Transport and Health in China

WHO

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With the global industrialization and urbanization, transportation has been rapid developed. Chinese government has paid more attention to the strategic importance of transport in civil and economic development, and got great achievements. The total miles of national highway and expressway were respectively ranked the 4th and the 2nd in the world in 2004. Meanwhile, China had become the world’s 4th largest automotive vehicle producer and the 3rd largest country in automobile ownership.

The rapid development of transportation has positively accelerated the growth of economy and throughput, and improved the standards of living. However, the transport also has brought negative impacts on environment and human being. For example, traffic-related air and noise pollution, road traffic injuries, reduction of physical activities and traffic congestion are getting worse, which create great challenges to government, public health organizations, and environmental authorities and also to the urban sustainable development strategies.

Urbanization and Transportation and Consumption of Traffic Energy in China

With the rapid development of economy, urbanization in China, the total number of cities has increased from 173 in 1978 to 660 in 2003; the urban population has increased from 240 million in the early 1980s to 520 million today, with the proportion increasing by 40%. At present, the average proportion of urbanization in the world is 47%, with 75% for developed countries and 37% for developing countries. In China, the proportion of urbanization is lower than the average level and has much room and potential for growth.

Since 1980’s, transportation has been rapidly developed in China. The total miles of national highway has been kept increasing. In 2004, the total miles of national highway was 1,870,700 kilometers, being the 4th in the world; The total miles of expressway have reached 34,288 km which was the 2nd in the world.
Meanwhile, China has become to the 4th largest country in automobile output and the 3rd largest country in automobile ownership in 2004, the number of automobile output and ownership amounted to 5.07 million and 27.42 million respectively, the number of motorcycle output and ownership amounted to 17 million and 79 million respectively. From early 1990s to today, automotive vehicle ownership in China has maintained an annual growth rate of 13%, ranked the 1st in the world; and the private vehicle ownership has an annual growth rate of 23%. However, because of the large population in China, the number of motor vehicle per 1000 persons is still relatively low compared with that in developed countries and even lower than that in some developing countries, such as Brazil and Mexico. Therefore the number of automobile ownership will still retain growth in the future. Now excessive motorization has brought enormous challenges, and in the future the situation will even grimmer.

The oil consumption in China increased gradually with the development of economy, and now China has become the 2nd largest consumer of oil in the world. The oil demands and the proportion of the oil used to traffic are increasing annually. In 2004, the total oil consumption was 310 million tons, a third of them used by motor vehicles. It is estimated that the proportion of oil consumption by traffic will reach to 43% of total consumption in 2010 and will over 50% in 2020. Since the oil resource is scarce in china, it will undoubtedly become an increasingly severe problem.

Urban Vehicle Exhaust Pollution and Human Health

Status of Exhaust Gas

Vehicle exhaust gas can be generally divided into two categories: gaseous pollutants (CO, NOx, HC etc.) and solid pollutants (particular matter and Pb). The emission amount of hydrocarbon (HC), carbon monoxide (CO), nitrogen oxides (NOx) were respectively 8,361,000 tons, 36,398,000 tons, 5,492,000 tons respectively in 2003. And about 60% CO, 50% NOx and 30% HC of atmosphere came

from vehicle exhaust.

Vehicle exhaust increased with sharp increasing of the number of motor vehicles and contributed the higher proportion of pollutants to air pollution in big cities. In main transport intersections of Beijing, Shanghai and Guangzhou, the proportion of CO and NOx exhausted by vehicle reaches to
77% and 72% of whole air pollution respectively, and the proportion of motor vehicle emission would be 79% of whole air pollution in 2005 in China. The air pollution in some big cities is changing form coal-burning to traffic pollution and presents a trend of combined air pollution.

**Health Effects of Vehicle Exhaust**

The pollutants from vehicle emission may cause the respiratory diseases, cardiovascular diseases, neural system symptoms, depression of immune function and even tumors. Traffic policemen, who had exposed to vehicle emission at a long term, suffer a higher prevalence of respiratory diseases than other occupational population, and the incidence of respiratory system disease in traffic policemen is higher than any other diseases. The asthma prevalence of children was positively correlated with the pollutants concentration (CO, NO2) exhausted by automobile; immune function of the children who had exposed more traffic environment is damaged in some degree, especially the level of sero-antalzyme and the IgG decreases significantly.

Lead poisoning is another severe problem. The lead in urban air is mainly from vehicle emission. Domestic studies showed that the concentration of lead in the semen of traffic policemen was significantly higher than that of general population, and the activity of sperm was significantly lower. Lead poisoning in children is also common in China; an average prevalence of lead poisoning was 10.45% in Chinese cities. However, since 2000, unleaded gasoline was used in whole country, after a half year, the average blood lead level in children aged 1-6 year decreased 3.8% and the proportion of the lead poisoning decreased about 13%. Therefore it is undoubted that vehicle exhaust impacts the human health obviously, and control the pollution can meliorate the situation markedly at the same time.

**Traffic Noise and Human Health**

**Status of Traffic Noise in China**

With a sharp increase of the number of vehicle, traffic noise is getting serious and related complaints are increasing. Currently, transport noise accounted for 23.5% of urban noise sources in China, the second leading cause of noise. About 16% of all Chinese cities are suffering noise pollution, the proportion of the roads where the equivalent sound levels over 70 dB(A) is over 30% in main cities at present (the average equivalent sound level is from 63.8 to 72.3 dB(A)). Furthermore, the economic loss due to traffic noise every year is RMB 21.6 billion Yuan (about 2.6 billion US dollars).
Noise level exceeds 50 decibels will affect sleep and rest. High level noise can impact human health, for example, cause a hearing impairment, cardiovascular, endocrine, reproductive and mental disease.

The traffic policemen, bus drivers and conductors are at the high exposure of traffic noise, for the sake of their working condition. Traffic policemen who exposed to noise of 73.8~76.8dB(A) showed that the incidence of hearing impairment was 23.8%, which was nearly three times higher than general population; And the incidence increased along with job experience.

### Road Traffic Accidents and Injuries in China

#### Status of Road Traffic Injuries

The gravest and the most direct negative impact of transport is traffic accident injuries which had become a major global public health problem. According to WHO data for 2002, road traffic injuries accounted for 2.1% of all global deaths and ranked as the 11th leading cause of death. And the cost of road traffic injuries is estimated about 1% to 2% of gross domestic product (GDP) in different countries.

From this century, over 100,000 people died and nearly 500,000 people injured in road traffic accidents in China every year, the number of deaths in road traffic accidents in China occupies the world first place. In 2002, the number of deaths in road traffic accidents in China represented 9.3% of the total number of deaths allover the world in 2002, and the direct economic cost is over RBM 2 billion. The estimated annual economic cost of traffic injuries in China is equivalent to US$ 12.5 billion--almost four times the amount of the total public health services budget for the country.

#### High Risk Population

**Gender**

Males occupied the majority of casualties; the ratio of casualty between male and female is about 3: 1 in China.

**Age**

The group aged 26 to 40 years old is the main casualty in road traffic accidents and accounted for about 40% of all casualties.
♦ Child road trauma is also a major problem in China: Traffic injury was second leading cause of death from all types of injuries among children aged 0 to 14 years.

♦ In recent years, the over-65-years age group has a greatest increase in casualties; and older people are more vulnerable from road traffic accidents.

Motorcyclists, cyclists and pedestrians
Motorcyclists, cyclists and pedestrians are “vulnerable” road users and at greater risk. Motorcyclists accounts for approximately 1/5 of all deaths and 1/4 of all injuries; cyclists and pedestrians account for approximately 1/3 of all casualties in road traffic accidents per year.

Rural population, townie laborers from rural area and self-employed laborers
The rural population, townie laborers from rural area and self-employed laborers sustain the vast majority of fatalities and injuries in road traffic accidents, accounting for 40% of all casualties. The road traffic accident has become the main cause of death in urban floating population in recent years.

Recommended Actions

1.1 Establish an Integrative Management Department of Transport
Urban transport is an involved and cooperating issue, but Chinese transport system and organization establishment is devoid of integration and cooperation in all levels. Hence there’s an urgency to establish an integrative management department to incorporate layouts and policies from all sides.

1.2 Implement Intellectualized Transport Management System with Information Technology
The modern traffic facilities for road safety are insufficient in China's big cities. To compare with Tokyo, junctions in Beijing, which monitored by Beijing traffic control center, is 3% of Tokyo; and pedestrian bridges and underground sidewalks are 4.8% and 5% of Tokyo respectively; the traffic signs per kilometer is 15% of Tokyo. The obvious lack of facilities and mismanagement lead to a frequency of traffic accidents. In big cities, especially in midtown, many vehicles are parking on the road or sidewalks because of shortage of parking lots, and exacerbate traffic congestion and increase traffic accidents. Therefore, there is need to implement intellectualized transport management system with information technology to improve the level of urban traffic management technology.

1.3 Devise Reasonable Strategies for Urban Transport Development
Make overall arrangements for the development of urban transport system in the context of socio-economic development strategy of regional planning and urban layout. At the same time, leave a certain room to make the strategies adjustable; dispose of new problems timely.

1.4 Give Different Levels of Priority to Develop Public Transport

Give priority to the development of public transport is a recognized way to resolve urban traffic problem. Recommend to extend and fortify the line of subway and railroad; optimize the allocation of public transport; build special lane only for public vehicles to improve the speed and efficiency of public transport, thereby attract more people to choose public transport and accordingly abate urban private transport.

1.5 Exploit the Potential of Existing Transport Facilities Fully

 Accord to domestic experience, to create a good traffic environment, mere investment on construction is not enough to meet the traffic demand. Authorities must be aware that traffic construction must be accompanied by advisable management to adjust and exploit the potential capacity of existing traffic facilities.

Department of Public Health

2.1 Enhance Environmental Surveillance and Control Traffic Pollution Strictly

2.1.1 Enhance Environmental Surveillance and Data Collection

Enhance long-term surveillance on O₃ and roadside CO, NOx, Pb, etc, and enhance traffic noise surveillance on sentinel sites to provide scientific evidences for pollution control measures.

2.1.2 Establish and Perfect Relevant Laws and Regulations to Control Traffic Pollution

Set up a more strict exhaust emission standard, considering traffic construction and air quality requirement. Encourage using vehicles with high efficiency and low emission; take traffic control measures to limit the cars without environmental sign, such as outdated vehicles with high emission. Enhance inspection on emission level of new produced vehicles; develop an implementation capacity on exhaust emission surveillance; Forbidden bugling in urban district and take measures to reduce road noise; prevent the buildings beside roads by noise-proof technique.

2.2 Establish Forecast and Alarm System and Assessment System of Traffic Pollution, and Assessment System of Health Impacts of Transport

At present, documents on Chinese traffic pollution, injuries, especially psychological burdens are very limited. Therefore, it’s urgent to forecast and alarm the status of traffic pollution, and enhance health department’s function to assess the health impacts and provide measures of prevention and intervention on this issue. Department of public health should use the method both of data collection and analysis and survey on field; research on GIS model of health impacts of urban transport in next step; and make policy recommendations for authorities further.
2.3 Improve the National Response Capability in Traffic Injuries

Perfect the laws and regulations on traffic safety, and execute the laws strictly; enhance the propaganda and public consciousness on traffic safety; establish institution for traffic first aid; enhance the capability of succoring; perfect the systems of social security and insurance.

The Public

Ultimately, this issue is closely related to public health; therefore, public propaganda is the key to resolve the problem.

3.1 Choose the Healthy Transport Modes

Healthy transport modes, such as cycling and walking, can improve the body condition, and are also non-polluting and energy-saved forms of transport. Moreover, choose the public transport can improve transport efficiency and reduce the transport burden.

3.2 Enhance Self-protection Awareness of Road Traffic Injury

Enhance awareness of road safety, abide by traffic regulations strictly, and create a pleasant atmosphere of road safety; use helmet and seat belt to mitigate the risk in road traffic accidents: Investigation of road traffic accidents indicated that if seat-belts are used correctly, 45% of the lives can be saved, and the rescue rate is higher when the vehicles turn over, up to 80%.

3.3 All People Should Participate in the Actions of Environmental Protection and Enhance the Awareness of It

Enhance the awareness of the importance of environmental protection; advocate using the low emission motor vehicles; switch off the motor to reduce emission when temporary parking or waiting in traffic jams; restrict horn to reduce traffic noise.