N° 1 SUSTAINABLE DEVELOPMENT Brief

September 2015

The economic impact of cycling

Summary

Cycling as an active means of transport brings multiple benefits. In particular, it contributes to better population health and reduces environmental footprints. Health benefits can be quantified and integrated together with other positive impacts on cost-benefits analysis for transport projects. Studies show significant economic benefits from prioritising cycling in transport solutions with median benefit to cost ratios of 5:1. This compares favourably with other forms of transport. Most studies coincide that the bulk of benefits comes from reduced mortality due to higher physical activity. The monetary value of these health benefits could exceed EUR 120 billion in the European Union. Growing urbanization will create increased opportunities for cycling, which can also have a wider economic impact. The popularity of cycling as a means of transport differs widely across countries. The potential for increasing the share of bicycles in transport across Europe is significant – and with it, to reap the benefits of higher bicycle use.

Key points

- Cycling is as an active means of transport that contributes to improved health and reduces environmental impacts
- These benefits can be significant and should be included when considering transport options
- Growing urbanization offers new scope for increasing the use of bicycles as a means of transport

Cycling brings multiple benefits

Cycling is receiving an increased policy attention, given its many benefits. Regular physical activity has a positive impact on health and cycling provides a way to incorporate exercise into daily routines in an easy way that is accessible to all. Insufficient physical activity is a major risk factor for ill health. In the countries included in the World Health Organization European Region, almost 1 million deaths per year can be attributed to physical inactivity[i]. The cost of physical inactivity can be estimated at around €150–300 per citizen per year, depending on the country[ii].

But besides this direct impact on health, there is

also an indirect influence, as the modal shift towards increased use of bicycles reduces the prevalence of polluting motor transport. These benefits accrue to individuals but also have a societal dimension, resulting in lower health costs for public health systems. The modal distribution of transport also influences energy consumption and greenhouse gas emissions. In addition, cycling has also benefits for decongestion, appeal of urban centres and accessibility, among others.

The recognition that cycling can make an important contribution to population health, sustainability and other positive societal outcomes has prompted multiple initiatives to promote this form of active travel. At the same time, there have been increasingly sophisticated attempts to quantify the economic impact of cycling, in particular to provide a better basis for decisions on infrastructure planning.

This note will review some key results of these studies and highlight their policy implications.

The value of health

There have been multiple studies that have attempted to identify and quantify the health

UNECE

benefits of transport projects. However, early studies lacked a coherent approach, which made comparisons difficult and results arguable[iii]. More refined methodologies have emerged. In particular, the World Health Organization, in the framework of the Transport, Health and Environment Pan-European Programme partnerships, has developed a health economic assessment tool (HEAT)[iv] that can be used to estimate the mean annual benefit of cycling in a given area due to reduced mortality on the basis of well-founded and standardised assumptions on key parameters. HEAT is now widely used as an input in the assessment of benefits of cycling in transport initiatives and academic studies.

HEAT is based on the relative risk of death from any cause among cyclists compared to those who do not cycle regularly[v]. It is applicable to adult populations where high levels of physical activity were not already prevalent.

A key input that needs to be supplied to obtain an estimate is the average time spent cycling in the studied population and the size of this population. Data collection is an issue for all studies (based on the HEAT model or not), which often differ in the way this data is obtained or estimated. There are two main methods: place-based, with automated or manual counts of cyclists at selected locations, and person-based, through surveys. This second method provides less accurate measures of the amount of cycling but it is better to identify who cycles and why.

HEAT can be used to assess the implications of an intervention with an expected impact (for example, if 40% of commuter car journeys in Scotland[vi] were switched to cycling, the annual economic benefit after five years would be equivalent to GBP 2 billion) or calculate the benefit of changes in levels of cycling over time (for example, it is estimated that in Glasgow the benefits of cycling increased from GBP 3 million in 2009 to GBP 4 million in 2012, due to higher cycling levels[vii]).

HEAT does not capture a number of health benefits associated to regular physical activity, such as lower incidence of ill-health (morbidity) and, therefore, lower absenteeism[viii], which are more difficult to quantify precisely. As a consequence, the results obtained are likely to underestimate overall health-related benefits. There are initiatives that go beyond the limits of the HEAT model to consider wider health benefits. For example, the UK All Party Parliamentary Cycling Group set specific targets for the rate of cycling to reach 10% by 2025 and 25% by 2050. The health benefits of this increase are estimated to be around 300,000 disability adjusted life years. This measure includes not only the impact of lower mortality but also reduced incidence of disease[ix].

Translating health impacts into a monetary value requires a method to carry out this conversion. Transport appraisals often use the standard value of a statistical life, which is based on the willingness to pay to reduce the annual risk of dying[x]. There may be significant international differences regarding this indicator, which have an impact on the estimates produced.

Costs and benefits: how does cycling compare?

Health benefits can be incorporated into Cost Benefit Analysis (CBA), which are routinely used in transport planning. CBA allows considering a range of actual and potential impacts of transport projects. Nordic countries have pioneered the work to integrate health effects and other impacts on the overall costs and benefits of transport infrastructures[xi].

Studies of cost and benefits for different transport infrastructures are often difficult to compare, due to the different methods and assumptions used. However, reported benefit to cost ratios (BCR) for cycling-related interventions are often higher than those regularly used in transport infrastructure planning. A review of 16 economic analyses of transport infrastructure and policies which included the health effects of cycling (and walking in some cases) in different countries found out that the median BCR was 5:1[xii]. Besides the direct comparison of BCR between different transport projects, infrastructure initiatives related to cycling have the advantage that they can be completed in relative short time compared with other infrastructure interventions.

A recent study directly[xiii] compared the cost of cars and bicycles in Copenhagen in terms of air pollution, climate change, travel route, noise, road wear, health and congestion. The conclusion was that private and social costs for a car are EUR 0.50 per kilometre and EUR 0.08 per kilometre for a bicycle. However, if only social costs are considered, one kilometre by car costs EUR 0.15, while there is a social benefit of EUR 0.16 for every kilometre cycled.

There have been attempts to build complex, dynamic scenarios which consider interactions between different variables (investment in cycle-friendly infrastructure, higher number of cyclists, car speed, frequency of incidents) and their feedbacks[xiv]. This type of model was used to assess the impact of different types of interventions to facilitate cycling in Auckland, New Zealand, with benefit to cost ratios ranging from 6 to 24. In this particular case, more extensive interventions were

associated to higher BCR. More limited interventions, although cost-effective, would not be sufficient to reverse the trend of a declining share of cycling in transport. The model incorporated the impact of injuries, air pollution, greenhouse emissions and fuel costs.

Health matters most

Health benefits are large and therefore have a significant influence on cost benefit analysis. According to one study, an individual switching a 5 km daily commute from car to cycling achieves health benefits worth EUR 1,300 annually[xv]. Studies coincide that health benefits would dominate over other benefits expected from higher levels of cycling. For example, a review of nine studies carried out using the UK Department for Transport's web-based multimodal guidance on appraising transport projects and proposals (WebTag) found that health benefits account for almost three quarters of all benefits, which concern also decongestion, absenteeism, amenity, environment and accidents[xvi]. This is also the conclusion of the more complex study in Auckland mentioned earlier, which showed that the greatest benefits derive from reduced all-cause mortality due to physical inactivity.

The European Cyclist Federation has estimated that the annual benefit of cycling in the EU is at least EUR 205 billion[xvii], calculated on the basis that 7.4% of the European citizens use the bicycle as the preferred form of transportation. Indirect benefits, such as tourism and the bicycle industry accounted for 30% of this total. However, health benefits represented the bulk of the estimated benefits, being around 55% of the total.

There are analyses that look exclusively at the savings for public health systems, leaving aside other considerations. For example, a recent study[xviii] showed the impact on healthcare direct costs due to changes in the frequency of some non-communicable diseases and road accidents in Florence, Italy. Increasing the modal share of cycling from 7.5% to 27% would lead to annual savings of EUR 771,201 over a ten year period. This is a significant amount, with only 13,000 residents using the bicycle as preferred means of transportation initially.

Growing urbanization and increasing opportunities

Increased urbanization and growing density in urban centres creates more opportunities for cycling, given the higher share of short distance local trips in these environments. There is clear evidence that the characteristics of the urban environment (e.g., infrastructure for walking and cycling, street connectivity, housing density, mixed land use and others) influence the likelihood of using active modes of transport. In areas that are more conducive to walking and cycling, people tend to use more this form of transport[xix]. In particular, distance makes cycling to work or other destinations less likely, so compact urban environments and mixed land uses (commercial and residential) are more conducive to cycling. The growing urbanization trend will therefore create new opportunities for more extended use of cycling that could be exploited by appropriate planning.

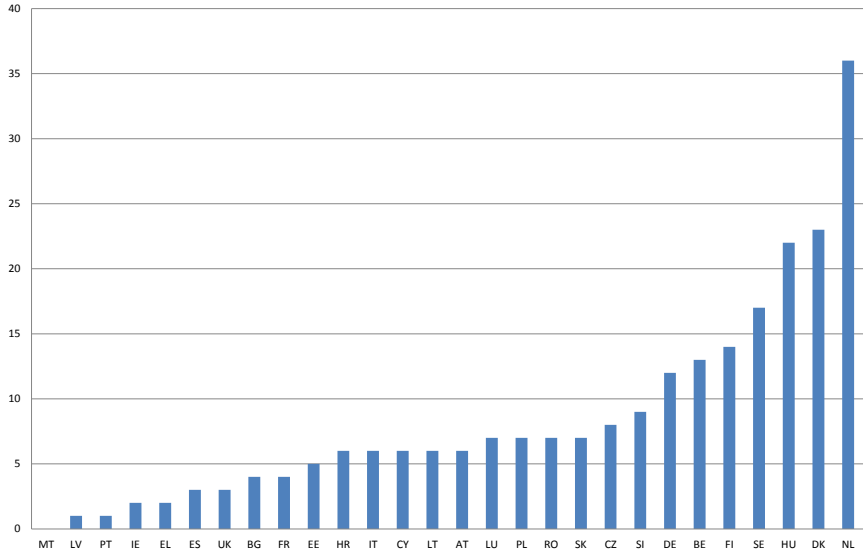
Cycling can also play a role in integrating different urban spaces, favouring connectivity. There are some studies that have shown a positive impact of cycling facilities on property values and retailing activity. Cycling can also facilitate access to job markets that would be difficult to reach otherwise, directly or as option connecting different modes of transport. This may be particularly important for low income users, thus favouring social inclusion.

More generally, cycling has a broader economic impact. For example, research carried out by the London Business School[xx] assessed the gross contribution of cycling to the British economy as worth GBP 2.9 billion in 2010 or GBP 230 per cyclist per year, including elements such a bicycle manufacturing, retail and other related employment. A study conducted in the framework of the Transport, Health and Environment Pan-European Programme (PEP)[xxi] concluded that increasing the modal share of cycling in the large cities in the European region to the levels observed in Copenhagen (26%) has the potential to create almost 77,000 jobs.

Barriers to cycling: the role of policies

If economic benefits are clear and significant, the relevant policy question is why the prevalence of

Figure 1. Prevalence of bicycle use, percentage, 2014



Note: Answers to the question "On a typical day, which mode of transport do you use most often?"
Source: European Commission (2014), Special Eurobarometer 422a, Quality of transport.

cycling is not higher and what could be done to increase it. Part of the answer concerns the insufficient awareness of these benefits both for the individual and society at large. There is evidence that policy measures that focus only on improved infrastructure, services or pricing are insufficient to convince users to switch transport modes[xxii]. Information campaigns among the public and the use of tools that facilitate quantifying these benefits are important to spread the knowledge and lead to better informed decisions.

But other reasons may act as factors that discourage cycling, which could be therefore the object of policy action. There are multiple strategies that can be used to promote cycling, including travel-related infrastructure, end-of trip facilities, transit integration, access to bicycles and regulations[xxiii]. Some initiatives are positive inducements such as traffic-free or better routes. However, increasing the use of bicycles as a means of transportation may require not only policies that facilitate cycling but also initiatives that discourage the use of cars. Creation of a supportive, safe environment for active travel may need also car restrictions, such as safe crossing facilities for bicycles. Motor traffic acts as a barrier to higher use of bicycles, as it is a source of real and perceived insecurity and other inconveniences for cyclists. This imposes external costs that should be taken into account when considering restrictions on car use or the level of car taxes[xxiv].

Studies on the benefits of cycling and the effects of different interventions depend often on specific assumptions, which makes the comparison of outcomes difficult. However, one clear conclusion of a general review of these studies is that benefit to cost ratios are generally larger in situations where there have been few initiatives to promote the use of cycling. At higher levels of bicycle use, there is less potential to increase cycling further[xxv].

There are very large differences across countries on bicycle use (figure 1). Leaving aside the impact of terrain characteristics, urban layout or other structural features that cannot be influenced by policy as explanatory factors for these differences, the potential for increasing the share of bicycles in transport across Europe is significant – and with it, to reap the benefits of higher bicycle use.

The PEP

The PEP – the Transport, Health and Environment Pan-European Programme- promotes a green and healthy mobility and transport for sustainable livelihoods for all. The PEP is a policy framework working with the transport, health and environment sectors of UNECE member States, intergovernmental organizations and civil society with UNECE and WHO providing its secretariat.

For more information, please visit

http://www.unece.org/thepep/en/welcome.html

REFERENCES

[i] World Health Organisation (2009), Global Health Risks: mortality and burden of disease attributable to selected major risks.

[ii] http://www.euro.who.int/en/health-topics/environment-and-health/Transport-and-health/data-and-statistics/economic-cost-of-transport-related-health-effects2

[iii] Cavill, N., Kahlemeier, S. Rutter, H., Racioppi, F. Oja (2008), "Economic analysis of transport infrastructure and policies including health effects related to cycling and walking: a systematic review", Transport Policy, 15.

[iv] World Health Organisation (2014), Health economic assessment tools (HEAT) for walking and cycling. Methodology and user guide, 2014 update.

[v] The use of this relative all-cause mortality indicator has the benefit of avoiding the need to make different assumptions regarding the impact of cycling in total activity.

[vi] Transform Scotland (2008), Towards a Healthier Economy. Why investing in sustainable transport makes economic sense. Transform Scotland, Edinburgh.

[vii] Crawford, Fiona and Bruce Whyte (2014), Assessing the health and economic benefits of cycling in Glasgow

[viii] Research looking at the differences in the levels of absenteeism among cyclist and non-cyclist found that those that cycled to work were one day less F., and Hildebrant V. (2010), "The association between commuter cycling and sickness absence", Preventative Medicine, Vol. 51, No. 2.

[ix] Lovelace, R. and Woodwock, J. (2014), Modelling uptake of cycling and associated health benefits

[x] OECD (2015), Mortality Risk Valuation in Environment, Health and Transport Policies, Paris.

[xi] Nordic Council of Ministers, Nordic Council of Ministers Secretariat (2005), CBA of Cycling.

[xii] Cavill, N., et al. (2008), ibid.

[xiii] Gössling, S., Choi, A. (2015), "Transport transitions in Copenhagen: Comparing the cost of cars and bicycles", Ecological Economics, Vol. 113, May.

[xiv] Mc. Millan A., Connor, J. Witten K., Kearns R., Rees D., of Commuter Bicycling: Simulating the Effects of Specific Policies Using System Dynamics Modelling", Environmental Health Perspectives, Vol. 122, No.4.

[xv] Rabl. A., De Nazelle, A. (2012), Benefits of shift from car to active transport, Transport Policy, Vol. 19, No. 1.

[xvi] Davis, A. (2014), Claiming the Health Dividend : A summary of the discussion of value for money estimates from studies of investment in walking and cycling, UK Department of Transport.

[xvii] European Cyclist Federation (2013), Calculating the economic benefits of cycling in the EU

[xviii] Taddei, C., Gnesotto R., Forni, S.,Bonaccorsi G.,Vannucci, A. Garofalo G., (2015), "Cycling Promotion and Non-Communicable Disease Prevention: Health Impact Assessment and Economic Evaluation of Cycling to Work or School in Florence", PLoS One, Vol. 10 No.4.

[xix] Saelens, B., Sallis, J., Frank L. (2003), "Environmental correlates of walking and cycling: findings from the transportation, urban design, and planning literatures", Annals of Behavioral Medicine, Vol. 25, No. 2.

[xx] Grous, Alexander (2011), The British cycling economy: 'gross cycling product' report, Sky and British Cycling, London.

[xxi] World Health Organization (2014), Unlocking new opportunities. Jobs in green and healthy transport, Geneva.

[xxii] Stopher, P. R. (2004), "Reducing road congestion: A reality check", Transport Policy, Vol. 19, No. 1.

[xxiii] Handy, S., Van Wee, B., Kroesen, M. (2014), "Promoting Cycling for Transport: Research Needs and Challenges", Transport Reviews, Vol. 24, No.1.

[xxiv] Saelensminde, K. (2004), Cost-benefits analyses of walking and cycling track networks taking into account insecurity, health effects and external costs of motorized traffic, Transportation Research Par A, Vol. 38.

[xxv] Buis, J. (2000), The Economic Significance of Cycling. A survey to illustrate the costs and benefits of cycling policy world-wide, Interface for Cycling Expertise I-ce.

Sustainable Development Briefs are summaries of sustainable development knowledge generated as part of the UNECE programmes.

Information Service
United Nations
Economic Commission for Europe

Palais des Nations CH - 1211 Geneva 10, Switzerland
T: +41(0)22 917 44 44
info.ece@unece.org
www.unece.org

UNECE