban				
		Smokers	Former smokers	Never smokers	Non-smokers	All
Ontario, Canada (2003)[112]	Not specified	12.0		24		
New South Wales, AUS (2004)[113]	≤10 years	37.2			59.0	
New Zealand (2007–2009)[114]	10 years	46.0				
New Zealand (2008)[115]	≤10 years	26.2	52	60.1		
USA (2009/2010)[116]	Current	19.0				
England (2008)[117]	≤10 years	32.5	40.5	49.4		
Victoria, AUS (2010)[118]	5–10 years	42.2				52.8
New Zealand (ages 15 and up) (2010)[119]	10 years					66
Bhutan (2011)[120]	Current	88.0				94
US (2011)[121]	≤10 years	32.7			53.1	
Hong Kong (2013)[122]	≤10 years	45.4	59.4	68		
New Zealand (adolescents) (2012)[108 123]	10 years	13.0	50	65		57
New Zealand (ages 15 and up) (2012)[110]	10 years	18.0			58	50
New Zealand (ages 15 and up) (2012)[124]	10 years	34.0	53	63		72
New Zealand (adolescents) (2014)[125]	Not specified	12.0				56

*Question wording is not consistent across all studies.

Table 3 Public support for government mandated reductions in nicotine levels in cigarettes

Country (year)	Focus	Percent supporting specified form of nicotine reduction				
		Smokers	Former smokers	Never smokers	Non-smokers	All
USA (2009/2010)[116]	Reducing nicotine levels to 'make cigarettes less addictive' if 'nicotine was made easily available in non-cigarette form'	67				
USA (2010)[126]	Reducing nicotine levels 'to help smokers quit'	45.5	48.5	46.2		
USA (2011)[121]	Immediately decreasing nicotine levels.	37.1			50.7	43.3
USA (2011)[121]	Reducing nicotine levels 'if it would cause fewer children to become addicted or hooked on smoking'	74			81	77.1
New Zealand (2012)[127]	'The nicotine content of cigarettes should be reduced to very low levels so that they are less addictive'	78.1 (recent quit attempt); 56.3 (no recent quit attempt)				

evidenced by Australia's leadership in defending plain packaging for tobacco, Uruguay's strong tobacco control stance in the face of industry attacks, and leaders in Africa who supported public health in the face of tobacco industry threats.[139–142] The FCTC has stimulated healthy 'competition' among countries and regions; its full and rapid implementation lays the groundwork for true endgame planning and allows a different vision of the future to emerge. Ideas discussed in this review, in combination with one another or with innovations not yet envisioned, should be considered as part of that planning.

What this paper adds

- The tobacco control endgame discourse is relatively new; the term 'endgame' can include models first proposed before the term itself was widely adopted.
- We identified and synthesised the literature on tobacco control endgames from multiple nations.
- There is no single endgame solution, but endgame thinking opens up novel policy approaches that could be useful for jurisdictions around the world.

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