Final Report Summary - PASTA (PHYSICAL ACTIVITY THROUGH SUSTAINABLE TRANSPORT APPROACHES)

Executive Summary:
PASTA “Physical Activity through Sustainable Transport Approaches” is a project aiming to improve health by promoting active mobility (AM), namely walking, cycling and the use of public transport, as an innovative approach to increase physical activity (PA).

PASTA started with a thorough literature review classifying AM measures and reviewing factors and indicators affecting AM. Based on this theoretical approach a total of 138 AM measures were collected in the seven case study cities (CSC) (Antwerp, Barcelona, London, Rome, Örebro, Vienna, Zurich) together with numerous city profile factors. The city specific image on walking and cycling was completed by workshops and interviews with stakeholders from different city departments, public transport operators, walking and cycling associations and health experts. In each city a big variety of different measures and interventions was implemented. Goals to reduce motorized traffic and to increase the share of walking and cycling are defined in the strategic policies. Political will, often tied with a powerful politician, is the most important driving force and a cornerstone for promoting AM, while missing political will is one of the main barriers.

In a good practice handbook 8 Europe wide examples are described, that were implemented successfully and that had a health dimension embedded, together with recommendations for local authorities on how to implement AM measures successfully.

A systematic review of quantitative health impact assessments on active transport policies show that in all studies the positive effects of more PA by an increase of walking and cycling exceed the negative effects due to an increased crash risk and a higher air pollution exposure. HEAT is an online tool developed by the WHO to conduct economic assessments of the health impacts of walking or cycling. The existing tool, that considers health benefits based on PA, was revised during the project and extended by three new modules (air pollution, crashes and carbon). In the updated version (HEAT 4.0) it is now possible to consider the effects of air pollution exposure and crashes as well as carbon emissions in the assessment. The updated tool together with a new handbook is available online: http://heatwalkingcycling.org/#homepage.

Main part of the project is a longitudinal study in all seven CSCs aiming for a better understanding of correlates of AM and their effects on overall PA, injury risk and exposure to air pollution. A total of 12,825 participants were recruited, 8,567 of them completed the baseline questionnaire. Each participant filled in average 8.1 subsequent questionnaires but there were also participants that stayed in the survey for the full lifetime (52 questionnaires). 5,623 filled in at least one complete trip diary reporting in total 46,103 trips. 263 crashes were reported by pedestrians, 745 by cyclists. Analyses of PASTA survey data show significant differences in the BMI of cyclists and car drivers. The latter are in average 4kg heavier than cyclists, several cofounding variables are taken into account. This effect can also be shown in longitudinal analyses but not that strong.

In three selected CSCs (Antwerp, Barcelona and London) a real life measurement of physical activity levels, black carbon exposure and subclinical health effects (e.g. heart rate variability, blood pressure or changes in retinal arteries) was done by 40 healthy volunteers. A subsample of about 500 participants in all CSCs was tracked with a smartphone app (Moves) to help validating the PASTA travel diary, to assess the relevance of environmental attributes in determining route choices and to estimate air pollution.
To showcase the results of PASTA a final results brochure was produced as well as a series of 11 factsheets. These are attached and available on the project website: www.pastaproject.eu

Project Context and Objectives:
Physical inactivity is one of the leading risk factors for mortality and a major cause of non-communicable diseases all over the world. Therefore a reduction of sedentary behavior and an increase of the level of physical activity (PA) in the population is a key goal of the EU Strategy on nutrition, overweight and obesity-related health issues. In contrast to this policy goal, levels of PA are decreasing and only one third of the European population is estimated to meet the minimum recommended levels of PA. For adults the WHO recommends at least 150 minutes of moderate-intensity aerobic PA (or 75 minutes of vigorous intense PA) throughout the week.

Walking and cycling for transport solely or in combination with public transport, also referred to as active mobility (AM), are well suited to provide regular PA. In contrast to sports or exercise, AM requires less time and motivation; it is convenient as a mode of transport and as a form of exercise; and it is economically affordable. Hence, AM has the potential to reach parts of the population which may be less receptive to appeals of sports and exercise, or cannot afford them in terms of finance or time. Especially for people with low PA such as sedentary, obese and elderly people it is easier to begin with AM as a moderate form of regular PA than with sports or other types of vigorous PA.

Increasing AM not only supports public health objectives but also serves goals in transport planning. The balanced and integrated development of all transport modes is a main characteristic of Sustainable Urban Mobility Plans (SUMPs) and also a key goal in the strategic EU policy documents. Increasing AM reduces the consumption of space for transport infrastructure, energy use, air pollution and noise and improves overall quality of urban life. However, to date, health aspects of AM are rarely considered in SUMPs. Practitioners in both, public health and transport planning departments, pursue opportunities to increase AM; however, they usually work in isolation, thus not benefiting from the large potential for synergy. Similarly, researchers in health and transport fields work on a better understanding of AM and its interrelation with PA, but again, systematic collaboration is rare.

PASTA “Physical Activity through Sustainable Transport Approaches” is a European research project funded by the EC under FP7-HEALTH-2013-INNOVATION-1 analyzing the promising link between AM and health. PASTA spans disciplines, research and practice, determinants and impacts, qualitative and quantitative methods and other dimensions of relevance in a comprehensive approach towards a better understanding of the interrelation between travel behavior and health. With its mixed-method and multilevel design applied in the seven case study cities (CSC) Antwerp, Barcelona, London, Örebro, Rome, Vienna and Zurich, PASTA addresses the complexity of AM promotion by tackling comprehensively its determinants and impacts. PASTA pursues the following four main aims:
• to investigate correlations and interrelations of AM, PA, air pollution and crash risk;
• to evaluate the effectiveness of selected interventions and measures to promote AM with regards to increasing AM and PA;
• to develop a comprehensive health impact assessment (HIA) of AM; and
• to foster the exchange between the disciplines of public health and transport planning, as well as between research and practice.

The project starts with a systematic review of the state-of-the-art on AM, where all subsequent work builds upon, including:
• an in-depth assessment of AM enablers, planning practice and demand at the city level in the seven PASTA cities;
• a web-based longitudinal study investigating determinants of AM, the interrelation between AM and PA, safety and air pollution exposure of AM, the effectiveness of selected AM measures; and,
• the advancement of HIA for AM.
Insights gained in these steps will feed into a compendium of good practice examples and recommendations for policies promoting PA through AM.

State-of-the-art of AM research and practice
To have a mutual understanding of relevant terms in transport planning and public health and to build on a common basis, the state-of-the-art is identified by a review of academic and grey literature on determinants of AM and PA as well as on policies
and evaluation studies. Terms of different disciplines are harmonized in a glossary and a classification scheme for AM measures is designed. For stakeholder involvement as well as for the collection of city indicators and good practice examples a list of contacts (in various cities and institutions) is be compiled at the beginning.

PASTA Cities: Contextual framework, transport system, demand and impact
The insights gained from the above evidence review are complemented through in-depth analysis of the PASTA case study cities. The contextual framework as well as policies and AM measures are gathered by means of interviews and workshops with local stakeholders and experts from public health, transport and urban planning in the seven CSCs and completed by a review and analyses of city indicators. The following objectives are pursued in the CSCs:
• Identification of AM measures and development of a set of indicators for the assessment of the state of the art of AM;
• Identification of urban policies and other initiatives that have direct or indirect effects on AM measures;
• Detecting factors that inhibit or promote the success of AM measures and/or the ability of individuals to benefit from AM measures and increase their PA;
• Identification and description of at least one top measure in each CSC for the evaluation of effectiveness in the longitudinal study.

Longitudinal survey: Determinants of AM, Interrelation of AM and PA
Determinants of AM and the evaluation of AM measures are investigated through a large scale longitudinal survey conducted in the seven CSCs from November 2014 to December 2016. It combines a longitudinal web-based survey (core module) with several smaller studies (add-on modules) to gather objective data to complement the self-reported survey data in selected CSC. The framework distinguishes hierarchical levels for the various factors (i.e. city, individual and trips) and three main domains or pathways that influence AM (and PA) behavior, namely socio-geographical factors, socio-psychological factors, and rationale or mode choice related factors.

The core module uses a longitudinal design, with a comprehensive baseline questionnaire and frequent short and long follow-up questionnaires. The initial baseline questionnaire collects key socio-demographic, individual, household, health, attitudinal and other variables that identify the person and her/his social context. Frequency of use of different modes and GPAQ questions gather information on mobility and PA habits. A one-day travel diary captures trips of the previous day in detail. Thirteen days after completion of the baseline questionnaire, a short follow-up questionnaire is sent to the participant asking about PA and travel behavior in the last seven days and crashes and near misses since the last questionnaire. Each third questionnaire is a longer follow-up including also a one-day travel diary. If a crash while using AM (cycling, walking or using PT) is reported in one of the follow-ups, this prompts an additional crash questionnaire asking about crash circumstances, location, causes, injuries and other consequences.

HIA: state-of-the-art, PASTA model and further development of HEAT
A main objective of PASTA is the improvement of HIA of AM based on the expertise within the PASTA consortium; existing research from projects such as SHAPES, TAPAS, iConnect, ITHIM and HEAT, stakeholders from each PASTA city; and data collected in the longitudinal survey and its add-on modules.
At first, a systematic review of HIA of AM is performed to reveal the main health pathways and methods existing in HIA of AM. This review highlights the weight of each health pathway associated with AM and identifies the main outcomes used to summarize and quantify the health impacts of AM (ie, mortality, morbidity, injuries, life expectancy, disabilities, work and school absences, and monetization). The HIA model for AM will be improved by a dose–response functions for PA and include an assessment for travelers in combination to general population exposure.
Finally, this work will feed into an update of HEAT like additional health outcomes, possible substitution effects between AM and PA, implications of crash risk, air pollution exposure, fuel savings and carbon emissions reductions, and alternative economic valuations. New modules and functionalities of HEAT will be designed with the specific aim of being user friendly and tailored to the target audience of users (eg, urban and transport planners) who do not necessarily possess advanced expertise...
in epidemiology, modeling and/or economics.

Compendium of good practices and recommendations for AM policies
To bring in the perspective from outside of the project, a network of different stakeholders and city representatives called “Friends of PASTA” is established that helps collecting and identifying good practice examples all over Europe. Those feed into a compendium representing the most innovative measures and approaches that include the health aspect in promoting AM. Recommendations for public authorities on how to integrate public health aspects in urban mobility policies, city and transportation planning at the national, regional and – in particular – at the city level are prepared and included in the best practice compendium.

Dissemination
The core element of all communication and dissemination activities within this study is the website where information about all activities is constantly updated, see http://www.pastaproject.eu. Results of the project are presented in various conferences covering different specific topics (transport, health) and addressing different audience (scientist, stakeholder, practitioners). A final conference is organized at the end of the project to present the project and results to a wider audience. The advanced HEAT, together with a compendium on good practices for AM measures, will be made available for free online and specifically distributed to local/regional/national governments, health and transport authorities at all levels, relevant experts and non-governmental organizations.

For more details see:
- Peer reviewed publication:

Project Results:
Literature review and assessment of state-of-the-Art of AM
For a common understanding of terminology in the project a glossary was set up and following terms were defined to guarantee a consistent use within the project:
Active mobility (AM) is regular physical activity undertaken as a means of transport. It includes travel by foot, bicycle and other vehicles which require physical effort to get moving. Use of public transport is also included in the definition as it often involves some walking or cycling to pick-up and from drop-off points. It does not include walking, cycling or other physical activity that is undertaken for recreation.
Active mobility measure: An active mobility measure is an action undertaken in order to increase the level of active mobility (in a specified population). This ranges from changing urban infrastructure or introducing new policies to campaigns to change people’s transport behavior.

The PASTA project has also developed an indicator set to help understand active mobility (AM) and the conditions which support or constrain it in a city. A better understanding of framework conditions and their relations can help decision makers to choose the most appropriate packages of measures to increase AM in their city. Based on extensive literature search and a European workshop, a set of 123 indicators, both qualitative and quantitative, were selected. The aspect if the indicator is valid, clear and feasible to collect was also considered in the selection. They were split into four categories:
• City profile factors: 21 indicators that describe “City area”, “Population”, “Climate”, “Economy” and “City management &finance”.
• Enablers: 27 indicators that describe “Knowledge of society and user needs”, “Vision, strategy and leadership”, “Personnel
and resources”, “Finances for AM measures”, “Public participation” and “Monitoring, evaluation and review”.  
• Transport System and Services: 44 indicators that describe “Information and MM services supporting AM”, “Individual (motorized) traffic”, “Parking policy & traffic restraint measures”, “Public transport”, “Walking infrastructure and overall walking conditions” and “Cycling infrastructure and overall cycling conditions”.  
• Results & Impacts: 31 indicators describing “Mobility”, “Road safety”, “Traffic noise” and “CO² emissions and air quality”.

For more details see:
- Deliverable D1.2 “Collection of indicators to evaluate active mobility”  
- Factsheet: PASTA indicator set

Within the analysis framework of PASTA the contextual framework in the CSC (“City profile factors” and “Enablers”) influences the “Transport system and services”. Both are describing the baseline situation which is again influencing “Results & Impacts”. On the other hand “Results & Impacts” are also influencing the “Transport System and Services” and the contextual framework.

An important part of “Transport System and Services” are measures that are implemented in cities to change or improve the baseline situation. In the project a special interest was on AM measures, so a classification scheme was developed that on the one hand fits the concept of the project and allows answering the research questions and is on the other hand comparable with other classifications and understandable to different communities. Following classes have been defined:
• Strategic policy measures: A policy represents a decision made by an individual or group which aims to achieve a specific aim or aims. A policy measure lies behind the other measures, since it constitutes a decision to do the other measures / package of measures. For example, a policy measure can be a cycling action plan: a decision to implement certain actions, and this action plan could include details of individual measures. Generally, policy measures are gathered in strategic policy packages, although this is not always the case.  
• Social environment measures: Measures that manage demand for active mobility by changing travelers’ attitudes and behavior. These measures, include, for example, walking school bus, personalized travel planning, or broad information campaigns that aim to affect the way people think about their mobility. It also includes “process-related” measures which aim to change the way that working is done within administrations, as well as “health literacy” measures which aim to address how people obtain, read, understand and use healthcare information (in this case about active mobility).  

A suggestion of subcategories here is:
• Pricing and incentives  
• Information and communication  
• Promotion  
• Education and training  
• Physical environment/infrastructural measures: These are measures to change the physical environment such as infrastructure for walking and cycling, green area development, localization, etc.  
• Regulation and legislation measures: These are top-down measures which can range over different geographical levels: national level, city level, work place etc. For example, legislation which allows right turns at traffic lights for cyclists, or low emission zones.

For more details see:
- Deliverable D1.1 “Description and classification of active mobility measures including factors affecting their effectiveness”

Assessment of AM initiatives and framework factors in case study cities
To reveal the baseline situation in the 7 case study cities (CSC) Antwerp, Barcelona, London (Borough of Newham), Rome, Örebro, Vienna and Zurich a thorough desk research of selected indicators was conducted. This information was completed by 7 workshops and additional 61 interviews with in total 162 local stakeholders and experts from public health, transport and urban planning. The selected work sequence allowed a collection of high quality data that is comparable between the cities. Beside the contextual framework with a special focus on AM measures, stakeholders were asked about their perceived
enabling factors for active mobility (comprising strategies, visions and policies driven by politics), barriers and challenges as well as their impressions of the cooperation of the health and transport planning area were also collected.

The baseline situation in the 7 CSC can be described as follows:

- **Antwerp**: Stakeholders in City of Antwerp concluded that the congestion problem potentially presents a suitable strategy to effectively enhance AM, since the theme has a high and relevant potential to provide a common gateway for different stakeholders, facilitate the creation of diverse alliances and is able to channel different interests towards a better AM infrastructure. Further it was perceived that subsidies from higher authorities help convince local administrations to cooperate in the promotion of AM. A practical perspective on how best to enhance AM concluded with the experience that cheap measures are easier and more rapidly to implement than expensive ones. One of the most challenging barriers to tap and exploit the positive relation between AM and health are the scattered allocation of mandates and competences within and between the mobility and health sector. Short chains of decision-making were identified to contribute to effective implementation of AM measures.

- **Barcelona**: With 32.3% walking is next to PT the most common mobility mode in Barcelona. On the contrary, cycling is below average with a modal share of 1.7%. Generally, the AM share in Barcelona is slowly increasing, but further efforts are needed to solidify this positive trend. With change in city government in 2015 sustainability issues appear higher up on the policy agenda and just recently the Barcelona City Council announced to expand Barcelona’s cycling network threefold within the next three years. The largest challenge in Barcelona was perceived to be the lack of inter-sectoral collaborations between the health and mobility sectors. Each policy sector with its own budget, responsibilities and interests continues to mainly work isolated. Health has no priority in mobility planning. However, stakeholders generally agreed that Barcelona would greatly benefit from synergies. Joint efforts and better communication among both sectors were desired.

- **London**: In the London context, there is an awareness of healthy urban planning, but it has appeared to be rather abstract and focussed on access to greenspace and leisure facilities. Given that public health has only recently been devolved back to local authorities after almost 60 years in car use became dominant and has dramatically affected urban planning, there is now a good potential for collaboration. Experts suggested that transport planners were far more aware of the health impacts than health professionals were aware of transport issues. The Mayors cycling vision is a very important feature in raising the profile of AM in London. Some stakeholders commented that there is too much attention, and to a degree funding, targeted at promoting cycling and leaving walking behind.

- **Örebro**: The city’s cycling culture has a positive impact on the political support, urban decision-making processes and the long-term vision for cycling. Consequently, there is a budget available for investments in the bicycle infrastructure. Stakeholders confirmed that the political will is fundamental to introduce policy and (sometimes conflicting) infrastructural measures that are favorable to AM. Additionally, a bicycle action plan was developed, which outlines measures like for example the strategic extension of the network of cycling paths and an improved maintenance. The implementation of measures are monitored and annually reported. There is a low level and no systematic cooperation between the health and mobility sector in Örebro. However, collaboration is taking place in the context of local to European projects and initiatives. This leads to the conclusion that a clear budget and mandate is needed in both sectors to ensure resources for systematic cooperation.

- **Rome**: The Italian capital has an enormous potential to tap into AM. In 2015 the city administration approved the Traffic Masterplan for Rome, which formulates a new understanding of mobility. Doing so AM has been recognized by urban planning, and supportive mobility measures are underway to be implemented, particularly, bike sharing systems, pedestrian areas, 30 km/h zones and the development of cyclability through not only a network of cycling lanes, but also intermodal access to PT. Rome is now advancing in AM, for example by allowing bikes in the metro for free and by creating specific calmed areas that are able to incentivize people to walk and cycle. However, further advances will only be made if infrastructure is combined with awareness raising and better information about road safety and benefits of AM. Moreover, AM related processes have to be politically addressed, supported and guided in order to change decisions of the administration as well as people’s mobility habits. Then a cultural change towards AM is possible in Rome.

- **Vienna**: There is a clear political will to promote AM as vital part of a liveable, healthy and attractive city. AM strategies and concepts exist and there is a range of measures, which are implemented continuously. In the Urban Mobility Plan (STEP 2025) the goal is defined to decrease the share of motorized private vehicles to 20% and increase sustainable mobility to an overall
modal share of 80%. However, decision making within city administration is often challenging as various city departments and other stakeholders (e.g. PT operator, car associations) are involved before a resolution is passed. For walking no dedicated budget exist contrary to cycling, which has a lot of potential to increase significantly.

• Zurich: Almost 50% of households do not own a car. Zurich can also be considered a walking-friendly city, in particular together with an excellent PT system. However, that often does not play in favour of the necessary stronger promotion and increase of the modest share of cycling. But the policy environment is improving through the adoption of quantified policy goals to double cycling, while at the same time achieve a 10% relative reduction of motorized traffic by 2025. Initial policy monitoring indicates that achieving those goals will be challenging. Also the increase in cycling accidents will need particular attention. Further investments are needed in the cycling infrastructure to cater for new, less experienced user groups which have not been well reached yet. Generally, AM and in particular cycling still receives little attention in specific urban and mobility planning processes. This is a key barrier for increasing cycling in Zurich.

For more details see: - Deliverable D2.1 “Baseline analyses of active mobility in case study cites”

In total 138 AM measures were collected in the seven CSC and assigned to one of the four categories defined before. The majority of them were classified as infrastructure measures (56) followed by social environment measures (38). 39% of all collected AM measures are targeting on both walking and cycling together, followed by 33% targeting only on cycling. Specific measures only targeting on walking are a minority with 11%, the remaining measures are addressing all transport modes. The measures are initiated or launched by different sectors mainly transport, environment or urban planning. Although there is cooperation between different sectors in 72% of all measures, only in 8% of them health care is involved.

Due to the fact, that our 7 CSC are very different in number and structure of population, topography, climate, built up area, modal split, transport system, political responsibility etc. it is hard to draw general conclusion. Analyses of stakeholder perspectives reveal that all cities have to struggle with similar barriers and challenges like missing political will, missing cross-sectoral and departmental collaboration, discrepancy about distribution of public space, the predominance of cars, lack of health literacy among certain social classes etc.

On the other hand there are a number of promising approaches and efforts towards a sustainable urban development summarized under ‘enabling framework conditions’: a clear vision on sustainable urban mobility, walking and cycling plans, collecting and monitoring AM data, integrating environmental and health targets in AM planning, dedicated budget for AM infrastructure, creating a safe and livable environment, discouraging car ownership, joint cooperation between the public an policy makers, increasing synergies between the health and transport sectors and so on.

The latter seems to be one of the missing links between transport and health. Although the relation between both policy fields and their mutual benefit is evident, transport and health politics operate in most cases in all case study cities separately. There is only a cautious convergence in some cases e.g. including health objectives in urban transport plans or vice versa. The lessons learnt from the PASTA stakeholders include for example: making health a key driver in transport planning and decision making, including health arguments explicitly in urban policy plans, implementation of HEAT in the decision making process, idea of ‘Health in all policies’, thinking and acting cross-sectoral, structured and regular exchange among the policy fields, support health literacy among the citizens and so on. Inter-sectoral collaborations needed between the health and the mobility sectors for a robust AM culture are currently in the beginning stages of development. The existing social, financial and political challenges to an inter-sectoral approach will continue to be overcome with effective planning and clear visions.

Global climate change and the importance of renewable resources are rapidly gaining attention in countries and cities across the globe. The European cities at the forefront of the movement to integrate sustainable and healthy systems into their everyday lives will serve as an example to the rest of the world. Incorporating and promoting the important benefits of active mobility measures will serve the health and longevity of people and their cities. The organizational cooperation between health and policy sectors that is needed to improve sustainable modes of transport will continue to be an important way forward in innovative cities. For more Details see Deliverable D2.2.
For more details see:
- Deliverable D2.2 “Description of active mobility measures and framework factors across case study cities”
- Factsheet: Transport & Health – how far do they link up in cities?
- Factsheet: Facts on Active Mobility Antwerp / Belgium
- Factsheet: Facts on Active Mobility Barcelona / Spain
- Factsheet: Facts on Active Mobility London / UK
- Factsheet: Facts on Active Mobility Örebro / Sweden
- Factsheet: Facts on Active Mobility Rome / Italy
- Factsheet: Facts on Active Mobility Vienna / Austria
- Factsheet: Facts on Active Mobility Zurich / Switzerland
- Paper in proceeding of a conference: WEGENER, S. R., E; GAUPP-BERGHAUSEN, M; ANAYA, E; DE NAZELLE, A; GERIKE, R; HORVATH, I; IACOROSSI, F; INT PANIS, L; KAHLMIEIER, S; NIEUWENHUIJSEN, M; MUELLER, N; ROJAS RUEDA, D; SANCHEZ, J; ROTHBALLER, C. 2017. Active mobility - the new health trend in smart cities, or even more? REAL CORP 2017 Proceedings/Tagungsband.

Longitudinal study to evaluate top measures to promote AM and investigate important correlations of AM
The PASTA project combined a longitudinal web-based survey with several smaller studies to gather objective data to complement the self-reported survey data. An innovative web-based survey design deployed frequent follow-up questionnaires through a fully-automated platform. The survey made use of state-of-the-art electronic features, like conditional questions, map-based capturing of locations and routes, use of images to visualize concepts, etc. The survey was conducted in the seven European CSC (Antwerp, Barcelona, London, Örebro, Rome, Vienna, Zurich). Cutting edge technologies are used to collect objective (i.e. not self-reported) and relatively unbiased data in subsamples pulled from the survey respondents in some cities.
To align the survey contents with the research objectives, a detailed conceptual framework was developed based on a review of previous work by others, including behavioral theories and conceptual frameworks on active mobility, as well as a scoping review of determinants of active mobility behavior (see also Deliverable: D1.1). The framework distinguishes hierarchical levels for the various factors (i.e. city, individual, and trips), and three main domains or pathways that influence AM (and PA) behavior, namely socio-geographical factors, socio-psychological factors, and rationale or mode choice related factors. Data on contextual factors was collected from publicly available GIS data and other data sources (i.e. population statistics, etc.) and by means of stakeholder interviews. Individual level data were collected through the PASTA survey. Socio-psychological factors included concepts from extended theory of planned behavior, trans-theoretical model and a range of attitudinal questions. Various socio-geographical factors collected as objective city wide data were matched with corresponding questions in the survey to capture subjective perceptions of these same aspects (e.g. proximity of public transport). The main outcomes of interest in PASTA are travel behavior (measured by frequency scale and 1-day travel diary adapted from KONTIV© design; and commuting route identification), physical activity behavior (measured by PA single item and the Global Physical Activity Questionnaire GPAQ with walking and cycling separated), and traffic safety incidents (i.e. crashes and near misses). These were collected prospectively and measured repeatedly.

For more details see:

The survey in the core module was implemented as an online web application, with a responsive design approach (i.e. the questionnaire can be completed across a wide range of devices – from mobile phones and tablets to desktop computers). The PASTA platform is implemented in PHP with a PostgreSQL back-end database. In addition to the participant’s user interface, it also provided a researchers’ user interface and dashboard for real-time monitoring of recruitment and survey data collection,
and a survey administration interface for survey creation and management. All content was developed in English and translated into Swedish, Dutch, Catalan, Spanish, Italian, Swiss German, and Austrian German.

The health add-on was a real-life study on PA, air pollution & short-term health effects. In three cities (Antwerp, Barcelona and London), exposure to air pollution and PA was assessed under real-life conditions. A multitude of non-invasive health biomarkers were repeatedly measured in 120 volunteers. Air pollution exposure while traveling is largely unknown or ignored by using fixed monitoring stations. Mobile sensors were therefore used for air pollution, PA and travel behavior. Not only exposure, but also inhaled dose is taken into account (especially relevant for AM).

In selected cities some participants were also invited to wear an accelerometer and use the Moves app during one week, providing objective data on overall PA. This would have allowed further validation of the adapted GPAQ questionnaire included in the PASTA survey by comparing the survey-reported values with accelerometer-derived levels of walking and cycling.

Participants were followed for 6 months using the commercial smartphone application called Moves (https://www.moves-app.com). The Moves app was used to track journeys and automatically detect active travel modes over the study period. A PASTA Tracking add-on website was created to download the data from Moves server (data collected by Moves app in JSON format).

For more details see:
- Peer reviewed publication:

A total of 10,691 participants were recruited over a period of 27 months in the 7 European CSC ranging from 1,844 individuals in Rome to 1,356 in Zurich. In all cities, except for Rome, more women than man were recruited, with an average age of 42 for men and 40.0 for women. Most of the participants were highly educated, with 72.5 % possessing a university degree, and 26.0 % possessing a secondary education. Over 60.6 % were full-time employees, followed by 16.8 % part-time employees, 13.8 % students, and 8.9 % of people with home duties, are retired or unemployed.

For more details see:
- Publication submitted to a conference:

8,567 participants completed the baseline questionnaire. Each participant filled in average 8.1 subsequent questionnaires but there were also participants that stayed in the survey for the full lifetime (52 questionnaires). 5,623 filled in at least one complete trip diary reporting in total 46,103 trips.

On average 23% of all trips are done by walking, 29% by cycling, 21% by car and 27% by public transport. As intended during recruitment, the share of cyclists in the sample is for all cities higher than in the population which is important for a sufficient sample size of cyclists, especially in cities with a very low cycling share. Most reported trips (31%) are done to and from work, followed by leisure trips 25 % and shopping trips 11%. Of all PASTA participants, 97% know how to ride a bike and 80% have access to a bike. Half of all participants ride their bike at least once in a typical week, 24% never ride a bike. 43.7% of participants reported at least one cycling trip in the trip diaries and can be classified as cyclists. Of these, 85% cycle 30 minutes or more per day. An average bike trip took 27 minutes and was approx. 5 km long. Male cyclists biked on average 50 minutes per day, females approx. 42 minutes.

Regarding cycling as a mode of transport, 77% think that it saves time, 57% find it comfortable, but only 23% consider it safe
with regards to the risk of traffic crashes. 92% agree with the statement that cycling for travel offers personal health benefits, and those for whom health is an important criterion when choosing their mode of transport indeed do bike more (approx. +10%).

Cyclists are slimmer than car drivers. On average, regular cyclists weigh 4 kilos less than car drivers. Public transport users are in between car drivers and cyclists. When people stop cycling, their weight increases. Taking up some cycling (a few times per month) lowers weight already.

For more details see:
- Presentations on an international conference:
  RASER, ET. AL. European Cyclists’ Travel Behavior: Differences and Similarities between seven European (PASTA) Cities, Int Conf on Transport & Health, 2017, Barcelona. Presentation
  GÖTSCHI, ET AL. Determinants of Cycling in 7 European Cities, Int Conf on Transport & Health, 2017, Barcelona. Presentation
  DONS, ET AL. Male Car Drivers Are 4kg Heavier Than Cyclists: Results from a Cross-Sectional Analysis in Seven European Cities, Int Conf on Transport & Health, 2017, Barcelona. Presentation

263 crashes were reported by pedestrians, 745 by cyclists. Most of all crashes (46%) were single accidents where no one else was involved. About 10% of all crashes were reported to an insurance company, about half of them to the police. After a comprehensive data cleaning and preparation we received a powerful dataset on PA, travel behavior and attitudes for further analyses. A sample of 546 participants, with a fair distribution over the 7 PASTA cities, was recruited for the tracking add-on and tracked for up to 6 month.

For more details see:
- Deliverable D3. 2 “Final WP3 report including core module and add-ons”
- Factsheet: Active Mobility and health: Insights from the PASTA project
- Peer reviewed publication:

Abstract: Physical activity and ventilation rates have an effect on an individual’s dose and may be important to consider in exposure−response relationships; however, these factors are often ignored in environmental epidemiology studies. The aim of this study was to evaluate methods of estimating the inhaled dose of air pollution and understand variability in the absence of a true gold standard metric. Five types of methods were identified: (1) methods using (physical) activity types, (2) methods based on energy expenditure, METs (metabolic equivalents of task), and oxygen consumption, (3) methods based on heart rate or (4) breathing rate, and (5) methods that combine heart and breathing rate. Methods were compared using a real-life data set of 122 adults who wore devices to track movement, black carbon air pollution, and physiological health markers for 3 weeks in three European cities. Different methods for estimating minute ventilation performed well in relative terms with high correlations among different methods, but in absolute terms, ignoring increased ventilation during day-to-day activities could lead to an underestimation of the daily dose by a factor of 0.08−1.78. There is no single best method, and a multitude of methods are currently being used to approximate the dose. The choice of a suitable method for determining the dose in future studies will depend on both the size and the objectives of the study.

Abstract: Reduction of sedentary time and an increase in physical activity offer potential to improve public health. However, quantifying physical activity behaviour under real world conditions is a major challenge and no standard of good practice is available. Our aim was to compare the results of physical activity and sedentary behaviour obtained with a self-reported instrument (Global Physical Activity Questionnaire (GPAQ)) and a wearable sensor (SenseWear) in a repeated measures study design. Healthy adults (41 in Antwerp, 41 in Barcelona and 40 in London) wore the SenseWear armband for seven consecutive days and completed the GPAQ on the final day. This was repeated three times. We used the Wilcoxon signed rank sum test, Spearman correlation coefficients, mixed effects regression models and Bland-Altman plots to study agreement between both methods. Mixed models were used to assess the effect of personal characteristics on the absolute and relative difference between estimates obtained with the GPAQ and SenseWear. Moderate to vigorous energy expenditure and duration derived from the GPAQ were significantly lower (p<0.05) compared to the SenseWear, yet these variables showed significant correlations ranging from 0.45 to 0.64. Estimates of vigorous-intensity physical activity in particular showed high similarity (r>0.59). Results for sedentary behaviour did not differ, yet were poorly correlated (r<0.25). The differences between all variables were reproducible across repeated measurements. In addition, we observed a relationship between these differences and BMI, body fat and physical activity domain. Due to the lack of a standardized protocol, results from different studies measuring physical activity and sedentary behaviour are difficult to compare. Therefore, we suggested an easy-to-implement approach for future studies adding the GPAQ to the wearable of choice as a basis for comparisons.

As part of the PASTA project, a systematic literature review was carried out to identify existing studies (until 2015) published in scientific literature that quantified the health impacts of different active mobility policies or interventions. 30 studies were identified that assessed different mode shift scenarios from motorized transport to active modes of transport. These studies used different assessment methods (comparative risk assessment, cost benefit-analysis, etc.) to compare the expected changes in exposure levels (of health determinants considered) and derive an overall conclusion of whether the assessed policy (i.e. scenario) provided net benefits or risks to health. Results showed that:

• 27 out of the 30 studies evaluated active mobility policies to provide net health benefits. The three studies that showed negative results were distinctive in their assessment approaches and assessed traffic safety only or compared to extensive intervention costs.
• The 27 studies that estimated net health benefits concluded that the benefits of active mobility result of increases in physical activity levels that outweighed detrimental effects of air pollution exposure (for the traveller) and even the risk of traffic incidents. Societal benefits of reduced air pollution and noise levels can also be expected with an increase in active mobility.

For more details see:
- Peer reviewed publication:

Active transport (i.e. walking and cycling for transport) can provide substantial health benefits by increasing levels of physical activity (PA) and help reduce transport-associated emissions. A health impact assessment (HIA) of scenarios on cycling network expansions in the seven diverse CSC was conducted by modelling the association between cycling network length (km) and cycling mode share (%) and estimating health impacts of the expansion of cycling networks. The results suggest that the length of the cycling network is associated with the cycling mode share of up to 24.7% in European cities. With respect to the HIA, the scenario assuming all streets have cycling infrastructure produced greatest health benefits through increases in cycling for London with 633 premature deaths avoided each year. If all 167 European cities, with a total population of over 75 million people, achieved a cycling mode share of 24.7% 15,801 premature deaths could be avoided each year. The largest cost benefit ratios were found for a 10% increase in cycling network.

For more details see:
Further HIA was done for a scenario in Örebro that assumed that the total number of journeys undertaken in the Municipality of Örebro, walking, cycling and public transport should account for 60% by 2020. If Örebro achieves a 60% of the modal share by 2020 made by public transport, walking, and cycling, 44 deaths could be prevented annually in the travelers who shift between cars and active transportation.

A new version of HEAT was developed in R Shiny. HEAT 4.0 was launched online at the end of October 2017 and includes new modules decided at consensus meetings of the HEAT core group. Together with the tool a new user manual was developed and published in printing and on-line.<http://heatwalkingcycling.org/#homepage

Following new modules were developed:

- Air pollution module: Calculating the exposure of cyclists or pedestrians to air pollution requires defining the air pollution in the place of interest. HEAT assumes that a certain proportion of the population changes its transport mode from an (unknown) average (non-active) transport behavior to walking or cycling. As also assumed in epidemiological studies on the health effects of air pollution, the HEAT model would be based on the assumption that this average transport behavior corresponds with the urban background air pollution levels. To derive conversion factors between background air pollution levels and exposure while walking or cycling, studies that estimated the concentrations of particulate matter with an aerodynamic diameter of 2.5 μm or less (PM2.5) while cycling or walking and background concentrations were reviewed. Ten studies that measured various modes of transport, including at least walking or cycling in a simultaneous or quasi-simultaneous design, were included. The data from these studies were harmonized to enable quantitative synthesis of the estimates. Based on this study, the HEAT advisory group supported using a conversion factor of 2.0 for cycling to background and of 1.6 for walking to background; as a simplification, a conversion factor of 2.5 is being used for car versus background. One consideration regarding developing a separate HEAT air pollution model concerned possible double counting of the health effects of air pollution by using the relative risk estimates derived from the meta-analysis of walking and cycling studies, which already included effects from air pollution by using mortality from any cause as a health outcome. To further study this aspect, the effect of air pollution on the relative risks of the walking or cycling studies included in the meta-analysis was calculated. The change in the relative risks for all-cause mortality and physical activity related to PM2.5 during the physical activity reported by each exposure group was less than 5% in all the studies included. Nevertheless, to enable separate effects from physical activity and air pollution to be estimated in HEAT, a relative risk for physical activity that is adjusted for the effects of air pollution is being used when the users select both physical activity and air pollution modules

- Crash module: To prepare the development of a HEAT module on road crashes, an exploratory literature review was carried out in 2016 to identify the various approaches to assess health effects of road crash risk on cycling based on exposure measures. The literature review focused on health impact studies identified by recent reviews and studies from 2009 onwards, assuming that the collected publications sufficiently take into account previous literature. As a result of the exploratory literature review, four different approaches for assessing the health effects of cycling road crashes were considered as possible methodological approaches for the HEAT road crash module at a HEAT core group meeting in November 2016. Following the HEAT aim to provide robust estimates of health effects while putting the smallest possible burden on the user in terms of providing input data, the HEAT core group proposed to further pursue a basic approach in combination with a non-linear approach for before versus after assessments. The HEAT consensus meeting adopted this proposal in 2017. Basic approach: Health effects would be calculated by multiplying a HEAT-provided generic road crash risk estimate with a user-provided measure of exposure for the studied use case. Although this approach is the simplest in terms of calculation efforts, it might lack accuracy in evaluating local cycling projects. Non-linear approach: This approach (also sometime referred to as
safety-in-numbers effect) is based on a basic and/or basic-plus approach, adding the option of applying a change in risk over time. The reasons for this effect could include car drivers becoming more aware of and used to cyclists, more drivers being cyclists themselves and cyclist advocacy becoming more effective. Nevertheless, infrastructure and other safety improvements may play a role. Thus, HEAT users could adjust (reduce) the HEAT-provided road crash risk estimate when exposure changes over time: that is, in assessing before versus after use.

• Carbon module: In preparation of the development of a HEAT module on how replacing motorized trips by walking or cycling affects carbon emissions (i.e. greenhouse gas emissions, measured in carbon dioxide equivalent), it was noted that, although several international, national and local tools and methods for estimating the effects on carbon emissions of transport policies and plans are available techniques for principally assessing the economic value of walking and cycling interventions reducing carbon emissions have not been well developed. Because of the scarcity of literature on how walking and cycling affect the carbon emissions, no formal review was carried out, but relevant approaches were summarized and presented to the HEAT core group in November 2016. Since there was not one agreed methodological approach that HEAT could adopt, it was proposed to base the proposed approach onto the following three main steps: A) assessing mode shift from motorized travel to active travel (or vice versa); B) assessing the carbon emissions from displaced motorized travel and increased walking and cycling; and C) assessing the economic value of the social effects of changes in carbon emissions. For each of the steps, possible approaches were considered and an approach for further development and presentation to the HEAT consensus meeting in 2017 was adopted. The overall approach was supported by the HEAT consensus meeting and methods for each of the steps were agreed.

For more details see:
- Deliverable D4.1 – Final WP4 report on health impact measurement of active mobility
- HEAT Methods and user guide:

A network of “Friends of PASTA” (stakeholder, city representatives or other people interested in the topic) was created to share information on the project and to collect further examples of good practice. Out of these measures, 8 good practices were selected and described in case studies in the “Handbook of good practice case studies for promotion of walking and cycling”.

There exist numerous handbooks and good practice collections which illustrate success stories from cities all over the world which have become leaders in active mobility promotion and public space design for people. They provide excellent recommendations to planners and urban designers about how to create healthy places through active mobility, and build more inclusive communities for walking and cycling. The innovation of the PASTA Handbook lies in its original approach for identifying successful measures across the transport planning and public health domains that had a health dimension embedded. Overall these good practices have specific characteristics of active mobility measures that can effectively support decision makers in a greater uptake of innovative approaches to promote walking and cycling in daily life. The compendium also comprises a list of existing resources, tools and compilations of good practices for practitioners which are available online as well as a set of recommendations for local authorities on how to implement such measures successfully.

For more details see:
- Deliverable D6.3 – Compendium of best practices and recommendations
Also available online:

Potential Impact:
The centre for all dissemination and communication activities is the project website which was launched at a very early stage in the project and is available under following address: www.pastaproject.eu. The site serves to raise awareness about the project and has wide range of information and resources available addressing all target groups.

The portal features information about the project, definitions of physical activity, the project partners, the advisory board, related projects, infographics and videos related to the project and the health benefits of walking and cycling, factsheets on good practice examples and publications. The information is presented in an accessible way using a diversity of formats (video, infographics, factsheets) to optimise the level of dynamic content. Language related to the internal workings of the project e.g. the WP format has been deliberately avoided as these semantics are not of relevance to an external audience.

A clear and appealing visual identity was created at the beginning of the project, which is used for all forms of communication and dissemination. This unique identity guarantees the best possible visibility for the project and a high recognition factor after the end of the project. Together with the visual identity a Communication and Dissemination strategy was also developed to communicate the key messages to the external world. To provide regular project updates (news items, event attendance, etc.) a project twitter account @EUPASTA was set up. This account counts 1690+ followers at the moment and is accompanied by several additional city accounts. This approach gives a human face to the project, through pictures and posts from locale partners and allows the project to engage in direct conversations between case study cities.

All results of the project (factsheets, scientific publications, newspaper articles, good practice compendium) as well as the final brochure are announced and promoted through the twitter account and the available on the website.

For more details see:
- Deliverable D6.1 – Project Website, Project leaflets and press releases
- Deliverable D6.2 – Final brochure with recommendations

A broad range of events have been targeted during the PASTA project, designed to reach out to practitioners, policy-makers and researchers working in the field of transport and health. A very extensive list of events in which PASTA partners participated during the project is online at the participant portal. Analysis of the events attended shows that as a consortium PASTA have achieved a good geographical spread, reaching the target groups identified in the PASTA communications strategy.

Some examples of events are:
• POLIS Conference, Brussels, Belgium, 2014
• Velo City, Nantes, France 2015,
• WALK 21 - XVI International Conference on Walking and Liveable Communities, Vienna Austria 2015
• IATBR - 14th International Conference on Travel Behaviour Research, Topic: "Transitions in a digital world", Windsor, UK 2015
• ICHT - International Conference of Transport and Health, London, UK, 2015
• mobilTUM – International Scientific Conference on Mobility and Transport, Munich, Germany, 2016
• Liveable Cities Conference, Rome, Italy, 2016
• ISEE – International Society for Environmental Epidemiology, 28th Annual Conference, Rome, Italy, 2016
• HEPA Europe Conference, Belfast, UK, 2016
• Walk 21, Hongkong, China, 2016
• EUP – 9th European Public Health Conference, Vienna, Austria 2016
• ISPAH – 6th Congress of the International Society for Physical Activity and Health, Bangkok, Thailand
• WCTR – World Conference on Transportation Research, Shanghai, China, 2016
• Velo City, Arnhem, Netherlands, 2017
• ICTH - International Conference of Transport and Health, Barcelona, Spain, 2017
• ISCTS – International Conference on Transport Survey Methods, Quebec, Kanada, 2017
• ICC – International Cycling Conference, Mannheim, Germany, 2017
• Etc.
On November 18th 2015 a workshop “building the liveable and healthy city” took place in Brussels. Beside first finding from the project, the workshop presented good practice examples, tools, and free training on the Health Economic Assessment Tool (HEAT) developed by the WHO, to help urban planners, transport and health practitioners better integrate cycling and walking into urban transport planning, and make the case for new investment in active mobility. The workshop targeted to researchers, urban and transport planning practitioners and public health practitioners.

For more details see:
- Deliverable D5.2 – Mid-term validation workshop

The PASTA Final Conference “Health-onomics of Walking & Cycling” took place on the 20 September 2017 in Mannheim, Germany, as part of the International Cycling Conference (ICC) hosted by the City of Mannheim / German Environment Agency (UBA) and co-organized by PASTA consortium member World Health Organization, the German International Development Agency (GIZ), the European Cycling Federation and others. The purpose of this Conference was to present the results of the longitudinal survey and present the outputs such as the factsheets, case studies, handbook of good practices and the updated HEAT. Introduction to the latter was complemented by the PEP – the Transport, Health and Environment Pan-European Programme which was held back-to-back with the final PASTA conference.

The event brought together approximately 300 researchers, practitioners and politicians from around the world to discuss the role of active mobility in the modern world, creating an intersection of academic, political and practical thinking strategies.

For more details see:
- Deliverable D6.4 – Final Conference

Foreground

The PASTA team created a lot common foreground, which is related to the survey and thereby collected data and will continue analyzing this data after the end of the project. New evidence on the effectiveness of AM to increase health, determinants that describe the participants and their preferred mode of transport as well as insights in crashes and their circumstances can be expected. The team developed a plan for the data management and data analyses after the end of the project, which brings new and better expertise to the research institutes and involved researchers and allows for collaboration with external experts in the field.

The updated version of HEAT as well as the methods behind is available online for free. The tool is very simple and easy to use to guarantee that a wide audience will use the findings from the project to show the benefits of increased AM and that this knowledge finds the way to decision makers and city representatives.

Knowledge generated by the literature review, the measure collection and the city analyses are available for a public audience and are spread trough all our channels. The good practice collection that can help cities to implement measures to promote AM is brought to a wide audience of stakeholders, city representatives and decision makers via the “Friends of PASTA” mailing list to support their work.

Strategic impact

Physical inactivity has emerged as a leading risk factor for non-communicable diseases and obesity, and is estimated to cause nearly 1 million, or close to 1 in 10 deaths per year in the 53 Member States of the WHO European Region. International groups such as the World Health Organization (WHO) and the Intergovernmental Panel on Climate Change (IPCC) have recommended dramatic worldwide policy change to control non-communicable disease, obesity, pollution, and climate change. Planning policies that promote physical activity contribute to these goals, with the potential for yielding further co-benefits. An important area in reducing sedentary behavior is promoting active mobility.

Realization of the potential health benefits from AM through concrete actions faces numerous challenges on the local and national level, often but not only related to funding. Many governmental departments do not invest resources in this policy
area, despite having a vested interest in the promotion of AM. A lack of understanding and comprehensive knowledge of available measures and synergies between them often renders investments haphazard and inefficient. A main barrier to be addressed is the lack of objective and quantitative information on the net impacts of AM on PA in particular, and health in general, taking into account both benefits and potential risks.

PASTA improves the understanding of the relationship between AM and PA and provides new evidence on the effectiveness of AM measures to improve PA and public health. Better knowledge and information is crucial for local and regional authorities to support AM measures and has therefore an impact on the promotion of AM as an innovative approach the increase PA levels. The work makes specific contributions in the areas of PA, AM, obesity, non-communicable diseases, indicators for effects of AM, effects of air pollution and injuries on health as well as the economic impacts of them, which are areas that have received increased attention in Europe and by the EC over the recent years and have been targeted as areas for further research. The findings of PASTA support the “Community Strategy on Nutrition, Overweight, and Obesity-related health issues”, the “Green Paper on Urban Mobility”, the “White Paper on Sports” and the related “Developing the European Dimension in Sport” as well as the objectives of the “European Innovation Partnership on Active and Healthy Ageing”.

With transport being the only major sector in the EU where greenhouse gas emissions are still rising, PASTA also contributes to the EU target for reducing CO2 emissions from vehicles by promoting modal shifts towards AM, and developing a tool that will enable to calculate the benefits of AM interventions in terms of CO2 emissions reductions.

By elucidating the links between injury aspects, infrastructure, road safety and their influence on AM, PASTA helps to provide policy makers with better tools to improve the safety conditions for cyclists and pedestrians, thereby contributing to objectives of the EU Road Safety Plan 2011-2020 objective 7 “Protect vulnerable road users”.

The findings of PASTA will also contribute to the implementation of International policies fully supported by the European Union. These include:

• The 2001 United Nations General Assembly declaration on Prevention and Control of non-communicable diseases, in which Member States commit to Advance the implementation of the Global Strategy on Diet, Physical Activity and Health, including, where appropriate, through the introduction of policies and actions aimed at promoting healthy diets and increasing physical activity in the entire population, including in all aspects of daily living, such as giving priority to regular and intense physical education classes in schools, urban planning and re-engineering for active transport, the provision of incentives for work-site healthy-lifestyle programmes, and increased availability of safe environments The 2011 Action plan for implementation of the European Strategy for the Prevention and control of non-communicable diseases (EUR/RC61/12) adopted by the World Health Organization Regional Committee for Europe in 2012, which identifies the promotion of AM as one of the supporting interventions for preventing NCDs in Europe;

• The 2010 Parma Declaration on Environment and Health, adopted by the Fifth Ministerial Conference on Environment and Health, which pledges to “integrate the needs of children into the planning and design of settlements, housing, health care institutions, mobility plans and transport infrastructure. To this end we will use health, environment and strategic impact assessments and we will develop and adapt the relevant regulations, policies and guidelines, and implement the necessary measures”

• The 2009 Amsterdam Declaration adopted by the Third High Level Meeting on Transport, Environment and Health, within the framework of the Transport, Health and Environment Pan European Programme, which in its Priority Goal 4 aims at “promoting policies and actions conducive to healthy and safe modes of transport by designing and modernizing urban areas and human settlements to improve the conditions for safe and physically AM, including infrastructure for walking and cycling, and efficient and accessible public transport, particularly focused on vulnerable groups such as children and persons with reduced mobility”.

Thanks to its strong dissemination strategies, which include the cooperation of different networks of project participants (POLIS, ICLEI, WHO) and relevant institutions and initiatives, such as CIVITAS and Smart Cities, among others, PASTA makes a direct contribution to awareness raising efforts of the EU, notably in relation to the European Mobility Week and Car Free Days, and the European Green Week.
Societal impacts
PASTA provides policy makers, transport and urban planners, public health authorities and practitioners as well as civil society with enhanced tools, better understanding and new findings for empowering urban societies, both at the level of decision makers and at the level of individual citizens to reduce sedentary behavior and enhance the level of everyday PA through AM. By supporting actions to increase PA in everyday life of the general population, PASTA contributes to the prevention of major chronic diseases, whose risk factors are closely linked to the settings and environments in which people live.

Through a strong multidisciplinary research team, the direct engagement in the project of different stakeholders, and the provision of new tools to appraise the health dimension of AM, along with effects on CO2 emissions, PASTA has a direct impact on the development and implementation of more effective and efficient evidence-based strategies for increasing AM through the right combination of policy measures and supportive policy environment to put them in place, making it more appealing to choose and maintain a healthy lifestyle. In particular, PASTA results in the following societal impacts:

- Identification of innovative approaches to increase active mobility to enhance the level of PA in the population and development of a better understanding on the relationship between AM and PA:
  Through its systematic review of measures to promote AM and the detailed analysis and evaluation of strategies and policies carried out in seven European CSC, PASTA provides policy makers in the transport, environment, urban planning and health sectors with an improved understanding of the levers that motivate or inhibit policy action on AM within the cities. By comparing the cities new ideas and good practices can be revealed and implemented in upcoming decisions. Through the development of an advanced tool for integrated health impact assessment of AM measures (PASTA model) and 2 applications as well as the update of HEAT, PASTA provide decision makers from different sectors with new, strong and convincing arguments to give serious consideration to investing in AM, based on a comprehensive understanding of the benefits and potential risks of the proposed AM actions. This will result in an impact on the discussions and trade-offs that take place locally in the context of decision-making processes for investments in AM, bringing more prominently to the front the large positive impacts of AM for health and society. This will also facilitate the identification of priority measures that should be taken to address possible risks identified through the integrated health impact assessment analysis, with views of maximizing the positive results of investments in PA and enabling policy and decision makers to make a more informed decision on different options for action, as well as on the optimal design and combination of measures, which are best suitable to local conditions. The compiled set of indicators for AM, and the evaluation of policies and interventions for AM has an impact on enhancing local capacities and possibilities for policy makers to evaluate and monitor the effectiveness of AM measures under consideration and, based on this evaluation, identify and address the need for corrective measures, if and when necessary.

- Advanced understanding of AM as a means to prevent major non-communicable diseases
  Through the results of the empirical study carried out in the 7 CSC, PASTA impacts the field of non-communicable diseases prevention by contributing new quantitative findings essential for the advancement of health impact assessment of AM and the understanding of how AM relates to total PA, in particular by investigating whether the uptake of AM results in an overall increase of PA, or whether it results in the substitution of other forms of PA by AM. The empirical data collected in the survey allow better informing of responsible persons about the benefits and also the risks of AM supporting measures. Parameters were derived which quantify, how the health conditions of target persons being actively mobile improve, which risk factors they are exposed to (e.g. air pollution, injuries) and how they influence their health conditions. Through the review of the evidence between AM and different health effects (for both mortality and morbidity) undertaken at the beginning of the project, PASTA has an impact on advancing the understanding of the specific contribution to health benefits provided by AM, as compared to other forms of PA.

Through its broad dissemination and communication activities and the accessibility and transparency of the tools produced (eg. HEAT), which are available for free through the web, PASTA has an impact on the awareness of citizens about the important health benefits that could be achieved through AM. Thanks to its user friendliness, the advanced health impact assessment
tool is usable by representatives of the general public as well as civil society organizations, providing them with a new means to advocate more investments into AM and to work with policy makers and authorities to improve the design and implementation of measures for AM promotion.

• Advancements the field of integrated health impact assessment
Through the development of an advanced and user friendly integrated health impact assessment tool (PASTA model), PASTA has a major impact on lowering the technical barriers that make the application of quantitative HIA of AM a complex and expensive challenge in most cities.
The existing health impact assessment tool (HEAT) provides institutions from different planning levels, and with different capacities and technical expertise, as well as other stakeholders, such as civil society organizations and health and sustainable transport advocates, with a user-friendly, robust and transparent tool to assess the health impacts of AM interventions into their decision making processes. 3 new modules were implemented to HEAT during the project, which makes it more powerful and allows the consideration of air pollution exposure, a reduction of carbon and crash risks. The provision of economic estimates of these risks and benefits will enhances the understanding and usability of the results by transport and urban planner, and the integration of the findings in broader studies and assessments of transport and urban design interventions.

• Identification of “good practices” and their economic and social benefits to support decision makers in a greater uptake of innovative approaches
A lack of understanding and comprehensive knowledge of available measures and synergies between them is amongst others often the reason for decision and policy makers not to support measures fostering AM. The handbook of good practice provides responsible authorities with information on innovative initiatives and measures supporting AM on different intervention levels, focusing on their effectiveness for improving health and reducing risks. The impact of this broadly disseminated collection of “good practices” on policy making is enhanced by the fact that these will be identified and described with respect not only to the implementation aspects of the proposed measures but, importantly, through an analytical description of the institutional infrastructure and policy environment in which action and the development of the good practice could take place, thereby providing most useful practical information on aspects which, though critical to understand the success or failure of certain measures, get rarely captured and analysed in similar collections.

• Clarifying the role of diverse public and private entities, such as business, including social enterprises, civil society organisations and public authorities, as well as their interaction
Although it is broadly recognized that tackling risk factors rooted in the broad environment, and in the settings where people live requires the ability of the health sector to effectively engaging and working across different sectors (in a “health in all policy” or “whole of government” approach to policy), there is very little knowledge and very few practical examples of how this can be done in practice. In particular, different sectors have very little if no incentive to take action to promote health. Therefore, their engagement in health promoting action needs to take place on the basis of different triggers and motivation. In turn, this requires a very good understanding of the stakes, objectives, performance criteria and decision-making infrastructures of different sectors.
PASTA, e.g. through the application of the health impact assessment tool and the provision of a user-friendly advanced tool for HIA, has an important impact on advancing the understanding of the effectiveness of health benefits and their important economic value as an argument and lever to prompt interest and action in support of AM from the transport and urban planning sectors, at the political as well as technical level.
The direct engagement of target end-users in the process of development of the advanced HEAT, both through the applications in the case study cities and through the contribution to the scientific consensus building process for the development of the tool will maximize user friendliness and relevance of the tool.

Actual impact on city level:
In addition to the more general impact above, there are also examples where the project had impact on decisions and actions taken on city level:
• Antwerp: A paper developed in the project (BUKERS, J., DONS, E., ELEN, B. & INT PANIS, L. 2015. Health impact model for modal shift from car use to cycling or walking in Flanders: application to two bicycle highways. Journal of Transport & Health, 2, 549-562.) was used during the budget discussion in the Province of Antwerp to safeguard the budget of cycling (as much as possible) in the savings rounds – more specifically the budget for the construction of cycling highways.

• Rome: The involvement of the city of Rome in the project and the success of the top measure (new investments in cycling infrastructure, especially bike racks) resulted in further investments and the implementation of 2000 new bike racks in March 2018 (nearby schools, libraries and metro stations) was just decided.

• Vienna: In Vienna there were 2 local partners that worked in close cooperation with the city (walking and cycling commissioner). Part of this cooperation was the implementation of the top measure in Vienna (personalized marketing campaign for people in life changing moments). This cooperation formed new networks, which led to a new project where the field of transport and public health work together for the first time.

List of Websites:
www.pastoproject.eu/home/

Reported by
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Last updated on 2018-06-20
Retrieved on 2019-08-06

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