Research of practical methods of protection of urban space from traffic-induced moise and polluted air based on foreign experience

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Abstract

The purpose of this article is to discuss strategies and methods of urban space protection, which ensures the formation of a healthy environment based on sustainable urban planning principles. As it is known, as cities develop with time, the economic activities of the population and the number of industries increase, as a result of which traffic flows and traffic jams increase. Accordingly, air pollution and noise caused by transport increases, which has a negative impact on public health, social aspects and ecology. Therefore, the fight against air pollution and noise caused by transport in the urban environment is one of the most urgent problems for the world. The article discusses proven methods and their results. Research has shown that there are several effective methods of reducing transport emissions, but if they are implemented incorrectly, they not only can slow down the process of reducing pollution but stop the improvement process altogether. The developed methods are mainly related to greening, public transport, restrictions (policies), materials, pricing, urban furniture and activities that are carried out as an experiment in some cities. It should be considered that cities have their own characteristics (topography, relief, density, etc.) therefore every city may have developed its own specific and individual solution to overcome the problem. Regardless of the developed strategies and methods, it is still difficult to find a model that will solve the problem and adapt to the perpetrators.

Key words: urban health, tactical urbanism, transport, ecology, urban planning

Introduction

Cities grow and develop over time. Together with them, the number of population (residents), economic activities and industries increases, resulting an increase in the number of cars, traffic flows and traffic jams. All this leads to an increase of noise and air pollution caused by private and public transport. Polluted environment has a negative impact on human health and causes various diseases. Traffic noise is classified by the World Health Organization (WHO) as the second most important cause of ill health in Western Europe, after air pollution, according to the EEA, noise is associated with more than 12,000 premature deaths each year, and air pollution (PM2.5, NOx and O3) - more than 550220.

Therefore, the fight against air pollution and noise caused by transport in the urban environment is one of the most urgent problems for the world. Car-oriented urban environments also reduce an individual's daily physical activity and are strongly associated with rising rates of obesity. The design philosophy of car-oriented cities means wide roads and parking spaces. Such an approach has led to a number of complex issues affecting community cohesion, health and social aspects. According to the Environment Agency, road transport is responsible for one fifth of greenhouse gas emissions (EEA, 2016). Over the past 25 years, European directives on noise and air pollutant emissions have limited maximum levels of pollutants, set higher fuel quality standards, stricter policy and technology standards for vehicle emissions, and set air quality limits and noise thresholds (Fig.1 and. Fig.2). So there is a dichotomy, on the one hand, urban

development and transport, which makes life easier and makes it possible to do various activities without wasting time, but on the other hand, it threatens the health of citizens, the environment and nature.
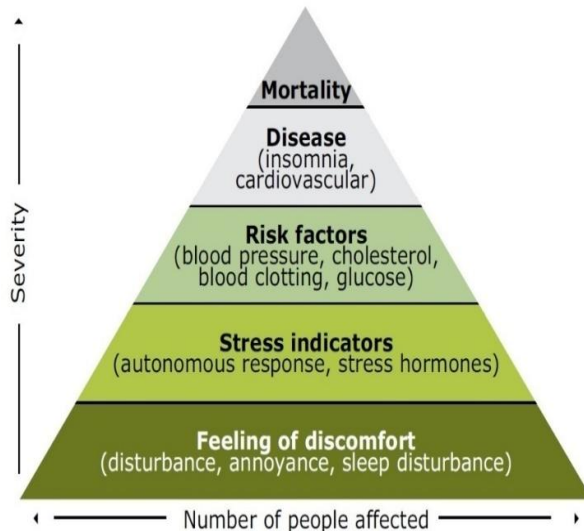
Source: Babisch, 2002, based on WHO, 1972.

Figure 1 Pyramid of noise effects (European Commission, 2015)
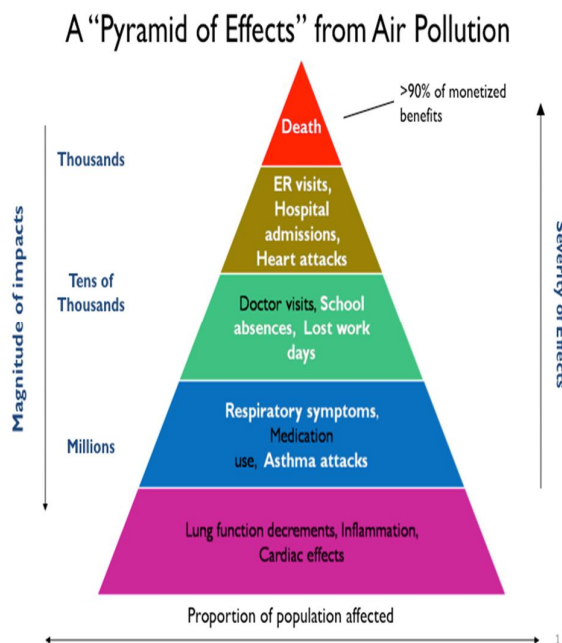

Figure 2 "Pyramid of Effects" from Air Pollution (EPA-US, 2015)

Main part

The purpose of this article is to discuss the existing practical methods and strategies that will reduce the negative impact of transportation on the population and promote the formation of a healthy environment based on the principles of sustainable urban planning. Dependence on the automobile and the focus of city architecture on it affect not only the health of society but also the ecology of the city.

The absence or lack of information makes it difficult to focus, manage and solve air pollution and noise related problems in the right way. Even when all the necessary data are available, it is still difficult to deal with air pollution and noise problems, especially within city center boundaries.

Everyone has the right to live in a good and healthy environment, which consists of a pleasant atmosphere combined with clean air, quiet streets, green spaces and other public places where the level of polluted air and noise does not harm people's health. But not only human health is at risk. Polluted air and vibrations caused by noise also damage buildings.

In many cities, the use of public transport is not widespread, because it does not provide enough or good connections between different areas of the city without losing a lot of time. Also nowadays, owning a private vehicle is no longer considered a luxury as it is available to people of different socio-economic status. Accordingly, the number of private cars increased significantly and traffic jams increased. This means that the problem is not only the loss of comfort and time, but also that the environment is increasingly damaged. Polluted air and noise are one of the main contributors to climate change.

Quality of life means "happiness and well-being of residents" which determines the success of cities in the future. (Eurostat, 2015). In a good urban environment, well-planned buildings and public spaces can create a safe, clean, peaceful and pleasant atmosphere. The

well-being of citizens and the economy depend on the quality of the environment (EEA, 2009). Finally, the collected information was analyzed and divided into two main parts: ways to solve air pollution and acceptable measures to reduce noise. Their effectiveness depends on the characteristics, importance and scale of the city or individual area.

There are several effective ways to reduce transport emissions, whether in or around the city. However, if they are implemented incorrectly, they can not only slow down the process of reducing pollution, but stop improvement altogether.

For example, a method of taxation was introduced for the use of private transport, which was first used in Singapore in 1975. The method produced good results from the start, reducing congestion by 45% and traffic accidents by 25%. This method has helped increase the use of public transport and improved infrastructure, safety and air quality. Today, 65% of Singaporeans use public transport.

The next method has already been tested in various cities and is related to the pricing of parking spaces in the city center. Pricing parking spaces can make drivers decide whether to use a private car to get around and use public transportation. Paid parking is associated with economy and can be considered an important factor for citizens. This factor is accompanied by a lack of parking spaces in the city centers, which is mainly related to the loss of time when searching for a free space.

One method to reduce air and noise pollution in cities and increase physical activity of citizens is to close streets in central areas to vehicular traffic and leave these streets for pedestrians. For example: in some cities certain streets are closed to cars 24/7. In some places - on weekends and weekdays it opens only after 20:00. Often these are streets that are in the center of the city, historically important and popular with both tourists and locals. However, this method may cause another important problem, which is related to the absence of alternative ways, the so-called A detour through which citizens will be able to travel by car. Therefore, it is a rather difficult decision to accept, because it is related to changing the road structure.

While in some countries and cities the state is fighting the consumption of old cars, the tradition of car-free days is being established all over the world, September 22 is now officially known as the day when everyone is invited to leave their cars at home and use bicycles or simply walk. The main goal is to show "car dependent" people that in some cases it is faster to walk or bike.

Reducing the use of private cars automatically means providing better public transport that will work efficiently. The BRT system is an innovative, high-capacity and low-cost public transit solution designed to improve urban mobility. This system uses mostly specialized vehicles on the roads to provide fast and efficient transportation for passengers in different directions. (National BRT institute, n.d.). Another benefit of the BRT system is that it reduces traffic congestion, road and parking costs. In the short term, BRT can reduce pollutant emissions by 29% and in the long term by about 45% (Hossain & Kennedy, 2008).

As air and noise pollution is mainly caused by human activities, the European Environment Agency has produced a guide to how each person can individually help reduce pollution in their daily lives. These are daily tips for those who want to help reduce air pollution and protect the environment (EEA, How can I help reduce air pollution? 2014): The aim of the campaign is to raise awareness in the community. To help people better see the causes of the problem, threats, opportunities to avoid them and recommendations.

Some cities are actively moving towards a healthy urban model. For example, the cities of Amsterdam and Copenhagen are known for their bicycle-friendly infrastructure and extensive public transport network, where cycling is an integral part of urban culture. Such planning promotes healthy lifestyles, community relations and environmental sustainability.

Public involvement and initiatives will significantly contribute to solving the problem. One of the public initiatives is the so-called Citizen urbanism or tactical urbanism (Fig. 3).

A movement emerged to bring about changes in the traditional planning system that would solve urban problems at minimal cost and at the will of the people. The term is defined as: "a fast, low-cost, action-oriented approach to making significant civic changes in neighborhoods and cities" that involves returning critical areas of the city occupied by cars to pedestrians. Tactical urbanism is characterized by: flexibility, diversity, easily transformable based on requirements, temporality, aesthetics. It makes visible a specific problem and improves the quality of life in the context for which it was created, through community involvement. Thus, it is a strategy that promotes the sustainable development of cities, creating comfortable spaces for citizens on foot. Such urban interventions require support from the state to avoid urban conflicts. The so-called Triad: public space - transport - individual. Thus, tactical urbanism tries to restore small public spaces, although the strategy requires a much more future-oriented vision and has implications for improving the quality of life in the city. However, it cannot be considered a perfect model of urban development, because technical urbanism is a response to a specific intervention. The concept of tactical urbanism was published as a guide in 2011 by American architect Tony Garcia and urban planner Michael Lydon. They formulated five principles of tactical urbanism in the form of small-scale projects: art installations painted directly on the street or other public surfaces, traffic regulation solutions, small recreation areas, guerilla gardening and temporary bike lanes. Tactical urbanism interventions can take many forms, depending on the specific goals and context of the project. Its aim is to see the potential for positive transformation of roads and streets and to promote a do-it-yourself vision. The key is to identify specific needs or challenges and develop low-cost, temporary solutions that can be implemented quickly and easily.
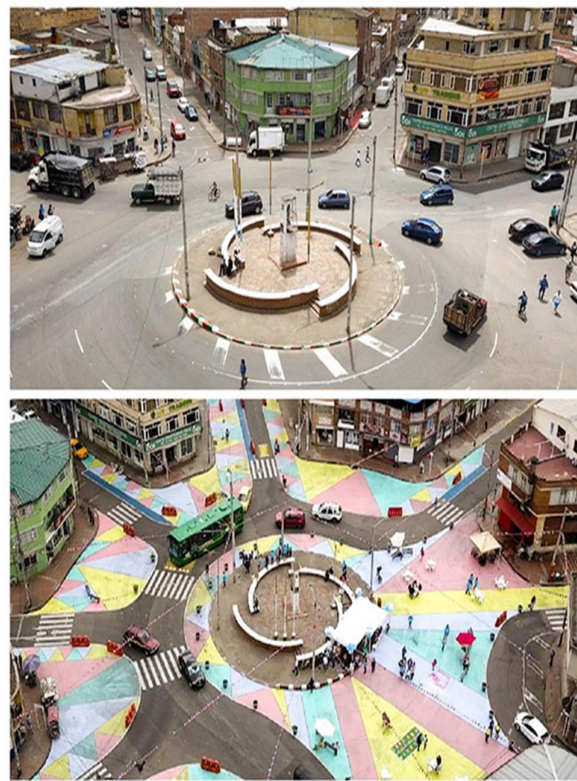

Fig. 3 Tactical Urbanism

Conclusion:

Thus, today's transport, accompanied by noise and air pollution, cannot be considered separately from the urban environment, so it is critically important to develop smart methods and strategies to overcome the problem. This is a process, the very management of which requires the joint involvement of society and the state.

The analysis showed that there are several effective ways to reduce transport emissions, but if they are implemented incorrectly, they can stop the improvement process altogether. The developed methods are mainly related to greening, public transport, restrictions (policies), materials, pricing, urban furniture and activities that are carried out as an experiment in some cities. It should be taken into account that cities have their own characteristics (topography, relief, density, etc.) therefore every city may have developed its own specific and individual solution to overcome the problem.

Regardless of the developed strategies and methods, it is still difficult to find a model that

will solve the problem and adapt to the perpetrators.

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