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**ECONOMIC COMMISSION FOR EUROPE  
WORLD HEALTH ORGANIZATION**  
Regional Office for Europe

**HIGH-LEVEL MEETING ON TRANSPORT, ENVIRONMENT AND HEALTH**  
**THE PEP Steering Committee**  
(Third session, 11 and 12 April 2005)

**TRANSPORT RELATED HEALTH IMPACTS AND THEIR COSTS AND BENEFITS  
WITH PARTICULAR FOCUS ON CHILDREN**

Introductory note by the WHO/Europe and UNECE secretariats

1. The present document has been prepared by Austria, France, Malta, the Netherlands, Sweden and Switzerland for consideration by the Steering Committee of the Transport Health and Environment Pan-European Programme (THE PEP) at its third session, 11 and 12 April 2005, under agenda item 4.A(c) on “Implementation of the Committee’s work programme 2003-2005 – Progress reports and proposals for further action”.
2. The document contains the main findings and key messages resulting from the project that has been jointly implemented by the above countries, in cooperation with WHO/Europe and UNECE secretariats, focusing on transport related health impacts, costs and benefits, in particular with regard to children. It also highlights the proposed next steps to follow-up on the implementation of this project.

3. The project contributed to the implementation of priority activities included in THE PEP Work Plan, namely “Promotion, implementation and review of policies designed to internalize the health and environmental externalities (external costs) generated by transport activities”, as well as “Special care for groups at high risk”. It also provided direct input to the European Children’s Environment and Health Action Plan for Europe (CEHAPE), which was adopted by the Fourth Ministerial Conference on Environment and Health (Budapest, 23-25 June 2004)<sup>1</sup>, as well as to the development of WHO guidelines for the assessment of health costs and benefits of transport-related policies and interventions, which are under development.

4. At its second session, THE PEP Steering Committee welcomed the work done by the countries involved to provide a more comprehensive understanding of the diverse health effects of transport on children and to contribute to the development of the CEHAPE<sup>2</sup>.

5. The project was implemented through a series of four workshops undertaken in the context of the project, namely:

- Workshop I. “Transport Related Health Impacts – Review of Exposures and Epidemiological Status,” Vienna, Austria, 24–25 April 2003;
- Workshop II. “Economic Valuation of Health Effects due to Transport,” Stockholm, Sweden, 12–13 June 2003;
- Workshop III. “Health Impacts of Transport on Children,” The Hague, Netherlands, 16–17 October 2003;
- Workshop IV. “Synthesis and Policy Recommendations,” Sliema, Malta, 19–20 February 2004.

6. The outcomes of the project have been summarized in a synthesis report and executive summary and were presented at the Budapest Conference at a side event on “Transport-related health effects with a particular focus on children – briefing for stakeholders” that took place on 23 June 2004<sup>3, 4</sup>.

7. The side event was co-chaired by Mr. Werner Wutscher, Secretary General of the Federal Ministry of Agriculture, Forestry, Environment and Water Management, Austria, and Mr. Pieter van Geel, State Secretary, Ministry of Housing, Spatial Planning and the Environment, the Netherlands.

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<sup>1</sup> For more information, please see <http://www.euro.who.int/budapest2004>

<sup>2</sup> Summary Report of the Second Session of the Steering Committee for Transport, Health and Environment Pan-European Programme (THE PEP) (ECE/AC.21/2004/14 - EUR/5045236/14)

<sup>3</sup> See also document ECE/AC.21/2005/10- EUR/05/5046203/10 Report on the contribution of THE PEP to the 4th Ministerial Conference on Environment and Health “The future for our children” (Budapest, 23-25 June 2004)

<sup>4</sup> The complete series of project reports and presentations can be downloaded from: <http://herry.at/the-pep/results.htm>.

8. Dr. Jaroslav Volf from the Czech National Institute of Public Health, chairman of THE PEP Steering Committee, framed the presentation of the study results in the context of THE PEP implementation. Ms. Brigit Staatsen, from the Dutch National Institute of Public Health and Environment and Mr. Robert Thaler, from the Austrian Federal Ministry of Agriculture, Forestry, Environment and Water Management presented the main findings and key messages of the study, on behalf of the project team.

9. The findings of the project were further disseminated on the occasion of other relevant events (e.g. launch of the European Mobility Week and Conferences related to Transport, Environment and Health that were organized during the Dutch presidency of the EU). Furthermore, final reports of the project have been sent to all members of THE PEP Steering Committee by mail.

10. In line with the recommendation of the Committee at its second session, proposed follow-up actions shall focus on further developing methods for the assessment of costs and effects of transport on health, and on further elucidating the relevance and applicability of the findings for the development of transport policies. It is proposed that this would be done through the development of national case studies focusing on different aspects of the economic valuation of transport-related environment and health effects. Follow-up actions are also expected to contribute to the implementation of the Children's Environment and Health Action Plan for Europe (CEHAPE).

11. An informal meeting of the interested countries is expected to take place in early 2005, to discuss the specific contents of the follow-up activities, including their co-ordination with other relevant on-going initiatives (e.g. a project on "Developing methods for the economic valuation of transport-related health effects in children" sponsored by the United States of America Environmental Protection Agency -USEPA ).

12. At its third session, the Steering Committee is invited to provide its views regarding the progress achieved so far and possible future directions of work. Delegations are invited, furthermore, to consider their possibilities of contributing to the proposed next steps for the implementation of the project, including notably through active participation in the Task Force for the implementation of the follow-up activities, whose establishment was decided by the Steering Committee at its second session (ECE/AC.21/2004/14 - EUR/5045236/14).

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Annex

**Transport-related Health Effects with a Particular Focus on Children  
Towards an Integrated Assessment of their Costs and Benefits.  
State of the Art Knowledge, Methodological Aspects and Policy Directions**

**EXECUTIVE SUMMARY**

**Background and Objectives**

Motorized road transport has increased rapidly in the European Region in the last decades. Forecasts for 2020 in the EU show a further rise in passenger and freight transport and similar trends are also expected in the eastern part of the European Region. There is an increasing awareness of the environmental and health effects of transport. The health risks posed suggest an increased urgency for action to reduce these effects and related risks. The integration of environmental and health dimensions into transport policies is necessary for achieving sustainability and reducing the disease burden. This is a challenging task but necessary for providing a viable future for our children.

To this end, Austria, France, Malta, the Netherlands, Sweden and Switzerland launched a joint project and series of workshops on “Transport-related Health Effects with a Particular Focus on Children” in 2003. With this joint initiative the participating countries intend to make an active contribution to the UNECE - WHO Transport Health and Environment Pan-European Programme - THE PEP as well as to the development of the CEHAPE - Children’s Environment and Health Action Plan for Europe.

The aim of this project which, focused particularly on road transport, was to make progress towards an integrated assessment of major transport related health effects by:

- 1) Focusing on children
- 2) Bringing together state of the art of knowledge about these health effects
- 3) Highlighting their costs and benefits
- 4) Focusing on methodological aspects
- 5) Identifying policy directions to address transport-related health effects on children

One of the outcomes of this joint project is a set of “Key Messages”. These ‘messages’ were developed after reviewing the evidence and a comprehensive list of policies addressing different aspects of transport-related effects on environment and health. This was undertaken by experts and was developed further at the Workshop on “Synthesis and Policy Recommendations” (Malta, 19-20 February 2004) by a panel of decision makers and external experts.

Experts from the six participating countries shared tasks, experiences and resources. Austria focussed on the psychological issues, France on air pollution, Malta on road safety, the Netherlands on noise, Sweden on economic valuation and Switzerland on physical activity. The project was supported by expert input from the WHO on road safety and climate change. A series of reviewing workshops in Vienna, Stockholm, The Hague and Malta complemented these studies involving also external experts and stakeholders. The results and conclusions of this joint project are summarized and published in a synthesis report complemented by five topic reports. It has to be stressed that due to limited time and resources, some effects of transport, such as the contamination of water and soil, as well as more comprehensive economic calculations could not be sufficiently undertaken. Follow-up activities would be advisable.

### **Air Pollution related Health Effects**

Many epidemiological studies have assessed and shown the association between ambient air pollution and health effects on adults using different indicators such as particulate matter (PM expressed as PM10, PM2.5, Total Suspended Particles - TSP, Black Smoke - BS) or gaseous pollutants (nitrogen dioxide (NO<sub>2</sub>), sulphur dioxide (SO<sub>2</sub>) and ozone (O<sub>3</sub>)).

Although fewer studies have focused on the effects of air pollution on European children, their results suggest that there is a relationship between air pollution in Europe and numerous adverse health outcomes in children, in particular, respiratory disease.

Children, in particular those under two years of age and adolescents, are considered to be more susceptible than adults to the effects of air pollution, partly because of their immature metabolism and their physiology.

Even at relatively low levels, ambient air pollution has been shown to affect children with asthma and other conditions. Living along busy streets in urban areas, particularly with heavy motor traffic, has been associated to several respiratory diseases (exacerbation of asthma, chronic respiratory symptoms, allergic symptoms, increased prevalence of a topic sensitization, reduction in lung function).

Results from different study consistently indicate that neonatal or early post-neonatal exposure to air pollution results in mortality; these effects seem to be stronger in the post-neonatal (1-12 months) period and due to respiratory causes. Brazil suggest that there is a positive relationship between exposure to air pollution and respiratory mortality in young children (< 5 years). There are no European studies using this health outcome.

Technical and legal measures implemented since 1990 (e.g. ban of lead in petrol, decrease in sulphur content of fuels, emission standards for vehicles) have led to a reduction of some vehicles exhaust emissions. In contrast, the effects of road transport-related particulate emissions and their continued increase in many countries are at the fore of today's health concerns. Models which forecast traffic growth and factor in both, the implementation of regulations and improved technical measures, suggest that any improvements archived by the latter measures, will be offset by the increased emissions due to traffic growth. As a result, if emission ceilings and air quality objectives are to be met, technical measures will have to be complemented by economic and structural actions, which act to restrict emissions from road transport and other mobile sources.

Several studies have produced estimates of the health benefits that could be attained by decreasing ambient air pollution levels in European cities, using particulate matter with a diameter smaller than 10  $\mu\text{m}$  (PM10) as an indicator. Other important indicators for transport related air pollution are PM2,5, NO<sub>2</sub> and black smoke. To put this in perspective, it has been estimated by the Air Pollution and Health: A European Information System (APHESIS) study that a decrease of 5  $\mu\text{g}/\text{m}^3$  in ambient PM10 levels (other factors unchanged) in nine French cities would prevent 1,561 anticipated deaths. The same scenario if applied to 19 European cities estimates that 5,547 deaths would be prevented. If the PM10 air quality guide value of 20  $\mu\text{g}/\text{m}^3$ , which must be implemented in 2010 in Europe, had to be implemented in the 19 European cities, this would prevent 11,855 deaths.

### **Climate Change and Health**

The transport sector is the second largest energy consumer in Europe. Over the period 1990 to 2000, transport greenhouse gas emissions in the EU-15 increased by 19 %, whereas emissions from Central and Eastern Europe had a smaller increase of 4 %. Projected trends forecast that CO<sub>2</sub> emissions will further increase in the future due to the growth in passenger and freight transport.

The health impacts of climate change have a unique set of features, (a) they are global, (b) they affect future generations even more than current ones, (c) they are unevenly distributed, and (d) they can be worsened through coexistent environmental changes. The effects will undoubtedly have a greater impact on societies or individuals with scarce resources, where technologies are lacking, and where infrastructure and institutions are least able to adapt. The Burden of Disease assessment of the WHO estimated, that, in the year 2000 there were an excess of 160,000 deaths due to climate change worldwide. The African and Asian continents face the biggest risk with children being the most vulnerable. In Europe, there is increasing evidence to show that extreme weather and climate events are becoming more frequent and intense and are associated with increases in hospital admissions in children during hot periods. The elderly, disabled, children, women, ethnic minorities and rescue workers may be at greater risk of exposure to the effects of flooding than others.

The analysis of the time series of climate patterns and laboratory confirmed cases of indigenous salmonella infections from ten European countries found that increases in temperature contributed to an estimated 30 % of cases of salmonellosis in most countries investigated. In relation to climate and ecosystem changes preliminary results show that Lyme borreliosis (LB) has spread into both higher latitudes and altitudes, and in some areas is associated with an extended and more intense LB transmission season. Among children, *Borrelia burgdorferi* is now the most common bacterial cause of encephalitis and facial palsy.

The health impacts of climate change are difficult to quantify and surrounded by a high degree of uncertainty with regard to the long time-scale involved, the extent of the impacts, and the pattern of future world development. However what has become clearer is that international efforts are needed to achieve a world-wide reduction in greenhouse gases emissions, if climate change is to be slowed.

### **Noise Exposure and Health Effects**

In Europe, transport (road, rail and air traffic) is the most important source of community noise. Approximately 30 % of the European Union's population (EU-15) is exposed to levels of road traffic noise of more than 55 dB(A). Exposure to high noise levels has decreased in some countries since 1980 due to technological measures, noise barriers and spatial planning. Due to the expected growth in traffic, extra measures will be needed. At current noise levels many people are annoyed and disturbed in their sleep. A small effect on cardiovascular risk is highly plausible.

The limited number of epidemiological studies in children indicates that noise exposure affects children's learning (cognition), motivation and annoyance. In addition, there is some evidence that noise is associated with impacts on the cardiovascular and endocrine system of children. A few intervention studies show the benefits that could be attained by decreasing noise levels: reduction of railway and aircraft noise improved the long-term memory and reading ability of school children. To avoid such effects, protection of children against noise exposure during the night and during learning activities is recommended. Recent estimations of the noise-related health impacts in the Netherlands suggest that current noise levels may be associated with annoyance in 1.5 - 2 million people (out of a population of 16 million) disturbed sleep in 550,000 - 1 million and about 220,000 cases of hypertension. In total, 1-2 % of the total disease burden could be attributed to traffic noise. Impacts in children cannot be estimated yet. The results of noise and HIA studies in different countries are difficult to compare due to methodological differences. The new EU directive on environmental noise provides a basis for further harmonization.

The benefits of implementing several source-measures for noise abatement on cars and trains will exceed the costs of these measures, as cost-benefit analyses clearly indicate. For example, it has been estimated in the Netherlands that the implementation of several source-measures on cars and trains will cost about 2 billion Euros. The benefits in terms of reduced annoyance are estimated to be about 4-6 billion Euros. Estimations are that in the EU-15 the overall external (abatement) costs of road and rail traffic noise amount 0.4 % of the total GDP, some 36 billion Euros.

### **Transport-related Physical Activity and Health**

The importance of regular physical activity for health is well established. Positive health effects have been demonstrated for life expectancy, cardiovascular disease, stroke, type II diabetes, obesity, some forms of cancer, osteoporosis, depression and independence at old age.

International minimum recommendations for health-enhancing physical activity refer to 30 minutes of moderately-intense activities. Moderate intensity is characterized by getting somewhat out of breath but not necessarily sweating, typical examples being walking and cycling. Further activities will convey further health benefits and in many countries the minimum recommendations for children are set at one hour per day.

However, levels of physical inactivity are alarmingly high not only in industrialized countries, and this poses a major public health problem. Studies indicate high levels of inactivity among young people and a tendency towards declining activity levels from childhood to adolescence, which starts at puberty and continues until the young adulthood. Transport-related physical activity can make an important contribution to overall physical activity in children. A wealth of data exists on overweight and obesity which are strongly influenced by physical activity behaviour. Direct health impacts of physical activity in children have been shown for major diseases. Short-term effects of physical activity are most easily demonstrated and impressive in size for weight control, while the associations with type II diabetes and cardiovascular disease could become very important if current trends of inactivity continue. There is a greater likelihood that physically active young people, compared with those inactive, will be more active in later life as well, so it is perceivable that all health effects of physical activity in adults may be influenced by increasing and maintaining active behaviour in young people.

There is a clear need to develop more interventions to increase physical activity and more specifically transport-related physical activity and to assess their effectiveness. In particular, traffic interventions should be identified, such as awareness programmes relating to taking children to school, that are most likely to increase health-enhancing physical activity and to reach physically inactive population groups.

In Switzerland, a country with 7 million inhabitants, current estimates suggest that between 1.4 and 1.9 million cases of disease, between 2,000 and 2,700 deaths and direct treatment costs of 1.1 to 1.5 billion Euros are caused by physical inactivity.

### **Psychological and Social Impacts**

Psychological and social impacts of transport are often ignored or underestimated despite the fact that they can influence mobility behaviour. For instance fear from traffic dangers has led to an increased number of parents who drive their children to school.

Furthermore health effects of noise and air pollutants also have a psychosocial component and therefore cannot be properly studied nor understood if psychology is neglected. Psychological and social mechanisms triggered by the perceived impact of transport alone can lead to disease. Every disease can also have consequences on the mental and social status of a person or an affected group of people. In addition, mental and social conditions can directly modify the impact of environmental stressors on humans.

In the long run high traffic density in human settlements may also lead to social effects by hindering the development of independence and social interaction in children.

Psychological and social effects of transport should be seen as an integral part of transport-related health impacts. One example is that walking to school instead of being taken by car has a direct positive effect on psychological and physical well-being in children, in terms of lower scores of depression, anxiety, aggression and hostility, fewer psychosomatic symptoms, and improved motor skills. Conversely, fear of road traffic injuries acts as a barrier which prevents children from more walking and cycling.

Addressing our true needs, including those of children, requires us to address physiological, safety, security, social, intellectual and aesthetic dimensions. Moreover, children have very definite ideas as to what they need and what they want. These ideas are surprisingly consistent and coherent and even younger school children are able to express their wishes if they get the proper opportunity. Children's needs and aspirations should be taken as an important reference point in the planning of human settlements and mobility management. This would improve planning processes, children's self esteem and their social competence.

### **Road Traffic Injuries**

Ten percent of the 1.2 million deaths estimated worldwide from road traffic injuries (RTIs) in 2002 occurred in the European Region. Road traffic injuries are the leading cause of death of children and young people (age of 5-29 years). 6,500 deaths/year are reported among children aged 0-14 years. Nearly 67 % of crashes occurred in built-up areas. Cyclists and pedestrians pay a disproportionate price, representing one third of the deaths from road traffic injuries. For the EU, the cost of RTIs are estimated to be 180 billion Euro per year. Children are particularly vulnerable because their ability to cope with traffic is limited until 10 years of age. They are more at risk in conditions with heavy or fast traffic, limited visibility, or when drivers' attention is focused elsewhere rather than on pedestrians or cyclists. A study reported that 33 % of children involved in road traffic crashes had post-traumatic stress disorder. Real and perceived safety concerns are quoted as the most important barrier preventing many people from choosing walking and cycling as means of transport. Reducing road danger requires control of this threat and reducing casualties. Of particular concern is the issue of speed at the moment of collision, which is a key determinant for the severity of road traffic injuries. In pursuit of reducing road danger, studies using a Willingness to Pay approach suggest that the public may be willing to have more rigorous road safety controls and greater accountability by governments, as in the rail and air sectors. These studies serve as a pragmatic basis for assessing the value and appeal of safety programmes. More generally, road safety, including danger reduction, should become a governing parameter of road transport, and not a tradable variable. This requires strong political commitment and leadership. The adoption of a comprehensive approach to road safety, should address all components of the transport system, namely road users, vehicles and infrastructure, and should take into account the human body's vulnerability to excess kinetic energy and that imperfect road user behaviour is likely.

## **Lessons Learned: Assessment of Health Impacts and Economic Valuation**

Assessments of transport related health impacts should be important tools to guide policy decisions in transport and land use policies. Health Impact Assessment (HIA) studies can also provide relevant information for policy makers on the effects of interventions on public health. Cost-benefit analyses can be derived from these estimates. There are challenges to the estimation of transport related health impacts in children, their costs and their benefits in particular:

- How to select pertinent health effects in children and how to estimate the quantitative relationships between exposure and health effect (Exposure Response Function)
- How to accurately estimate the fraction of exposure coming from transport
- How to measure and express in monetary terms effects of physical, mental and social health and well-being and how to achieve comparability

There are different concepts to evaluate mortality or the risk of mortality and it is important to consider the context in which they are to be used.

For transport related air pollution and the related external costs two main methodologies have been used. These have been designed to answer different questions. The tri-national European project of Austria, France and Switzerland for the London Conference of WHO 1999 and the APHEIS study have led to a more global understanding of the overall impact of air pollution and is more appropriate for general transport policy planning at a national level. The ExternE study, which follows an impact-pathway approach, offers a better methodology to understand and assess the effects of specific interventions, such as minimum standards on fuel quality and engine or exhaust technology.

For noise assessments the mapping of noise exposure of the population and therein of children is crucial. Annoyance and sleep disturbance are recommendable end-points for health impact assessments. For these indicators generalized exposure response functions are available which can be used for impact assessment of transport noise.

Road safety impact assessments should focus in particular on vulnerable road users (e.g. children, bicyclists and pedestrians) and the decisive role of speed. They should be included into impact assessments of transport and land use programs and strategies.

Areas that require further investigation are the quantification and monetary valuation of psychological and social effects and the benefits of physical activity. A number of selected Swiss projects have begun to assess the effectiveness of interventions to promote physical activity. Studies to incorporate the health benefits of cycling into the cost benefit analysis of infrastructure development are also underway in Norway and Sweden. The result of a recent cost-benefit-analysis of cycling infrastructure in three Norwegian cities show that when the positive health aspects of physical activity are considered, the benefits for society of investing in cycle networks, significantly outweigh the cost.

Economic analyses and tools like cost-benefit analysis are often used in decision making regarding transport investments. These economic valuations have not to date taken sufficiently into account the transport related environmental health effects. Another major challenge when undertaking economic valuations is the issue of monetarization. Although not all health effects can be monetized as yet, there is a need to find ways of taking these fully into account when undertaking assessments and evaluations.

The Willingness To Pay (WTP) methodology of monetarization satisfies the condition of economic welfare theory by evaluating people's preferences. So far there have been no economic valuations that have applied this approach to children, but only to their parents as relevant studies of the US Environmental Protection Agency have shown. Economic valuations of transport-related health effects in children should apply at least the same costs as for adults, until child-specific values become available.

Often incomparability is a major obstacle. Different studies may give different results. The reasons for the differences should be made transparent. Harmonization of the methodology is strongly desirable.

Further research and work on traffic-related health effects on children and their economic evaluation is recommended.

## **KEY MESSAGES AND POLICY DIRECTIONS**

### **Children are vulnerable and their needs should be taken first.**

- Children are vulnerable from a physiological, psychological and economic point of view.
- Experience of a “healthy” environment as a child will influence future choices towards a healthy environment as an adult.
- Investments to improve health and environmental conditions for children benefit the entire society and avoid future costs.
- The UN Convention on the Rights of the Child (1989) specifically addresses children’s rights to express views freely and be given due weight in accordance with age and maturity (Article 12).

### **There is an increasing dependence on private car use leading to severe restrictions for children’s choice of mobility and physical activity.**

- This is the result of the large investments in road infrastructure, the significant growth in road traffic and the rising car ownership and use among families.
- Urban sprawl is inter-related with car-dependent mobility and impediments to short distance trips on foot or bicycle.
- Children are the main losers of car dominated patterns of mobility as they have less opportunities for physical exercise and choice in modes of mobility.
- Consumers’ behaviour (bigger/faster/more cars) offsets progress in cleaner technologies.
- Lack of investment and modernization of infrastructure and rolling stock has resulted in a stagnation or even a sharp decline of public transport and rail, particularly in the countries of Eastern Europe, the Caucasus, Central Asia (EECCA).

### **Present transport patterns and future trends pose a significant threat to children’s health and development.**

- Children’s health is at risk due to traffic related accidents, air pollution, greenhouse gas emissions, noise, and restricted opportunities for safe walking, cycling and other outdoor activities.
- Present transport patterns are major contributors to ill health in children, for example through road traffic injuries and respiratory illness, and have contributed to the epidemic of childhood obesity and adult illnesses such as heart disease and osteoporosis.

**Healthy mobility makes a difference.**

- A minimum of 30 minutes a day of moderately intense physical activity significantly reduces the risks of important diseases such as cardiovascular disease, hypertension, Type II diabetes and some forms of cancer and enhances psychological wellbeing.
- Moderate physical activity will bring the biggest benefits to the sedentary.
- Safety concerns need to be addressed, by providing appropriate infrastructures in order to make walking and cycling realistic options (rather than being an excuse for a lack of action).
- Substituting car trips by journeys undertaken on foot, by bicycle and other forms of human powered mobility as well as public transport will also contribute to reducing congestion, exhaust emissions and noise.

**Prioritizing health and environment considerations as part of transport decision making, (particularly those addressing children's needs), would increase the efficiency and sustainability of transport systems. Policy makers should focus on implementing measures, which are highly beneficial to children, as they would also bring benefit to everyone.**

**Integrated policies for making transport children friendlier:**

- Integrate a "children friendly mobility" vision into transport and transport related policies as well as infrastructure and human settlement planning. This could be facilitated by developing environment and health targets specific to children i.e. reductions in road traffic injuries, increase in physical activity.
- Implement sustainable mobility management plans in schools including kindergarten and pre-schools. These plans should be developed and implemented in cooperation with pupils, teachers, parents' organizations, local authorities and transport operators, with a view to promoting walking, cycling and public transport and less car use on the way to and from school.
- Give priority to speed reduction and control, for example by establishing 30 km/h as maximum speed limit in urban residential areas, implementing traffic calming, reducing car traffic and restricting access for motorised vehicles particularly around schools, playgrounds and kindergarten.
- Develop policies facilitating the reduction of car dependence and promote car-free settlements, housing and shopping, leisure activities and tourism.

**Tools to support the integration of health concerns and children's needs into transport policies and decision-making:**

- Make use of tools for decision making such as Environmental Impact Assessments (EIA), Health Impact Assessment (HIA) and Strategic Environmental Assessments (SEA) in bringing health and environmental considerations at the core of decisions related to transport and land use planning.
- Children Impact Assessment (CIA) should be one of the tools used to measure effects of planned interventions at national/regional/local levels in order to identify areas of high concern for children. This approach can be used to assess health impacts, costs and benefits, and support the identification of recommended policy actions and implementation tools.
- Undertake and use economic studies and valuation methods for valuing and prioritizing road safety and health benefits of walking and cycling in the development of transport policies.

**Awareness raising, education and communication strategies:**

- Launch national awareness-raising programmes on child friendly mobility, highlighting in particular the benefits of human powered mobility.
- Use communication strategies, which are action-oriented and tailored for different target groups.
- Promote more ecological and safer driving behaviour, such as “eco-driving”, by implementing eco-driving measures including training of the drivers in safe and children-friendly driving styles.

**Infrastructural measures and planning:**

- Extend and improve safe and attractive infra-structure for bicycles and pedestrians.
- Improve and extend public transport infrastructure and services, increase service quality and the use of fleets with child friendly low floor vehicles, and prioritize public transport in road traffic schemes.
- Reform design-standards and planning guidelines for infrastructure, transport codes, and zoning regulations according to children's needs.
- Implement noise abatement plans and measures, tighter noise requirements for sensitive areas such as schools and residential areas to minimize harmful educational and psychological effects.

**Technical measures and standards:**

- Substantially reduce particle emissions by advocating the installation of particle filters or other appropriate technologies in cars and further tighten the particle emission standards for motorized vehicles in particular passenger cars.

- Implement safety measures, which are known to save children's lives such as child car safety seats, seat belt use, improving visibility, helmet use.

**Research programmes should focus more on children specific concerns.**

- Give more priority and support to assessments and monitoring of the transport related environment and health threats posed on children including epidemiological research on air pollution and noise, research on cumulative effects and inter-linkages with psychological and social issues as well as the positive impacts of mobility patterns relying on physical exercise.

**Children's health can also be promoted by general policy using economic instruments and normative interventions.**

- Implement mobility management in communities including parking fee schemes, car traffic restrictions and prioritization of walking, cycling and public transport.
- Enforce speed limits and speed control.
- Enforce maximum permissible alcohol blood level for drivers of less than 0.05 g/dl.
- Reduce traffic emissions by restricting traffic and improving vehicle technologies to meet the requirements set by the EU National Emission Ceilings of air pollutants.
- Further tighten emission standards (air pollutants as well as noise) for all motorized vehicles and improve safety for both their occupants and other road users (e.g. pedestrians, cyclists).
- Enforce periodic maintenance checks and improve emission remote control systems.
- Use CO<sub>2</sub> / energy taxes and incentives for introducing energy-saving technologies.
- Establish fiscal incentives for public transport and cycling.
- Consider pricing of road infrastructure - road pricing, parking fees, charging of car purchase and ownership.
- Provide incentives for zero or ultra-low emission vehicles (noise, pollution).

**Individual costs of mobility do not reflect the full costs to society. In particular children's specific costs and needs for mobility are not yet accounted for: it is necessary to improve economic assessments and internalisation of costs and benefits, correct pricing-signals and include children specific costs in economic valuations.**

- Promote and improve economic valuation of the transport related health impacts on children, including negative health effects of transport such as exhaust emissions and noise, as well as the positive health effects of walking and cycling.

- Integrate transport related health impacts on children and their costs and benefits into policy instruments e.g. when conducting cost-benefit-analysis of infrastructure and when considering internalisation of the external costs of transport.

**There is a need to redesign human settlements and infrastructure to provide more space for physical, mental and social development of children. Integration of children's needs in planning and decision-making would help overcoming segregation effects and social deficits.**

- Consider needs of children in the decision making process of transport, human settlements, land use and infrastructure planning, etc.
- Make children's needs and aspirations an important reference point in the creative planning process of human settlements and mobility management and follow a participative approach by involving children.
- Bring all relevant partners together for implementation; build new partnerships with children's interest groups.

**Incorporating children's needs requires a shared responsibility of families, the educational, health, environment, transport and urban planning sectors as well as of the private sector, industry and civil society.**

- Enforce better integration of children's needs and the related specific requirements into relevant policies at all political levels (international, national, local).
- Intensify pan-European co-operations and use the implementation of international agreements such as the WHO-CEHAPE, WHO/UNECE THE PEP, the EU-Environment and Health Strategy as driving forces for child friendly adaptation of existing policies and the formulation of new policies and actions.
- Strengthen the role of the health as well as of the education sector e.g. extending the concept of "healthy schools" by encompassing the journey to school.
- Promote the notion of liability for children's health and the environment in industry (vehicle manufacturers, public transport companies) and amongst transport providers and infrastructure planners.

**There is a world to win: Start to act now!!**

- Collect and disseminate examples of best practices and assessments, establish new partnerships and co-operation among sectors.
- Develop and implement children friendly mobility plans and monitor their achievements.
- Design a "package" of integrative measures with a timeframe for implementation. These could start with pilot projects.

- Assess the transferability of different strategies across different cultural, political, economic and social settings.
- Start assessments of transport related health effects which include their costs and benefits with a particular focus on children.

### **Links for further information**

Children's Environment and Health Action Plan for Europe

[www.euro.who.int/budapest2004](http://www.euro.who.int/budapest2004)

THE PEP - Transport Health and Environment Trans-European Programme

<http://unece.unog.ch/the-pep/en/welcome.htm>

“Transport-related Health Effects with a Particular Focus on Children” (Transnational study and workshop series by Austria, France, Malta, the Netherlands, Sweden and Switzerland, 2004)

[www.herry.at/the-pep](http://www.herry.at/the-pep)

“Health Costs due to Road Traffic-related Air Pollution” (Tri-lateral study by Austria, France and Switzerland, 1999)

[www.euro.who.int/transport/HIA/20021107\\_3](http://www.euro.who.int/transport/HIA/20021107_3)

World Health Organization

[www.euro.who.int/transport](http://www.euro.who.int/transport)

ADEME – Agency for Environment and Energy Management, France

[www.ademe.fr](http://www.ademe.fr)

bmgf - Austrian Federal Ministry of Health and Women

[www.bmgf.gv.at](http://www.bmgf.gv.at)

BMLFUW - Austrian Federal Ministry of Agriculture, Forestry, Environment and Water Management

[www.lebensministerium.at](http://www.lebensministerium.at)

bm:vit - Austrian Federal Ministry of Traffic, Innovation and Technology

[www.bmvit.gv.at](http://www.bmvit.gv.at)

Federal Office of Public Health, Switzerland

[www.bag.admin.ch](http://www.bag.admin.ch)

FOSPO - Federal Office of Sports, Switzerland

[www.baspo.admin.ch](http://www.baspo.admin.ch)

Medical University Vienna, Environmental Health Institute, Austria

[www.univie.ac.at/umwelthygiene/](http://www.univie.ac.at/umwelthygiene/)

Ministry of Health, Elderly & Community Care, Malta

[www.health.gov.mt](http://www.health.gov.mt)

Ministry of Housing, Spatial Planning and the Environment of the Netherlands (VROM)

[www.vrom.nl](http://www.vrom.nl)

Ministry of Transport, Public Works and Water Management of the Netherlands (VenW)

*www.minvenw.nl*

RIVM - National Institute of Public Health and Environment, the Netherlands

*www.rivm.nl*

Swedish Institute for Transport and Communications Analysis (SIKA)

*www.sika-institute.se*

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