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Review on Urban Transportation System and Its Adverse Impacts to Public Health of the Cities

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Abstract: The main research objective is creating the knowledgebase on transport and urban development and their adverse impacts to public health of big cities' citizen. This research is a flatform from which future studies could be conducted with the purposes to improve urbanization and health-related issues toward healthy cities and sustainable urban development. The literature review research method is applied throughout the study process to review and summarize on: (1) the legal documents on urban planning and development, including transportation, environmental related-aspects; (2) scientific studies on urban planning and development, urban planning - transport - public health relationship, public health contribution to sustainable development, and (3) news and articles from media, newspaper about the current situation of urban planning, traffic, health issues and changes in related policies, etc. Main findings of the study: (1) listing out the major negative health effects related to transport and urban planning, such as: injuries and accidents are main causes leading to urban mortality (especially in Asia) and illness realated to pollutants releasing from traffic activities; and (2) introduction some public health improvement applying planning-related measures: Healthy Cities Program (HCP) and Healthy Urban Planning (HUP) by WHO, KonSULT's policy measures analysis in term of Health effects.

Keywords: Urban Transport, Transport Development Management (TDM), KonSULT, Transport - Public Health Relationship

1. Introduction

Mega Cities are the regions with the highest urbanization rate, a dense population with a large number of individual motorized vehicles, their transport infrastructure is always under high traffic pressure which leads to several problems and aggressively harm to the health of citizens.

There are some notable health-related problems caused by inappropriate transport and urban planning: (1) Injuries and mortality caused by traffic accidents; (2) Air pollution (including dust, fined and ultra fined particles) induced by traffic smog; (3) Mental stress caused by traffic noise, heavy traffic and post-accidents trauma. Awareness of these problems, municipality has implemented many measures on improvements of transport and urban system. Unfortunately, some of applied measures are not appropriate implemented or excessive abused giving rise to unwanted negatives (e.g. excessive reliance on minimum parking requirement, built-more-road measure, etc.). In order to solve current problems effectively, comprehensive awareness, analysis and health impacts assessment consideration-and-application on applied measures are vital to the sustainable development of the cities in the future.

Therefore, this study focuses on reviewed and summarized analyzed health impacts assessment results on current applied measures using literature review method as a key research methodology and scientific observation to revised the current situation.

**Research methodology*

The research is conducted as literature review research

type. Therefore, the main applied research methodology is the literature review. Moreover, the reviewed documents are chosen based on its research topic relationship and publication date, as most up to date as possible.

2. Public Health Impacts Analysis Causing by Urban Transportation

Transport aspects have the major implications for the health of urban citizens. WHO (2000) [3] stated many health consequences of transport in their report:

1. Serious loss of human life and injuries from road traffic accidents;
2. The significant premature mortality and burden on hospital resources causing by traffic air pollution;
3. The severe and pervasive annoyance emits from traffic activities and the learning difficulties and increase in risk of cardiovascular disease associated with it;
4. The negative health conditions (e.g. obesity, depression, etc.) due to the increase of sedentary lifestyle as well as the missed opportunities for several health benefits of physical active lifestyle; which are the consequences of the failures in promoting non-motorized forms of transport – cycling and walking;
5. The constraints on children development and neighborhood support networks caused by heavy traffic.

Influence level of harmful factors is differentiated by different social groups based on a series of external factors. For example: people, who have to travel a lots, are exposed to higher and more often air pollution as well as struggled with many serious health factors associated with travel behaviors than people who don't have to. [3]

There are many studies about the transportation and its negative impacts to public health. As consequences, the awareness on adverse health impacts associated with transport is increasing both in academic [4–11], and policy circles. Khreis et al. (2017) [4] has summarized the adverse health impacts caused by transport- and urban planning – related factors into his research (Figure 1).

Todd (2013) [10] states that public health is greatly affected by transportation policy and planning decisions in various ways. The transportation policy and planning decisions have a significantly impact on the health-related problems by influencing traffic accident and pollution emission rates, physical activity, basic access, and mental health. By promoting the new transport planning paradigm, which changes the basis of transport system performance evaluation from mobility into accessibility, the public health would be improve greatly. The new transport planning paradigm applies more comprehensive analysis of transport-health impacts and planning options. In details, it supports more integrated, multimodal planning, including improvements to alternative modes, more Traffic Demand Management strategies (TDMs), and smart growth development policies (Table 1). The new paradigm both supports and is supported by more comprehensive analysis of health impacts.

According to statistical data from research of (Subramanian 2012) [11], mortality caused by transport factors are leading in the causes of death in United States. Trong báo cáo còn đề cập tới các tác động tích cực của các giải pháp giao thông theo mô hình mới tới các yếu tố tiêu cực được liệt kê (Figure 2). Transport planning decisions affect major health risks, including cancer, cardiovascular disease, traffic crashes, and diabetes, by influencing physical activity, pollution exposure, and crash risks.

3. Public Health Improvement Applying Planning-Related Measures

As discussed in previous parts, the policy and transport – and urban planning – measures have significant implications on public health status improvements. In the other hands, transport planning and related policy is irreplaceable in urban planning operation and related development policy in general. Therefore, in order to maximize the efficiency of transport – public health measures, the comprehensive urban planning measures are extremely neccessary for this purpose. Aware of the need for comprehensive public health solutions, WHO has launched the Health for All strategy (also called 'Health for All' by the year 2000) which aims to meet the new demands on people's health since the 1970s, this strategy is officially launched at World Health Assembly in 1979. Afterwards, in 1986, at the First International Conference on Health Promotion in Ottawa, the Ottawa Charter is announced. The Charter declared that 'the fundamental conditions and resources for health are peace, shelter, education, food, income, a stable ecosystem, sustainable resources, social justice and equity. Improvement in health requires a secure foundation in these basic prerequisites.

The international Healthy Cities movement started in 1986, since WHO started a project with the aim of taking rhetoric of Health for All and Ottawa Charter into actions. A healthy cities concept has been defined as one which is continually creating and improving both physical and social environments and expanding those community resources which enable people to mutually support each other in performing all the functions of life and in developing to their maximum potential [12]. Originally, the Healthy Cities approach aim to put health high on the political and social agenda and to build a strong movement for public health at local level. It puts a major emphasis on interdisciplinary cooperation, community development and the development of city health profiles [13].

The WHO has identified 11 principles of a healthy city [14]:

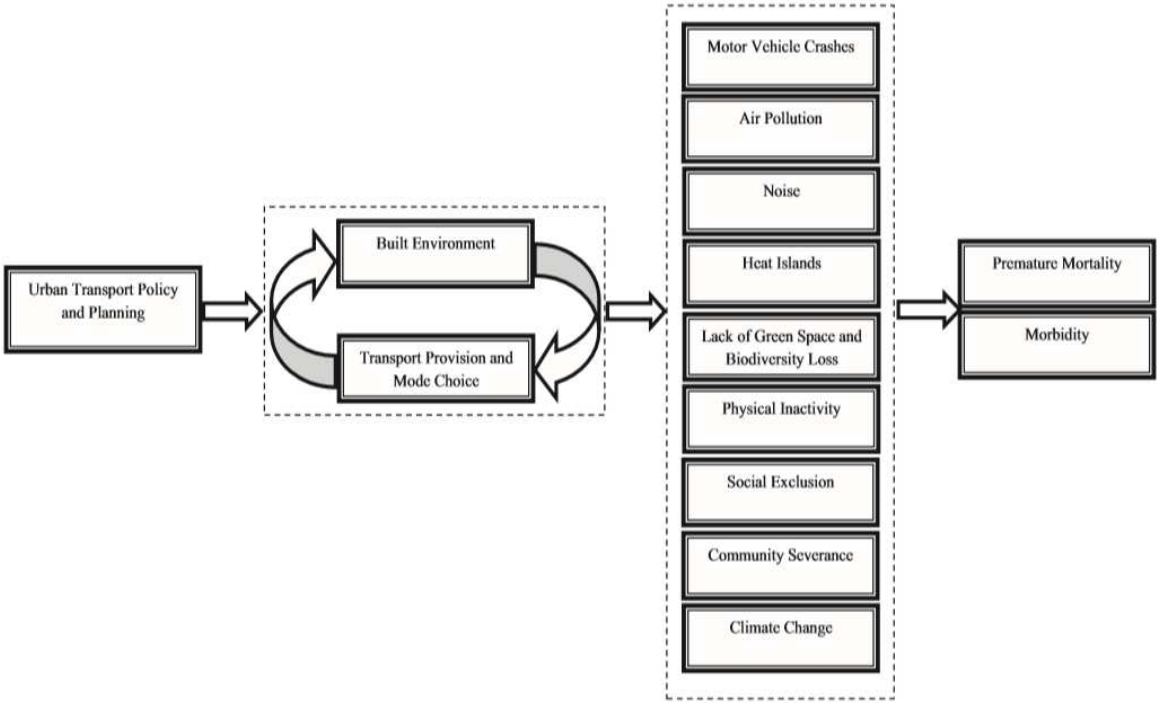
1. The meeting of basic needs (for food, water, shelter, income, safety and work) for all city people;
2. A clean, safe physical environment of high quality, including housing quality;
3. An ecosystem that is stable now and sustainable in the long-term;

4. A diverse, vital and innovative economy;
5. A strong mutually supportive and non-exploitative community;
6. A high degree of participation and control by the public over the decisions affecting their lives, health and wellbeing;
7. The encouragement of connectedness with the past, with the cultural and biological heritage of city-dwellers and with other groups and individuals;
8. Access to a wide variety of experiences and resources with the chance for a wide variety of contact, interaction and communications;
9. A form that is compatible with and enhances the preceding characteristics;
10. An optimum level of appropriate public health and sick care services accessible to all;
11. High health status (high levels of positive health and low levels of disease).

Recently, Healthy Cities Program (HCP) is adapted widely by many municipalities around the world, leading by European Cities. In European region, the WHO adopted an updated strategy for Health for All in the 21st century (Health 21) and consolidated this with a World Health Declaration [15]. This strategy firmly recognized the role of agencies outside the formal health sector to resolve the wider determinants of health and the interaction between health and sustainable development. In order to ensure scientific, economic and political sustainability operate the implementation of Health 21 in Europe, there are four strategies for action were chosen:

1. Multi-sectoral strategies to tackle the determinants of health, taking into account physical, economic, social, culture and gender perspectives and ensuring the use of health impact assessments;
2. Health outcome driven programs and investments for health development and clinical care;
3. Integrated family and community-oriented primary health care, supported by a flexible and responsive hospital system;
4. A participatory health development process that involves relevant partners for health at all levels (example: local community, workplace, school) and that promotes joint decision-making, implementation and accountability.

Not only received the attention and support from WHO and National Governments, scientists, researchers and planning experts are also very interested in the relationship between sustainable urban planning and community health factors. Since 2001, the Knowledgebase on Sustainable Urban Land Use and Transport (KonSULT) is established. The Knowledgebase is included a list of various transport and urban planning solutions and related policies that aim to support policymakers, researchers and stakeholders to understand the challenges of achieving sustainability in urban transport, and to identify appropriate policy measures and packages. Moreover, The KonSULT is continuously updated to reflect the results of recent research. Khreis Haneen, et al. (2017) [6] have added potential health impacts to the existing KonSULT's policy measures which provide the more comprehensive look on the impacts of its measures to public health. The study has showed positive impacts to human health in case of appropriate policy measures as well as potential negative health impacts if the KonSULT's policy measures are implemented with inappropriate methods.



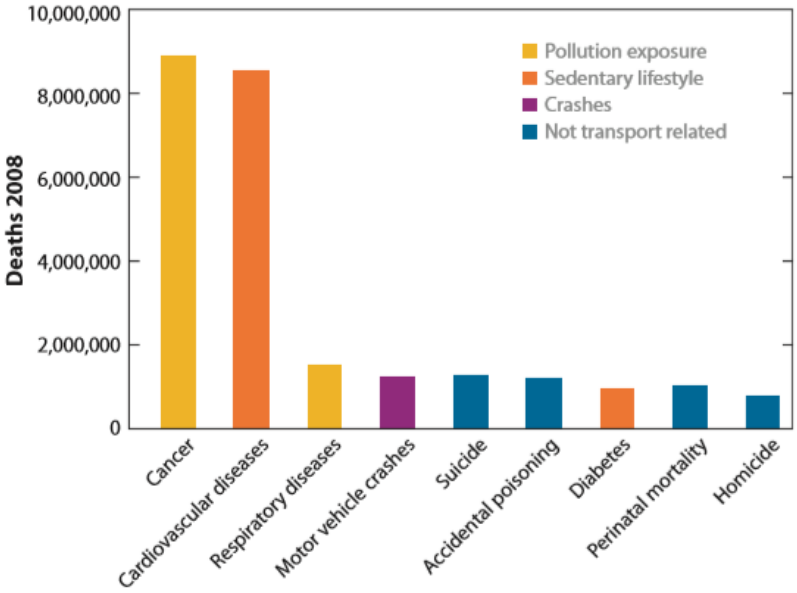
(Source: Khreis Haneen, et al. 2017) [4]

Figure 1. *Linkages between transportation and its adverse health impacts.*

Table 1. *The comparisons between the old and new transport planning paradigms.*

	Old paradigm	**New paradigm**
Definition of transportation	Mobility (physical travel)	Accessibility (people's overall ability to reach services and activities)
Transport planning goals	Maximize travel speeds and minimize user costs	Optimize transport system efficiency and equity
Modes considered	Mainly automotive	Multimodal: walking, cycling, public transport, and automobile
Performance indicators	Vehicle traffic speeds, roadway level-of-service (LOS), distance-based crash and emission rates	Quality of transport options, multimodal LOS, land use accessibility
Consideration of transportation demand management (TDM)	Generally considers vehicle travel reductions undesirable. Considers TDM a solution of last resort	Supports TDM whenever cost-effective
Favored transport improvement strategies	Road and parking facility expansion	Improve transport options, TDM, more accessible land development
Health impacts considered	Per-kilometer traffic crash and pollution emission rates	Per capita crash and permission rates, physical activity, and basic access

(Source: Todd Litman. 2013) [10]



(Source: Subramanian R. 2012) [11]

Figure 2. *Leading causes of death in the United States.*

4. Conclusion

The paper has reviewed and summarised literature reviews: (1) the legal documents on urban planning and development, including transportation, environmental related-aspects; (2) scientific studies on urban planning and development, urban planning - transport - public health relationship, public health contribution to sustainable development, etc. (3) news and articles from media, newspaper about the current situation of urban planning, traffic, health issues and changes in related policies, etc.

This research is a flatform from which future studies could be conducted with the purposes to improve urbanization and health-related issues toward healthy cities and sustainable urban development.

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Biography

Vo Minh Phuc (1985, Ho Chi Minh city). Lecturer, Facutly of Engineering and Technology, Hong Bang International University, Ho Chi Minh city, Viet Nam. Since graduated BA in Urban Studies in 2017 at Faculty of Urban Studies of University of Social Sciences and Humanities, VNU-HCM, Mr. Vo has continuously studied and released several scientific publishcations in urban study field. In 2018, with DAAD scholarship, he participated in Sustainable Urban Development Master Program of Vietnamese – German University cooperating with Technische Universität Darmstadt (TUD). In 2019, Mr. Vo also acquired DAAD scholarship for studying and finishing his master thesis at TUD, Germany.

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