

King Hussein Cancer Center

Position Statement on Electronic Nicotine Delivery Systems in Jordan

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مركز الحسين للسرطان
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About this position statement

Electronic Nicotine Delivery Systems or ENDS, known by many names (e.g. electronic cigarettes, Electronic Nicotine Delivery Devices, e-cigs, pods, pod-mods, tanks, vaping devices, vapes, vape pens),[1] are battery-operated devices that heat a liquid (a solvent typically containing nicotine, flavorants, and other chemicals) to generate an aerosol that is inhaled (rather than burn a tobacco mixture as with conventional cigarettes). While ENDS began appearing in some global market as early as 2006,[2] these products became officially licensed for sale in Jordan in 2019,[3] and have gained popularity in the community, particularly among adolescents, young adults, and females.

ENDS have been marketed globally by the tobacco industry as smoking cessation tools and as safer “smoke-free” alternatives to combustible cigarettes.[2] However, there are various ongoing concerns regarding ENDS, including their safety profile; their potential to fuel nicotine dependence as well as normalize smoking; their role as gateway products to other tobacco use; and the conflicting evidence about their use as smoking cessation tools.[4]

King Hussein Cancer Center (KHCC) – from the perspective of a clinical entity that treats both cancer patients and smokers, and seeks to contribute to the well-being of the Jordanian community – has issued this statement to highlight the key findings to date regarding the clinical and public health effects of ENDS; and to provide to healthcare practitioners and decision-makers with recommendations specific to the Jordanian context with regards to these products.

Key messages

- ✓ While Jordan has attempted to regulate ENDS, the country’s current regulatory framework has not been sufficient to curb the emergence of specialty vape shops and booths which have marketed hundreds of attractive youth and gender-oriented flavors and colors in a largely unrestricted manner, particularly through digital media.
- ✓ Jordan has faced longstanding challenges in tobacco control implementation. Historically, there have been inconsistent efforts from various governmental and nongovernmental entities to proactively support the Ministry of Health (MoH) in its tobacco control efforts. There is strong concern that the widespread use of ENDS in the country will further complicate the country’s national tobacco control goals.
- ✓ The evidence available thus far indicates that ENDS are not safe, and have the potential to impact health, with further research and long-term follow-up being required.
- ✓ In the absence of continually updated youth surveillance systems, we lack knowledge regarding the true impact of ENDS availability on current and potential tobacco use in the country, particularly among community groups that would have been less likely to become tobacco users in the absence of ENDS.

- ✓ The use of ENDS for smoking cessation has been based on studies with methodological limitations. Furthermore, these studies largely evaluate combustible cigarette smoking cessation, rather than complete cessation from both tobacco and recreational nicotine products.
- ✓ Due to the current tobacco and ENDS-related regulatory and implementation challenges, and due to the absence of continual monitoring of national public trends in use, healthcare professionals in Jordan should be cautious regarding these products, which may be imposing more harm than purported good to public health in the country.
- ✓ Jordan's MoH has expanded its smoking cessation clinics to now include 31 clinics across the country. These clinics utilize evidence-based medications for smoking cessation and should consistently be the first line of interventions promoted in Jordan for those seeking smoking cessation.
- ✓ In the event of failure of all lines of evidence-based therapy for smoking cessation, clinicians should not promote ENDS as smoking cessation tools. Rather, specific messaging regarding the ramifications of use of ENDS should be provided, with a disclaimer that these products cannot be clinically recommended by Jordanian healthcare practitioners.

The Burden of Tobacco in Jordan

Globally, tobacco control efforts have resulted in the decline of combustible cigarette smoking. However, this decline has been disparate across countries and the number of smokers has been increasing in certain low and middle-income countries.[5] Current estimates indicate that approximately 80% of smokers reside in low and middle-income countries (LMICs),[6] areas which the tobacco industry is increasingly targeting.[7] The disproportionate burden of tobacco use warrants more intensive efforts to address events and emerging products that may further contribute to the tobacco epidemic.

Smoking rates in Jordan are some of the highest in the world and have been increasing. From 2007 to 2019, overall smoking prevalence increased by 45% (29% vs 42%).[8, 9] As of 2024, the Jordan Adult Tobacco Survey (JATS) revealed a higher prevalence of use of tobacco or ENDS in men and women: 71.2% and 28.8% respectively (in 2019, tobacco use rates were 66.1% and 17.4% in men and women). [9, 10] In Jordan's Global Youth Tobacco Survey of 2014, adolescent smoking in Jordan (children aged 13 to 15) was reported by approximately a quarter of students.[11] In a more recent national school survey (conducted between December 2022 and April 2023), 19.2%, 15.1%, and 9.8% of 12 to 18 year olds were smoking waterpipe, ENDS, and conventional cigarettes, respectively.[12]

More concerning, the high rates of smoking in the country exist within a challenging environment for tobacco control, namely an environment with limited implementation of Jordan's Public Health Law articles that pertain to tobacco control, coupled with a flooding over recent years, of ENDS in the Jordanian market.[13] It is noteworthy that globally, tobacco use has been declining across several countries, placing Jordan in stark contrast to global trends.

ENDS use in Jordan

Jordan, in its efforts to curb illegal entry of ENDS into the country, developed policies in 2019 to legalize ENDS,* but these policies have not deterred the mushrooming of ENDS products that are clearly marketed in an aesthetic and irresponsible manner to target community groups. Data about ENDS prevalence of use at the national level are scarce. The 2018/2019 STEPs survey was the first national survey in Jordan that asked respondents about ENDS use (daily, non-daily, and ever-used). Despite ENDS not yet being licensed for sale in the country at the time of the survey, approximately 16% and 3% of male and female adult respondents, respectively, used ENDS (9.6% overall). Notably, while in men smoking cessation was the most frequently cited reason for use, among the smaller group of women using these products, enjoyable flavors were the most commonly cited reason.[9] In another national survey conducted a few months after ENDS legalization,* approximately 11% and 14% of male and female adult respondents, respectively, reported use of ENDS (11.7% overall). [14] In studies subsequent to these surveys, ENDS use continued to be documented: 11% of college students surveyed between October 2020 and January 2021 reported ENDS use;[15] while in other surveys of college students, there have been higher rates of use reported. Specifically, in two additional studies, 15.8% and 37.4% of students reported ever-use of ENDS.[16, 17] The 2024 Jordan Adult Tobacco Survey indicates that rates of ENDS use among Jordanians aged 15 or older is 7.2%.[10]

* ENDS were legalized in May of 2019 and published in the National Gazette in July of 2019.

A closer look at ENDS

The design features of ENDS

ENDS have evolved dramatically since they first emerged in the market. First generation ENDS resembled combustible cigarettes in exterior but have gradually changed in appearance, becoming sleeker and less emblematic of the combustible cigarette with time, while also delivering higher concentrations of nicotine in a faster [and more addictive] manner. ENDS (ranging from first generation to fourth generation devices) present in various forms including both disposable and refillable, with a wide variety of nicotine concentrations; different types of nicotine (salt versus freebase; synthetic versus tobacco-derived); variable voltage; a countless number of possible e-liquid constituents; and variable 'hacking' potential, all which alter their safety, nicotine bioavailability profiles, and regulatory mechanisms.[1, 18, 19] There is limited [publicly available] information regarding market consumption data and market shares of specific types/characteristics of ENDS in Jordan.

Toxicology of ENDS

ENDS heat liquids that typically contain nicotine (free-base or salt), flavors, water, and humectants such as propylene glycol and vegetable glycerin.[20] In addition to the chemicals originating from the e-liquid, the heating of the e-liquid involves chemical reactions which further generate additional compounds with the potential to be toxic. Contrary to what many may believe, the liquids in ENDS are not simple solutions that may or may not contain nicotine. Rather, hundreds of chemicals – many with carcinogenic or toxic, inflammatory characteristics – have been identified in ENDS liquids and aerosols, including nicotine, propylene glycol, tobacco-specific nitrosamines, aldehydes, metals, volatile organic compounds, phenolic compounds, polycyclic aromatic hydrocarbons, flavorings, and tobacco alkaloids (the concentrations of these compounds are generally lower than combustible cigarettes, but are highly variable across ENDS devices and liquids).[21-23] In addition, some ENDS liquids may be infused with drugs such as tetrahydrocannabinol.[21]

It is important to note that concerns have been raised regarding labeled nicotine content in ENDS liquids: studies have demonstrated that these liquids, including "nicotine-free" labelled liquids, can be mislabeled and may contain higher or more variable concentrations of nicotine than those specified in the label.[24, 25]

Health impacts of ENDS

Since their marketing, there has been a pervading public perception that ENDS are less harmful than combustible cigarettes.[26-29] Moreover, health authorities such as Public Health England have endorsed a widely cited claim that ENDS are "95% less harmful" than combustible cigarettes,[30] a claim that has been critiqued as one based on scientific opinion from a group of 12 experts, rather than clear, hard evidence; moreover, this claim has a limited perspective of what constitutes harm; and was based on limited knowledge about older ENDS.[31-33]

In reality, there are limited longitudinal epidemiological studies linking long-term health effect of exposure to e-cigarettes. Most of the evidence on the direct effects of ENDS relies on in vitro and animal studies; human studies are largely limited to acute pathophysiologic mechanisms and intermediate health endpoints.[34] There are methodological challenges related to measuring the health effects of these devices, including: the limited time that ENDS have been in the global market; the evolving nature of device characteristics and heterogeneous nature of vaping topography; and the availability of thousands

of e-liquids that contain various flavorings, nicotine amounts, and other constituents.[21, 35] Moreover, many ENDS users are former or current tobacco smokers, rendering the teasing apart of ENDS health effects from those of combustible tobacco use methodologically challenging.[35] Nevertheless, useful frameworks for evaluating ENDS are available to guide researchers,[36] and numerous reviews have been published with regards to the potential health effects of ENDS on various body systems (see as examples Banks et. al,[37] and Kaur et. al, [38]).

Cardiovascular health

Nicotine activates the sympathetic nervous system resulting in increased heart rate and blood pressure, and coronary vasoconstriction, and there is some evidence to suggest that ENDS use also is linked to detrimental changes in biomarkers of oxidative stress, an increase in systolic blood pressure, increased endothelial dysfunction and arterial stiffness, and impaired autonomic cardiovascular control.[21, 39, 40] With regards to cardiovascular disease (CVD), a cross-sectional analysis of 175,549 respondents revealed that lifetime incidence of myocardial infarction (MI) was associated with ENDS use only among current tobacco smokers,[41] and reviews have also suggested that ENDS use (exclusive or with combustible cigarettes) is associated with an increased MI risk.[42, 43] However, there is still insufficient evidence to draw conclusive statements regarding the risk of clinical cardiovascular disease among ENDS users who are non-tobacco smokers.[44, 45] The lack of association should be interpreted cautiously, and should not be taken as evidence that ENDS are harmful only when combined with smoking, particularly because exclusive ENDS users (who are nonsmokers) tend to be younger,[46] and because of the shorter follow-up period in studies evaluating MI risk with ENDS use. Thus, the lack of statistically significant associations of ENDS use with CVD (such as MI) among exclusive ENDS users may be due to the insufficient time to develop clinically significant CVD in these studies.[45] Berlowitz et. al. also reported insignificant differences in CVD risks among dual users and exclusive cigarette smokers which weakens the popular notion that adding ENDS use in smokers could lower CVD events.

Taken together, and given the evidence gaps regarding the cardiovascular effects of ENDS,[47] ENDS should not be labelled as cardiovascular- safe products or as products which will definitely lower the risks of CVD in tobacco smokers.

Respiratory health

ENDS use in youth was significantly associated with higher reported respiratory adverse events when compared to nonsmokers.[48, 49] There is moderate certainty that ENDS are associated with less serious respiratory adverse events (wheezing, cough, chest pain, shortness of breath, and phlegm production) among ENDS users compared with combustible cigarette smokers.[44] There is insufficient evidence to support the possibility that switching to ENDS (exclusive or dual use) in asthmatic and Chronic Obstructive Pulmonary Disease (COPD) patients could reduce respiratory exacerbations or disease progression.[44] While few studies have explored this association and reported improved symptoms in asthma and COPD, these studies have been limited in size and power.[50, 51]

During the summer of 2019, e-cigarette or vaping product associated lung injury (EVALI) outbreaks were reported almost exclusively in the United States, and as of February 18, 2020, a total of 2807 hospitalized patients with nonfatal cases and 68 deaths of EVALI have been reported to the United States Centers for Disease Control and Prevention (CDC).[52] Additional cases have been reported worldwide, including Jordan.[52-56] There is conclusive evidence that the EVALI epidemic was caused by the use of ENDS,[36]

and while lung injury was linked to vitamin E acetate (an additive used in tetrahydrocannabinol-containing e-liquids), the exact etiology of EVALI is yet to be determined.[47, 52]

Nicotine dependence

Nicotine is the primary psychoactive addictive constituent that drives sustained smoking, while other non-nicotine factors associated with tobacco self-administration (e.g., taste, aroma, throat irritation, airway sensations, sight, and the hand-to-mouth movements) as well as other chemicals in tobacco products (such as acetaldehyde) play a role in fueling the nicotine addiction.[57, 58] As with combustible cigarettes, ENDS are designed to deliver nicotine. Moreover, the nicotine being delivered through ENDS is increasingly being delivered in higher amounts and with faster time to peak concentration as ENDS' design features have changed and e-liquids have become more concentrated.[59, 60] ENDS use also is accompanied by enjoyable sensory stimuli that further promote their use.[61, 62] It is therefore not surprising that signs of dependence have been reported in ENDS users who do not smoke tobacco,[63] and that evidence is conclusive that ENDS use leads to nicotine addiction.[44] Relatedly, ENDS features (flavors, designs, concentrations) may alter user experiences, and require further study in order to better understand how the rapidly evolving features of ENDS affect use as well as the potential for abuse of these products. It is important to emphasize that 'low nicotine' e-liquids are not an assurance that a user will inhale lower amounts of nicotine or toxic chemicals: vaping behavior, puffing topography (puff duration, puff volume and inter-puff interval), and device wattage are amongst the factors that can lead to higher exposure to nicotine and other toxic chemicals in users of low nicotine e-liquids.[64, 65]

Given the association of ENDS use with development (or perpetuation) of nicotine dependence, the concerns regarding tobacco smoking's effect [via nicotine] on adolescent cognitive function and brain development as a result of neurochemical changes with prolonged nicotine exposure, also apply to the use of ENDS.[66-68] Furthermore, nicotine use in adolescents has been associated with other substance abuse,[69] and given the potential for e-liquids to be modified, this concern becomes even more serious when considering adolescent ENDS use. The surge of ENDS globally is now a recognized threat to pediatric health and wellbeing.[70, 71]

Mental health

In both adults and adolescents, ENDS use has been associated with various mental health conditions and symptoms, including anxiety, depression, suicidality, impulsivity, stress, and problems with concentration. [72-80] The directionality of these associations is unclear and requires further study, but it is evident that ENDS use warrants caution, given its potential to predispose to and/or worsen certain mental health conditions.

Neurological diseases

ENDS use has been linked to neurological symptoms including seizures. The United States Food and Drug Administration issued a special announcement alerting of seizure reports received by the FDA and the American Association of Poison Control Centers in some ENDS users.[81] Seizures have typically been reported with poisoning (e-liquid ingestion),[44] but surveillance reports indicate that ENDS use in their intended manner (inhalation) has also been linked seizures as well as other neurological symptoms (tremors, syncope).[82]

Cancer

Given the long latency period between carcinogen exposure and cancer formation, evidence on the effect of ENDS use on carcinogenesis in humans is extremely sparse.[44] Findings from laboratory studies suggest a carcinogenic potential of ENDS,[83-85] and samples taken from ENDS users exhibit DNA alterations consistent with those observed with cigarette smokers.[86, 87] There is therefore a clear scientific premise for the carcinogenicity of ENDS,[88-90] and more studies emerging suggesting links to specific cancers such as lung cancer.[91] Nevertheless, this association requires further extensive investigation.[92] It is relevant to note that Cancer Organizations have warned against the widespread use of ENDS,[93, 94] and that the American Cancer Society does not recommend their use as cessation aids.[94]

Other effects

Other harmful effects that have been associated with ENDS use include sleep disorders, cough, throat irritation, dizziness or lightheadedness, dry mouth, headache and nausea.[44, 95-98]

Unintended effects

ENDS use has been associated with poisoning due to intentional or accidental e-liquid ingestion (leading to symptoms such as vomiting, diarrhea, abdominal pain, and seizures); burns and injuries; and environmental hazards due to an increase in airborne particulate matter, particularly in in-door environments.[44, 99]

ENDS and smoking cessation

ENDS, since their availability in the global market, have been promoted as “safer” tools to quit tobacco smoking.[21] Several studies have attempted to evaluate the efficacy of ENDS for smoking cessation (rather than nicotine cessation). It is important to distinguish smoking cessation from nicotine cessation in the context of ENDS.

Reviews have varied in their conclusions regarding ENDS as smoking cessation tools, largely due to the variability (in design and quality) of studies.[100] A recent Cochrane review indicated that the use of ENDS could help smokers [followed for six months to one year] abstain from tobacco product use.[101] Specifically, nicotine-containing ENDS relative to nicotine replacement therapies increased the chances of tobacco cessation by 55%; while nicotine-containing ENDS relative to non-nicotine containing ENDS increased the chances of tobacco cessation by 34%. These relative findings were translated to the following anticipated absolute effects:

Comparison (A) [101]	Nicotine-containing ENDS: 9 out of 100 abstained at 6 months to a year relative to NRTs (6 out of 100 abstained at 6 months to a year)
Comparison (B) [101]	Nicotine-containing ENDS: 8 out of 100 abstained at 6 months to a year relative to non-nicotine-containing ENDS (6 out of 100 abstained at 6 months to a year)
Comparison (C) [101]	Nicotine-containing ENDS: 7 out of 100 abstained at 6 months to a year relative to behavioral support or no support (4 out of 100 abstained at 6 months to a year)
Comparison (D) [102]	Combination forms of NRTs*: 174 out of 1000 abstained, relative to 137 out of 1000 in single-form NRTs (studies with atleast 6 months follow-up included)
Comparison (E) [103]	Varenicline: 14 per 100 abstained, relative to 6 per 100 with placebo (at 6 to 12 months)

Comparison (F) [103]	Nicotine-containing ENDS: 14 per 100 abstained, relative to 6 per 100 with placebo (at 6 to 12 months)
Comparison (G) [103]	Fast-acting NRT or nicotine patch: 8 to 9 per 100 abstained, relative to 6 per 100 with placebo (at 6 to 12 months)

* NRTs: Nicotine replacement therapies

The studies reporting abstinence with ENDS referred to tobacco use abstinence rather than nicotine abstinence.[104] In fact, nicotine abstinence is far more likely when using evidence-based pharmacotherapies such as nicotine replacement therapy than when using ENDS: specifically, for every 100 smokers that were given nicotine replacement therapy, 7 were predicted to stop both smoking and nicotine use while 2 were predicted to stop smoking but continue to use the nicotine replacement therapy (a well-established and safe medicament). For every 100 smokers that were given ENDS, 3.7 were predicted to stop both smoking and nicotine use while 10.6 were predicted to stop smoking but continue ENDS use.[104]

In addition it is also important to note that of the nine analyses which compared ENDS to NRTs in the Cochrane review,[101] only two demonstrated a significantly higher (than NRT) rate of tobacco use cessation;[105, 106] and in both of these studies, the use of NRTs was suboptimal (e.g. limited coverage, or coverage for a shorter period of time than is recommended for use). In one of the larger studies included in the Cochrane review, significantly higher rates of abstinence from smoking at 6 months with ENDS were observed when compared to “optional” NRTs: vouchers of a negligible monetary amount (50 USD, which could have been used for any purpose) were distributed to those in the NRT arm, while those in the ENDS arm received six months of free ENDS (including various flavors and paraphernalia).[107] Moreover, in a systematic review to assess the long-term abstinence and relapse rates associated with ENDS, the evidence was inconclusive with regards whether or not the effects observed with ENDS were sustained.[108]

In light of these arguable numbers as well as various methodological limitations and concerns,[109] it is important to reiterate the value of well-established and objectively evaluated evidence-based pharmacological and behavioral approaches, which are the foundation of Jordan’s Tobacco Dependence Treatment guidelines,[110] guidelines employed by the MoH’s 31 tobacco dependence treatment clinics that have been established across the Kingdom.[111]

Messaging regarding ENDS as cessation tools

In the event that healthcare practitioners may need to discuss ENDS with smokers, they should do so realizing the various caveats specific to Jordan, as well as the general caveats of using these products. Several recommendations with regards to messaging about ENDS as cessation tools have been proposed.[112] Some of these recommendations have been adapted to the Jordanian context and are included below with other important points for Jordanian healthcare practitioners to note:

- i. Provision of intensive tobacco dependence treatment or referral to a smoking cessation clinic (e.g. clinics within primary healthcare centers in the MoH [111]) is the first line of action for healthcare practitioners. If a smoker is seeking to quit, they should exhaust structured behavioral strategies and first-line, evidence-based regimens such as nicotine-replacement therapies, varenicline, and bupropion.
- ii. Practitioners should not encourage or endorse ENDS as smoking cessation tools. If smokers request information regarding ENDS, healthcare practitioners should have a clear discussion with

patients to explain that although there are a few studies that ENDS can help people stop smoking combustible cigarettes, the studies are limited in their timeframes as well as generalizability to the Jordanian smoker. Furthermore, resorting to ENDS as a smoking cessation tool could result in continued use of ENDS and perpetuation of nicotine addiction. Dual use is also a possible consequence, meaning that the risks of tobacco use have not been completely eliminated. It is also important to note that the Jordanian Food and Drug Administration (JFDA) has not approved ENDS specifically as cessation aids (unlike smoking cessation medications).

- iii. Although ENDS may produce lower quantities of harmful products than combustible cigarettes, ENDS use is not harmless, and the long-term impact of their use still needs to be studied. Because of the uncertainty still attached to ENDS use, those who opt to use them should still plan on quitting them as soon as possible. It is also necessary to note that ENDS pose harms due to both the nature of how they operate (heating an e-liquid, regardless of whether or not the e-liquid is labelled “nicotine-free”) as well as their nicotine delivery in potentially addictive and harmful concentrations (when e-liquids contain nicotine).
- iv. Any evidence-based cessation method requires a behavioral support component in order to increase the likelihood of quitting success. ‘Quitting’ merely by switching to ENDS use ignores the complexity of nicotine addiction and tobacco use.
- v. It is difficult to determine precisely what is delivered to an ENDS user in terms of nicotine or toxicants. E-liquids vary tremendously, and puff topography as well as device characteristics alter the concentrations of chemicals released and delivered to the user. The ENDS market in Jordan contains various selections of devices, nicotine concentrations, and flavors. This makes the role of a healthcare practitioner in advising or monitoring an ENDS user challenging.
- vi. It is important that ENDS users be warned about hacking or altering commercial ENDS.
- vii. Any problems associated with ENDS use should be reported immediately to the JFDA.
- viii. ENDS use should be discouraged in people who do not use combustible tobacco products.

Dual use of ENDS and tobacco products

Dual use of ENDS and combustible cigarettes is reported in studies of ENDS users. The reasons behind dual use and the associated health effects require further investigation.[113, 114] With the availability of ENDS and an accessible tobacco product market, dual users of both ENDS and smoked tobacco products are likely to become more prevalent in Jordan.

ENDS use as a gateway to smoking

The subject of whether or not ENDS use in nonsmokers increases the likelihood of their transitioning to tobacco smoke continues to be studied. No consensus has been reached, with studies providing evidence supporting this theory, and others suggesting no effect.[115-119] It is important to note that tobacco use and vaping rates are influenced by country-level environmental and policy factors and country-specific details.[120-124]

Until Jordan fully implements its tobacco control related articles of its Public Health Law and sound surveillance systems become established within its tobacco control efforts, the potential for current vaping trends in the country to fuel a greater tobacco epidemic cannot be ruled out, particularly due to the high rates of use of both cigarettes and waterpipe. Jordan has faced longstanding challenges in tobacco control implementation pre-ENDS era,[13] particularly due to the historically limited efforts [from

other governmental and nongovernmental entities] to engage with the MoH's tobacco control efforts. It is therefore highly likely that the widespread use of ENDS in the country will further deter the country from lowering its tobacco use rates.

The ENDS regulatory framework

Jordan signed the World Health Organization's Framework Convention on Tobacco Control (FCTC) in 2004, and has since then attempted to match the majority of its regulatory tobacco policies with the FCTC treaty. With the emergence of ENDS, the WHO, during its seventh conference of the parties to the WHO FCTC, emphasized the importance of countries implementing additional measures to regulate ENDS.[125] In addition to the global demand for regulatory measures, it became clear that illegal ENDS markets were emerging in Jordan.[126] In fact, during a market study conducted by King Hussein Cancer Center during 2018/2019 (i.e. when ENDS were still illegal), 63 types of ENDS and 75 e-liquid brands (with a variety of flavors) were identified in the selection of 42 traditional point of sales and 32 online point of sales that were included in the study.[127] As a result of global tobacco control calls as well as a seemingly inevitable influx of ENDS into the country, Jordan in 2019 expanded its commitments under the FCTC treaty, established ENDS-specific regulatory measures, and legalized ENDS.[128] However, unlike previous tobacco product regulations which were developed through the MoH and the Jordan Standards and Metrology Organization (JSMO), ENDS regulations were established under the JFDA[†]. [129] In December of 2021, Jordan's FDA reported registering 184 entities to sell ENDS.[130] As of 2022, there were over 570 e-liquid (nicotine salt and free base nicotine) variations and 223 device variations registered in the Jordanian market (internal data). In other countries, analyses of the chemical and toxicant components of ENDS on the market has informed how these products should be regulated.[131] To date, no studies on the chemical constituents of these products (specifically in the Jordanian market) have been conducted or else made publicly available.

ENDS are classified under tobacco products in the JFDA and are currently regulated through JFDA. Important elements of Jordan's ENDS regulations established by its FDA include:[128, 132]

- Age restrictions (not available to those younger than 19);
- Including a warning label regarding nicotine and its addictive nature;
- Limiting the maximum capacity of the "tank allocated for refilling the electronic liquid" to 2 ml;
- Limiting the maximum capacity of the "refills for refilling the electronic liquid" to 60 ml;
- Limiting concentrations of nicotine (free nicotine: up to 20 mg/ml; nicotine salt: up to 25 mg/ml);
- Prohibiting the promotion of ENDS;
- Prohibiting the sales of ENDS within a 500 m radius from schools and hospitals; and
- Restricting the display and promotion of ENDS.

The current JFDA ENDS regulations do not explicitly state what flavors are considered appealing to youth, nor do they explicitly state which flavors are not allowed.

[†] More recently, the regulation of all tobacco products as well as ENDS and heat-not-burn tobacco are under the jurisdiction of JFDA, which nevertheless continues to work with other entities to regulate these products.

It is relevant to note that although ENDS are currently not regulated by JSMO, JSMO also issued ENDS standards in 2019, which included the following restrictions:[133]

- Limiting the maximum capacity of refill containers to 10 ml;
- Limiting the maximum capacity of “single-use” containers to 2 ml;
- Limiting concentrations of nicotine to 20 mg/ml (with no specification with regards to type of nicotine).

With regards to regulation through taxation, ENDS, like other tobacco products, are subject to special taxes. When initially marketed, ENDS (devices and liquids) were pooled in a single category, and a 200% tax was imposed on the category. In September of 2024, a new tax system was announced: a 5 JOD per ml tax was imposed on prefilled ENDS; a 15 JOD tax was imposed on ENDS devices; and a 1 JOD per ml tax was imposed on ENDS liquids.[134, 135] By December of 2025, further amendments were announced resulting in a rollback of excise taxes on ENDS and related products. The tax on prefilled ENDS was reduced to 30% of the previously established rate, declining from 5 JOD per ml to 1.5 JOD per ml. Similarly, the tax on ENDS devices was lowered to 10 JOD per device, representing 60% of the previous rate. Taxes on e-liquids also was reduced by 50%.[136]

Implementation of the ENDS regulatory framework in Jordan

To date, the current JFDA regulations have not been evaluated with regards to extent of implementation. However, in light of the numerous points of sales for ENDS that have now become a norm in Jordan, and what has been observed of youth-appealing flavors and devices appearances in the country, it is reasonable to state that more efforts are needed to control these products in the Jordanian market. ENDS are available in diverse, attractive flavors. Surges of ENDS use at schools were reported as early as 2019.[137, 138] In a more recent field study conducted by Tobacco-free Jordan and King Hussein Cancer Center, data collectors scoped the 150m radius of 94 schools in two districts of Amman and found [across 213 shops within this radius] that 69.0% of stores were directly violating Jordan’s Public Health law by selling at least one tobacco/electronic nicotine product (approximately 12% sold ENDS or e-liquids) around schools.[139]

The tobacco backdrop in Jordan and ENDS regulations

There have been concerns that the emergence of ENDS (in addition to new tobacco products) will likely distract from reaching a tobacco endgame,[140] Thus, the ENDS regulatory framework in Jordan cannot be presented in isolation of Jordan’s other tobacco control regulations.

In theory, Jordan’s current laws prohibit the sales of tobacco products to those younger than 18, while ENDS products cannot be sold to those younger than 19; smoking “in all its forms” is banned in public places and public transit; promotion of any form of tobacco products is prohibited; and the regulations authorize considerable penalties on entities or persons violating these regulations.[141] In reality, the implementation of these regulations has been problematic. Minors can easily access tobacco products, exposure to tobacco smoke is rife, penalties are insufficiently enforced, and tobacco and ENDS use is prevalent and normalized.[9]

To effectively address ENDS in the Jordanian market, regulations for both ENDS as well as tobacco products must be aligned and comprehensively enforced, to preempt complementary or substitutive effects between products. Excise taxes on tobacco products and ENDS in Jordan illustrate a gap in this approach: taxes were raised inconsistently across categories (cigarettes; waterpipe molasses; ENDS devices and liquids; and heated tobacco product devices and sticks) such that some products remained affordable. Other tobacco products and paraphernalia (e.g. rolling tobacco, tumbak, and waterpipe devices) were either left unchanged or remained not subject to specific taxes. In addition, the tax system continues to be complex and inconsistent, varying by final pack price for cigarettes and heat sticks, and by type of ENDS (disposable ENDS or refillable ENDS).

Although prices and affordability of ENDS in Jordan have not been studied, ENDS, despite the change in taxes, continue to be widely used and accessible. Possible reasons include the presence of large quantities of ENDS in the market prior to tax changes in 2024, and the presence of smuggled ENDS, but this would require studies to confirm.

ENDS regulations and other country experiences

Globally, the approach to tobacco control has entailed the regulation of ENDS alongside other tobacco products in order to avoid the further fueling of a long-existing tobacco epidemic.[142] Even in the UK, one of the few countries to attempt to medicalize ENDS, the availability of ENDS has also been accompanied with calls for tighter regulations (both tobacco and ENDS-specific) to enable achieving “smoke-free” objectives for the country.[143]

The regulation of ENDS has been proposed through various means including:[112, 144-148]

- i. Pre-Marketing authorizations
- ii. Restricting nicotine concentration of e-liquids
- iii. Minimum age of purchase
- iv. Restricting volumes of e-liquids
- v. Prohibiting or regulating ENDS marketing
- vi. Excise tax on ENDS
- vii. Bans or restrictions on ENDS use in public places
- viii. Health warnings on ENDS
- ix. Child-resistant packaging
- x. Entire bans on ENDS
- xi. Banning specific forms of ENDS such as disposables
- xii. Restricting access to ENDS as prescription-only products
- xiii. Ban on non-tobacco flavored ENDS
- xiv. Ban on non-tobacco and non-menthol flavored ENDS
- xv. Ban on nicotine-containing ENDS
- xvi. Plain packaging

With regards to Jordan, approaches (i) through (viii) are in theory part of Jordan’s tobacco regulations. However, their implementation, particularly with regards to promotions, minimum age of purchase, accessibility, and use in public places, does not appear to be rigorous. Social media promotion of ENDS is pervasive; ENDS are sold widely in appealing forms and flavors to all age groups and smoking/non-smoking

groups; ENDS and their [alluring to youth and women] paraphernalia are easily accessible in the Jordanian market; and smoking as well as vaping are prevalent in public spaces.

Recommendations[†]

The World Health Organization's call for more intensive efforts to control ENDS should be heeded in Jordan.[149] The status quo in the country with regards to tobacco and ENDS control is to its disadvantage, and presence of these devices have complicated a pre-existing epidemic. To encourage a conducive change, various clinical and public health recommendations to address the current ENDS situation in Jordan are included below:

1. With regards to smokers seeking cessation tools, evidence-based pharmacotherapeutic and behavioral solutions are available. Healthcare practitioners should not encourage smokers to use products [ENDS] for which comprehensive advice regarding safety and methods of use are either incomplete or difficult to provide. ENDS (both devices and liquids) as well as ENDS user behaviors are highly heterogeneous,[150] and render difficult the provision of information regarding the quantification of ENDS use and nicotine/toxic chemical exposure. Given that the rates of nicotine abstinence are low with ENDS use, and the rates of smoking abstinence are not considerably higher than those observed with approved pharmacotherapies, ENDS should not be promoted as viable cessation tools.

2. The short and long-term effects of ENDS use on physical as well as psychological health and their potential to lead to subsequent tobacco product use require further research. There is a global deficit of health information with regards to ENDS due to their relative recency in the market. Given the tobacco industry's well-documented history of fueling tobacco use through misleading claims regarding its products,[151] coupled with the wide promotion of these products to vulnerable groups that is being observed in Jordan, ENDS should not be readily accepted nor promoted as "safer" alternatives. This position should be assumed until ENDS are more stringently regulated, and the tobacco industry in Jordan (represented by both manufacturers, distributors and sellers) clearly demonstrates that these products are not being marketed to vulnerable groups, and access to them is controlled.

Establishing the risk/benefit ratio of ENDS and their effects on public health in Jordan requires the integration of current and emerging evidence on both the direct and indirect exposures and effects while also considering Jordanian contextual factors and baselines, as well as country-specific regulatory elements. Until reliable data become available, healthcare practitioners in Jordan are unable to make clear statements regarding the wider impact of ENDS on Public Health in the country (i.e. impact on health as well as tobacco and ENDS use in the community).

3. Surveillance systems are indispensable tools that inform how tobacco and ENDS use has changed over the years.[152, 153] In the US for example, large longitudinal cohort studies such as PATH (Population Assessment of Tobacco and Health) monitor the changing rates of tobacco and ENDS use,[154] and have alerted decision makers with regards to escalating rates of ENDS use. Such continually updated surveillance systems are currently lacking in Jordan – particularly those pertaining to youth and young adults. Thus, as of yet, we are unaware of the true impact of this loosely regulated group of products on

[†] Further priorities and recommendations elicited from tobacco control stakeholders through a participatory roundtable that was conducted after launching the Position Statement also are available from www.khcc.jo/en/enriching-the-national-tobacco-control-programs

current and potential tobacco use, particularly on vulnerable groups and groups that would have been less likely to become tobacco users in the absence of ENDS.

4. Regulation of ENDS to deter the promotion of these products to vulnerable groups, and to avoid a surge in nicotine addiction and the possibility of transitions to combustible cigarette or waterpipe smoking, requires that Jordan's authorities and the tobacco control community (led by the MoH and inclusive of the various governmental and nongovernmental stakeholders) collectively promote and implement all tobacco and ENDS regulations towards one end goal (protecting public health and ending the tobacco epidemic). In Jordan, multiple authorities oversee the regulation of ENDS and tobacco products and their markets (e.g. MoH, Ministry of Industry and Trade, the Ministry of Finance Income and Sales Tax Department, Ministry of Local Administration, Ministry of Interior, Ministry of Education, JFDA, JSMO, Jordan Customs, affiliated institutions, and several other institutions). Objectives across these stakeholders do not always align (some arguably have competing objectives), and differences in tobacco product (versus ENDS) regulations create confusion. There has been inconsistency in endorsing and implementing sensitive demand-reduction measures, as exemplified by reversal in 2025 of the increased special taxes on ENDS [in 2024], spurred by industry-led circulation of illicit trade concerns.[155] These regressions undermine the fact that tax increases effectively reduce the affordability and consumption of nicotine products. Thus, Jordan's regulatory environment has impeded a comprehensive tobacco and ENDS control process.

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