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EDITORIAL

Clouds of Harm: The Health Impact of Youth Vaping in Malaysia

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E-cigarettes (EC), also known as vape pens, e-cigars, or vaping devices, produce an aerosolised mixture that contains flavoured liquids and nicotine, which users inhale. These electronic nicotine-delivery systems come in a wide variety due to differences in nicotine concentrations, e-liquid volumes, carrier compounds, additives, flavours, and battery voltages. Each EC device typically operates using a standard system, which includes a rechargeable lithium battery, a vaporisation chamber, and a cartridge. The lithium battery powers the vaporisation chamber, which contains the atomiser. Users inhale through a mouthpiece, and the airflow activates a sensor, initiating the atomiser to deliver nicotine to the lungs. The liquid nicotine stored in a small cartridge is then vaporised and inhaled.

The number of e-cigarette users has significantly increased, mainly due to the perception that they are a healthier alternative to traditional tobacco consumption, minimal regulation on use, and the appealing design of the devices. Over the past decade, e-cigarette use among young adults in Malaysia has risen dramatically. In 2011, the prevalence of EC use among individuals aged 15 and older was 0.8%. By 2016, this number had grown to 3.2% for Malaysians aged 18 and older, and by 2019, EC use among those aged 15 and above had reached 4.9%. Among Malaysian youth aged 15–19, the usage was reported at 7.5%, and for young adults aged 20–24, it was 14.7%. In contrast, less than 5% of adults aged 30 and older used e-cigarettes.

Usage is particularly prevalent among

younger age groups, with a 2023 survey showing that EC use among individuals aged 15–24 rose from 1.1% in 2011 to 8.6%. Demographically, e-cigarette users in Malaysia are more likely to be male, younger, and possess higher education levels. A study at Universiti Malaysia Sabah (UMS) revealed that 27.2% of students reported using e-cigarettes, with male students aged 18 to 21 being more likely to use EC than those aged 22 to 24. Peer influence was a significant factor in the decision to use EC, as accepting an offer to vape from friends significantly increased the likelihood of usage. Additionally, individuals with a history of smoking combustible cigarettes were found to be more inclined to use e-cigarettes.

Nationally, the prevalence of EC use among young adults aged 20–24 years was recorded at 14.7%. A nationwide study highlighted that young adults, particularly males and those identifying as Malays, Bumiputera from Sabah, and Bumiputera from Sarawak, are more susceptible to EC usage. This demographic data indicates a higher prevalence of e-cigarette use among young adults in Sabah compared to other regions, emphasising the need for targeted public health interventions and policies to tackle this growing concern.

The health impact of e-cigarettes raises significant issues. Research indicates that both short-term and long-term effects on lung function exist.

Short-Term Effects on Lung Function

Some studies suggest that short-term inhalation of e-cigarette vapour may not cause substantial changes in lung function among healthy individuals. A meta-analysis revealed no significant changes in lung function parameters following acute exposure. However, many participants reported experiencing an acute cough following short-term use. Furthermore, short-term use of nicotine e-cigarettes has been linked to decreased oxygen levels, increased airway resistance, and reduced specific airway conductance in healthy users. Other studies have noted significantly lower blood oxygenation levels (SpO2) after vaping for just 20 minutes.

Long-Term Effects on Lung Function

Concerns have emerged regarding long-term respiratory effects, which have demonstrated measurable adverse biological impacts on respiratory health, including inflammation and impaired immune responses. This could potentially result in chronic respiratory conditions. A study focusing on young adults revealed that both vapers and smokers exhibited significantly lower peak exercise capacities and oxygen intake compared to non-smokers, indicating compromised physical fitness and potential lung function impairment.

Nicotine-Free E-Cigarettes. It is worth noting that even nicotine-free e-cigarettes can negatively affect lung function. Research indicates that vaping, regardless of nicotine content, can lead to decreased oxygen saturation levels, signifying reduced oxygen intake by the lungs.

Cardiovascular Effects

Vaping has been associated with adverse effects on the cardiovascular system. Users may experience cardiac arrhythmia, hypertension, acute coronary syndromes, and heart failure, which show a modest increase in incidence and mortality among vapers. The underlying mechanisms that contribute to these harmful effects are believed to include inflammation, endothelial dysfunction, atherosclerosis, oxidative stress, and hemodynamic changes. However, the exact mechanisms remain unclear.

A meta-analysis suggested that while e-cigarettes (EC) have adverse acute effects on heart rate, beneficial changes may occur in blood pressure regulation when individuals switch from traditional tobacco smoking to long-term EC use. Conversely, some

researchers reported that blood pressure remained unchanged or did not decrease in vaping participants compared to their pre-vape status. It was also indicated that vaping might hinder the anticipated reduction in blood pressure experienced during periods of relaxation. These findings align with other studies observing variable correlations between nicotine use and elevated blood pressure. After using a vape, increased heart rate and blood pressure are common immediate physiological responses.

Effects of E-Cigarettes on Bone Mineral Density (BMD)

Research on the impact of e-cigarette use on bone health is limited. Some studies suggest that exposure to e-cigarette vapour may negatively affect bone cell function. It has been documented that e-cigarette vapour condensate can reduce the viability and impair the function of osteoblasts. Additionally, the impact on bone remodelling, characterised by reduced viability and impaired functions of osteoblasts and osteoclasts, is associated with high concentrations of nicotine.

Impact on Muscle Function

Nicotine, a primary component of many e-cigarettes, can interfere with muscle protein synthesis. Research indicates that nicotine may suppress genes and cellular pathways essential for muscle repair and growth, which can hinder muscle development. Furthermore, nicotine has been shown to elevate cortisol levels, a stress hormone that can promote muscle breakdown, further impeding muscle growth and function.

Effects on Brain Development

The human brain continues to develop until around the age of 25, particularly the prefrontal cortex, which is responsible for decision-making, impulse control, and emotional regulation. Nicotine, the main addictive substance in e-cigarettes, disrupts this developmental process. Research indicates that nicotine exposure during adolescence alters synaptic plasticity and neurotransmitter pathways. It is associated with reduced cognitive performance, including poor attention span, learning difficulties, and memory deficits. Some animal studies have found that adolescent rats exposed to nicotine exhibited long-term changes in brain circuits, increased risk-taking behaviour, and a heightened reward response to other addictive substances. Studies from Universiti Malaya and USM (2021–2023) revealed that students who vape heavily reported lower academic performance and difficulties in focusing. Additionally, some experienced irritability, poor sleep, and increased symptoms of dependency.

Mental Health Effects

Mental health issues may lead youth to vape, and vaping can exacerbate existing anxiety, depression, and stress. Young vapers are 2 to 3 times more likely to experience depression, anxiety, and mood disorders. Frequent vaping is linked to low self-esteem and emotional dysregulation. Many young people use vaping as a coping mechanism, which increases the risk of addiction. Research from Universiti Kebangsaan Malaysia (2022) found a higher prevalence of depressive symptoms among university students who vape regularly. Feelings of loneliness and peer rejection were also more common among vapers. Some participants described vaping as a "temporary relief" for stress, leading to overuse.

Withdrawal symptoms such as anxiety, irritability, and restlessness when not vaping can negatively affect mental well-being.

Reproductive Health Effects

These effects are becoming a growing concern but are less commonly discussed. Nicotine and other chemicals in e-cigarettes can influence reproductive hormones, blood flow, and sexual performance. The American Journal of Preventive Medicine (2021) reported a link between nicotine and erectile dysfunction (ED) in young males, even among those without

a smoking history. E-cigarettes can impair endothelial function, reducing blood flow to the genitals. Young male vapers are beginning to report early signs of ED. The Journal of Adolescent Health (2009) also published findings that female users experienced increased menstrual irregularities and reduced libido. Toxic chemicals, such as formaldehyde and diacetyl, may impact sperm quality and testosterone levels, though more research is needed. Malaysian health professionals have raised concerns about reproductive side effects, but there is limited peer-reviewed local data available.

Vaping among young people in Malaysia has become a serious public health concern. Research shows that e-cigarette use can harm brain development, worsen mental health, impair respiratory and cardiovascular function, negatively affect bone and muscle health, and even impact sexual health in young adults. Despite being marketed as a safer alternative to smoking, vaping exposes users to nicotine addiction and other harmful chemicals. In response to this growing issue, the Malaysian government has recently (1st August, 2025) announced a ban on vaping, particularly targeting products that contain nicotine or appealing flavours, as well as the use of addictive drugs and chemicals that attract youth. This is a significant and timely step to protect young Malaysians from the harmful effects of e-cigarettes.

However, the ban alone is insufficient. It must be supported by rigorous enforcement, education in schools, awareness campaigns, and support for those wanting to quit. Malaysia now has a critical opportunity to reverse the vaping trend and prevent long-term health consequences for its young population. With continued action and collaboration, we can clear the clouds of harm and protect the next generation.

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