

NOVEL AND EMERGING TOBACCO AND NICOTINE

PRODUCTS IN GHANA

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ACRONYMS AND ABBREVIATIONS

ENDS	Electronic Nicotine Delivery System
ENNDS	Electronic Non-Nicotine Delivery System
E-liquids	Electronic Liquids
E-Pipes	Electronic Pipes
E-Cigar	Electronic Cigar
E-Cigarette	Electronic Cigarette
EN&NNDS	Electronic Nicotine & Non-Nicotine Delivery System
E-Cig	Electronic Cigarette
FCTC	Framework Convention on Tobacco Control
FDA	Food and Drugs Authority
GYTS	Global Youth Tobacco Survey
GRA	Ghana Revenue Authority
HICs	High-Income Countries
HTPs	Heated Tobacco Products
LMICs	Low and Middle-Income Countries
PICO	Population Intervention Comparator Outcome
RCT	Randomized Control Trial
TJNA	Tax Justice Network Africa
VALD	Vision for Alternative Development
WHO	World Health Organization

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BACKGROUND



Tobacco smoking kills more than eight million people worldwide annually, with a disproportionately high burden of these deaths occurring in low-income and middle-income countries (LMICs). Since the mid-2000s, the tobacco and nicotine product landscape has been expanded to include a variety of new products including electronic cigarettes (e-cigarettes). The use of electronic cigarettes commonly referred to as vaping, has seen an exponential surge internationally in recent years, with numerous countries noting an uptick in users (Yoong et al. 2021). There are many different types of e-cigarettes, the most common types of electronic nicotine delivery system (ENDS) and electronic non-nicotine delivery system (ENNDS) (Figure 1). However, the portrayal of e-cigarette usage in African news remains unclear.

Electronic nicotine and non-nicotine delivery systems (EN&NNDS) are a heterogeneous class of products that use an electrically powered coil to heat and turn a liquid (e-liquids) into an aerosol, which is inhaled by the user. These e-liquids may or may not contain nicotine (but do not contain tobacco). They also typically contain additives, flavours, and chemicals harmful to people's health. The generation and composition of aerosol during EN&NNDS use or so-called vaping and the subsequent exposure to aerosol substances is determined by four factors: the e-liquid composition; the materials used in manufacturing the

device; the electrical power or wattage used during the operation to heat the e-liquid; and the puffing topography or inhaling characteristics of the user while using EN&NNDS. E-liquids always contain carrier liquids (humectants), which comprise 80–90% of the volume of the liquid, some water (10–20% of the volume), and, generally, nicotine and flavours (Figure 2). E-liquids may also contain nicotine, a highly addictive substance, that may adversely affect fetal and adolescent brain development. ENDS contain nicotine, whereas ENNDS are labeled as not containing nicotine, although this claim is not always accurate. . The most commonly used type of ENDS product is e-cigarettes, but ENDS also include other products such as e-hookahs, e-pipes, or e-cigars (World Health Organization, 2022).

The number, quantity, and characteristics of potentially toxic substances in the aerosol emitted by EN&NNDS are highly variable and depend on product characteristics (including device and e-liquid features) and how the user operates the device. Under typical conditions of use, however, the number and concentrations of potentially toxic substances emitted from unadulterated EN&NNDS are lower than in tobacco smoke, except for some metals. The main substances in the aerosol that raise health concerns are metals, such as chromium, nickel, and lead, and carbonyls, such as formaldehyde, acetaldehyde, acrolein, and glyoxal. When the e-liquid contains nicotine, the aerosol contains nicotine. The amount of nicotine inhaled by ENDS users is highly variable and depends on product characteristics (including device and e-liquid characteristics) and how the device is operated. There is substantial evidence that nicotine intake from ENDS among experienced adult ENDS users can be comparable to that from combustible tobacco cigarettes.



Electronic cigarettes typically work by devices that simulate the feeling of smoking by heating a liquid solution that usually contains nicotine. This has become a novel lifestyle choice and a potentially safer alternative to smoking for many individuals, mainly young adults (Ebrahimi Kalan et al., 2023).

THE E-CIGARETTE

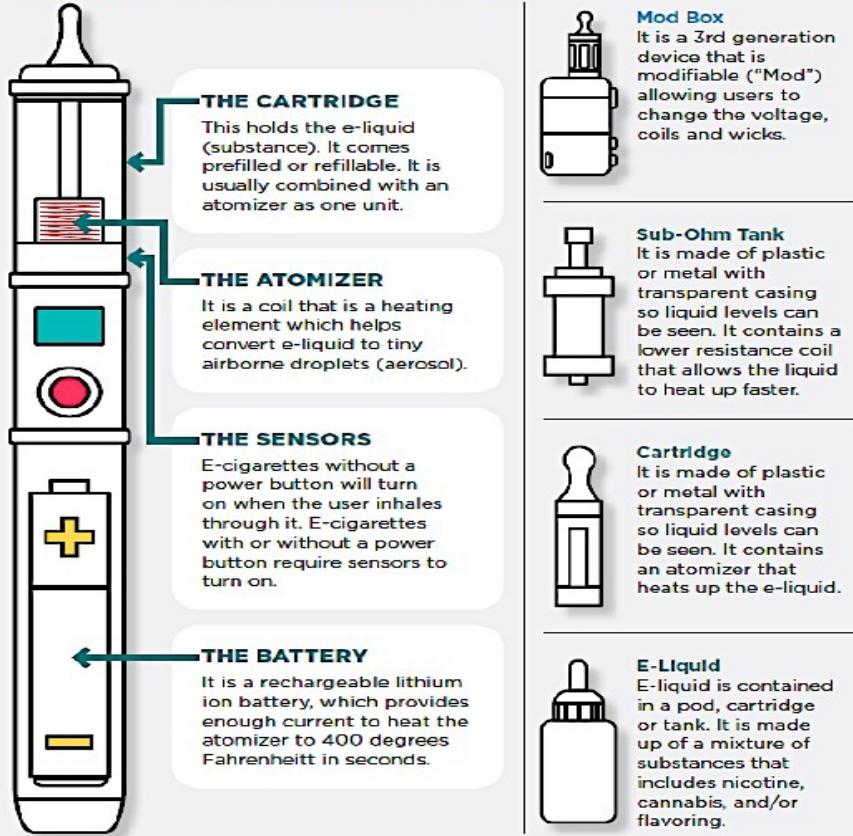


Figure 2: Features of e-cigarettes (from US Department of Health and Human Services, Centre for Disease Control and Prevention)

The emergence of ENDS and ENNDS could contribute to either reducing or exacerbating the tobacco use burden, depending on how their accessibility and use are regulated. The Conference of Parties of the World Health Organisation Framework Convention on Tobacco Control (FCTC) has issued guidance on the regulation of HTPs, ENDS, and ENNDS products such that the protection and promotion of human health is prioritized (World Health Organization, 2022). Currently, there is no clear understanding of the long-term health effects of these products, and they are not inherently safe, thus policymakers need to ensure that the right levels of regulations are in place so that they do not encourage initiation by youths and non-smokers (World Health Organization, 2022). Many countries have concerns about the uptake of e-cigarettes among young people, and currently, 103 countries are monitoring e-cigarette

use among adolescents through national school-based surveys. According to the latest Tobacco Epidemic Report 2023, 78 countries (including Ghana) have not started monitoring e-cigarette use and have no data to guide local policy and regulatory decisions (Figure 3). However, low-income countries such as Togo and Yemen conduct surveys among adolescents that incorporate questions about e-cigarette use (World Health Organization, 2023). Given the progress made towards a tobacco-free generation such as warning labels on cigarette packs, smoke-free places, taxation on tobacco products etc, continued surveillance of e-cigarette use is essential to providing evidence for developing, sustaining, and strengthening tobacco control in the country level.

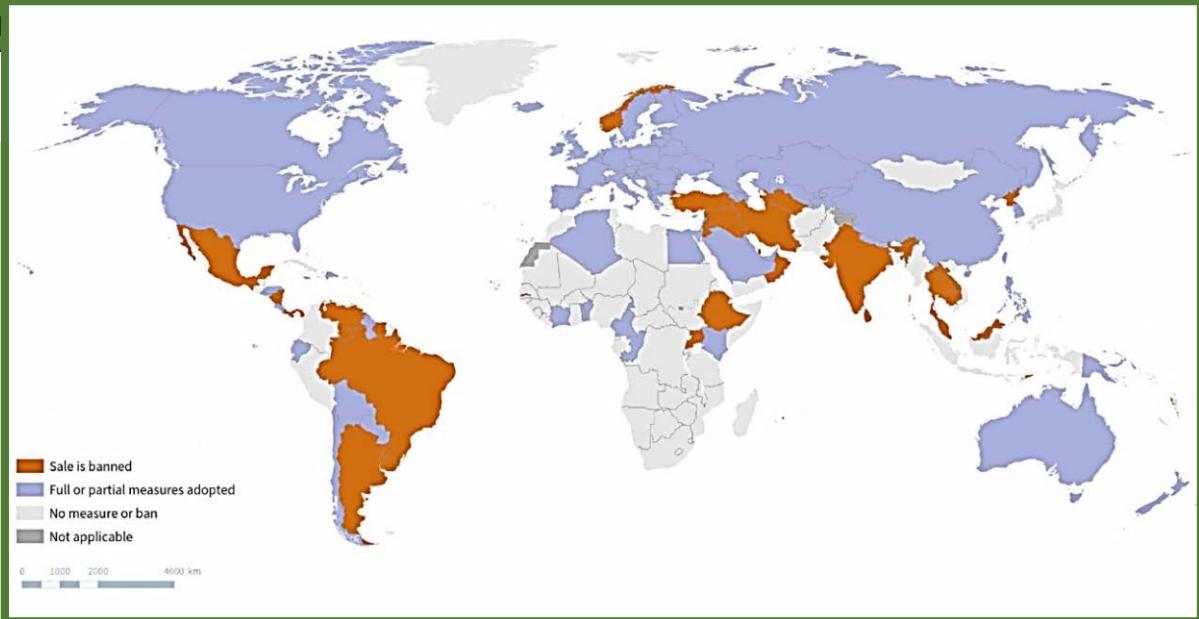


Figure 3: Measures to regulate ENDS – full, partial, or no ban, 2022 (Source: Global Tobacco Epidemic Report 2023)

Several key factors affect the prevalence of e-cigarette use, including economic conditions, cultural norms, laws and regulations around tobacco products, and marketing tactics used by the tobacco industry. These factors shape how socially, or culturally acceptable and accessible e-cigarette use is within both LMICs and high-income countries (HICs). The diversity of the products, their design features, and characteristics make it hard for countries to regulate them and monitor their use in the population. This includes consideration of taxation of these products, given that taxation is a core component of a comprehensive regulatory approach in the context of tobacco control.

Examining the use of emerging tobacco products like e-cigarettes is important to inform tobacco control policies as the tobacco product landscape continues to change in many LMICs including the African region. As the majority of

research investigating the long-term effects of these novel products on population health and their potential to help smokers quit has been conducted in HICs, how and when these novel products will evolve and be treated in LMICs is unclear. This research gap calls for more country-specific studies in LMICs including Africa to better understand the current situation of e-cigarettes across settings and inform appropriate regulations and policies.

This report provides an overview of the current market and regulatory fiscal landscape for e-cigarettes in the African Region, with a focus on Ghana. Continued surveillance and monitoring of e-cigarettes and other new and emerging tobacco products is essential for informing tobacco control policy planning, regulation, and practice (including the Public Health Act 2012 and the Excise Duty Amendment Act 2023).

RESEARCH QUESTIONS



- 1** What are the perspectives of various stakeholders, on the regulatory framework and current e-cigarette legislation in Ghana, and recommendations for future policies?
- 2** What are the main types of ENDS/ENNDS products in Ghana and what are the main suppliers, prices, marketing, and advertising of the products?
- 3** What are the current tax structures used or proposed to be used for these products?



METHODS



This report outlines results from three separate but connected pieces of research. First, a systematic rapid review of the e-cigarette marketing literature published in peer-reviewed journals between 2020 and 2022. Secondly, a review of the current e-cigarette market draws on available data from online market searches, the press, and other published sources. Finally, a description of the current regulatory framework for e-cigarette marketing in Ghana draws on semi-structured interviews with key professionals ($n=10$) working in the field and relevant documentary sources.

Rapid systematic review

In line with the resources available and to swiftly add evidence in this rapidly expanding field, a rapid review method was chosen. The study followed the guidelines for conducting rapid reviews proposed by Cochrane (Garrity et al., 2021). An electronic database search was conducted in Medline, PubMed, and Google Scholar. A search was also conducted on Google for newspapers and online publications on the subject matter. The population, intervention, comparator, and outcome (PICO) elements were used to formulate the key terms for the search strategy and develop the inclusion criteria for study selection. Based on PICO, the key terms for the search were "Cigarette Smoking" OR "Tobacco Products" OR "E-Cigarette Vapor" OR "Vaping" OR "Electronic Nicotine Delivery".

The search string was optimized for each database and developed from a combination of controlled vocabularies (e.g., MeSH and Emtree) and free text search (limited to title, abstract, and keywords search) that included the most pertinent related terms. A search limit was applied to identify only English-language peer-reviewed articles. The full search strings used for each database have been included in Supplementary Table 4. Records yielded transferred to Endnote X9 (Clarivate, Philadelphia, PA, USA) and uploaded onto Rayyan for deduplication and screening. Full texts of relevant articles were downloaded and further screened. A customized data extraction form was developed, piloted, and refined by the review team. Two reviewers extracted pertinent data from the included articles. All reviewers verified the tabulated data for correctness and completeness.

Characteristics of included studies

A total of 229 articles were retrieved from the search of databases, of which 19 remained after the removal of irrelevant articles and duplicates. The full-text screening resulted in the inclusion of 5 articles. Additional search resulted in further retrieval of 5 articles from organizational websites and reports, totaling 10. The included studies were published from 2020 to 2022 and were mainly conducted in South Africa (n=6), Ghana (n=2), Nigeria (n=1) and two studies with a global perspective, including a systematic review and a secondary data analysis of the most recent data from 75 GYTS countries. All the studies were cross-sectional, except for one systematic review (Yoong et al., 2021). Most of the studies were conducted among children, adolescents, and young adults, with a sample size that ranged from 948 to 264,490.

Market survey

An online market search consisting of an in-depth analysis of keyword variations and industry-specific terms commonly used in the context of electronic cigarettes and vapes to ensure comprehensive coverage and accurate identification of all relevant products in the Ghanaian market. We developed targeted search terms such as "electronic cigarettes," "e-cig", "vapes," "vape pens," and "vape accessories" to systematically explore each of the common online platforms in Ghana, including Tonaton, Jiji.com and Vape Gh. The team also implemented a social media keyword tracking system to monitor and capture the most frequently used terms and hashtags related to electronic cigarettes and vapes on platforms like Instagram and Facebook, ensuring a thorough examination of product availability and consumer engagement.

Stakeholder interviews

Semi-structured interviews were conducted with ten (10) stakeholders representing government, revenue authority, media, civil society, and academia. A topic guide (see appendix) was developed to address the research questions above. Interviews focused on: policy implementation and compliance; local contextual factors and the regulatory framework for e-cigarettes in Ghana. Topic guides were not prescriptive and allowed flexibility in response to interviewee roles. Interviews were conducted either face-to-face or by telephone and lasted between 30–60 minutes. All interviews were recorded and transcribed verbatim.

RESULTS



Evidence review *Prevalence of ENDS use*

Eight of the included studies reported on the use of e-cigarettes. The prevalence of e-cigarette use among youth varied by income groups and WHO regions in World Bank countries. The current prevalence of e-cigarettes in the Continents of America, Europe, Asia, and Oceania were 10%, 14%, 11%, and 6%, respectively (Tehrani et al., 2022). In an analysis of Global Youth Tobacco Survey (GYTS) data from 70 countries, current e-cigarette use was > 10% in 30 countries, the highest of 35.1% in Guam (Sreeramareddy et al., 2022). According to Tehrani et al. (2022), the lifetime and current prevalence of e-cigarettes globally were 23% and 11%, respectively and the current prevalence of e-cigarettes among men and women was 12% and 8% respectively.

In the European region of Germany, 9.2% of 12–17-year-olds were classified as ever users of e-shisha and 1.8% were current users of e-shisha (Yoong et al., 2021). Some of the reasons highlighted for the increasing use of e-cigarettes include marketing with flavors, being promoted as being less harmful (Egbe et al., 2023), having friends who use it and for stress relief (Tamulevicius et al., 2020),

proximity and density of vape shops and social norms (I.T. Agaku et al., 2021b). The use of e-cigarettes has also been linked to quitting smoking, however, e-cigarette use has been found to depress long-term cessation. According to Agaku et al (2021a), 20% of those who intended to quit smoking used e-cigarettes only. In this study, among ever-established smokers, sustained quitting at the 12-month mark was lower among those who used e-cigarettes as compared with never-e-cigarette users.

In sub-Saharan Africa (SSA) the reported prevalence of awareness of and use of e-cigarettes across 14 countries (including Senegal and Ethiopia in Africa) indicated that more than 18 million adults reported current use of e-cigarettes in the 14 countries with considerable variations in use across countries and population subgroups with certain socio-demographic characteristics (Pan et al., 2022). A higher adjusted prevalence of current e-cigarette use was observed in certain countries among men, young adults aged 15–24 years, urban residents, and adults with higher educational levels and higher wealth index. Whilst Russia (4.4%) and Romania (3.8%) had the highest age-standardized prevalence, India (0.02%), Senegal (0.1%) and Ethiopia (0.1%) had the lowest (Pan et al., 2022). South Africa reported a consistent increase in the prevalence of e-cigarette use from 0.3% in 2011 to 1.6% in 2017 and 2.7% in 2018. Other prevalence of e-cigarette use reported in South Africa was 23.8% (I. T. Agaku et al., 2021b), and 37% among ever-established smokers (I. T. Agaku et al., 2021a). In Lagos, Nigeria, the prevalence of

ever-use of e-cigarettes was 7.9% (95% CI: 5.8,10.0) among 949 respondents (15-35 years). Old age and being male were independently associated with higher odds of e-cigarette use. However, significantly higher odds of e-cigarette use were associated with age, sex, alcohol, friend's use, and other tobacco products or substance use (Erinoso et al., 2021).

In Ghana, according to the 2017 Global Youth Tobacco Survey (GYTS), a nationally representative survey conducted every four or five years across the three ecological zones (Logo et al., 2020, 2021) among 13-15-year-old junior high school students ($n=5585$), 4.9% were currently using e-cigarettes (males: 4.9%; Females: 5.0%)(Table 1). Another source (unpublished), among adolescents in junior high schools (10-19 years) in the Upper East Region of Ghana ($n=1328$), the prevalence of e-cigarette use was 7.8% (males=10.4%; females=5.3%) and about 10.5% of them had ever experimented to use e-cigarettes in 2022.

Awareness and perceptions

Awareness and use were highest in the European region (74.6% and 34.5%) and HIC (83.6% and 39.4%) (Sreeramareddy et al., 2022). Awareness of e-cigarettes (heard about e-cigarettes) was high, especially in the European region and HIC, and correlated with the use of e-cigarettes (Erinoso et al., 2021; Sreeramareddy et al., 2022). In South Africa, 61.2% of those aware, believed 'e-cigarette advertisements and promotion may make adolescents think of smoking traditional cigarettes'; 59.5% supported that 'e-cigarette smoking should be banned indoors (I. Agaku et al., 2022); perceptions and beliefs about the harm of these products encourage their popularity In South Africa, 20.1% of respondents in a study reported exposure to e-cigarette advertisements (Agaku et al. 2021). Exposure was most prevalent among those aged 16–19 years (24.6%) and top sources of exposure were stores, 40.7%; malls, 30.9%; and television, 32.5%, magazines, 22.1%; radio, 19.9%; billboards, 15.0% and other sites, 10.2%.

Types of ENDS

In the study by Yoong et al (2021), the prevalence of ENDS or ENNDS use in children and adolescents younger than 20 years from 69 countries and territories report that, the most frequently reported flavor categories were fruit (high school: 66%; middle school: 68%, and menthol or mint flavour (high school: 57%; middle school: 31%). Mint, mango, and other fruits were the common flavors reported. Yoong et al (2021) also reported on the types of devices used. In Malaysia, 33.7% of adolescents who ever used ENDS or ENNDS, used the modular system or vape mods and 13.4% used disposable ENDS or ENNDS.

Market Survey

We identified a comprehensive range of electronic cigarette and vape products available in the online marketplaces in Ghana. Tonaton, jiji and Vape Gh were the leading online markets in Ghana. In the jiji.com search, 111 different brands of e-cigarettes were advertised for sale, whilst, 61 brands were found on Tonaton site (Table 2). The location of the product was mainly in Accra (Ghana's capital city) and the price ranges from 100-600 GHC (~10-60 USD) (Table 1).

Products	Price GHC	Location of Sale
Vape Soul Disposable Vape (2000 Puffs)	200	Osu-Accra
Vape Pen (E-Cigarettes)	220	Kumasi-Ashanti
Geek Bar Disposable E-Cigarette Passion Fruit	100	Oyarifa-Accra
80W Vape Electronic Cigarette with 6 Flavors	250	Madina-Accra
Shisha Pen with Flavor Electronic Cigarette	150	Ashaley-Botwe-Accra
Vaporesso Luxe Q Vape KIT	420	Achimota-Accra
Disposable Vape/5000 Puffs (Elfbar Vape)	225	Asylum Down-Accra
Vape Soul Disposable Vape (2000 Puffs)	220	Osu-Accra
Rechargeable and Quality Shisha Pen	180	Accra Newtown
Electronic Vape Pen	245	Dome-Accra

Table 1: Types, price and location of ENDS on online markets in Ghana (source Tanaton.com and jiji.com)

Products	Price GHC	Location of Sale
800 Puffs Disposable Vape Pen	120	Tema-Accra
Disposable Shisha/Vape Pens 800 Puffs	124	Spintex-Accra
Disposable Vape	350	Kumasi-Ashanti
VTV 8000 Puffs Vape	290	Osu, Accra
Smok X- Priv Kits	1,200	Lapaz-Accra
Vozol Disposable Vapes	150	Oyarifa-Accra
Tugboat Disposable Vape 2500 Puff	120	Circle, Accra
Electronic Vapor	600	Dansonman-Accra
Geek Bar Disposable E Cigarette Passion Fruit	100	Oyarifa-Accra
Innokin Cool Fire Mini Rechargeable Electric Vape	500	Oyarifa-Accra
Disposable Vape	300	Cantonment-Accra
Apple and Grape Disposable Vape	100	Oyarifa-Accra
Electronic Vape Pen	245	Dome, Accra
Premium Disposable Vapes 5000 Puffs	280	Osu-Accra
800 Puff Electronic Cigarettes	80	Adenta,-Accra
Disposable Vapes	265	Dansoman, Accra
Red Bull Flavored Disposable Vape Pen	100	Oyarifa-Accra
Electronic Vapes	580	Burma Camp-Accra

Table 1: Types, price and location of ENDS on online markets in Ghana (source Tanaton.com and jiji.com)

Stakeholder interviews

This section of the report draws on stakeholder interviews and documentary reviews to capture the regulatory framework for e-cigarette marketing. We categorized and organized our findings into four main sections. Selected quotations are presented here as either evidence or for explanatory purposes.

Health effects of ENDS

Interviews commenced with a general discussion of the emergence of e-cigarettes onto the market and how this constituted a positive or negative outcome for public health. Stakeholders held different perspectives toward the health effects of ENDS; whilst some said they generate less secondhand smoke, others expressed concerns about potential chemicals in the exhaled vapors. According to WHO, aerosols generated by e-cigarettes typically raise the concentration of particulate matter in indoor environments and contain nicotine and other potentially toxic substances. E-cigarette emissions therefore pose potential risks to both users and non-users (World Health Organization, 2022).

One stakeholder also believed that ENDS can adversely affect health similar to cigarettes, and there were also concerns regarding their use in helping smokers quit tobacco.

“ My thoughts are that it has the same effect that normal cigarettes have on people, throughout usage the effect will be the same. And that is why we are keen on controlling that space. Because if you allow its usage without any control, likely, people may not be taking this normal cigarette however the use of the electronic ones will also cause the same harm that we are trying to prevent....I believe that given the content, the fact that they contain nicotine, is the same effect that this may have on them. ” (GRA)

“ Studies have shown that they pose a major risk to health and therefore, you cannot completely say that this product is better than what you have in let's say cigarettes. So, yes, they are harmful ” (Researcher)

The e-cigarette was also not recommended to use for tobacco cessation and hence their approval for cessation purposes was also not seen as a positive move (Ministry of Health, 2017). The use of e-cigarettes as a harm reduction strategy was noted to be only a tobacco industry marketing tactic according to the participants.

“ It's laughable for somebody to even talk about reducing the harm. We are looking at totally halting the harm. And while we are fighting the already existing problem that has been caused by the consumption of tobacco if you were coming to the table to discuss anything, it wouldn't be to introduce any other product, it would be to look at how to hold tobacco itself. ”

(Civil Society Advocate)

According to WHO, the levels of risk associated with using e-cigarettes or tobacco products are likely to depend on a range of factors, some relating to the products used and some to the individual user (World Health Organization, 2022). Factors include product type and characteristics, how the products are used, including frequency of use, how the products are manufactured, who is using the product, and whether product characteristics are manipulated post-sale.

Marketing and availability of ENDS in Ghana

Whilst some stakeholders indicated that the main users of e-cigarettes were from the high-income groups, others also believed that it was young people that tend to get attracted to the different appealing flavors that are available (similar to water pipes).

“ They can have different flavors for you because, to some extent, they are trying to mimic the traditional cigarettes that they already brought to the market. If you observe the traditional cigarettes that also have its flavors, so you can have like menthol, they will have one that they call that pilot or whatever, some of these products that are coming in flavors such as mint. ”

(Researcher)

Given that the product is not an approved one in the country, stakeholders had their reservations regarding age restrictions, warning messages or other tobacco control measures applicable to ENDS.

“ In Ghana, the product is not even regulated even though they are in our tariffs. So they are not even supposed to be sold on the market. It is only for cessation purposes, as the FDA has even issued a notice on that. So I don't think the age restriction will even come in ”

(GRA)

Complementing this view, a review of online media releases indicates that Ghana has banned all recreational use of vaping and e-cigarette products (Tobacco Reporter, 2023). In a press release by the focal point for tobacco control in Ghana, the Food and Drugs Authority (FDA) states that

The sale, advertisement and recreational use of electronic nicotine delivery systems (ENDS) such as vapes and other non-nicotine tobacco products by the public is illegal

(Figure 4). However, ENDS can be registered as a prescription-only medicine for cessation therapy. The FDA also claims it has sent notices to manufacturers, importers, wholesalers, and retailers to remove all advertisements on social media, billboards, and neon signs immediately and refrain from the importation of the products.

**FOOD AND DRUGS AUTHORITY
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Type of Communication: Substances of Abuse
Identification Number: FDA/CSD/CPE/PRS/23/021

For Immediate Release: 5TH JULY 2023

FDA STRENGTHENS REGULATION ON ELECTRONIC NICOTINE DELIVERY SYSTEMS (ENDS) / VAPES

The Food and Drugs Authority (FDA) has noted with concern the sale, advertisement and recreational use of electronic nicotine delivery system (ENDS) such as **Vapes** and other non-nicotine tobacco products by the public. ENDS can be registered as a **prescription only medicine for the purposes of cessation therapy**.

The FDA wishes to remind the public that Vapes contain nicotine, which is highly addictive and causes diseases which include, but not limited to, cancer, heart disease, lung disease, infertility, diabetes, and gum disease.

The sale and advertisement of ENDS, Vapes and non-nicotine products contravene Part Six and Sections 61 (2) and 62(1) of the Public Health Act. 2012 (ACT 851) as well as

“The pricing, it's been sometime now since I purchased some of them but even that it was a small bottle. The prices range between 20 - 30 G H C depending on the volume and flavor and the type” (GRA)

Figure 4: Press release by the FDA (Ghana) on the regulation of e-cigarettes

Despite the product being unapproved, stakeholders had seen it on the market with different types and flavors and prices ranging from 20-30GHC (2-3 USD)

Regulatory framework for ENDs

Three main issues concerning the current regulatory system were highlighted. First, stakeholders cited problems about compliance with the law. According to the current regulations, e-cigarettes are not approved to be used in the country and they are not legal to have them in Ghana and need to be approved by the FDA for cessation purposes. Secondly, stakeholders were concerned about taxing a product that is not even licensed for use in the country (not even for cessation purposes). However, stakeholders from the Ghana Revenue Authority emphasized that taxing a product was only to regulate it effectively since its availability is illegal in the first place (table 3). In response to the worsening economy of Ghana, the government in March 2023, introduced three new taxes – the Excise Duty Amendment Bill 2022, Growth and Sustainability Levy Bill, and Income Tax Amendment Bill 2022 – to raise revenue and meet the criteria for a \$3 billion International Monetary Fund programme staff-level agreement. The objective of the Excise Duty (Amendment) Act, 2023 (Act 1093) was to revise the excise duty for tobacco products, wine, malt drinks, and spirits and impose an excise duty on sweetened beverages (including fruit juices) and including electronic cigarettes and electronic liquids (table 3).

PRODUCT CATEGORY	TAX RATE AS A PERCENTAGE OF THE PRICE CIF VALUE
Tobacco products	
Cigarettes	50 % of the ex-factory price
Cigars	50% of the ex-factory price
Snuff and other tobacco	GHS 280 per kilogram
Electronic cigarettes	50% of the ex-factory price
Electronic smoking devices	50% of the ex-factory price

“ We use the same fiscal measure to control the use of these substances, you know, so for instance, we believe that once we impose taxes on them, they make the prices of the products expensive, and then they make the products expensive and out of reach of the ordinary person on the street, and for that matter, that will control its usage. So I believe that even though it's not a regulated product, it's a product that is not supposed to be sold on the market, but it's still available. So I believe that you know, it's either we can enforce the ban on it properly or we use fiscal measures to control its uses. ” (GRA)

However, whilst one stakeholder expressed displeasure on taxing an illegal product that has not been licensed in the country and attributed these to industry-political links, another view was that it should be taxed as any other tobacco product in line with revenue generation for the government.

“ And I'm surprised that a product that did not have legal backing found its way on the excise amendment bill, and it didn't hit anybody on the subcommittee level, I would pardon them. But I don't think I can pardon the regulators at the GRA, or the FDA if they had the opportunity, that is if they had the opportunity to see the document while it was still a bill, and in their interactions with the GRA and FDA, and then the committee, you know that we're working on it. It's more like a smuggled product. ”

(Civil Society Advocate)

Almost all the interviewees expressed the need to ban the products or regulate their use.

“ I think that it should be banned, in a worst-case scenario, it should be made very expensive. But I don't even want to entertain that thought. It should be banned just like we've banned tobacco in public smoking if you want to do it, you should hide and do it, but it should not be accepted in any form to the extent that you are putting a tax on it or generating revenue on it ”

(Media)

Finally, the introduction of ENDS in Ghana was viewed as a negative influence on the tobacco control efforts over the years. One stakeholder described e-cigarettes as a product causing a milder form of death ("softer death").

“ When it comes to winning, tobacco control, it will take a big toll on our achievements. After all the years after all our achievements after all the impact we've made, you know, over the years, you're going to be having a bypass, industry is trying to bypass our achievement with cigarettes and other tobacco products that the industry is claiming is less harmful and will give you a softer death ”

(CSO advocate)

Views on ENDS policy development

Overall, there was broad agreement that this product should be banned completely with strong agreement on a specific legal framework for ENDS by amending the current tobacco control act and not necessarily getting a new act in place for ENDS.

“ I don't think there is any need for a new act. Of course, I am not a legal expert. But I think the current law prohibits smoking or the use of these cigarettes in public places and other institutions or enclosed us. ”

“ It's just a matter of amending it ”

(Researcher)

Maximizing efforts and research on the effects of e-cigarettes is crucial to effectively prevent and control tobacco and nicotine product use in Ghana and even on a global scale. Stakeholders also indicated the lack of country-specific data on e-cigarette use in Ghana and emphasized that healthcare professionals and the public require further research on the risks of e-cigarettes in local populations to inform evidence-based policies and practices.

I think at the moment a lot of research has to be done. Yes, a lot of research has to be done. We need to track how many people are using these e-cigarettes and what has been the health implications For example trying to look at some of the health conditions, particularly in the lungs, because of all these problems, we talk of the nicotine problems, a majority of them you will find that it is associated with the lungs. So, a lot of research has to be done.

(Researcher)

CONCLUSION



ENDS are currently banned in over 30 countries worldwide. The use of ENDS is high in HIC and in WHO EUR and AMR regions. Ghana like many other countries is slowly experiencing a growing demand for e-cigarettes as a trendy alternative to traditional smoking. However, the use of e-cigarettes in Ghana and many other African countries remains relatively low. The prevalence of ENDS use in Ghana (from little evidence) is in the range of 5-7% among the young population. To better understand the determinants of e-cigarette use and formulate future e-cigarette regulatory policies, an expanded and standardized surveillance system is needed. There is an urgent need for e-cigarettes to be regulated in the LMICs including the African region to prevent the escalation of its use as in HICs. One of the recommendations from the National Tobacco Control Strategy in Ghana is to provide for regulation of novel and emerging tobacco and nicotine products. E-cigarettes in Ghana are not licensed for use in Ghana and are meant to be used as a prescription drug for cessation as a form of harm reduction (as indicated by the regulatory body). However, several brands and types of e-cigarettes continue to perpetuate the Ghanaian market (including online) with over 100 brands currently present. The revenue in the e-cigarette market is projected to reach US\$12.0m in 2023 in Ghana experiencing an annual

growth rate of 7.47% between 2023-2028 (Statista, 2023). In response to the illegal sales of e-cigarettes, the Ghana Revenue Authority introduced excise taxes to regulate these unlicensed products in 2023.

Lessons learned from regulatory actions, mostly in HICs, emphasize the importance of comprehensive regulations on ENDS that address all aspects, including advertising promotion and sponsorship, and taxation. Additionally, restricting or banning the sale of ENDS products with enticing flavors that appeal to young people can have a crucial role in preventing youth use. WHO also recommends that ENDS be regulated where they are not banned.

There is very limited evidence regarding the impact of ENDS or ENNDS on tobacco smoking cessation, reduction, or adverse effects: data from RCTs are of low certainty, and observational studies of very low certainty. The limitations of the cohort studies led us to a rating of very low-certainty evidence from which no credible inferences can be drawn. The lack of usefulness in addressing the question of e-cigarettes' efficacy on smoking reduction and cessation was largely due to poor reporting. To date, evidence on the use of ENDS as a cessation aid remains inconclusive. In part due to the diversity of ENDS products and the low certainty surrounding many studies, the potential for ENDS to play a role as a population-level tobacco cessation intervention remains unclear. Reviews underline the need to conduct well-designed trials measuring biochemically validated outcomes and adverse effects.

Given that the use of ENDS in Ghana is still in the early phase with a relatively low prevalence, banning the product completely seems a much better solution.

Introducing ENDS in Ghana could undermine existing tobacco control efforts in these nations where implementation of the WHO FCTC articles has already been challenging. Proven tobacco cessation measures that could be substituted for electronic cigarette use in Ghana may include advice at primary care facilities, a national toll-free quit line, behavioural tobacco cessation interventions, and treatment with cost-covered tobacco cessation medications (Cahill et al., 2013).

As the market of ENDS, and ENNDS products continues to evolve and grow in the region, and as governments continue to explore new ways to regulate them, further analysis is needed on the successes and failures experienced. Comprehensive monitoring and surveillance of the evolution of these products' market sizes and structures, along with the way they are being regulated is urgently needed in countries in the African region.

RECOMMENDATIONS FOR GOVERNMENT



1. Strong regulation, i.e. the same as for tobacco products including complete ban of the product. To help tobacco users quit and to strengthen national and global tobacco control, governments need to scale up policies and interventions that we know work.
2. Preventing initiation of ENDS use by non-smokers and children by preventing or restricting advertising, promotion, and sponsorship, and restricting flavors that appeal to children.
3. Make all indoor public places completely smoke-free in line with Article 8 of the WHO FCTC (comprehensive smoke-free policy)
4. Higher excise taxes (if product is not banned) – Effective implementation of excise taxes in reducing the affordability of these products will be a key regulatory approach.
5. Embark on a nationwide mass awareness campaign about the devastating effects of smoking including e-cigarettes and vapes, and other new forms of tobacco and nicotine products.
6. Restricting the spread of unproven health benefits – while electronic cigarettes have been touted as potential tools for tobacco harm reduction, WHO warns about its health benefits, and the scientific community also remains divided over their safety, effectiveness for smoking cessation, and associated ethical implications.
7. Protecting public health policies from commercial and other vested interests (article 5.3 of the WHO FCTC should be respected when developing and implementing ENDS legislation and regulations).
8. Strengthen existing tobacco surveillance and monitoring systems to assess developments in ENDS and nicotine use by sex and age
9. Refusing sponsorship or engagement with tobacco and nicotine industries

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APPENDICES

Supplementary Table 1

JIJI.COM-Market Survey (October 2023)					Tonaton Online Market Survey (October 2023)				
Products	Types	Website	Price GHC	Location of Sale	Products	Types	Website	Price GHC	Location of Sale
Vape Soul Disposable Vape (2000 Puffs)	Vape	https://jiji.com.gh/osu/hookah-and-vaporizers/vape-soul-disposable-vape-2000-puffs-kfAK4OblaUE50KPAatSVsYNY8.html?page=1&pos=1&cur_pos=1&ads_per_page=20&ads_count=79&lid=xNL6-FoBqf9b6mW1&indexPosition=0	200	Osu-Accra	Electronic Vapor	E-cig	https://tonaton.com/_a_electronic-vapor-wt3WVm6EGc02oJvq8Y3veF.html	600	Dansonman Accra
Vape Pen (E-Cigarettes)	E-cig	https://jiji.com.gh/kumasi-metropolitan/hookah-and-vaporizers/vape-pen-e-cigarette-oPTCwJlGjm5f2xIFrDShQSlJ.html?page=1&pos=2&cur_pos=2&ads_per_page=20&ads_count=79&lid=xNL6-FoBqf9b6mW1&indexPosition=1	220	Kumasi Ashanti	Geek Bar Disposable E Cigarette Passion Fruit	E-cig	https://tonaton.com/_a_geek-bar-disposable-e-cigarette-passion-fruit-avSsvVtzuiU18Jm1Bs2RV2Xe.html	100	Oyarifa-Accra
Geek Bar Disposable E-Cigarette Passion Fruit	E-cig	https://jiji.com.gh/oyarifa/hookah-and-vaporizers/geek-bar-disposable-e-cigarette-passion-fruit-avSsvVtzuiU18Jm1Bs2RV2Xe.html?page=1&pos=4&cur_pos=4&ads_per_page=20&ads_count=79&lid=xNL6-FoBqf9b6mW1&indexPosition=3	100	Oyarifa, Accra	Innokin Cool Fire Mini Rechargeable Electric Vape	E-vape	https://tonaton.com/_a_innokin-cool-fire-mini-rechargeable-electric-vape-39pHaeoNaUeO1R1ltjSWqOEH.html	500	Oyarifa-Accra
80W Vape Electronic Cigarette with 6 Flavors	E-cig	https://jiji.com.gh/madina/hookah-and-vaporizers/80w-vape-electronic-cigarette-with-6-flavors-xAQxa9qj42WulY3RHs9YawbB.html?page=1&pos=6&cur_pos=6&ads_per_page=20&ads_count=79&lid=xNL6-FoBqf9b6mW1&indexPosition=5	250	Madina, Accra	Disposable Vape	Vape	https://tonaton.com/_a_disposable-vape-puffs-mo9bzllRe3LMJMh6qQuNgV6v.html	300	Cantonment, Accra
Shisha Pen with Flavor Electronic Cigarette	E-cig	https://jiji.com.gh/ashaley-botwe/hookah-and-vaporizers/shisha-pen-with-flavor-electronic-cigarette-wkD9LojvI0z8ykuaxPgzbIP.html?page=1&pos=5&cur_pos=5&ads_per_page=20&ads_count=79&lid=xNL6-FoBqf9b6mW1&indexPosition=4	150	Ashaley-Botwe, Accra	Apple and Grape Disposable Vape	Vape	https://tonaton.com/_a_apple-and-grape-disposable-vape-uv41wEZrfbuQWWmpU79XUqn.html	100	Oyarifa-Accra
Vaporesso Luxe Q Vape KIT		https://jiji.com.gh/achimota/hookah-and-vaporizers/vaporesso-luxe-q-vape-kit-kL1nNEfmQf0BBBaGXdjzKNlm.html?page=1&pos=10&cur_pos=10&ads_per_page=20&ads_count=79&lid=xNL6-FoBqf9b6mW1&indexPosition=9	420	Achimota, Accra	Electronic Vape Pen	Vape	https://tonaton.com/_a_electronic-vape-pen-rB8pa38WWbILKhfITbkKraq7.html	245	Dome, Accra
Disposable Vape/5000 Puffs (Elfbar Vape)	Vape	https://jiji.com.gh/asylum-down/hookah-and-vaporizers/disposable-vape-5000-puffs-8EWkwUZOxQGdSxUDvPxGGsoX.html?page=1&pos=9&cur_pos=9&ads_per_page=20&ads_count=79&lid=xNL6-FoBqf9b6mW1&indexPosition=8	225	Asylum Down, Accra	Premium Disposable Vapes 5000 Puffs	Vape	https://tonaton.com/_a_premium-disposable-vapes-5000-puffs-BaPRCZCGtdOpAMriajZ09uc.html	280	Osu, Accra
Vape Soul Disposable Vape (2000 Puffs)	Vape	https://jiji.com.gh/osu/hookah-and-vaporizers/vape-soul-disposable-vape-2000-puffs-kfAK4OblaUE50KPAatSVsYNY8.html?page=1&pos=12&cur_pos=12&ads_per_page=20&ads_count=79&lid=xNL6-FoBqf9b6mW1&indexPosition=11	220	Osu-Accra	800 Puff Electronic Cigarettes	E-cig	https://tonaton.com/_a_800-puff-electronic-cigarette-i0luExu3bhwQrjPMpamat1mr.html	80	Adenta, Accra
Rechargeabl	E-cig	https://jiji.com.gh/accra-new-town/hookah-and-	180	Accra	Disposable	Vape	https://tonaton.com	265	Dansoman,

e and Quality Shisha Pen		vaporizers/rechargeable-and-quality-shisha-pen-zzb260mX3RNWrJ409RND79w7.html?page=1&pos=13&cur_pos=13&ads_per_page=20&ads_count=79&lid=xNL6-FoBqf9b6mW1&indexPosition=12		Newtown	Vapes		/a_disposable-vapes-zoo3Sj4z6oiuVOLxf8g5gBET.html		Accra
Electronic Vape Pen	Vape	https://jiji.com.gh/dome/hookah-and-vaporizers/electronic-vape-pen-r8Bpa38W/WBiLKhfltbKzraq7.html?page=1&pos=15&cur_pos=15&ads_per_page=20&ads_count=79&lid=xNL6-FoBqf9b6mW1&indexPosition=14	245	Dome-Accra	Red Bull Flavored Disposable Vape Pen	vape	https://tonaton.com/a_red-bull-flavoured-disposable-vape-pen-hKCn83hCYT6NgKKDA3vNpzm4.html	100	Oyarifa,Accra
800 Puffs Disposable Vape Pen	Vape	https://jiji.com.gh/tema-metropolitan/hookah-and-vaporizers/800-puffs-disposable-vape-pen-hUT2v9mC9jc8S0lpn9lsgcn4.html?page=1&pos=17&cur_pos=17&ads_per_page=20&ads_count=79&lid=xNL6-FoBqf9b6mW1&indexPosition=16	120	Tema	Electronic Vapes	Vape	https://tonaton.com/a_electronic-vapes-jVrRFq7UznX1btehO1EOfcV8.html	580	Burma Camp, Accra
Disposable Shisha/Vape Pens 800 Puffs	Vape	https://jiji.com.gh/spintex/hookah-and-vaporizers/disposable-shisha-vape-pens-800-puffs-819Zb417a8ciRa5pBVk4F4WU.html?page=1&pos=19&cur_pos=19&ads_per_page=20&ads_count=79&lid=xNL6-FoBqf9b6mW1&indexPosition=18	124	Spintex-Accra	Tugboat Disposable Vape 2500 Puff	Vape	https://tonaton.com/a_tugboat-disposable-vape-2500-puff-BY8RioMyNk76eB1BkgzhBG.html	120	Circle, Accra
Disposable Vape	Vape	https://jiji.com.gh/kumasi-metropolitan/hookah-and-vaporizers/disposable-vape-eK85R285U09DE1nJGx8JHLIR.html?page=2&pos=5&cur_pos=5&ads_per_page=20&ads_count=79&lid=xNL6-FoBqf9b6mW1&indexPosition=24	350	Kumasi, Ashanti					
VTV 8000 Puffs Vape	Vape	https://jiji.com.gh/osu/hookah-and-vaporizers/vtv-8000-puffs-vape-8SLv3VMO9MKbhmpElY2CeI05.html?page=2&pos=6&cur_pos=6&ads_per_page=20&ads_count=79&lid=xNL6-FoBqf9b6mW1&indexPosition=25	290	Osu, Accra					
Smok X- Priv Kits	E-cig	https://jiji.com.gh/lapaz/hookah-and-vaporizers/smok-x-priv-kits-oQfxojKQCUChf4NsbOSBuaRe.html?page=2&pos=7&cur_pos=7&ads_per_page=20&ads_count=79&lid=xNL6-FoBqf9b6mW1&indexPosition=26	1,200	Lapaz, Accra					
Vozol Disposable Vapes	vape	https://jiji.com.gh/oyarifa/hookah-and-vaporizers/disposable-vapes-xhXZr4TlhKVrmBmLXAzvdA5.html?page=2&pos=11&cur_pos=11&ads_per_page=20&ads_count=79&lid=xNL6-FoBqf9b6mW1&indexPosition=30	150	Oyarifa, Accra					

Supplementary Table 2:

Author, year	Year	Country	Type of study	Study aim	Study population	Sample size
Logo et al	2021	Ghana	Cross sectional	determine the profile of tobacco use and to assess the factors associated with tobacco use among adolescents in Ghana	Adolescents in Ghana (11-17yrs) - JHS students	5,664
Logo et al	2020	Ghana	Cross sectional	Assessed sex, age and regional differentials in waterpipe smoking among the youth in Ghana, and also explored the association between the use of other tobacco products and waterpipe use	Adolescents in Ghana (11-17yrs) - JHS students	5,664
Agaku, Egbe & Ayo-Yusuf	2021	South Africa	Cross sectional	Understand how e-cigarettes are marketed in South Africa.	non-institutionalised civilian adult population aged 16 years	3063 individuals who participated in the 2017 South African Social Attitudes survey
Egbe et al	2023	South Africa	Cross sectional	investigated trends in the prevalence and dual use of factory-made (FM) cigarettes, other tobacco products, and electronic cigarettes (e-cigarettes) in South Africa over a 12-year period		14582 from South African Social Attitudes Survey
Tamulevicius et al	2020	United States, Germany, South Africa	Cross sectional	explored associations between individuals' quit type (ie, no plans to quit, plans to quit, or quit > 6 months ago) and perceived health status, perception of harm compared to cigarettes, perception of secondhand vapor harm, and reasons for first use	university students; 62% females, mean age 21 years	2792
Agaku et al	2021	South Africa	Cross sectional	measured geospatial distribution of vape shops in South Africa and the associations with health perceptions and behaviors	participants in the 2018 Health 24 survey	n = 18,208
Agaku, Egbe & Ayo.Yusuf	2020	South Africa	Cross sectional	investigated the relationship between e-cigarette use and smoking cessation among South African adult smokers.	participants in the 2018 Health 24 survey	n = 18,208
Yoong et al	2021	Global	Systematic review	synthesize the prevalence of ENDS or ENNDS use in children and adolescents younger than 20 years	26 national surveys representing 69 countries and territories. children and adolescents	median sample size of 3925 (IQR 1=2266, IQR 3=10 593)
Sreeramareddy, Acharya & Manoharan	2022	Global	d	describe the distribution of pooled estimates of e-cigarette awareness, 'ever e-cigarette use', 'current e-cigarette use', and 'dual use' by age, sex, and contextual factors (e-cigarette regulatory policy status, WHO regions, and World Bank income group)	school-going youth aged 13–15 years in 75 countries/territories	264, 490 (male = 128,581, female= 135,909) youth surveyed in 75 countries/territories during 2014–2019
Erinosa et al	2021	Nigeria	Cross sectional	assess the prevalence and factors associated with electronic cigarette use, as well as the relationship between their use and anxiety among adolescents and young adults in Lagos, Nigeria	young adults in Lagos, Nigeria- 15-35 years	949

GYTS= Global Youth Tobacco Survey

Supplementary Table 3:

Author, year	Awareness of ENNDS & ENDS	Use of ENNDS & ENDS	Reasons for use	Perceptions	Recommendations
Logo et al	NA	Electronic cigarette: 5.8% (boys = 5.5%, girls 6.1%) and water pipe (Shisha): 1.7% (boys = 0.9%; girls 2.1%)	NA	NA	Promoting anti-smoking campaigns in early adolescence, as well as programmes targeting early tobacco use can guard the youth against initiating tobacco use.
Logo et al	NA	3.1% of the respondents had ever smoked waterpipe. 55.0% of the current waterpipe users smoked ≥ 3 sessions per day. 46.9% of the current waterpipe users smoked at home. Regional distribution--> Savanna/northern zone 7.5%; Middle/forest zone 0.7%; Coastal zone 0.5%. 67.3% first used waterpipe when they were 13 years old or younger	NA	NA	Waterpipe use, particularly among the female student population, represents an emerging tobacco epidemic and hence deserves immediate attention from authorities. Education on the health implications of waterpipe use should be intensified among the youth, to help minimize its use and to prevent its associated health harms.
Agaku, Egbe & Ayo-Yusuf	NA	NA	NA	Of those aware, 61.2% believed 'e-cigarette advertisements and promotion may make adolescents think of smoking traditional cigarettes'; 59.5% supported that 'e-cigarette smoking should be banned indoors.'	Comprehensive regulatory efforts are needed to address e-cigarette advertising, marketing and sponsorship in order to protect public health
Egbe et al	NA	The prevalence of waterpipe tobacco use consistently increased from 1.2% (95% CI: 0.8–1.9) in 2010 to 4.1% (95% CI: 3.0–5.7) in 2018. The prevalence of e-cigarette use was 0.5% (95% CI: 0.2–0.9) in 2010. This decreased to 0.3% (95% CI: 0.1–0.6) in 2011, then increased to 1.6% (95% CI: 1.0–2.6) in 2017 and to 2.7% (95% CI: 1.7–4.4) in 2018.	Reasons for increased use: <ul style="list-style-type: none"> - marketing of these products with flavorings that mostly appeal to youth - e-cigarettes have been promoted by manufacturers and some public health advocates as 'less harmful' alternatives to tobacco products - there are specialized lounges, bars, and shops for e-cigarettes and waterpipes, which might encourage their use in social settings among young people 	perceptions and beliefs about the harm of these products encourage their popularity, i.e. e-cigarettes have been promoted by manufacturers and some public health advocates as 'less harmful' alternatives to tobacco products	The use and dual use of tobacco and electronic cigarette products have been increasing in recent years in South Africa. Interventions to help users quit and prevent young people from initiating use are urgently needed to curb these increases.

Tamulevicius et al	NA	1217/ 2792 were ENDS users	2 primary initiation factors: friends who were vaping and stress relief. Other reasons: Looks cool, want to try it, to lose weight, to enjoy flavors, weight management	Young adults view secondhand vapor as not harmful even though devices emit heavy metals, carcinogens and nicotine. No plans to quit → viewed electronic devices as less harmful than traditional cigarettes; quit 6 months ago → perceived them as being equally as harmful.	There is a lack of consistent education and messaging regarding the known negative health effects of ENDS and secondhand vapor in the scholarly literature.
Agaku et al	NA	Overall, weighted ever use prevalence among the study population was 23.8% for e-cigarettes and 3.0% for heated tobacco products.	Proximity and density of vape shops could influence ease of access as well as social norms in its two forms—descriptive (perceived prevalence), and injunctive (perceived acceptability).	37.5% believed e-cigarettes “Are more socially acceptable than regular tobacco products”, and 48.2%: e-cigarettes “should be regulated in the same way that current tobacco products are”. 25.9%: e-cigarettes “contain lower levels of toxic substances than regular cigarette smoke” and 23.4% believed they “are a safer alternative than smoking regular cigarettes” whereas 29.5% believed aerosol from e-cigarettes “pose a risk to bystanders”. 21.8% “taste better than burning tobacco products”. Availability influence perception on e-cigarette	Efforts to regulate e-cigarette marketing can benefit public health. E-cigarette regulation should pay attention to e-cigarette marketing and distribution as part of comprehensive tobacco control in South Africa.
Agaku, Egbe & Ayo-Yusuf	NA	37.0% of ever established smokers had ever used an e-cigarette, while 36.1% of current combustible smokers currently used an e-cigarette	NA	more e-cigarette ever versus never users believed e-cigarettes could assist smokers to completely quit (35.5% vs 20.4%) or cut down (51.7% vs 26.5%).	e-Cigarette use, while associated with higher likelihood of quitting short term, was associated with lowered likelihood of long-term quitting and higher likelihood of smoking relapse among ever-established smokers who had tried to quit.
Yoong et al	NA	The pooled prevalence for ever ENDS or ENNDS use was 17.2% (95% CI 15–20); current use the pooled prevalence estimate was 7.8% (6–9). Occasional use was 0.8% (0.5–1.2). for daily use and 7.5% (6.1–9.1) for occasional use.	NA	NA	There is significant variability in the prevalence of ENDS and ENNDS use in children and adolescents globally by country income status. These findings are possibly due to differences in regulatory context, market availability, and differences in surveillance systems.

		Prevalence of ENDS or ENNDS use was highest in high-income geographical regions. Prevalence estimates for ever use ranged from 2% (95% CI 2–3) in Cambodia to 52% (51–53) in France			
Sreeramareddy, Acharya & Manoharan	Overall pooled estimates were 56.7% (95% CI 55.2, 58.2) for awareness of e-cigarette. Awareness was >80% in 13 countries mostly from Europe Poland being the highest at 95.8% (95% CI 94.8–96.6). Awareness and use were highest in the European region (74.6% and 34.5%) and HIC (83.6% and 39.4%). Boys, higher age, and youth from countries with RP had a higher e-cigarette awareness. Awareness correlated with use of e-cig	In 30 countries, current e-cigarette use was >10%, the highest of 35.1% (95%CI 32.4–38.0) in Guam. 'Ever use', 'current use', and 'dual use' were 20.2%, (95% CI 55.2, 58.2), 10.9% (95% CI 19.2, 21.3) and 4.6% (95% CI 4.1, 5.1) respectively. Use higher in Boys, higher age, and youth from countries with restrictive policies. Both 'ever e-cigarette use', and 'current e-cigarette use' m-t-f ratio was >1 in most countries.	NA	NA	Prevalence of e-cigarette use among the youth varied by income groups and WHO regions in World bank countries E-cigarette was highest in HIC and those in EUR and AMR regions.
Erinosa et al	Most respondents had heard of e-cigarettes (59.7%), while 26.3% recognized the images of e-cigarettes from social media posts	The prevalence of e-cigarette ever-use was 7.9% (95% CI: 5.8,10.0); six (0.9%; 6/51) were current users (used e-cigarettes in the past 30days) and forty-five (7.0%) were former users (>30 days since last use). 41.2% reported a lifetime use of between 2–10 days and 3.9% reported more than 50 days, with majority (n = 37, 72.6%) using it at home.	NA	NA	a higher likelihood of e-cigarette use among alcohol consumers, poly-tobacco or substance users and individuals with friends who use e-cigarettes. Health Providers and policy makers in Nigeria might consider preventive measures aimed at young adults with the identified risk factors, as well as close monitoring of trends in e-cigarette use in the coming years.

Supplementary Table 4:

Search Strategy PubMed

"Africa South of the Sahara" [Mesh] OR sub-Saharan Africa[Title/Abstract] OR Africa [Mesh] OR Africa[Text Word] OR Ethiopia [Title/Abstract] OR Ghana[Title/Abstract] OR Kenya[Title/Abstract] OR Nigeria[Title/Abstract] SouthAfrica[Title/Abstract] OR Tanzania[Title/Abstract] OR Uganda[Title/Abstract]

AND

"Cigarette Smoking"[Mesh] OR "Tobacco Products"[Mesh] OR "E-Cigarette Vapor"[Mesh] OR "Vaping"[Mesh] OR "Electronic Nicotine Delivery Systems"[Mesh] OR "Cigarette Smoking" [Title/Abstract] OR "Tobacco Products" [Title/Abstract] OR "E-Cigarette Vapor" [Title/Abstract] OR "Vaping" [Title/Abstract] OR "Electronic Nicotine Delivery Systems" [Title/Abstract] OR E-Cigarette [Title/Abstract] OR "Electronic nicotine" OR E-cig*[Title/Abstract] OR "Novel tobacco products" [Title/Abstract] OR "vape electronic cigarette" [Title/Abstract] OR "boxmod" [Title/Abstract] OR vaporizer[Title/Abstract] OR mod[Title/Abstract] OR e-cig[Title/Abstract] OR cigar[Title/Abstract] OR cig [Title/Abstract] OR ciggie [Title/Abstract] OR ciggy [Title/Abstract] OR "vapor pen*" [Title/Abstract] OR e-cigar[Title/Abstract] OR e-pens[Title/Abstract] OR e-pipe*[Title/Abstract] OR e-hookahs[Title/Abstract] OR ENDS[Title/Abstract] OR "vape pen*" [Title/Abstract] OR vape [Title/Abstract]

Interview guide

- Participant information

1. Background
2. Age group
3. Organization
4. Occupation
5. Years of service

- 3) Thoughts on the effects of the product (e-cigarettes) in Ghana?

- a) Effect on youth/adults
- b) Health effects
- c) Tobacco control
- d) Industry

- 1) Types of tobacco products

- What do you know about -

- a) Electronic nicotine and non-nicotine derivatives (what do you think about these?)
- b) What drives the development of these novel tobacco products

- 4) Regulation of e-cigarette use in Ghana

- a) Public use ban (smoke-free law)
- b) Taxing products (currently included in the amended excise tax bill – good move?)
- c) Licensing them for use? (? FDA)
- d) Cessation?? (? Included in the cessation program)

- 2) Availability of tobacco products (e-cigarettes)

- What are your thoughts on -

- a) Consumers (who are they - socio-economic groups/age)
- b) Pricing
- c) Availability
- d) Marketing/point of sale/types of outlets
- e) Flavors available
- f) Warnings labels on ENDS/ENNDS
- g) Age restrictions
- h) Content information (contains harmful products – nicotine??)

- 5) Recommendations for future legislation/ regulation

- a) Readiness of the country?
- b) Banning them completely?
- c) Facilitators (industry??)
- d) Barriers
- e) Creating a specific act vs. amending an existing act
- f) Is a thorough examination of such products necessary?
- g) What regulatory challenges do they bring about?
- h) Links of e-cigarettes with illicit trade
- i) Recommendations for its use/non use



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