

## Walking in Shanghai : street planning and design based on walkability

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**Abstract:** In the process of rapid urbanization, urban traffic emphasizes the development of motorization and neglects the important health effects of non-motorized transportation systems. The impact of automobile traffic on urban ecological environment and walking environment cannot be ignored. This not only causes serious air pollution, but also leads to a decline in the health of residents. Before the car became popular, walking was the most important way for city residents to go out. Residents walk not only to reach their destination, but also to socialize and exercise on the road. Improving the walking environment will enable people to choose more green ways of travel. It allows them to communicate with others while walking, which helps the residents' mental health and enhance community cohesion. This paper explores the importance of walking ability to improve the health of urban residents, and points out that walking cities are an important part of building a healthy city. By studying the practice and design guidelines for improving the walking environment in Europe and the United States, and using Shanghai as a case, explore how to transform an international city into a livable and healthy city. And what are the shortcomings in Shanghai's current street design guidelines.

**Keywords:** walkability; healthy city planning; walking environment

### Introduction

In 1987, the World Health Organization (WHO) established the "Health Cities Project" for the first time. The researcher of this project suggested that, "Where people live affects their health and chances of leading flourishing lives. Communities and neighbourhoods that ensure access to basic goods, that are socially cohesive, that are designed to promote good physical and psychological wellbeing, and that are protective of the natural environment are essential for health equity."<sup>[1]</sup>

In Europe, the Healthy City Project has a five-year development phase and has consistently achieved the goals and outcomes of each phase. This project has changed the traditional urban planning to focus only on the concept of urban economic, social and cultural construction. People are beginning to realize that planning should also target health promotion. Planners should strengthen their focus on public health, integrate healthy development into urban construction, and achieve a healthy built-up environment and promote public health as a foothold for healthy urban planning.

The rapid advancement of industrialization and urbanization has brought rapid economic growth to the world's major cities, and has also brought about increasingly severe urban environmental pollution, motor vehicle traffic pollution, and urban ecological imbalances. Whether a city is healthy depends not only on the medical and

health fields, but also on the urban ecological environment, the transportation environment and the social environment.

The urban walking environment is the most basic environment for people's lives, but it suffers from the imbalance of serious damage and development. How to improve the quality of urban walking environment, how to coordinate the relationship between urban pedestrian built environment and public health has become an urgent question to answer. At present, developed countries in Europe and America have produced many excellent walking environment practice and design guidelines, which have good guiding significance for developing countries. Comparing the current situation of Shanghai's walking environment with the implementation of the "Shanghai Street Design Guidelines" and the experience of Europe and the United States, it will be able to further guide the pedestrian environment in Shanghai to further deepen and improve, and to explore the construction of a healthy international metropolis.

### Methods

This paper adopts literature research method and inductive method to collect and study a large number of literature materials and scientific research results, and conduct comprehensive analysis and in-depth summary of the theoretical and practical progress of pedestrian environment planning and construction at home and abroad. Then use the method of comparative analysis to judge the characteristics of Shanghai's walking environment and study the feasibility and operability of the Shanghai Street Design Guidelines. The guidelines are supplemented and revised by the evaluation results to further deepen and improve the guidelines.

### Text format

#### *The contradiction between motorized traffic and healthy cities.*

Among the factors affecting the urban environment, motor vehicles occupy a high weight. Since the German engineer Carl Benz has invented the world's first car, the car has been on the planet for more than 100 years, and the number of cars continues to grow. Taking China as an example, in the past five years, the annual increase of motor vehicles has increased by more than 15 million, and the average annual increase of drivers has reached more than 20 million. The number of motor vehicles in the country has reached 264 million, including 154 million vehicles. 300 million people, including more than 246 million motorists.

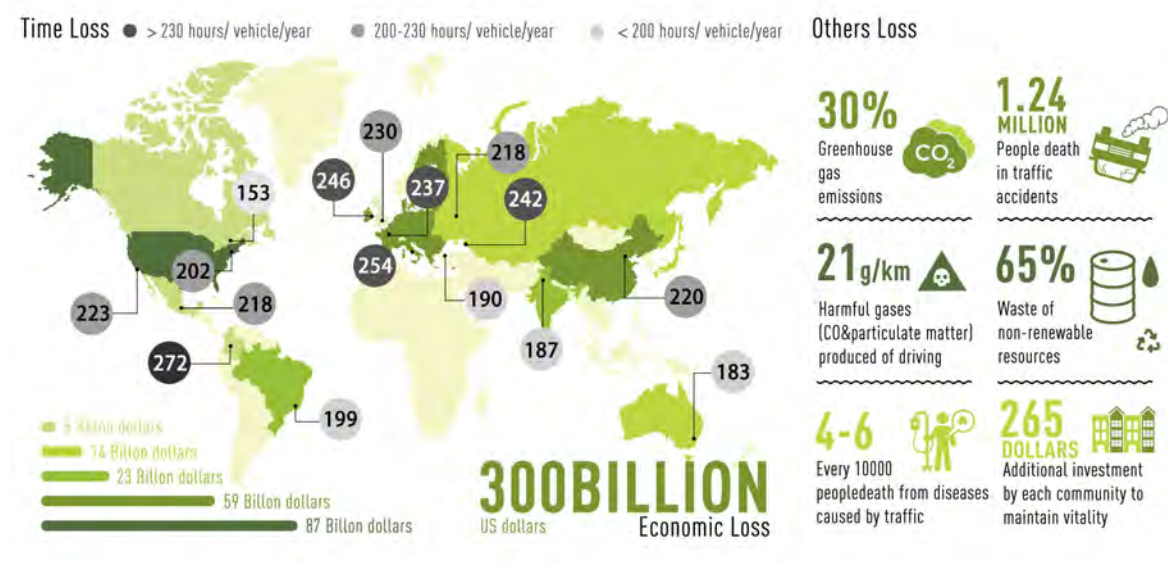


Fig1. Loss caused by traffic jam

The huge impact of such a huge number of vehicles on the city is terrible. The most intuitive negative impact is the waste caused by congestion. According to statistics, citizens in big cities around the world spend more than two hundred hours a year on congestion. At the same time, congestion also brought high economic losses. The United States loses about \$87 billion a year, and the United Kingdom loses about \$5.5 billion a year. In other countries, about 2% of the gross national product is wasted on congestion.

Compared with obvious congestion, the negative impact of motor vehicle traffic on urban health is even more serious.

70% of urban air pollution comes from automobile exhaust. Of the car's emissions, 90% come from diesel exhaust particles, DEP. These pollutants are mainly caused by incomplete combustion of automobile fuels. The main components are carbon monoxide, hydrocarbons, nitrogen oxides, carbon dioxide, lead, fine particles and the like. Among these pollutants, particulate matter that can enter the lungs has the greatest impact on human health. In the past 100 years, the incidence and mortality of airway allergic diseases have increased significantly.<sup>[2]</sup>

Researchers have observed PM2.5 in 185 countries. By assessing the link between particulate matter emissions and average life expectancy in each country, researchers can speculate on the impact of air pollution on the global average life expectancy. They confirmed how air pollution drastically shortens the life expectancy of the global population and draws the conclusion that humans have lost their lives on average for about one year. The study also highlighted the benefits of improving air quality for older people. For most Asian countries, if air pollution is no longer a risk of death, the likelihood of a 60-year-old person living 85 years or older will increase by 15% to 20%.<sup>[3]</sup>

At the same time, motor vehicle traffic has also had an indirect negative impact. The first is that most of the motor vehicles are driven in densely populated areas of the city. Considering that the pollutants in the exhaust gas are mainly spread through the ground through mechanical diffusion and thermal turbulence, pollutants in the traffic micro-environment, such as inside the vehicle and on both sides of the road. The concentration is much higher than the environmental background concentration, which greatly increases the health risks of residents exposed to high concentrations of pollutants.

The second is because the changes brought by the car to the street are subversive and systematic, and the traditional urban space and street structure are gradually being disintegrated. Streets lack human participation and applicability, and urban residents are increasingly prone to health crises such as tension, anxiety, depression, and insecurity. People are no longer willing to stay in the city street space. This has led to a continuous decline in the mental health of urban residents.

### *Benefits of a good walking environment*

The shaping of the walking environment is an essential part of building a healthy city, which is embodied in the three aspects of society, economy and environment.

In terms of environment, pedestrian-preferred urban construction can reduce motor vehicle travel, reduce road congestion, and reduce carbon emissions. Despite all kinds of technical means, walking priority is still a cheap, operational, and important way to cope with energy shortages and climate change, reduce pollution and noise, increase safety and mobility.

On the social front, walking priority can reflect social equity. Walking is an integral part of many people's lives. The walking system can meet the needs of all sectors of society. The most vulnerable groups benefit the most from the construction of the walking system. Although the middle and lower classes cannot participate in the planning process, policy makers should still look at walking. Walking can also enhance the vitality of the

community, which is more beneficial to people's mental health. Walking can be cheap, convenient, and thief-lower to reduce the risk of obesity and promote physical health [4], and the World Health Organization also recommends replacing some medications by walking every day. Related studies have shown that the reduction of walking will increase the risk of chronic diseases such as obesity, arteriosclerosis and arrhythmia, which directly affect the health of urban residents. Corrective analysis showed that people walking or cycling to work were significantly less likely to have obesity, high blood pressure and diabetes than those who commuted to work by private transport. Walking to and from work is positively correlated with the health of men and women, and negatively correlated with male body mass index (BMI), obesity, triglyceride, blood pressure and insulin levels.

On the economic front, the relevant research shows that the same amount of money, invested in the construction of the walking system is far more helpful than the other places to the health of people [5], can bring long-term financial benefits.

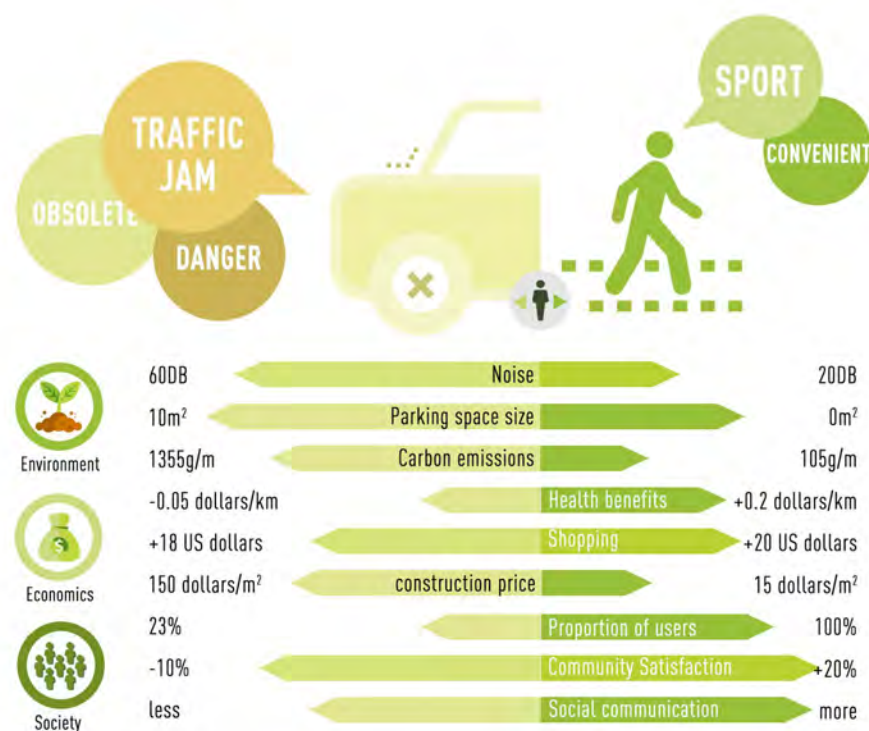


Fig2. Comparison of differences between cars and walks

### *Actions and guidelines to improve the walking environment*

Motor vehicle-oriented traffic planning has caused such a bad negative impact, and walking has so many health benefits. In Europe, a series of practices to correct mistakes began. Urban builders provide a healthy lifestyle by improving the walking environment, thereby alleviating the health challenges of urbanization.

In 1978, the Austrian capital of Vienna began construction of new motor vehicle lanes to alleviate traffic congestion in the city. At the same time, it also introduced a free policy for parking lots in the city center. This erroneous policy led to a deterioration in urban air quality, a significant increase in traffic accidents and peaked in 1994. Some residents moved out of the city center due to the deteriorating living environment. After realizing the seriousness of the problem, the municipality of Vienna began to pay attention to the impact of non-motorized traffic on urban health. The new car-free zone is set in the city centre, and the expensive parking costs

have also brought about a fundamental change in the way the citizens of Vienna travel. 60% of the citizens began to use the green way to enter the city center, the air quality and the urban environment have been improved, and Vienna has regained its charm and vitality. The Vienna government proposed that in 2025, the proportion of citizens using public transport, bicycles or walking will reach 80%; personal car travel will be reduced to 20%.

Not only Austria, France, the Netherlands, Germany, the United Kingdom, India and other countries have proposed plans to reduce the use of motor vehicles. In 2017, the world's major cities planning to build car-free cities at the World Economic Forum reached 12, including Oslo, Madrid and Chengdu, China. In 2018, the Mayor of London clearly stated in the transportation strategy to reduce motor vehicle traffic on London roads, improve air quality, and achieve urban goals of zero carbon emissions; more importantly, roads must be designed to promote people's health. activity.

The United States has also proposed design guidelines for promoting walking, and "health promotion" as one of the important goals of urban planning, and released a series of guidelines for space design actions to promote health. Among them, New York's "Active Design Guidelines: Promoting Physical Activity and Health in Design" and Los Angeles's "Design a Healthy LA" are two representative design guidelines.

The Active Design Guidelines believe that promoting the use of transportation and related activities (such as walking and cycling will give commuters the opportunity to perform physical activities. Due to differences in social status and economic level, different groups of people have gymnasiums, gymnasiums, etc. Site accessibility and use are different. Sometimes this limits people's choice of physical activity and thus has a greater impact on health. But physical activity depends mainly on the design of walking, cycling and public transportation systems. It is possible to push people to choose these healthy ways of travel.

In the Active Design Guidelines, the principles of health-oriented include increasing the density of roads from a macroscopic level, creating as many pedestrian passages as possible, and setting up isolation zones (trees, etc.) between motorways and walkways as much as possible. reducing the impact of traffic exhaust and noise on human health.

Based on the Active Design Guidelines, major cities in the United States have developed transportation and public space designs that promote active lifestyles. For example, the "Play Streets" project in New York in 2010 used urban roads to provide public space for the public, for low-income people and lack of Community residents of the recreational venues provide an activity venue for physical exercise.

Design a Healthy LA was released in 2013 by the Urban Design Studio of the Los Angeles Urban Planning and Development Department. It is the basic construction manual for the authorities to improve the health of residents by creating environmental space design. From the perspective of urban design, the manual proposes interventions in the three spatial latitudes of buildings, streets and blocks. Because the designer believes that people of all ages and people with different activities can participate in the walk, it is proposed to establish a continuous and rhythmic walking facilities and provide benches. This is especially important for older people or pedestrians who need frequent breaks. The safety of travel is also an important factor in promoting travel. Implementing measures to reduce vehicle speed has created a safe street for pedestrians. Configure pedestrian lighting facilities and road signs to help pedestrians identify where they are heading and improve safety. "Design a Healthy LA" also pays attention to the environment and culture of the neighboring units, and hopes that walking can stimulate the vitality of the neighborhood.

#### *Shanghai's walking environment practice and design guidelines*

Shanghai is an international metropolis with a blend of history and modernity. Before the opening of Shanghai, it was a meteorological situation in Jiangnan Water Town. The staggered rivers and streets together constitute



the transportation system of the time. Since the opening of Shanghai in 1843, the Anglo-American legal concession has been established and expanded. The public concession streets are mainly square grids, which conform to the original terrain. The French Concession incorporates radial roads and straight lines in the road network.

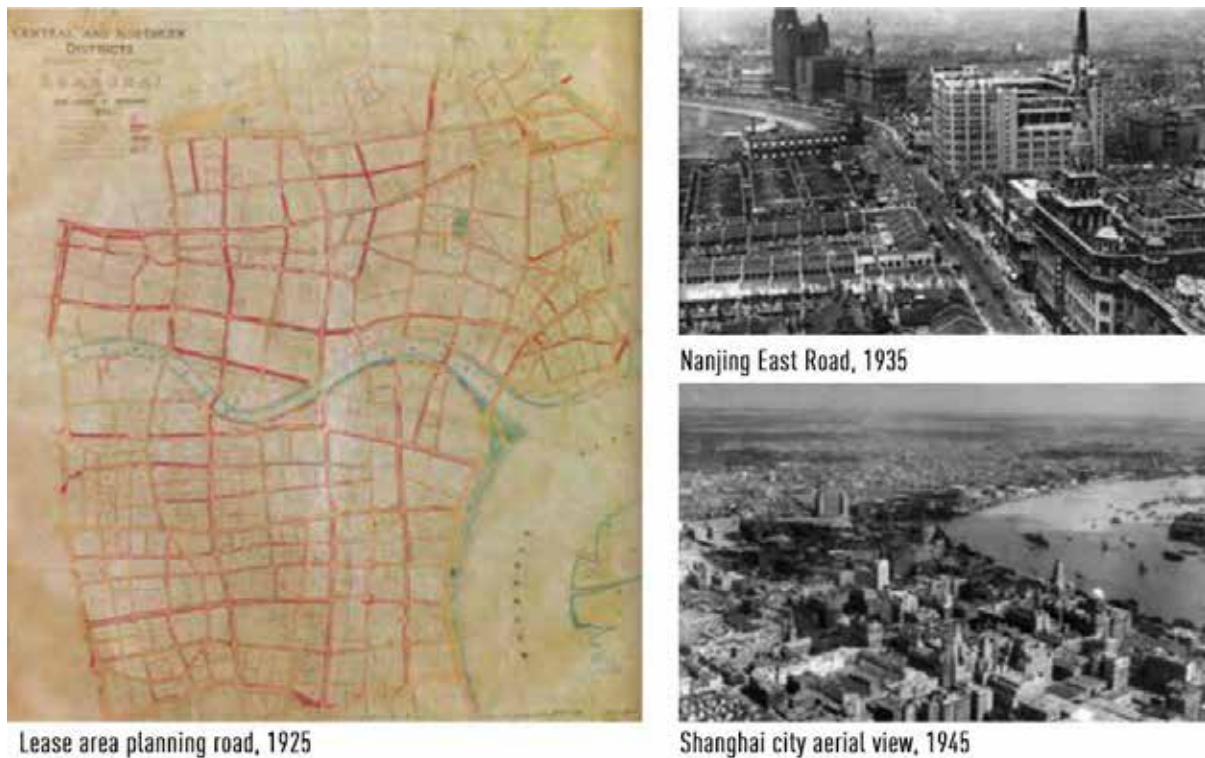


Fig3. Historical picture of Shanghai walking environment

Beyond the concession, in 1930, the Shanghai Municipal Authority compiled the "Greater Shanghai Plan" and built a central area in the Jiangwan area. The use of narrow streets and dense road networks in the city center is an important practice in the construction of modern Chinese cities. The "Shanghai Metropolitan Plan" compiled from 1945 to 1949, the Shanghai government carried out a systematic road planning for the city's road network. After the liberation to the beginning of the new century, the Shanghai Central City road network system was adjusted several times. Its planning concepts and guiding ideology are not the same, reflected in the constant and repeated changes in the red line of the road. Especially after the reform and opening up, the road network construction focuses on improving the traffic capacity of motorized transportation. After 1980, with the rapid expansion of urban form, isolated high-rise office buildings, large commercial complexes, access control communities, and centralized office parks became common forms of construction. Urban activities were transferred to the interior of the plot, causing lack of vitality in some areas. .

In 2007, Shanghai Municipal Engineering Management Office compiled the "Guidelines for Shanghai New Town Road Planning". In 2016, Shanghai promulgated the "Shanghai Street Design Guidelines", stating that the street design should be changed from car to person. The subsequent White Paper on Shanghai Transportation Development will be planned to build a slow-moving system as an important traffic strategy and target task. The "Shanghai Urban Master Plan (2017-2035)" further clarified that the city's slow-moving traffic accounts for no less than 50% of all-way and full-purpose travel, of which pedestrians and non-motor vehicles are respectively no less than 25%. In 2018, Shanghai issued the "Street Space Design Fans for Opinions", hoping to establish safe streets, green streets, vibrant streets, and smart streets.

Like other big cities in the world, Shanghai's road network has basically been shaped. The method of increasing road density cannot solve the problem of Shanghai walking environment. Therefore, Shanghai set out to develop relevant plans to improve the slow-moving system and improve the environmental quality of the street space. Shanghai divides all roads into 15 categories, each of which presents a typical representative street. In Huangpu District, Hengfu District and Taopu Science and Technology Smart City, a large number of street quality improvement work has also been carried out, and historical roads have been rehabilitated and new district roads have been completed. Some achievements have been made in high quality construction.



Fig4. Classification and current situation of Shanghai streets

Although the "Shanghai Street Design Guidelines" proposed four major street design concepts, the street design guidelines mainly focused on the creation of environment and space, and did not directly solve the macro mobility problem. Compared with the two manuals in the United States, the Shanghai Street Design Guidelines contain less content on management and evaluation, but only put forward the principled content: "Need government departments, owners along the line, designers, enterprises and the public to participate and cooperate together. ", did not propose specific implementation rules, does not have practical guidance and operational. This also reflects the flaws in China's planning on how to specifically conduct street assessments and implement public participation.

Less concern for people's mental health is also a problem in the "Shanghai Street Design Guidelines." The guidelines propose a number of recommendations that are conducive to traffic efficiency and the ecological environment, but ignore the positive effects of the street on the community and have major drawbacks in this regard.

## Conclusions

This article takes the negative impact of motor vehicle traffic and the importance of the walking environment to the city as an entry point, summarizing the efforts made by countries around the world to establish a good walking environment. Taking the walking design guidelines in New York, Los Angeles, and Shanghai as examples, analyze the design principles of health orientation and explore the shortcomings in the Shanghai guidelines. Walking environment

It is an important part of urban health, and the compilation of the Shanghai Street Design Guidelines is a useful attempt in this regard. However, the transformation of ideas, methods, techniques, and evaluations will be a long-term gradual process. It still requires the joint efforts of management departments, designers, and the general public to promote the establishment of healthy cities through continuous practice.

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