

ELECTRONIC CIGARETTE – SUBSTITUTE FOR A TOBACCO CIGARETTE

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Abstract

The electronic cigarette (e-cigarette) was patented and manufactured in 2004 by Lik Hun of the Chinese corporation Ruyan. It was officially introduced in Europe in 2006. From the very beginning, it was promoted as a replacement for tobacco cigarettes. The idea for its patenting arose from the need to reduce the harmful effects on the health of tobacco smokers. By using e-cigarettes, smokers continue the smoking habit, integrated into their daily lives. The World Health Organization points to the health risks of smokers, as well as the greater harm of tobacco cigarettes, compared to e-cigarettes. Its focus is to protect the young population, among whom the number of e-cigarette smokers is rapidly increasing.

The aim of the paper is to introduce readers to what an e-cigarette is, the history of its existence, and its way to use, and to make a modest contribution to smokers' feelings and the risks to their health through surveys.

From our studies resulting from surveys of 30 e-cigarette smokers – randomly found, who were former smokers of tobacco cigarettes, we concluded that: 16.7% feel afraid for their health, 6.7% suffer from respiratory system diseases, 3.3% have some heart disease or circulatory problems, 23.3% feel addicted to smoking e-cigarettes 33.3% often need a tobacco cigarette, 53.3% smoke up to 5/daily, 40% smoke up to 10/daily, and 6.7% smoke more than 10/daily. 40% of those surveyed feel great when they smoke an e-cigarette. The current research regarding the harmfulness of e-cigarettes is hypothetical and requires a serious approach and future long-term studies.

Keywords: survey, smoking, health, risks.

Introduction

Cigarette smoking is an ancient ritual enjoyed by the smoker, whether it is during socializing, relaxing, or in various situations in which he feels the need. The harmful effects of tobacco smoking have long been pathologically studied and medically confirmed. The World Health Organization (WHO) is spreading a major anti-smoking campaign [17], but despite this, there are a number of popularized statements that justify smoking and glorify tobacco, because it is a natural means of enjoyment, and that the harm comes from the artificial additives used by the tobacco industry, whose main goal is to increase the number of smokers and ensure ever-increasing profits.

In accordance with the anti-smoking campaign and the desire of passionate smokers to continue smoking without harming their health, an electronic cigarette has been patented that promotes safe smoking. This way, the smoker will enjoy smoking and will retain all the mental beliefs about safety and companionship, while not worrying about their health. But is that really the case?

The electronic cigarette (e-cigarette) was first patented and manufactured by Lik Hun of the Chinese Ruyan Corporation in 2004. In Europe, more specifically, at a conference in Austria in April 2006, it was officially promoted by the Chinese company SBT Ruyan [13].

Initially, e-cigarettes were sold illegally, mainly online, in Brazil, the United Kingdom, Canada and Israel. Despite the lack of sanitary and medical regulations, as well as the lack of official approval for sale, their popularity and sales are growing rapidly. Today, e-cigarettes are used in many countries, on all continents.

The WHO, headquartered in Geneva, Switzerland, contacted its 193 member states in 2008, warning them about false, unverified claims made by manufacturers and distributors of e-cigarettes and issuing an official appeal to the public not to use them, because there is no verified scientific evidence that they are safe and that they help smokers quit smoking. The main idea of the campaign was to increase awareness among the world public about the negative effects of smoking. The same year, regarding the appearance of e-cigarettes on the market, the WHO stated the following position: “Users of e-cigarettes inhale nicotine vapor into their lungs, as well as many other potentially toxic ingredients that have not yet been discovered and tested. There is no scientific evidence to support the claim that e-cigarettes are a safe and effective smoking cessation aid, like nicotine gum or nicotine patch, that help smokers to free themselves from nicotine addiction. If e-cigarette manufacturers and sellers want to help smokers quit, they should act within the appropriate legal framework. This means conducting rigorous clinical and toxicological studies.”[14]

In the 26 of August 2014, the WHO again warned its members about false, unverified and untrue claims made by manufacturers and distributors of e-cigarettes. It stated in its official appeal to the public that there is still no confirmed scientific evidence that e-cigarettes are safe for health and that they help smokers quit smoking. [15]

A 2012 study conducted in Greece found that e-cigarettes are not a threat to the heart. Dr. Konstantinos Farsalinos of the Onassis Cardiac Surgery Center in Athens, told the annual meeting of the European Society of Cardiology that: “E-cigarettes are not a healthy habit, but they are a safer alternative to tobacco cigarettes.” Farsalinos and his team examined the heart function of 20 young smokers before and after smoking tobacco cigarettes and 22 e-cigarette smokers. The tobacco smokers in this study suffered more significant heart dysfunction, including increased blood pressure and increased heart rate, while e-cigarette smokers had only a mild increase in blood pressure. This clinical study by a team of Greek doctors is the first in the world to study heart changes after using e-cigarettes [8].

The US Food and Drug Administration (FDA) classified e-cigarettes as drugs in 2009, requiring regulatory approval for their supply. Thus, e-cigarettes, like food, drugs, and cosmetics, must be approved for sale under the US Federal Food, Drug, and Cosmetic Act [12].

In September 2018, FDA further strengthened its plan to prevent youth smoking from electronic devices (vapers) by targeting the e-cigarette industry, with penalties for retailers and manufacturers who engage in illegal sales. FDA Commissioner Scott Gottlieb indicated that this is the first step in a new strategy to campaign against the e-cigarette industry [1].

In September 2019, during a massive outbreak of lung diseases in the United States linked to e-cigarettes, Donald Trump said that his administration planned to propose a ban on liquid flavors [2]. In December 2019, the US Congress passed a law raising the age limit for the sale of all tobacco products, including e-cigarettes, from 18 to 21 [3]. In 2020, the FDA ordered a halt to the sale of sweet and fruity-flavored e-cigarettes [4]. In 2022, the FDA targeted Juul, denying it a marketing application and marking its products off the US market. However, some regulatory loopholes (specifically around single-use, pre-filled products) still allow the marketing of flavored products by other companies [5].

The investigators analyzed health data from 4.3 million former smokers and found that those who switched to e-cigarettes were twice as likely to die from lung cancer, compared to those who used tobacco products containing nicotine [9].

Numerous statistical studies conducted in several countries show that by introducing a minimum age for the use of e-cigarettes, the number of users aged 12 to 17 increases, indicating that e-cigarettes are replacing tobacco smoking among young people [6].

There are also those who criticize the ban on e-cigarettes. According to them, e-cigarettes are a much safer alternative to tobacco, and the introduction of bans on their use means an incentive for smokers to return to smoking tobacco products [7].

In a storm of propaganda and counter-propaganda about e-cigarettes, in 2019, San Francisco, California, became the first city in the United States to ban the sale of electronic cigarettes on its territory [16].

To January 2020, twenty states had imposed taxes on e-cigarettes, sixteen had completely banned the product's use indoors, and eight had imposed temporary restrictions on the sale of all flavored e-cigarettes. [10].

WHO reported in January 2024 that there are two types of electronic cigarettes, one containing nicotine (ENDS - Electronic Nicotine Delivery Systems), and the other without nicotine (ENNDS - Electronic Non-Nicotine Delivery Systems). These cigarettes do not contain tobacco. In them, a liquid is heated, creating aerosols that the user inhales. They usually contain additives, flavors, and chemicals that can be harmful to human health. This category of products includes: e-cigarettes, e-cigars, and e-pipes. WHO is concerned that these products are being placed on the open market for mass consumption and are aggressively marketed to young people. Currently, 88 countries do not have a minimum age for purchasing electronic cigarettes, and 74 countries do not have regulations for these harmful products [18].

The Republic of North Macedonia is among the countries in the world with the largest number of citizens who are active smokers. The first best choice for smokers is to quit smoking. But if they do not quit, then the second choice is to switch to better alternatives, including e-cigarettes. In this regard, smoking e-cigarettes in our country is allowed (Decision adopted at a Government session on December 21, 2021, and announced by the Ministry of Health). Regarding e-cigarettes, legal regulations are included in the Law on Tobacco, Tobacco Products and Related Products [11].

In many countries around the world, surveys are conducted in which e-cigarette smokers provide information about their health and addiction. The data from the surveys are submitted to WHO, in order to assist in the work and activities that are marketed to the public.

The aim of this paper is to inform readers about what the e-cigarette is, the history of its existence and its way of use, and to make a modest contribution to the feelings of smokers and the risks to their health through surveys conducted among randomly encountered smokers.

Materials and methods

Our investigation is based on 30 surveyed people who smoke e-cigarettes, and previously smoked tobacco cigarettes. The people were randomly met, smoking in different places that surround us, such as in restaurants, at various outdoor events, or in parks, beaches, etc.

The questionnaires are self-created, inspired by similar questionnaires that have been used in many countries in surveys of smokers.

- Construction, function, and use of the e-cigarette:

The e-cigarette has evolved rapidly in recent years. The main parts that make up an e-cigarette are:

- ✓ Battery,
- ✓ Capsule - tank with e-liquid,
- ✓ Nozzle with screw - a place from which nicotine vapor is inhaled.

To function, the electronic cigarette has a capsule inside that contains a liquid, which evaporates thanks to an electric battery. The smoker inhales the vapor through the mouth, thus imitating real smoke from a tobacco cigarette. Also, at the end of the e-cigarette, an LED light is lit that resembles a lit cigarette. The liquid in e-cigarettes contains nicotine, among other things, propylene glycol and/or vegetable glycerin used as solvents, and may have additives with different flavors, such as menthol, vanilla, tobacco, coffee, etc. Figure 1 shows the construction of the e-cigarette.

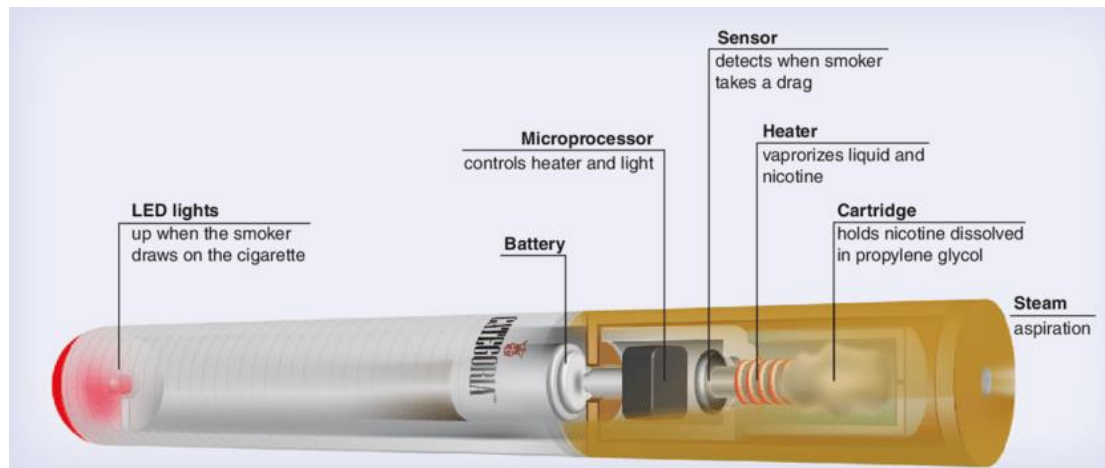


Figure 1. Diagram of the operation of the electronic cigarette

(Dr. Ashraf El Adawy – Consultant Chest Physician WHO Consultant – EMRO, Egypt)

<https://www.slideshare.net/slideshow/e-cigarettes-the-untold-truth/118739417>

- Advice for users of e-cigarettes:

- ✓ Be careful not to spill liquid into the central part of the capsule tube.
- ✓ The liquid you inject should not exceed the limit, i.e. the 1.6 ml mark on the upper white cap.
- ✓ Avoid spilling liquid during injection, and if this happens, the wetted surfaces should be washed thoroughly with plenty of soap and water, which would prevent contact of the liquid with the skin and mucous membranes.
- ✓ If the liquid in the capsule is less than 0.6 ml, and the vapor gradually disappears or when the smoker wants to change the flavor, the tank should be refilled. A 1.6 ml aerosol filling is equivalent to about 800 inhalations.
- ✓ Cleaning or reusing the capsule is not recommended.
- ✓ The capsule should be replaced if you notice a loss of power during vaporization, when you feel a strange taste or when you notice liquid leaking from the bottom. Each capsule has a useful life of approximately 10 refills, which is 1-2 weeks of vaporization. It is recommended that the smoker have additional capsules according to his needs. The nozzle above the capsule should be kept covered with a plastic cap at all times, for hygiene reasons. The capsule should always be kept tightly closed to the nozzle and in a vertical position.
- ✓ When the battery contact button is released, the device stops working and there is no vapor. It is recommended not to operate the device without liquid in the capsule.

Results and discussion

In many countries, surveys have been conducted with e-cigarette smokers. Studies on the effects and harmfulness of e-cigarettes are becoming more and more extensive. The dilemma remains whether natural tobacco is harmful to the health of smokers, the additives that are an integral part of cigarettes, or the chemistry of e-cigarettes. So far, there is no reliable data supported by scientific investigation that would allow the free circulation of e-cigarettes. Opinions on this issue are divided in different countries. With the rapid increase in users, the need for thorough research on the harmfulness or harmlessness of e-cigarettes on the health of smokers is also growing. Our investigations are also in this direction.

Survey A provided information on the health status of 30 e-cigarettes smokers, as well as on e-cigarettes smoking addiction and cigarettes with tobacco. From this surveyed group, 16.7% feel fear for their health, 30% do not pay attention, and 53.3% do not feel any fear. 6.7% suffer from

respiratory diseases, 33.3% do not know, and 60% do not suffer. 3.3% have some heart disease or problems with blood flow, 30% do not know, and 66.7% are not sick. Addiction to smoking e-cigarettes is felt by 23.3% of the surveyed persons, 26.7% don't think about it, while 50% are not addicted. All respondents were tobacco smokers. 33.3% of them often need a tobacco cigarette. 6.7% do not think about it, while 60% have lost their dependence (Table 1).

The analysis of the Limit Significant Difference (LSD) shows that there are highly significant differences among smokers who do not feel fear for their health, do not suffer from respiratory diseases, do not have heart disease or circulatory problems, do not feel addicted to smoking e-cigarettes and do not need tobacco cigarettes, compared to those surveyed who answered the questions positively.

If we take into account that the respondents who do not have an answer to the questions, do not suffer from diseases of the respiratory organs, the heart and blood flow, and that they are not addicted to smoking, we could hypothetically say that the smoking of e-cigarettes it is less harmful compared to smoking cigarettes with tobacco, however, to confirm this with greater certainty, more extensive investigations is needed, which is advocated by the WHO.

Table 1. Survey-A of 30 e-cigarette smokers

Respondents	Questions and answers														
	Do you feel fear for your health?			Do you suffer from respiratory diseases?			Do you have heart disease or circulation problems?			Do you feel addicted to smoking e-cigarettes?			Do you need cigarettes with tobacco?		
	YES	-	NO	YES	-	NO	YES	-	NO	YES	-	NO	YES	-	NO
1.			x			x			x		x		x		
2.	x					x	x		x	x					x
3.		x				x			x			x			x
4.		x				x			x			x			x
5.		x				x			x			x	x		
6.			x			x			x			x			x
7.			x			x			x			x			x
8.	x				x				x			x			x
9.			x		x				x	x					x
10.			x			x			x			x	x		
11.			x			x			x			x		x	
12.		x		x					x			x			x
13.	x					x			x			x			x
14.			x			x			x	x					x
15.			x			x		x		x			x		
16.			x			x		x			x		x		
17.			x			x		x			x		x		
18.			x			x			x		x				x
19.			x	x					x		x				x
20.		x			x				x	x					x
21.		x			x				x		x				x
22.		x			x			x		x					x
23.	x				x			x			x		x		
24.		x			x	x			x			x			x
25.	x					x			x			x	x		
26.			x			x			x			x			x
27.			x		x				x			x		x	
28.			x			x			x			x			x
29.			x		x				x			x	x		
30.		x			x				x		x		x		
Number of responses:	5	9	16	2	10	18	1	9	20	7	8	15	10	2	18
LSD _{0.05} =	5.33														

0.01 =	7.74
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From the survey B of 30 smokers it follows that 53.3% smoke up to 5 e-cigarettes. per day, 40% smoke up to 10 e-cigarettes per day, and 6.7% smoke more than 10 e-cigarettes per day. 40% of the surveyed people feel wonderful when smoking an e-cigarette. The same percentage belongs to people who do not make a difference, i.e. they feel the e-cigarette as well as the tobacco cigarette. 20% do not attach importance to what they smoke, they are simply carried away by the habit of smoking (Table 2).

It is pleasing to note that more than 50% of the surveyed people smoke less than 5 cigarettes per day, while the percentage of those who smoke more than 10 cigarettes per day is very small. Statistical processing of the data showed high significance (of 1%) among smokers who smoke up to 5 e-cigarettes/daily compared to those who smoke more than 10 cigarettes/daily, and significance of 5% compared to those who smoke up to 10 cigarettes/daily. As for the smoker's feelings when smoking an e-cigarette, they are different, and the differences are not highly significant.

Table 2. Survey-B of 30 e-cigarette smokers

Respondents	Questions and answers					
	How many times a day do you smoke e-cigarettes?			How do you feel when smoking an e-cigarette?		
	Up to 5	Up to 10	More than 10	Wonderful	Nothing special	Same as how to smoke a cigarette with tobacco
1.	x			x		
2.	x				x	
3.		x		x		
4.	x			x		
5.	x				x	
6.		x				x
7.	x					x
8.		x		x		
9.	x					x
10.	x					x
11.			x		x	
12.		x			x	
13.		x		x		
14.	x					x
15.	x			x		
16.	x			x		
17.	x			x		
18.		x				x
19.		x				x
20.		x			x	
21.	x			x		
22.		x				x
23.	x			x		
24.	x				x	
25.	x					x
26.	x					x
27.		x				x
28.			x	x		
29.		x				x
30.		x		x		

Number of responses:	16	12	2	12	6	12
LSD _{0.05} =	4.96					
LSD _{0.01} =	11.45					

The majority of those surveyed say that the passion for smoking is greater than the fear for their health. The anti-smoking campaign is not enough to quit smoking. Perhaps specialized people and institutions are needed, where smokers will be provided with adequate help in their treatment from addiction.

Figures 2 and 3 are a graphical representation of the questions and answers from 30 surveyed e-cigarette smokers (Survey–A and Survey–B), regarding health and smoking habits.

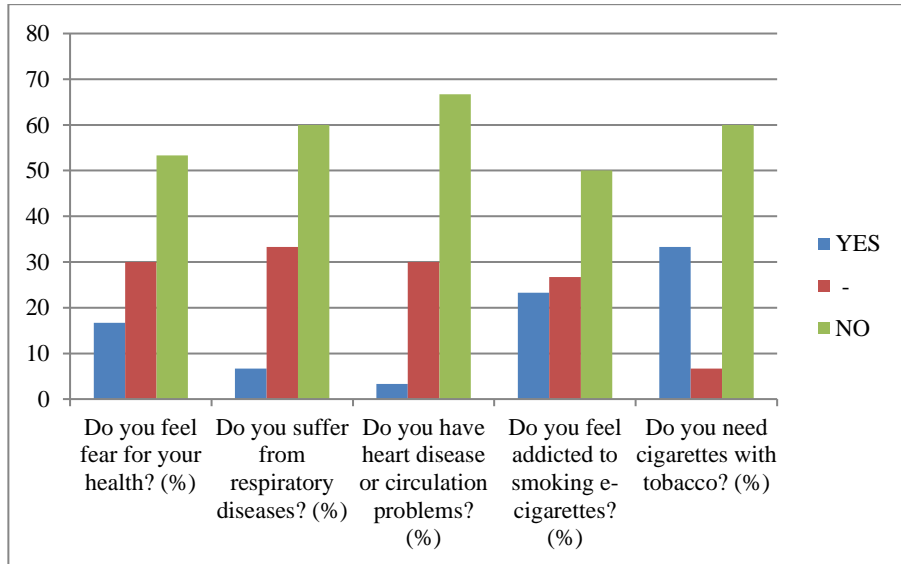


Figure 2. Graphical representation of the questions and answers from the Survey – A

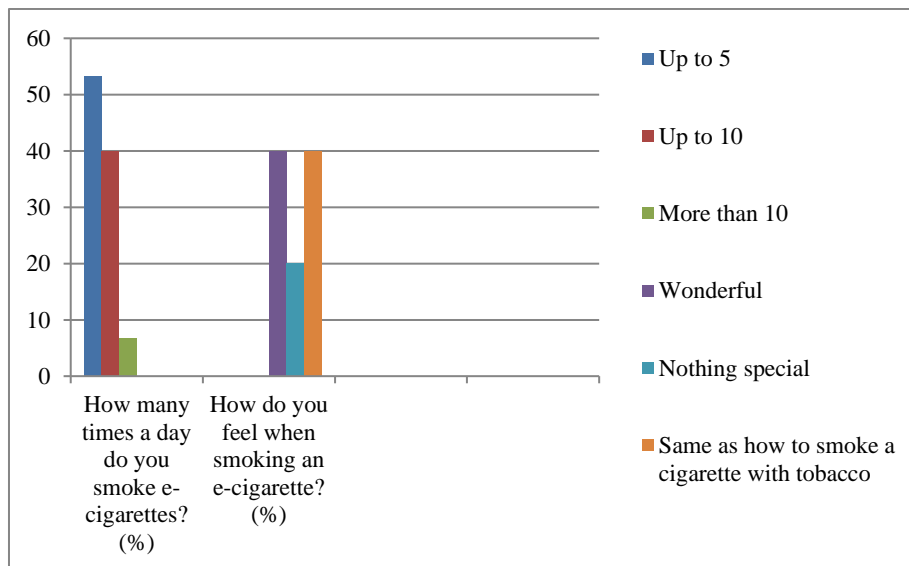


Figure 3. Graphical representation of the questions and answers from the Survey - B

Figure 4 shows a young lady smoking an electronic cigarette (surveyed in a restaurant in Prilep). Her enjoyment of smoking is obvious.

Figure 5 shows two ladies talking (surveyed on the quay of Lake Ohrid). One of them smokes a tobacco cigarette, and the other smokes an e-cigarette, while they drink coffee. Both enjoy smoking.

The two photos represent another recent fragment of the age-old scenario of smoking companionship.



Figure 4. A young lady smokes an e-cigarette
(Jane Aleksoski – Ph.D, Scientific Tobacco Institute – Prilep)



Figure 5. Two ladies talking, drinking coffee and smoking cigarettes
(Jane Aleksoski – Ph.D, Scientific Tobacco Institute – Prilep)

- The future of electronic cigarettes:

While specialists debate the need to expand investigations on e-cigarettes, and ways to promote better information about the health risks that their use can cause, consumption is growing, especially among the young population. Reality shows that the world of e-cigarettes is evolving. Their future promises an exciting journey towards new trends and advancements in this industry. The investigators predict the following:

- ✓ Improvements in e-devices: Greater integration of technology is expected in vaping devices. Modernized e-cigarettes, with connectivity options, mobile apps, and touchscreens, will become more common. These devices will allow for more precise control of power, temperature, and battery life.
- ✓ Placing a greater emphasis on human health: Health awareness will continue to be a major trend. Research will be focused on finding safer vaping liquids and reducing potentially harmful additives.
- ✓ Finding advanced delivery systems: Innovations in nicotine delivery systems will continue to evolve. High-tech tobacco heating devices and vaporization systems will compete in the market with promises of less harm.
- ✓ Personalization and taste: Consumers will continue to seek unique and personalized flavors. In the near future, there will be a wide range of flavored liquids with high-quality ingredients and more sophisticated flavor profiles.
- ✓ Greater environmental awareness: Sustainability will be an increasing concern. Companies will look for more environmentally friendly solutions in the production and packaging of vaping products.
- ✓ Emerging markets: In 2025, we are likely to see significant growth in emerging markets, with greater adoption of e-vaporizers in countries around the world.

Conclusions

The studies relate to the e-cigarette, its popularization and rapid acceptance, especially by the younger generation. Through this paper, the reader is introduced to its function and method of use, the precautions that the smoker should take, as well as the risks of using the product.

Information about e-cigarettes and their marketing is one of the priorities of the WHO. It constantly appeals to the harmfulness of their use, from the addiction they create, the potential risks and the insufficient proofs that their use would reduce or help smokers quit smoking tobacco cigarettes.

Despite strong negative propaganda, statistics and analysis, we predict a bright future for e-cigarettes. This prediction is based on the increasingly rapid advancement and integration of technologies and continued research into safer vaping liquids and less harmful additives.

The intention of our surveys is to make a modest contribution to the information that the WHO receives from countries where e-cigarettes are used, and based on the analysis, it continues to present its position to the public.

For further investigations and confirmation of our hypotheses, derived from previous studies, it is necessary to conduct additional testing within the framework of larger studies on a global level.

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