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Low hanging fruit: climate change and tobacco endgame measures

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The health risks of tobacco use are well-documented and widely acknowledged by the public. Tobacco consumption is a leading cause of preventable diseases and deaths worldwide. However, the impact of tobacco goes beyond human health, extending to environmental degradation, climate change, and pollution. The environmental footprint of tobacco includes not only the production and distribution of tobacco products but also the waste generated, which continues to harm ecosystems for decades. These environmental costs—spanning deforestation, soil degradation, pollution from cigarette butts, and other forms of waste—are significant and unbalanced by any benefits to society. By addressing the tobacco epidemic, the global community could mitigate a substantial environmental burden and refocus resources on pressing climate change issues.

KEYWORDS
deforestation, law, plastic wastes, policy, tobacco and tobacco product, marine pollution

Introduction

Tobacco consumption is a leading cause of preventable diseases and deaths worldwide, and the health risks of smoking are well-documented and widely acknowledged by the public (Murray et al., 2020). However, the impact of tobacco goes beyond human health, extending to environmental degradation, climate change, and pollution (Zafeiridou et al., 2018a; Zafeiridou et al., 2018b; Hopkinson, 2025). The environmental footprint of tobacco includes not only the production and distribution of tobacco products but also the waste generated, which continues to harm ecosystems for decades. These impacts - spanning deforestation, soil degradation, and pollution from trillions of cigarette butts discarded each year into the environment, as well as other forms of waste - are substantial. They are also incurred without any societal benefit to balance the cost. By addressing the tobacco epidemic, the global community would mitigate a substantial environmental burden and refocus resources on pressing climate change issues (World Health Organisation, 2017).

In light of this, tobacco-related environmental harm presents an additional clear rationale for not only accelerating the implementation of the evidence-based measures in the World Health Organization Framework Convention on Tobacco Control (FCTC) but also for stronger tobacco policies as encouraged in Article 2.1 of the FCTC, which calls on countries to "implement measures beyond those required by this Convention" (WHO, 2003). One such policy approach is the adoption of "Tobacco Endgame" strategies, which focus on the cessation of tobacco production and consumption, rather than merely the mitigation of harm, as a pathway to health, economic, and environmental improvements (Tamil Selvan et al., 2024). Successfully implementing tobacco endgame policies could free up crucial resources, complement other climate change mitigation strategies, and provide valuable lessons for broader environmental policy, particularly for products that are also nonessential, toxic, and require upstream solutions.

The problem

Even before considering the environmental impact, the tobacco epidemic stands as one of the greatest preventable health crises in history. Tobacco is the leading cause of preventable death, responsible for over eight million fatalities annually worldwide. The healthcare burden of tobacco use is staggering, with direct medical costs and loss of productivity amounting to trillions of dollars every year (Goodchild et al., 2018).

The environmental consequences of tobacco production and use are profound, extending far beyond the immediate impact on human health. The entire lifecycle of tobacco products—from farming to disposal—leads to significant negative environmental externalities. Tobacco farming contributes to soil degradation, deforestation, and water pollution. Tobacco farming requires large amounts of pesticides and fertilizers, which contaminate local ecosystems, reducing biodiversity and contributing to soil toxification (Zafeiridou et al., 2018a).

Cigarette filters–known as "butts" post-consumption–are a particularly pernicious negative externality of the tobacco epidemic. Roughly 4.5 trillion butts end up in the environment each year, making them the number one source of waste and plastic waste (World Health Organization, 2022). The cellulose acetate in filters does not biodegrade and is a major source of plastic microfibres. Cigarette butts are full of toxins and carcinogens that leach into the environment (Novotny and Hamzai, 2024; Shen et al., 2021) and clearly meet the definition of "avoidable single-use plastics" as defined in the ongoing UN Global Plastics Treaty negotiations. In one laboratory experiment, a single butt introduced to a fish bowl killed half the fish (Slaughter et al., 2011; Novotny and Slaughter, 2014).

The environmental impact of tobacco stretches from the farm to the disposal of tobacco product waste. The full product life cycle—from cultivation to disposal—has numerous environmental consequences (Zafeiridou et al., 2018a; Zafeiridou et al., 2018b):

- **Soil Degradation and Toxification**: The chemicals used in tobacco cultivation deplete soil nutrients and create toxicity, making land unsuitable for future agricultural use.
- **Deforestation**: Tobacco farming also contributes to deforestation, particularly in regions where forests are cleared to make way for tobacco plantations and for curing tobacco leaf.
- **Manufacturing and Distribution**: The production process, which includes curing, manufacturing, and distribution, also generates significant emissions of greenhouse gases (GHGs).
- **Second and Third-Hand Smoke**: The emissions from burning tobacco contribute directly to air pollution and greenhouse gas emissions. Second-hand and third-hand smoke, which linger in the environment, worsen indoor air quality and harm those who are exposed passively.
- **Tobacco Product Waste (TPW)**: The disposal of cigarette butts, filters, and vape cartridges contributes to plastic pollution, which affects both terrestrial and marine ecosystems.
- **Excessive Water Use**: Cigarette production consumes 22 billion tons of water, which is more than 2.5 times the annual water supply of a country like the United Kingdom, and the production of 1 kg (kg) of tobacco is equivalent to the potable water needs of one person for an entire year (World Health Organization, 2022).

As a consequence of tobacco industry deception, popular belief is that the addition of filters to cigarettes reduces the health risks associated with smoking. Filters came into widespread use in the 1950s, as the health harms of smoking became obvious (Doll and Hill, 1950; Doll and Hill, 1954; Medical Research Council, 1957) and the industry needed marketing tools to convince people who smoke that quitting was unnecessary and that they could instead reduce their personal risk (Taylor, 1984). However filters do not reduce the toxic chemicals inhaled by smokers, who simply compensate by inhaling more. In fact, filters may increase the risk of certain types of lung illness including adenocarcinoma (Song et al., 2017). Cigarette butts end up in landfills, waterways, and oceans, leaching harmful chemicals into the environment (Beutel et al., 2021).

Redirecting resources

If the tobacco epidemic ended, the economic costs of tobacco-related healthcare, loss of productivity, and environmental damage mitigation could be redirected to other critical initiatives, such as addressing climate change, education, and the provision of universal healthcare. The United Nations Development Program estimates that tobacco costs the global economy $1.85 trillion per year, or 1.8% of global GDP, a figure that dwarfs total international development aid (Goodchild et al., 2018). In addition, many other societal problems worsened by the tobacco epidemic—such as deforestation, poverty and food security—would be made more manageable even in the absence of additional investment (World Health Organisation, 2017).

Human rights basis for tobacco endgame

The global community has long recognized the interdependence of human health and the environment. The right to health is enshrined in international law and is intimately connected to the right to live in a healthy environment. Tobacco use violates both rights by exposing individuals to harmful substances and contributing to environmental degradation (World Conference on Tobacco, 2018; Williams et al., 2024). Furthermore, tobacco production, particularly in low-income countries, disproportionately affects marginalized populations, including children, women, and racial minorities.

The impact of tobacco on vulnerable populations is significant. Children exposed to second-hand smoke are at greater risk for respiratory illnesses, while women, particularly in low-income countries, are more likely to be employed in the tobacco farming sector, often in poor working conditions. These conflict with both gender and intergenerational equity. Furthermore, tobacco-related health inequities disproportionately affect racial minorities, compounding existing social inequalities (Zafeiridou et al., 2018a; Romeo-Stuppy et al., 2022).

At its core, addressing tobacco use as an environmental issue is an extension of the health agenda. By eliminating tobacco

Box 1 The MPOWER framework.

- Monitor tobacco use and prevention policies
- Protect people from tobacco smoke
- Offer help to quit tobacco use
- Warn about the dangers of tobacco
- Enforce bans on tobacco advertising, promotion and sponsorship
- Raise taxes on tobacco

consumption and its associated environmental harms, societies could work toward a more sustainable, inhabitable world for future generations. Ensuring a healthy environment is a prerequisite for safeguarding human health and wellbeing.

To be sure, achieving global tobacco endgame will be a complex process and policies and progress will vary based on national and regional contexts. For example, many of the financial benefits of ending the tobacco epidemic will accrue over the medium- and long-term, but in many places–in particular low- and middle-income producer countries–the short-term costs may be painful. A whole-of-government approach must include multilateral institutions and donor countries to help overcome short-term obstacles.

World Health Organization (WHO) framework convention on tobacco control (FCTC)

The World Health Organization Framework Convention on Tobacco Control (FCTC) is the world's first global public health treaty. Adopted in 2003, the FCTC sets binding obligations for countries to implement measures that reduce tobacco use, including bans on advertising, public smoking, and health warnings on packaging (WHO, 2003). The FCTC has had notable successes, including the reduction of tobacco use prevalence in many countries. However, its implementation has faced challenges, particularly in relation to the influence of the tobacco industry, which continues to undermine public health efforts (McHardy et al., 2025; World Health Organisation, 2023).

Article 5.3 is the cornerstone of FCTC implementation and unique in global treaty-making. It emphasizes the importance of countering tobacco industry interference in policymaking and proscribes FCTC Parties from interacting with the tobacco industry beyond what is necessary to enforce law. The lessons learned from this approach can inform broader environmental policymaking, particularly in industries like fossil fuels, which also exert significant political influence and are a barrier to meaningful legislation.

FCTC Article 18 specifically addresses the obligation of Parties to protect the environment vis-à-vis tobacco. Article 18 has received increased attention at recent FCTC Conferences of the Parties (COPs), and a decision at COP 11 in November 2025 has spurred further consideration.

The MPOWER framework (Box 1) is an important structure for implementation of the FCTC, setting out measures that parties to the treaty need to take and against which progress can be assessed.

Related global mechanisms

The United Nations Sustainable Development Goals (SDGs) includes a specific target (3a) to strengthen the implementation of the WHO FCTC, highlighting the importance of tobacco control in the broader context of global health and the negative impact of tobacco consumption on global development (UN Development Programme, 2017).

The United Nations Noncommunicable Disease Global Action Plan (NCD GAP) focuses on reducing the burden of diseases caused by tobacco, which is the leading cause of preventable death worldwide (World Health Organisation, 2013). Tobacco control is a key component of the NCD GAP and is critical in mitigating the long-term health, economic, and environmental burdens of tobacco.

As discussed, tobacco control also strongly intersects with human rights, particularly in ensuring access to a healthy environment and protecting vulnerable populations from exploitation.

Tobacco and the tobacco industry have devastating consequences on the environment, including contributing to declining agricultural output and increasingly severe weather events, while reducing countries' resilience to the effects of climate change both by worsening population health and by increasing the burden on finite healthcare resources.

Tobacco endgame

The tobacco endgame approach, aimed at phasing out commercial tobacco sales entirely, addresses the health, environmental, and economic ramifications of tobacco production and consumption (Hopkinson, 2025; Tamil Selvan et al., 2024; Ollila et al., 2024). Policy approaches to the endgame have varied based on local context, ranging from immediate sales bans to birthdate-based sales phase-outs to the elimination of the sale of filtered cigarettes.

Strategies to mitigate the environmental impacts of the tobacco product life-cycle are either ineffective or have only trivial impacts. An example is litter picking, which accounts for only a few million of the trillions of butts discarded annually (Hopkinson, 2025). Worse, they can be used by the tobacco industry as a part of bogus corporate social responsibility or greenwashing, such as Extended Producer Responsibility schemes that have increasingly cropped up. Approaches that will reduce and end smoking are needed.

As of March 2026, 31 jurisdictions have passed tobacco endgame laws, and endgame bills are working their way through the parliaments of South Australia, France and the United Kingdom.

For the first time since the original negotiations, the FCTC COP has addressed Article 2.1, which calls on Parties to go beyond the specified obligations in the treaty. At least 15 countries have set endgame prevalence goals.

Conclusion

The environmental cost of tobacco is vast and often overlooked in the broader climate change discourse, missing an opportunity for policy synergy. The cultivation and curing of tobacco has a major impact on land use and deforestation, while disposal of cigarette waste into the environment drives forest fires and pollutes ecosystems. By implementing tobacco endgame policies, the world could not only reduce one of the largest preventable health threats but also free up resources to tackle pressing climate challenges. Estimates suggest that savings from tobacco-related healthcare costs could amount to $1.85 trillion per year, or 1.8% of global GDP (UNDP, 2018). Achieving tobacco endgame will require political will and a whole-of-government approach, leveraging global frameworks like the FCTC and lessons learned from other environmental treaties. Ending the tobacco epidemic is a critical step toward building a more sustainable, healthy future on a finite planet.

Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

Author contributions

CB: Writing – original draft, Visualization, Conceptualization, Project administration, Supervision. LH: Conceptualization, Writing – review and editing. KR-S: Conceptualization, Writing – review and editing. NH: Writing – review and editing.

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