PROMOTING POPULATION HEALTH AND EQUITY IN EUROPE

FROM EVIDENCE TO POLICY

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Euro Healthy

Acknowledgments

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EURO-HEALTHY Consortium

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(ASPB) Agència de Salut Pública de Barcelona
(PHE) Public Health England
(UPO) Paris Nanterre University
(IST-UL) Instituto Superior Técnico, Universidade de Lisboa
(UM) Maastricht University
(UCL) University College London
(BHT) Beuth University of Applied Sciences Berlin
(KI) Karolinska Institute
(UoA) National and Kapodistrian University of Athens
(CUP) Charles University
(CSI-Piemonte) Information System Consortium
(EUBA) University of Economics in Bratislava
(VUB) Vrije Universiteit Brussel
(ASL TO3) Local Public Health Agency Torino 3

Summary

The EURO-HEALTHY project (Shaping EUROpean policies to promote HEALTH equitY) is a three-year Horizon 2020 research project launched in January 2015 aiming to advance knowledge of policies that have the highest potential to enhance health and health equity across European regions with particular focus on urban areas.

Within the EU Horizon 2020 research and innovation programme, the call "Foresight for health policy development and regulation" underpinned the need for more meaningful information, particularly on the regional health inequalities within the EU. Consequently, EURO-HEALTHY developed a comprehensive and structured framework of analysis, integrating and quantifying key factors impacting population health and health inequalities, taking the EU's diversity into account and foreseeing the impact of policies. Following a socio-technical approach, the sound methods were built through highly participatory processes involving a large group of multidisciplinary experts and key stakeholders at different geographical levels. The methods were applied to analyse health and identify geographical health inequalities in 269 NUTS 2 regions, ten selected metropolitan areas and two city case studies.

In this publication, we present some of the main findings, conclusions and recommendations of the EURO-HEALTHY project. The booklet consists of: I) Profiles of each Work Package summarizing their work and II) Fact sheets that present an overview of evidence on thematic areas going from the relationship between health status and a wide range of determinants, to specific methodological aspects including the evaluation of health and of policies with potential to promote health and health equity.

Our desire is that the evidence shared in this informative booklet would be a starting point for policymakers and concerned stakeholders to enhance their understanding on what are the drivers of health inequalities in Europe and, thus be a trigger to an extended dialogue on what are the policies having the highest benefit in promoting more equitable and healthy environments at different levels (European, regional and local).

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EURO-HEALTHY OVERVIEW

CONTEXT AND RATIONALE

Health inequities have been increasing in Europe, particularly in a context of an ageing society and economic and social crisis. In countries with different levels of infrastructures and health system preparedness, health inequities create significant policy challenges.
Addressing this challenge, the EU funded project EURO-HEALTHY (Shaping EUROpean policies to promote HEALTH equitY), over the past two and a half years has worked to identify and understand key factors that affect European population health and to advance knowledge as to which policies have the highest potential to enhance health and health equity across 269 European regions. For this reason the project has developed tools – based on a Population Health Index (PHI) – to evaluate and monitor overall health as well as interactions between health and multiple dimensions at different geographical levels. The PHI is used to foresee (using scenario analyses) and discuss the impact of multi-level policies and combinations of policies to promote population health and health equity across European regions with more emphasis on two case studies (Lisbon and Turin).

WHO WE ARE?

EURO-HEALTHY has brought together 15 multidisciplinary institutions from 12 European countries assuring a multi-sectoral approach required to employ cross-cutting determinants of population health. This highly collaborative partnership enhanced the capacity of all involved researchers to conduct transdisciplinary and interdisciplinary research by integrating a variety of disciplines to achieve a common objective.
The project is supported by the Project Advisory Board which comprises of Alec Morton from University of Strathclyde Business School, UK (decision analysis and management science), Ana Diez-Roux from Drexel University School of Public Health, USA (multilevel determinants of population health and conceptual approach of health outcomes), Patricia O´Campo from Dalla Lana School of Public Health Sciences, and University of Toronto, Canada (multilevel modelling and monitoring methods on links between the socio-economic attributes of neighbourhoods and health), and Pedro Pita Barros from Nova School of Business and Economics, New University of Lisbon, Portugal (health economic and policy).

STAKEHOLDERS

The project has progressively involved 96 stakeholders and 56 experts to actively engage them into multiple research activities related with the process of building the EURO-HEALTHY PHI, population health scenarios and two case studies (Lisbon and Turin). The involvement of stakeholders was designed to

strengthen their understanding of the impact that different policies can have on health promotion and health equity, thus maximizing the project's influence on the public debate.

WHAT IS THE EURO-HEALTHY POPULATION HEALTH INDEX (PHI)?

The EURO-HEALTHY PHI is informed by evidence on the relationship between multiple determinants (economic conditions, social protection and security, education, demographic change, lifestyle and health behaviours, physical environment, built environment, road safety, healthcare resources and expenditure, healthcare performance) and health outcomes. The Index structure is based on a multi-criteria model that follows a socio-technical approach, integrating the technical elements of a multi-criteria value model and the social elements of interdisciplinary and participatory processes that collected the views of experts and stakeholders on what factors contribute to the European population health. The results of the EURO-HEALTHY PHI will contribute to the evidence on what is keeping European regions healthy or making them sick and how the opportunity for good health differs between and within European countries.

WORK PACKAGES PROFILE

1.

WP2 Socioeconomic, health behaviours and lifestyle determinants of health and wellbeing
WP3 Environmental public health risks
WP4 Healthcare access and mortality profiles
WP5 Population Health Index
WP6 Decision support for multicriteria modelling of the Population Health Index and evaluation, foresight and selection of policies
WP7 Good practices in public policies to reduce health inequities
WP8 Dissemination

WP2 SOCIOECONOMIC, HEALTH BEHAVIOURS AND LIFESTYLE DETERMINANTS OF HEALTH AND WELLBEING

BACKGROUND

More than half of the world population lives in cities and this percentage will increase to 70% by 2050. In Europe, these percentages are higher[1-3]. Socioeconomic inequalities in health tend to be larger in urban areas with disadvantaged and poor populations being concentrated in marginalized neighbourhoods, usually inner city areas, and having higher incidence of many diseases[3].
However, the evolution of intraurban inequalities in health and specifically in mortality have been few analysed in European contexts and specially the changes that have occurred during the economic crisis that started in 2008. For this reason, one of the objectives of this WP is to analyse the evolution of socioeconomic inequalities in mortality in nine metropolitan areas. Moreover, the WP reviews and identifies indicators to be included in the Population Health Index.

OBJECTIVES

- To identify, in the literature, the socioeconomic and lifestyle/behaviours determinants that influence population health and wellbeing and, to assess the availability of data needed to construct these indicators to be used in the Population Health Index, between 2000 and 2015 across Europe, particularly in selected metropolitan areas;
- To collect socioeconomic and mortality data for small areas of metropolitan areas / cities;
- To analyse the evolution of socioeconomic inequalities in mortality in nine metropolitan areas.

METHODS

For this, we reviewed scientific articles published in several scientific databases and also key reports on socioeconomic inequalities in health in order to find socioeconomic indicators (including cultural and demographic) and lifestyle/behaviours risk factors relevant to monitor health inequalities. In addition, we prepared a manual so that each focal point collected socioeconomic, mortality and population data for small areas of the respective cities or metropolitan areas, for a fifteen year period, in a harmonised way.

To analyse the evolution of socioeconomic inequalities in mortality we performed an ecological study of trends based on three periods (2000-2003, 2004-2008 and 2009-2014). The units of analysis were the small areas of nine European cities/metropolitan areas (Athens Metropolitan Area, Barcelona, Berlin plus Brandenburg, Brussels-Capital Region, Lisbon Metropolitan Area, London, Prague, Stockholm and Turin).

RESULTS

A list of identified indicators in the literature is provided. The maps show that in most of the cities and for most of the causes, the distribution of the composite deprivation indicator is similar to the distribution of mortality. Socioeconomic inequalities in mortality are more important for men than for women and they tend to be stable through the years.

RECOMMENDATIONS

The majority of indicators of economic and social environment and demographic change are not available at small area level as, for example, municipalities or even inside the cities. This disaggregation would be very useful.
Indicators of the built environment are not easy to define and therefore it is necessary to improve them and to have more sources of information as, for example, those referred to urban regeneration, green spaces, mobility, etc.
Lifestyles are well measured through health interview surveys, but these data are available at country level. It is necessary to increase the sample sizes of the surveys in order to have data at small area level (e.g. regions, cities).
Usually data on mortality are not easy to be obtained at small area level inside the cities. This information should be available to monitor trends in mortality inequalities in cities.
Socioeconomic inequalities in mortality have to be reduced implementing specific policies focussed on the main determinants of health.

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WP3 ENVIRONMENTAL PUBLIC HEALTH RISKS

BACKGROUND

Densely populated urban areas in Europe are facing environmental public health challenges associated with air pollution, climate change, environmental noise, and the wider built environment.
Despite improvements in air quality in Europe over recent decades, air pollutants, such as particulate matter (PM), nitrogen dioxide (NO_2) and ground-level ozone (O_3) still pose a significant threat to public health[1]. In addition, climate change is likely to aggravate certain public health risks, by increasing the frequency and severity of extreme weather events, such as heatwaves and floods. Road traffic noise has been linked to cardiovascular diseases, while the rapid urbanization has resulted in the growth of motor vehicles in many areas in the world, which is associated with morbidity and mortality from road traffic incidents.

OBJECTIVES

WP3 focuses on identifying the main environmental risk factors and their interactions that affect public health and wellbeing in Europe. More specifically, the main objectives were to:

- Assess the health impacts of the main environmental risk factors (e.g. air pollution, environmental noise, climate change) and urban environmental determinants (e.g. housing, transport, walkability, urban green spaces) in European metropolitan areas;
- Provide a set of recommendations related to the analysis of the environmental health risk factors, in order to support stakeholders in decision making, particularly at city level.

A number of descriptive metrics of environmental conditions (environmental indicators) were identified and analysed in relation with the associated public health impacts. The indicators included in the WP3 analysis are related to: air pollution ($PM_{2.5}$, PM_{10}, NO_2, O_3), traffic noise, high/low temperatures, urban green spaces, flooding events and road safety.

RESULTS

The environmental analysis enabled the determination of the health effects associated with the selected environmental conditions across and within the European metropolitan areas. By performing health impact assessment, the fraction of population deaths that is associated with the environmental factors (attributable mortality) was quantified.

Key results are as follows:

- The highest mortality attributable to long-term exposure to $PM_{2.5}$ was estimated for Athens and Brussels, where the median values across municipalities reached up to 18% and 16% respectively, whereas the highest mortality attributable to NO_2 was estimated for London and Athens (10% and 9% respectively) in 2010; the range of attributable mortality estimates (e.g. 8-18% attributable deaths to $PM_{2.5}$ in Athens) within the metropolitan areas indicates a significant intra-urban variability of air pollution health impacts;
- The mortality attributable to short-term exposure to O_3 was significant in the southern European metropolitan areas (up to 32 attributable deaths per 100,000 inhabitants in Athens in 2012);
- The heat-related mortality was higher in Athens (6 attributable deaths per 100,000 inhabitants in 2006), while the cold-related mortality was higher in London (80 attributable deaths per 100,000 inhabitants in 2001);
- The positive impact of urban green space was more noticeable in Athens and Prague (preventable mortality: 20 and 33 per 100,000 inhabitants, respectively in 2012);
- The victims in road accidents decreased in 2011 compared to 2001/2002 in Barcelona and London; average estimates across municipalities dropped from 332 (2001) to 215 (2011) victims per 100,000 inhabitants in Barcelona and from 453 (2002) to 297 (2011) victims per 100,000 inhabitants in London.

RECOMMENDATIONS

The analysis performed within WP3 provided evidence of recent environmental public health impacts in European metropolitan areas, which can be used to inform the development of interventions to improve public health and reduce inequalities. The most important environmental indicators that need to be considered for policy making at city level are related to air pollution, urban green spaces and road safety. The significant variability of indicator values across and within the metropolitan areas suggests their contribution to the environmental health inequalities, in particular:

- Air pollutants ($PM_{2.5}$ and NO_2) were associated with high estimates of attributable mortality in most cities; the large variability of the estimates within the metropolitan areas indicates the need for considering interventions at local/municipal level;
- The evolution of the road safety indicators over time showed that road accidents have decreased in the last years of the assessment;
- The positive impact of urban green spaces on population health highlights the importance of developing green spaces for healthier environments.

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WP4 HEALTHCARE ACCESS AND MORTALITY PROFILES

BACKGROUND

Differences in morbidity and mortality between socioeconomic groups and between areas (i.e. "place effect") are one of the most consistent findings of epidemiologic research. A literature review identifies two important findings: access to health care services reduces geographic inequalities in health through health care utilisation and the effectiveness of health care utilisation improves health outcomes and reduces mortality[1-2]. In a context of increasing health inequalities in Europe, measuring spatial differences in the quality of medical care and health system performance is a challenging but essential task.

OBJECTIVES

WP4 focused on the spatiotemporal trends in avoidable mortality recorded in Europe at the regional level over the most recent period (2000-2015), and on the determinants of this regional distribution.

More specifically, the objectives were:

- To identify, in the literature: I) the causes of death considered avoidable and that can be used to compare different regions and contexts, II) the determinants of socio-spatial variations in avoidable causes of death and III) the indicators related to healthcare access and utilization;
- To collect publicly available data on healthcare access and mortality (including avoidable mortality and social factors that affect access to healthcare services) for the regional and metropolitan areas through each focal point;
- To identify spatio-temporal dynamics registered across European Regions (NUTS 2 and in the nine metropolitan areas) and analysis of the relationships between: i) socioeconomic and environmental determinants and healthcare access and utilization with avoidable mortality, and ii) the role of the level of centrality in Europe of each region in these relationships;
- To make recommendations for monitoring and tackling inequalities in avoidable mortality.

RESULTS

Avoidable mortality and spatial distribution

- Significant spatial inequalities in avoidable mortality can be found in Europe, whatever the spatial scale of analysis (regions, cities, intra-urban);
- Eastern, central and Baltic countries record a clear excess avoidable mortality compared to the European average;
- Cross-regional comparisons reveal specific geographical continuities or discrepancies within a given country (border effects, urban-rural dichotomy, central and metropolitan regions vs intermediate regions);
- Within metropolitan areas, a centre-periphery gradient is almost systematically reported regarding the spatial distribution of avoidable mortality;
- Between 2000 and 2015, a decline in avoidable mortality has been recorded all over Europe, which tends to prove improvements in healthcare efficiency. However, the decline of avoidable mortality is higher in metropolitan regions and differences between metropolitan and peripheral regions in avoidable mortality tend to increase all over Europe.

RECOMMENDATIONS

- Trends in non-avoidable, avoidable, preventable and amenable mortality should be more systematically compared;
- Relative measures, i.e. evolution rates, should be preferred to absolute values, i.e. age-standardised mortality rates, so as to work on avoidable mortality trends;
- Further information is needed about the geographical differences in diagnostic, patterns and death certification, and their influence on avoidable mortality national variations.
- Age and sex profiles should be investigated more systematically when analysing avoidable mortality variations in Europe;
- In an exploratory way, a focus on variations in mortality from diabetes, hypertensive conditions, tuberculosis, maternal and perinatal mortality should be considered;
- Focus on peripheral regions (not only the less densely populated regions but also the intermediate ones, composed of small and medium cities) should be continued while inequalities inside metropolitan areas need to be further investigated.

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WP5 POPULATION HEALTH INDEX

BACKGROUND

Indices are commonly used to provide a comprehensive picture of health and wellbeing across regions countries, in multiple dimensions [1].
Significant advances have been made at EU level on health inequality measurement. Yet, the need for more meaningful information on the regional health inequalities within the European Union urged for research advances in developing holistic measures, integrating relationships between the multiple dimensions of population health [2] and based on sound methods taking into account Europe`s diversity, with the potential of monitoring health and of foreseeing the impact of policies [3].
A multidimensional index of population health may be used by researchers, experts and policymakers to: I) understand how population health varies across and within countries; II) comprehend how environmental, social, economic and lifestyle/behavioural variations explain different levels of population health; III) monitor current and future European regional inequalities and inequities in health; IV) comprehend the extent to which policies from different sectors can improve health and reduce inequalities at different geographical levels.

Therefore, there are critical aspects to consider when developing such multidimensional measure: from the selection of the most relevant indicators to the constraints of data availability and data treatment in order to compare and aggregate indicators. In this process, the participation of experts and stakeholders from various areas of disciplines and geographical locations is deemed as valuable not only to capture multidisciplinary point of views but also to increase their awareness on what are the main drivers of health inequalities across and within European countries.

OBJECTIVES

WP5 focused on the construction and application of the Population Health Index (PHI) to all EU regions (269 NUTS2) and to ten metropolitan areas (Athens, Barcelona, Berlin, Brussels, Lisbon, London, Paris, Prague, Stockholm and Turin). The PHI aimed to provide a comprehensive picture of health inequalities in multiple dimensions and at different geographical levels.

More specifically, the objectives were to:

- **Provide a framework for integrating data from different dimensions.** This included data management, data collection, construction of EURO-HEALTHY databases and its integration with online platforms, namely a web-based Geographic Information System (WEBGIS).
- **Inform the construction of the Population Health Index.** This included I) the application of participatory processes (involving stakeholders and experts) to identify the areas of concern and key dimensions and select indicators of health determinants and of health outcomes considered relevant to evaluate population health and II) assisting the multicriteria modelling of the index (value functions and coefficient weights).
- **Analyse the geographical variations of the PHI across areas of concern and dimensions.** A number of geospatial analysis methods (e.g. spatial autocorrelation, regression analysis, cluster analysis) using GIS tools, were applied to visualize and study the patterns and degree of inequalities and to infer the relationships between multiple health determinants and health outcomes.

RESULTS

- **Data platforms** The development of web platforms for data management (enabling the data upload, storage and download) facilitated the integration of a very large set of indicators from different dimensions in the different scales of analysis (Country, NUTS 2 regions and municipalities within metropolitan areas). Making these platforms open and accessible by all partners, the collaboration research between all partners was enhanced and the usage of a common framework to analyse population health across Europe was promoted.
- **Participatory processes** The participatory processes undertaken to structure the PHI (main areas of concern, key dimensions and indicators) were successful in adding diversity of points of view and in validating the holistic perspective of health (inter- trans- multidisciplinary) that frame this measure. As an example, 80 indicators were selected to appraise population health in multiple dimensions of health determinants and health outcomes.
- **Databases** The data collection of indicators pointed to significant differences in the data availability across different population health dimensions. Several indicators, namely of physical and built environment and lifestyles and health behaviours, that were selected for inclusion in the PHI, revealed constraints regarding availability and reliability of data at regional level (NUTS 2). Specific activities of data completeness were undertaken to overcome the cases of missing data, which assured the database integrity in order to compare and aggregate the indicators.

- **Population Health Index applied to 269 NUTS 2 and 540 municipalities within 10 Metropolitan Areas** The application of the PHI to the EU regions and selected metropolitan areas provided an evidence-based analysis of the present inequalities in several sub-indices, namely in:
    - **2 components** Health Determinants and Health Outcomes;
    - **10 areas of concern** I) Economic Conditions, Social Protection and Security, II) Education, III) Demographic Change, IV) Lifestyle and Health Behaviours, V) Physical Environment, VI) Built Environment, VII) Road Safety, VIII) Healthcare Resources and Expenditure and IX) Healthcare Performance and X) Health Outcomes;
    - **17 dimensions;**
    - **39 indicators**.

RECOMMENDATIONS

- **The integration of researchers, stakeholders, policymakers and citizens should be further improved and promoted by the European Commission**. Continued and enhanced multi and interdisciplinary approaches are essential in supporting the measurement of health inequalities and inequities and for informing policymaking.
- **The Population Health Index is to be seen as a tool for more evidence-based policymaking.** Its findings offer opportunities to maximize the potential of the European Structural and Investment Funds (ESIF) in order to reduce inequalities and stand to be a starting point for policy dialogue at national and regional levels. In addition, it could be a valuable resource for policy monitoring and evaluation.
- **The design of population health measures should reflect the views of stakeholders and experts along with scientific evidence and reliable data**. With the involvement of local panels (e.g. stakeholders, policymakers, citizens) and accounting for the specific local context, the PHI model could be transferable to other geographies, in particular to support the definition of policy priorities and axes of intervention to promote health.
- **There is an urgent need for data collection at meaningful scales for analysing population health**, **that is, at regional and local level**. There is a lack of data at regional level on several indicators considered relevant to appraise population health, namely those associated with physical environment, healthcare performance and lifestyle and health behaviours.
- **Opportunities for a more standardized, harmonized and concerted data collection in the EU Member States in a widely agreed set of indicators of population health should be promoted and implemented.** High quality data is fundamental to understand the health variations and, most importantly, to address them.
- **Finally, the monitoring of the PHI may be ensured at a high EU level through the hosting of its WEBGIS in existing or planned**

infrastructures of health information. The incorporation of the Population Health Index findings in an open access web platform (WEB-GIS) enabling the visualization, analysis and comparison of population health across countries, regions and selected metropolitan areas, is a cornerstone in bringing not only the policymakers but also citizens on board of the multidimensional understanding of geographical inequalities in health.

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WP6 DECISION SUPPORT FOR MULTICRITERIA MODELLING OF THE POPULATION HEALTH INDEX AND EVALUATION, FORESIGHT AND SELECTION OF POLICIES

BACKGROUND

The overall objective of the EURO-HEALTHY project was to advance knowledge of policies that have the highest potential to enhance health and health equity across European regions. To meet this goal, the first aim was to develop a Population Health Index (PHI) able to measure population health (PH) across European regions; and the second aim was to use the PHI to foresee and discuss the impact of multilevel policies and combinations of policies in PH and health equity across European regions, thus providing a basis for policy dialogue.

With regard to the first aim, the design of the project recognised that the construction of the EURO-HEALTHY PHI should consider not only the current state of the art and evidence on the different areas of concerns within the domain of PH, but also the perspectives and values from a representative group of experts and stakeholders spread across Europe. Implementing this required the promotion of collaborative and participative environments, deemed as a challenge for the success of the project.

With regard to the second aim, to enlighten the design and evaluation of policies with a potential to improve health and health equity across European regions, European scenarios had to be built to support policy-makers understanding which driving forces could play a role in the evolution of PH inequalities in Europe. Furthermore, the project recognised as critical to develop and test methodologies that could inform about which policies have the highest potential to improve health and health equity while accounting for cost, doability and power issues and in light of the newly developed European scenarios, the EURO-HEALTHY scenarios.

Within this background, WP6 had the mission to develop, apply and test novel evaluation methods and tools to address and overcome common challenges and pitfalls in the construction of health indexes, in the building of scenarios and in the evaluation of policies.

OBJECTIVES

In line with building reliable tools to assist policy-makers in holistically evaluating Population Health (PH) and in designing and evaluating policies to promote health and health equity across European regions, WP6 developed, applied and tested novel methodologies within the EURO-HEALTHY project. Specifically three novel methodologies have enabled the project successfully to:

- Construct a comprehensive, transparent and sound EURO-HEALTHY Population Health Index (PHI);
- Build EURO-HEALTHY scenarios that are key for policy-makers to understand which driving forces may play a role in the evolution of PH inequalities in Europe;
- Illustrate how local policies can be evaluated in a common basis regarding their benefits and their doability in light of the EURO-HEALTHY scenarios.

These novel methodologies not only address pitfalls and answer to challenges identified in PH measurement, policy evaluation and foresight literature, but also explored innovative ways of combining evidence with the views and values of experts, stakeholders and policy makers in constructing evaluation tools in the health context. Accordingly, these inclusive participatory processes raised further issues and avenues for research and can be adapted and applied to other research and policy contexts.

RESULTS

The MACBETH socio-technical methodological approach was successful in building the EURO-HEALTHY PHI:

- To avoid the common critical mistakes that are often performed in the construction of indices, namely an incomplete structure, meaningless scores, not testing and modelling of (preference) interdependencies, use of 'importance' weights and 'normalized' scores, the approach makes use of principles and concepts of multicriteria value measurement;
- To ensure that the EURO-HEALTHY PHI considers the multiple dimensions that PH entails and is informed by evidence on the relationship between multiple determinants and health outcomes, as well as by the way health experts and stakeholders interpret that evidence and make use of their knowledge to evaluate PH, a specific socio-technical design was built;
- To promote a constructive process in which the PHI is built with insights of a high number of geographically dispersed experts and stakeholders, the model building approach made use of a range of non-face-to-face participatory processes based on Web-Delphi's (making use of friendly and attractive interface) that have shown to be a rich and effective way to collect information;

- By envisaging and applying a sound socio-technical process, the EURO-HEALTHY WebGIS now provides a wide range of information to analyse PH and health inequalities across European regions either at the global level, for PH determinants and outcomes, for PH areas of concern, for PH dimensions, and for PH indicators that are based on robust information.

A comprehensive description of the EURO-HEALTHY PHI building is detailed in EURO-HEALTHY 'Technical Report 6.1 Structuring a multicriteria model to evaluate Population Health' and on 'Technical Report 6.2 Development of the multicriteria model to evaluate Population Health of the EURO-HEALTHY project'.

A novel socio-technical methodological approach was successfully applied to build EURO-HEALTHY PH scenarios that highlight drivers expected to affect the evolution of PH inequalities in Europe:

- To build EURO-HEALTHY scenarios that make use of the input of a large number of experts and stakeholders, of future-oriented evidence, and that can be easily replicated in other contexts;
- To produce EURO-HEALTHY scenarios that are useful to reflect upon the future of PH inequalities in Europe and that are useful to evaluate policies to improve health and health equity in Europe, the proposed methodological approach was specifically applied to build two EURO-HEALTHY extreme Scenarios for future changes in PH inequalities across European regions. This led to the set-up of two extreme EURO-HEALTHY scenarios – Failing Europe (worst) and Sustainable Prosperity (best) – that shed light on possible futures relevant for the evaluation of policies, and on which drivers can affect health and health inequalities across European regions.

A detailed account of the methodological approach to build the EURO-HEALTHY PH scenarios can be found in EURO-HEALTHY Technical Report 6.3 Scenario building and analysis of policies of the EURO-HEALTHY project.

A novel methodology was devised and successfully tested to the evaluation of policies – informed by European scenarios – at the local level:

- Aligned with the methodological framework of the EURO-HEALTHY, the evaluation of policies departs from the EURO-HEALTHY PHI and is designed to enable participation of local stakeholders;
- To make use of sound evaluation methods and to involve health stakeholders and experts in the evaluation of policies, the proposed methodology is socio-technical by nature. Examples of novel components of the methodology are the assessment of the effort (captured by doability) of policies in light of the two EURO-HEALTHY PH scenarios;
- The application of the methodology in the Lisbon case study was very successful in illustrating which policies may generate a high benefit-to-effort

ratio for the city under the two European scenarios, and have shown ways of making local stakeholders interact and align towards a policy agenda;
- The methodology includes further steps that although have not been applied to Lisbon, are designed to inform the selection of a portfolio of policies to promote PH and decrease health inequalities within a region or city.

A detailed account of the methodology is available in the conference presentation from Correia et al. (2017) "*Methodology for the evaluation of policies in the Lisbon case-study*" (presentation in the pre-conference workshop "*Shaping policies to promote urban health equity: a socio-technical approach. Evidence from the EURO-HEALTHY case studies*", 14th International Conference on Urban Health, 26-29 September 2017, Coimbra-Portugal).

RECOMMENDATIONS

The fulfilment of WP6 objectives allowed to collect first-hand knowledge and experience regarding the development and application of methods and tools for the health evaluation context. Several recommendations emerged from this research process.

Health and health equity

- The EURO-HEALTHY PHI, as a comprehensive, transparent and sound PHI, is a useful tool to assess PH across European regions;
- PHI inequities should be assessed by both, aggregated and disaggregated analyses of multi-level PHIs – e.g. for PH determinants vs. outcomes, for PH areas of concern and for PH dimensions, in order to provide policy makers with an holistic perspective;
- The EURO-HEALTHY scenarios, and future-oriented evidence collected, should be considered by policy makers while reflecting upon the future of PH inequalities in Europe and which health policies are useful to improve health and health equity in Europe;
- Based upon the case studies, the EURO-HEALTHY PHI can effectively be a start point to discuss policies with a potential to improve the PH profile of European regions.

Methodological

- The MACBETH socio-technical methodological approach is a sound methodology for the construction of indices, avoiding the common critical mistakes that are often performed in their construction, namely an incomplete structure, meaningless scores, not testing and modelling of (preference) interdependencies, use of 'importance' weights and 'normalized' scores; MACBETH questioning protocols are intuitive and should be used to avoid the eventual difficulty and cognitive uneasiness experienced by evaluators when trying to express their preference judgements numerically;

- Web-Delphi processes (making use of friendly and attractive interface) have shown to be an inclusive and effective way to collect information from a high number of geographically dispersed experts and stakeholders. The results of the Web-Delphi processes should be latter used to inform and assist a smaller and strategic group of participants to solve the questions in hand, as an effective way of including the views of an enlarged number of participants in the decision making process;
- The evaluation of health policies should be done in light of theoretically sound scenarios and assisted by powerful graphs that can show the extent to which possible futures have a key role in the analysis of policies, in order to make local stakeholders interact and align towards a policy agenda;
- From the experience of developing and applying methods within the scope of EURO-HEALTHY, several issues emerged requiring further research. Some of these issues include: overcoming data limitations that have influenced the development of the EURO-HEALTHY PHI; researching for new ways for involving experts and stakeholders in web-based formats, as well as for analysing the quality of their information these formats allow to collect; and by developing further the methodologies to evaluate policies, using a wider range of case studies involving real policy-makers.

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WP 7 GOOD PRACTICES IN PUBLIC POLICIES TO REDUCE HEALTH INEQUITIES

BACKGROUND

Different forms of governance can shape agendas, policies and programmes in inclusive and health promoting ways, or perpetuate social exclusion, inequitable distribution of resources and health inequities[1]. In the present context of fiscal austerity and with public resources under strain, it is imperative to have adequate and informed decision-making processes that allow for identifying policies to reduce or eliminate health differences among citizens. Governing for equity in health through action on social determinants, involves a commitment not only to a value of health but also to the concept of "equity in all policies"[2,3]. The range and scope of policy responses to address health determinants is very broad and can be aimed at various levels of implementation (European, national, regional and local). Some policies are explicitly targeted on promoting health, while others have no specific objective of reducing health inequalities but implicitly contribute to health gains through action on health determinants[4]. Despite considerable knowledge advances on key driving forces likely to influence health and wellbeing, there remains an information gap between the intended objectives during the policymaking process and the actual assessment of the implementation and impact of policies across different decision-making levels.

OBJECTIVES

- To identify and review targeted health and non-health related policies to address inequalities in health, based on meta analyses, including policies set at different decision-making levels (EU, national, NUTS 2 and metropolitan areas);
- To link the analysis and selection of policies with the set of relevant indicators and dimensions relevant to assessing the impact of policies on population health;
- To synthesise findings, identify good/best practice in policies' adoption, and provide guidance for policy making, taking into account the responsible for defining and implementing policies (EU, national, regional and local) and the requirements for the approval and implementation of these policies;
- To analyse and assess the impacts of the best set of policies on the indicators integrating the Population Health Index, and doing the same for a set of policies relevant for two pilot metropolitan areas (Lisbon and Turin).

RESULTS

- A sample of 21 selected EU funded projects was comprehensively reviewed to support the literature-based meta-analysis of policy interventions including health and non-health related policies addressing inequalities in health. The project covered seven different thematic dimensions and had been finalised between 2005 and 2015. A total of 126 targeted activities aiming at various levels of decision-making were identified and reviewed. The results were transferred into a policy/intervention matrix that was used to identify relevant dimensions and respective indicators during the initial process of developing input for the creation of the framework for the population health index. The initial recommendations from WP 7 for the selections of possible indicators were informed by this research.
- An expert policy forum was organised as a pre-conference to the 9th European Public Health Conference by WP 7 in collaboration with the EUPHA section Public Health Practice and Policy. The two (half) days event aimed at advancing the knowledge on specific policies and to facilitate discussions between researchers and stakeholders about policies with the highest potential to enhance health and health equity across Europe. The expert policy forum used major findings from the meta-analysis and the comprehensive project reviews as input for its deliberations (see above). In a sequence of thematic sessions and a round table discussion good and best practice in a couple of policy areas were discussed as documented in the content report to this expert policy forum[5]. Further, the deliberations at the forum underlined that despite the various initiatives and continuous debate on the need for bridging the gap between policy research and policy practice and the need for consequently applying the principal of HiAP there is still only slow progress, if at all. As a consequence the analysis of the success of policies (health and non-health related) based on a set of available indicators and dimensions remains rather difficult.
- To provide further input to the identification of good/best practice in policy implementation a systematic review of effective programmes for equity in population health was conducted. The systematic review comprised selected programmes and interventions from 16 EU member countries. This review included only health-targeted interventions and describes success factors and criteria for assessing good/best practice.
- A further comprehensive analysis focussed on European Structural Investment Funds (ESIF) as a tool with the potential to reduce health inequity in Europe. A better understanding of ESIF interventions should be critical to inform and provide guidance for policy making, taking into account the responsibilities for defining and implementing policies (EU, national, regional and local) and the requirements for the approval and implementation of these policies. The analysis revealed that despite

the relevance of ESIF for strategies that aim for reducing health inequity any assessment remains difficult, as often health is not in the focus of the interventions. In general documentation and analysis of ESIF would need to be further improved and a comprehensive data-base on ESIF is still missing.

- To analyse and assess policies on the indicators integrating the Population Health Index selective policy analyses on EURO-HEALTHY Population Health Index Dimensions were performed on:
  - Economic and Social Environment and Demographic Change: Potential barriers in healthcare access of elderly population influenced by the economic crisis and the troika agreement[6];
  - Lifestyle and Health Behaviours: Gathering and Processing Health Information regarding Obesity in Stockholm Sweden;
  - Physical Environment: Air quality strategies on public health and health equity in Europe[7]. Evaluation of the key success factors for meeting EU air quality regulations at city level;
  - Built Environment: Fatality rate due to road traffic accidents / Emergency Medical Services in Naxos, Greece;
  - Health Services: Healthcare resources – Medical Doctors per 100.000 inhabitants;
  - Health Outcomes: Length of life – Trends in mortality from colorectal cancer in older adults in Sweden, 2000-2015: an analysis of the impact of the FOBT screening Programme.
- To analyse and assess the impacts of the best set of policies on the indicators integrating the Population Health Index, for a set of policies relevant for two pilot metropolitan areas (Lisbon and Turin):
  - Example Lisbon: A set of 18 policies was selected by experts, local stakeholders and policy makers, to improve population health in the municipality of Lisbon. These policies were mainly targeted to all city districts, although some interventions were of relevance for specific districts. As the policy analysis exercise merely determines the policy set with the highest potential to increase population health in Lisbon, the implementation and effectiveness of the set has yet to be evaluated.

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WP 8 DISSEMINATION

BACKGROUND

The dissemination of EURO-HEALTHY project has been aimed at academics, researchers and policy makers. UCL and other participating partners ensure, with the help of their communication teams, that research outcomes are widely and effectively disseminated to relevant actors. Partners involved in this work package have been closely collaborating with other work packages to draw on the achieved results. Internal and external dissemination to a wide range of potential users has been achieved through a combination of different communication tools.

OBJECTIVES

The aim of Work Package 8 "Dissemination" has been to communicate and translate the work of the EURO-HEALTHY research consortium in ways that target a wide range of audiences by fulfilling the following objectives:

- To develop a dissemination plan (Task 8.1).
- To develop a project identity (Task 8.2).
- To carry out internal dissemination of communication and research results within project partners through the following channels (Task 8.3).
- To Internal dissemination between partners from the EURO-HEALTHY project will be carried out through an intranet (Task 8.3.1).
- To carry pout external dissemination through external channels (Task 8.4).
- To collaborate with institutes and decision-makers (Task 8.4.1).
- To develop a public website (Task 8.4.2).
- To establish Twitter and Facebook accounts (Task 8.4.3).
- To write and publish a periodic newsletter (Task 8.4.4).
- To disseminate videos of interviews with lead EURO-HEALTHY researchers and the two pilot studies carried out in metropolitan areas (Task 8.4.5).
- To facilitate a space on the EURO-HEALTHY website to store the Web-GIS platform (Task 8.4.6).
- To carry out the dissemination of oral presentations presented in scientific conferences (Task 8.4.7.1).
- To carry out the dissemination of scientific publications carried out by EURO-HEALTHY partners (Task 8.4.8).
- To establish relationships with the media (Task 8.4.9).

RESULTS

Project identity, including the project logo as well as templates for range of documents (such as power point or poster templates or letter heads), were developed in early months of the project. Electronic communication through emails, Twitter and Facebook were produced in the first six months of the project. Furthermore, one of the key products of WP8, the website, was developed within the first nine months. Internal communication was carried out from the first months through an internal server and via email.
The address of the public website is *www.EURO-HEALTHY.eu* and it is maintained by UCL and continuously updated in collaboration with all partners. It has several sections describing the main aims of the project, project partners and news among others.
Both Facebook and Twitter accounts for the project were set up. These social media allowed fast communication of project results to scientific and non-scientific community as well as informing partners about important documents added to the project website. Facebook was very useful for fast and dynamic posting of project activities and conferences or meetings related to EURO-HEALTHY attended by project partner researchers.
Regarding the newsletters and leaflet, these were written in collaboration with partners and published. Wide dissemination of these was performed via extensive mailing lists, and publication on Twitter, Facebook and the website. Furthermore, the EURO-HEALTHY Publications Committee and Guidelines were established.

RECOMMENDATIONS

- To carry out successful dissemination of research findings to non-academic audiences it is important to collaborate with relevant stakeholders from the beginning of the development of research projects. Collaborating with decision-makers form the earliest stages of the research process will enable to tailor outputs which will be policy relevant and to shape research question in a way to make these useful for policy and decision making.
- Working together with decision makers will not only assist in knowledge translation for researchers but will also include decision makers in the research process making them familiar with the importance of producing evidence in a systematic and scientific way and its relevance for research, policy implementation and programme monitoring and evaluation.

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FACT SHEETS

2.

1. The evolution of socioeconomic inequalities in mortality in nine metropolitan areas
2. The mortality attributable to air pollution
3. The reduced mortality due to higher exposure to green spaces
4. Healthcare access and avoidable mortality
5. Involving key stakeholders in the EURO-HEALTHY
6. The selection of indicators to evaluate European population health
7. The availability of population health indicators across the European regions
8. Using the MACBETH socio-technical methodological approach to build the EURO-HEALTHY PHI
9. The geography of the EURO-HEALTHY Population Health Index
10. Devising and testing a novel methodology for the evaluation of policies under European population health scenarios
11. Building the EURO-HEALTHY scenarios to understand which driving forces may play a role in the evolution of Population Health inequalities in Europe
12. Air quality strategies on public health and health equity in Europe
13. European Structural and Investment funds – a tool with potential to reduce health inequity in Europe?
14. Effective programmes for equity in population health in the European Union

1. THE EVOLUTION OF SOCIOECONOMIC INEQUALITIES IN MORTALITY IN NINE METROPOLITAN AREAS

WHY IS IT IMPORTANT?

Socioeconomic inequalities in health tend to be larger in urban areas with disadvantaged and poor populations being concentrated in marginalized neighbourhoods, usually inner city areas, and having higher incidence of many diseases[1]. However, the evolution of intra-urban inequalities in health and specifically in mortality have been few analysed in European contexts and specially the changes that have occurred during the economic crisis that started in 2008.

WHAT WE DID

For this reason, one of the objectives of this Work Package was to analyse the evolution of socioeconomic inequalities in mortality in nine metropolitan areas, before and after the starting of the financial crisis, which we present in this section. We performed an ecological study of trends based on three periods (2000-2003, 2004-2008 and 2009-2014). The units of analysis were the small areas of nine European cities/metropolitan areas (Athens Metropolitan Area, Barcelona, Berlin plus Brandenburg, Brussels-Capital Region, Lisbon Metropolitan Area, London, Prague, Stockholm and Turin). We calculated a composite deprivation indicator including unemployment, percentage of manual workers, percentage of people with primary education and percentage of people with university education. The mortality indicator used for the analysis was the Standardized Mortality Ratio (SMR). The SMR is dependent on population size, thus areas with low population tend to present very unstable estimates. For this reason we used Bayesian methodologies to smooth the SMR (sSMR), specifically we used the hierarchical Bayesian model proposed by Besag, York and Mollié (BYM).

WHAT WE FOUND

The maps show that in most of the cities and for most of the causes, the distribution of the composite deprivation indicator is similar to the distribution of sSMR. As an example, Figure 1 shows for men and women, the deprivation indicator and the sSMR (all causes of death) for Lisbon, London and Barcelona in the three periods. It can be seen how the pattern is similar for the three periods. Socioeconomic inequalities in mortality are more important for men than for women and they tend to be stable through the years.

KEY MESSAGES

- Although socioeconomic inequalities in mortality have not widened after the starting of the financial crisis in the urban areas studied, it is important to monitor inequalities in mortality through the years because the impact of the crisis can be shown in the future.
- Policies to tackle socioeconomic inequalities in health have to be prioritized, mainly focussed to the main social determinants of health. For this reason, it is important to promote intersectoral work within the different departments of urban governments.

Figure 1. Socioeconomic deprivation indicator and smoothed Standardized Mortality ratios (sSMR) for three periods (period one: 2000-2003, period two: 2004-2008 and period three: 2009-2014) in small areas for men (a) and women (b) of Lisbon, London and Barcelona.

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Carme Borrell [1], Laia Palència [1], Mercè Gotsens [1], Marc Marí Dell'Olmo [1], Maica Rodríguez-Sanz [1], Lucia Bosáková [2], Katarína Rosičová [2], Zuzana Hajduová [2], Marleta Seidlova [3], Michala Lustigova [3] and Dagmar Dzurova [3]

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LISBON MEN

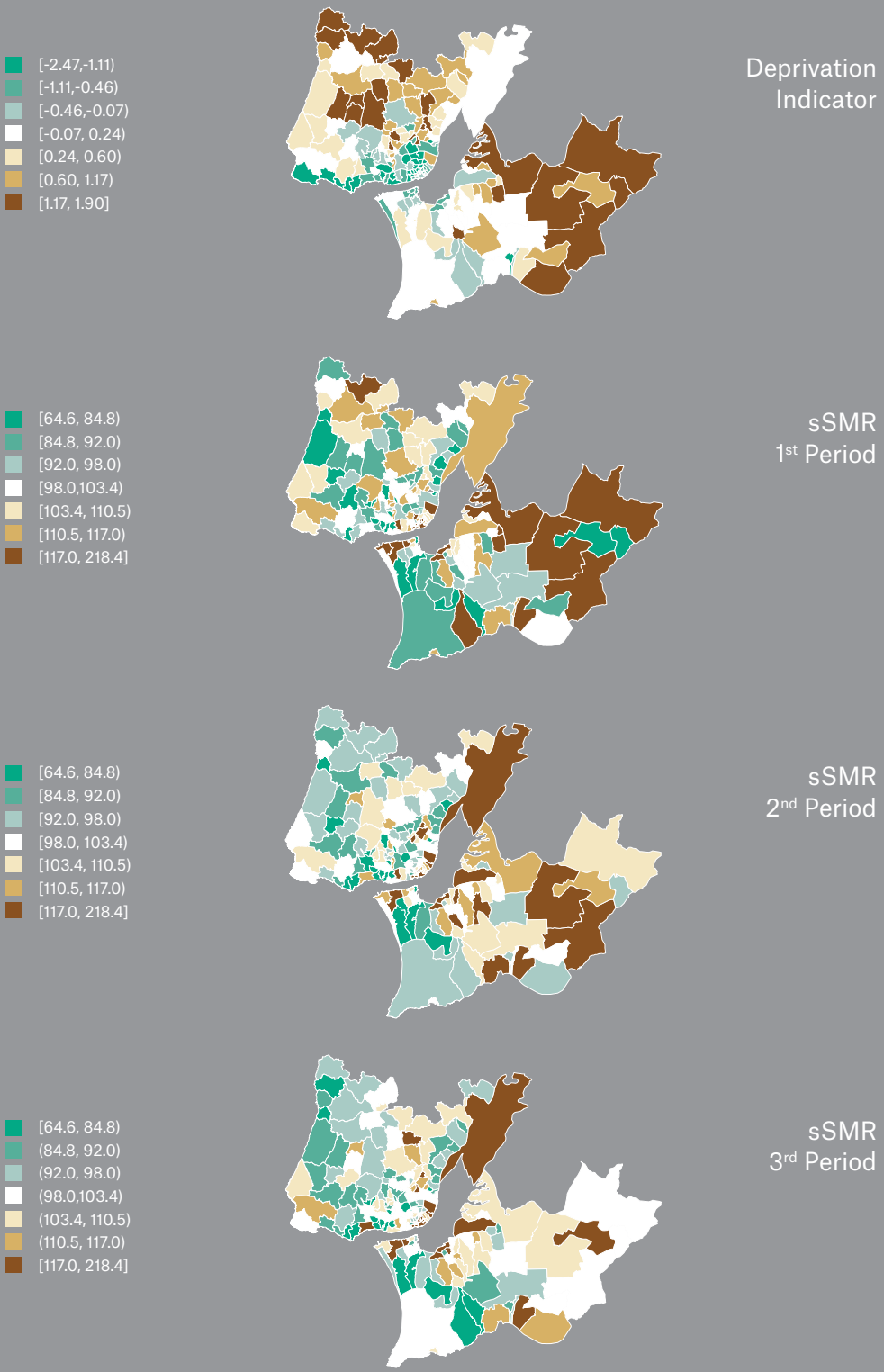

FIG. 1 — A

LONDON MEN

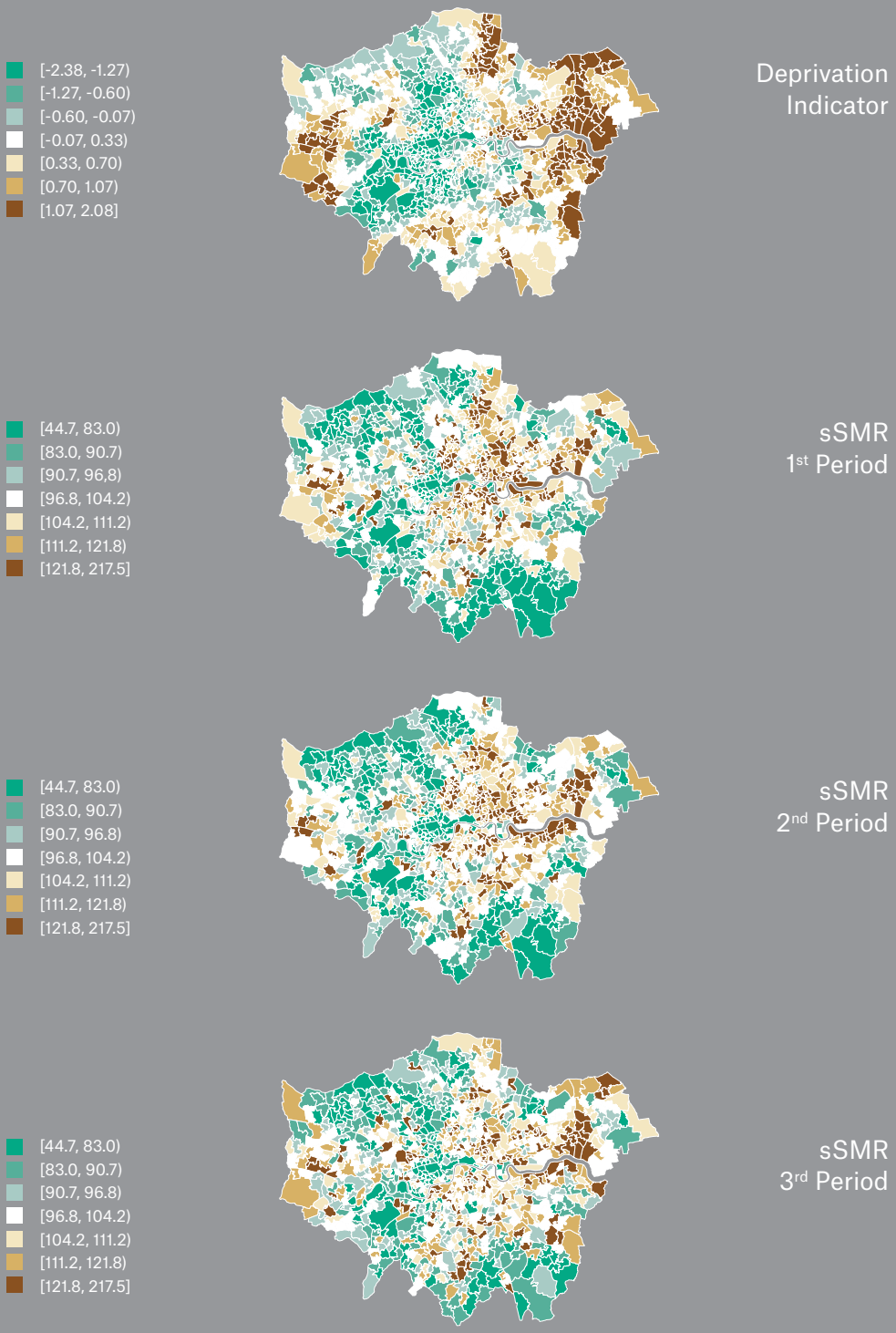

FIG. 1 — A

BARCELONA MEN

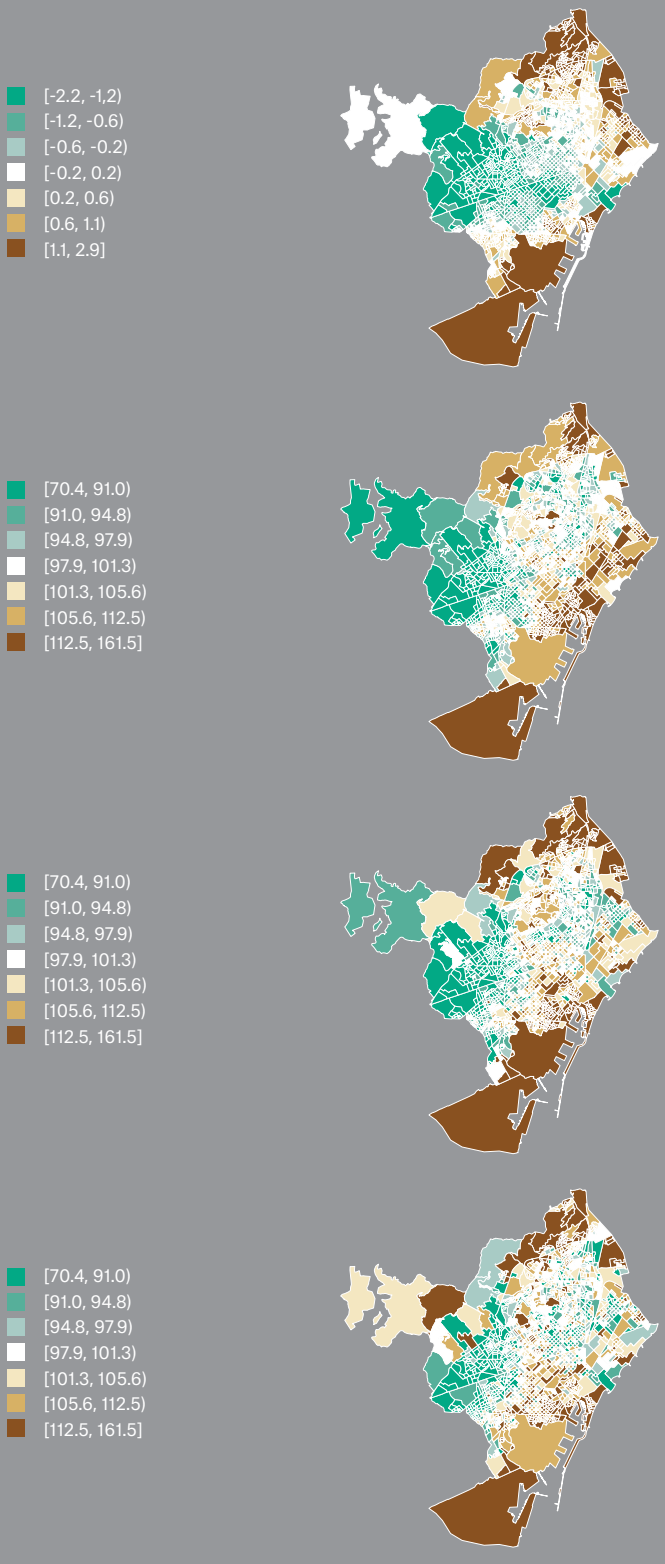

FIG. 1 — A

LISBON WOMEN

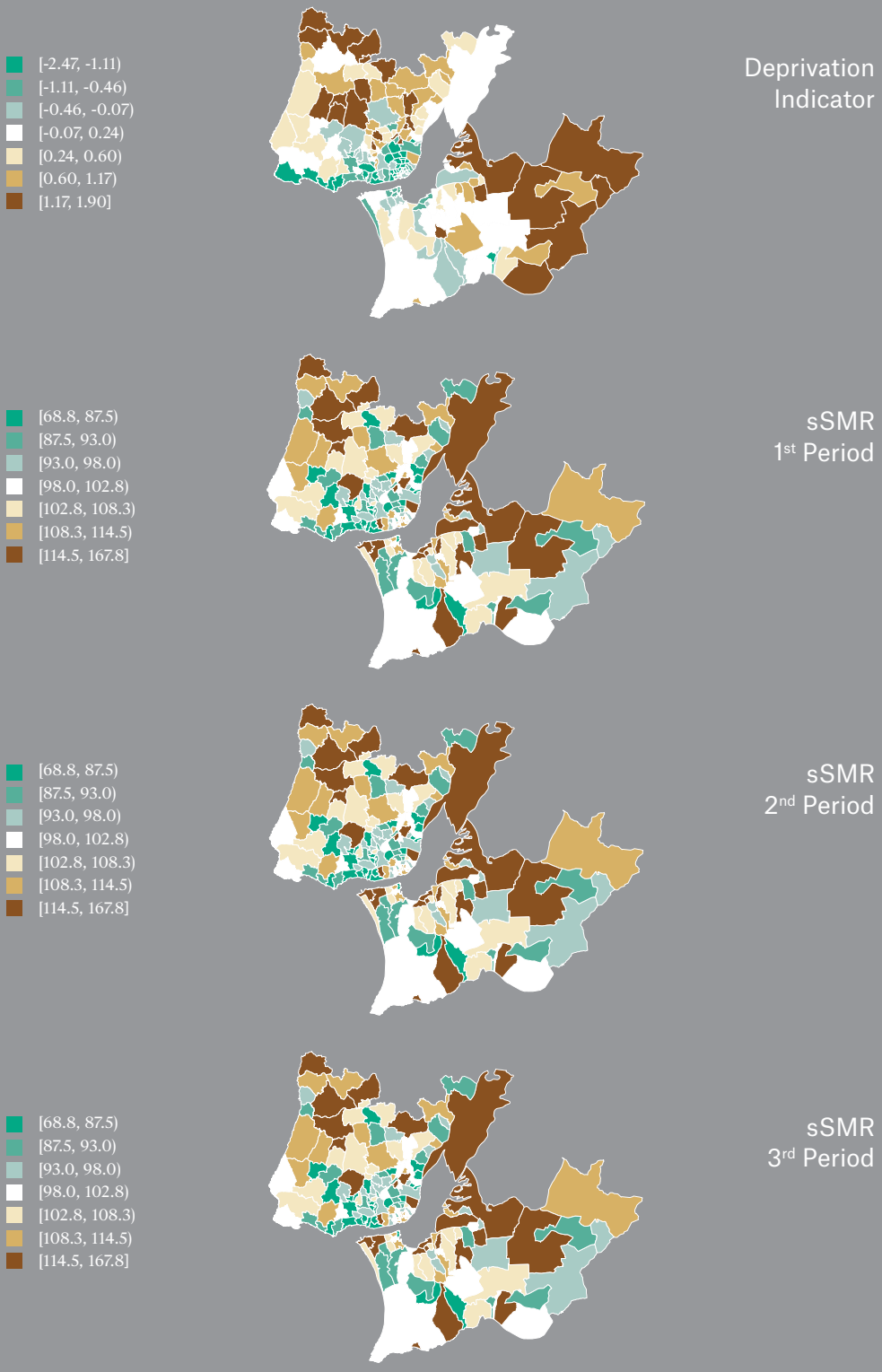

FIG. 1 — B

LONDON WOMEN

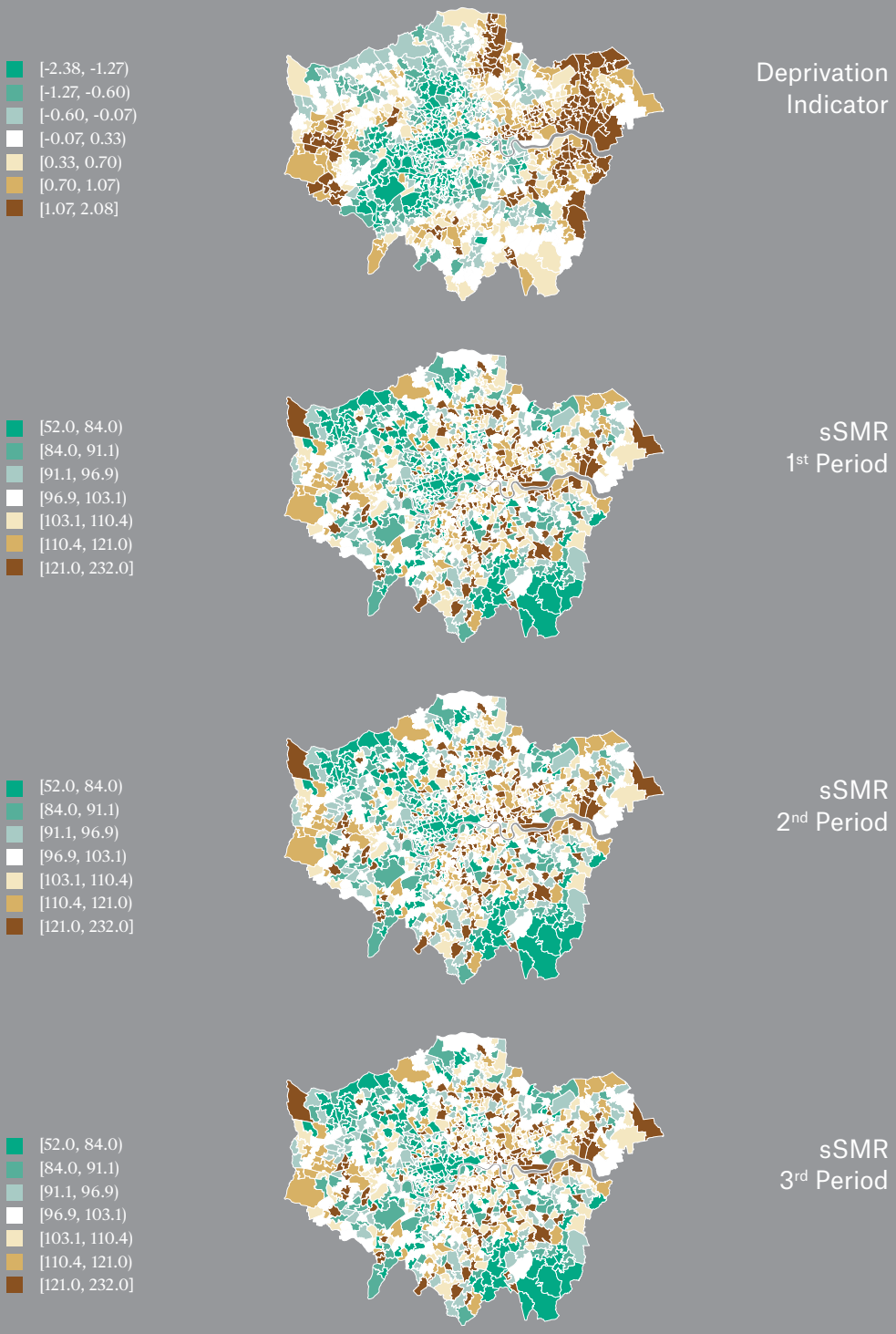

FIG. 1 — B

BARCELONA WOMEN

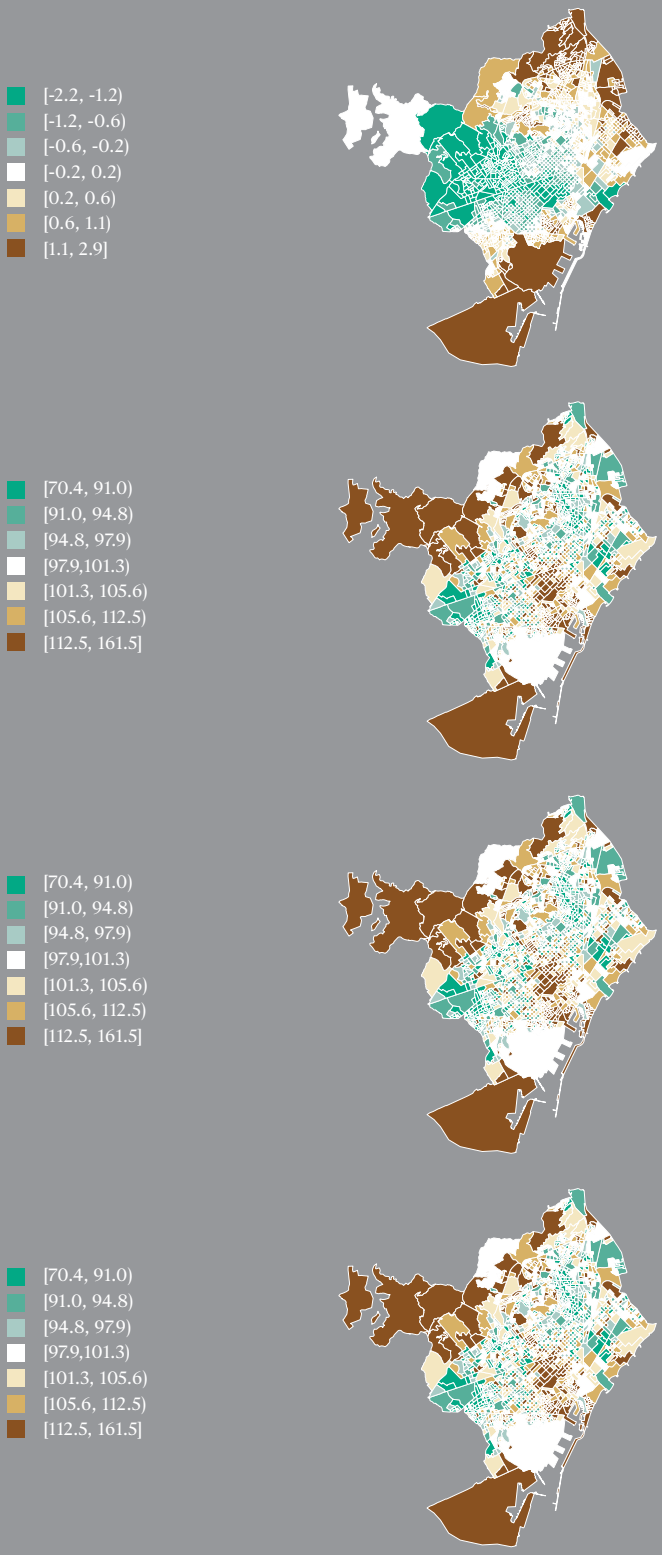

FIG. 1 — B

2. THE MORTALITY ATTRIBUTABLE TO AIR POLLUTION

WHY IS IT IMPORTANT?

Despite improvements in air quality over recent decades, air pollution still has a significant effect on public health. Studies have shown that long-term exposure to air pollution reduces life expectancy by increasing deaths from cardiovascular and respiratory conditions and from lung cancer. Fine particulate matter ($PM_{2.5}$) has been found to have the strongest associations. There is increasing evidence of health effects associated with nitrogen dioxide (NO_2), including mortality associated with long term exposure. Short-term exposure to elevated levels of air pollution can also have a range of adverse health effects, particularly on individuals with pre-existing heart or lung conditions, increasing hospital admissions.
The air pollution has been significantly aggravated with the urbanisation and as a result of industrial activities, domestic heating, as well as traffic-related emissions.

WHAT WE DID

The aim was to identify the main environmental risk factors that affect public health in European urban areas in the recent years. In particular, we assessed the health impacts associated with long-term exposure to air pollution ($PM_{2.5}$ and NO_2) among other environmental factors (e.g. urban noise, road injuries). We conducted health impact assessments (HIA) in order to quantify the fraction of premature deaths that is associated with air pollution (attributable mortality)[1,2]. Annually averaged air pollution data and one- or multi-year mortality data were collected for the period 2005-2010, to enable us to identify differences across time.

WHAT WE FOUND

In Figure 1, the columns represent the median mortality attributable to $PM_{2.5}$ across the municipalities of the European metropolitan areas and the error bars the values at the municipalities with the lowest and highest mortality estimates, for 2005 and 2010.
In Athens, London and Stockholm, the estimates of attributable mortality were lower in 2010 compared to the estimates for 2005, while in Barcelona, Lisbon and Turin the estimates were higher for the latest studied period.
In 2010, the highest mortality was estimated for Athens and Brussels, where

the median values across municipalities reached up to 18% and 16% respectively. The highest mortality attributable to NO_2 was estimated for London and Athens.
The range of values of mortality attributable to air pollution, across the municipalities, in most of the metropolitan areas, was very wide (e.g. in Brussels values spanning from 8% to 16% in 2010). Thus, the populations in the different municipalities are unevenly affected by the exposure to air pollution.

Figure 1. Mortality attributable to long-term exposure to $PM_{2.5}$ (%) in the European metropolitan areas. *Note: In Athens, there is significant contribution of naturally-produced particles (desert dust) to $PM_{2.5}$ concentrations.*

KEY MESSAGES

- Tackling air pollution should be prioritised across Europe, as the mortality attributable to air pollution was higher compared to the mortality associated with other environmental factors in all studied cities.
- The public health impacts due to long-term exposure to air pollution were more noticeable in the urban areas of Athens, Brussels, London and Turin and significantly less evident in Stockholm.
- The large variability of the health impact estimates within the metropolitan areas indicates the need for considering interventions also at local/municipal level.

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3. THE REDUCED MORTALITY DUE TO HIGHER EXPOSURE TO GREEN SPACES

WHY IS IT IMPORTANT?

Green spaces such as parks, community gardens, and sports fields are considered as fundamental components in an urban environment. Recent studies have provided evidence of multiple benefits from access to urban green spaces, through various mechanisms, such as improved air quality, heat reduction and enhanced physical activity that may have a synergistic effect. Also, there is scientific evidence that exposure to natural environments may decrease the mortality related to cardiovascular disease (CVD).
Hence, increasing and improving green spaces are often seen as key interventions for creating healthier and more sustainable urban environments.

WHAT WE DID

The reduction of the risk of CVD and all-cause mortality in areas with higher residential green spaces has been quantified in literature. We first distinguished high and low percentages of green spaces in each metropolitan area – the 1st (low) to 3rd (high) quartiles of the percentage of urban green space across the municipalities (Table 1). We then estimated the preventable fraction of all-cause deaths and deaths from CVD, by comparing the relative risk between the urban areas with different percentages of green spaces[1].

Year\Area	Athens		Prague		London		Stockholm	
	low	high	low	high	low	high	Low	high
2006	2.3	8.8	0.7	12.7	11.3	19.4	58.7	79.3
2012	2.8	11.9	0.7	12.7	11.3	19.4	58.4	79.2

Table 1. Quartiles of urban green spaces: low (1st quartile) and high (3rd quartile).
The land use data was provided by the Urban Atlas of the European Environment Agency* for 2 years – 2006 and 2012 – (vector data code: 14100, 14200) and was spatially averaged at municipal level. * http://land.copernicus.eu/local/urban-atlas

WHAT WE FOUND

In Athens, Prague and London, the majority of municipalities is covered by less than 20% by green areas, while in Stockholm more than 50% is covered by green spaces with the exception of the central municipality (~30%).
The number of preventable deaths from all causes and CVD per 100,000 inhabitants due to increased exposure to green spaces is illustrated in Figure 1. The estimates were high in Athens and in Prague, lower in London and even lower in Stockholm, where there is no significant variation in green spaces between the municipalities and percentage of green space cover is already high. The preventable CVD deaths per 100,000 inhabitants were high in Prague and Athens and lower in London and Stockholm. The reduction of the preventable deaths in 2012 compared to 2006 in Athens is associated to the increase of the green space areas.

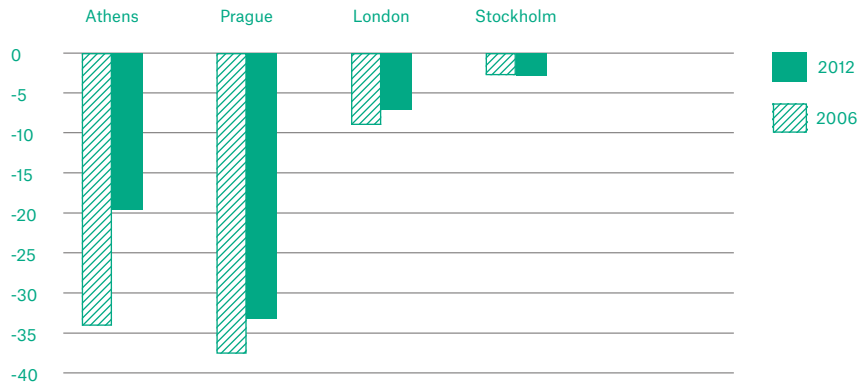

Figure 1. Preventable all-cause mortality (per 100 000 inhabitants) due to exposure to increased greenness.

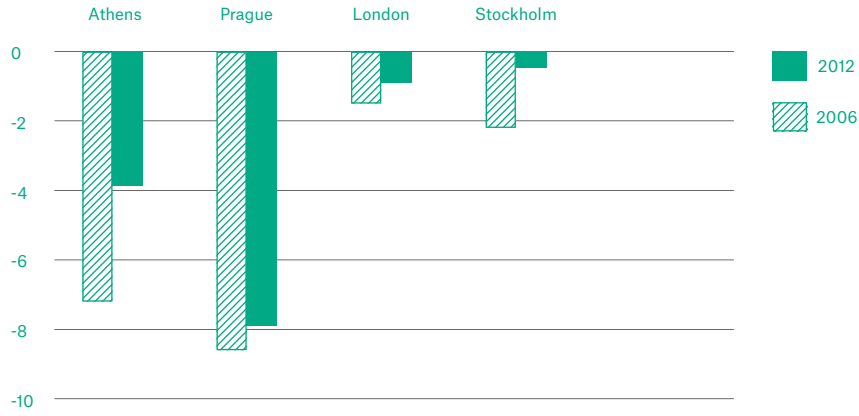

Figure 1. Preventable CVD mortality (per 100 000 inhabitants) due to exposure to increased greenness.

KEY MESSAGES

- The high preventable mortality estimates denotes the large difference in the coverage by green spaces across the municipalities of the metropolitan areas; so populations in different municipalities have differential access to green spaces.
- The preventable mortality due to higher exposure to green spaces indicates their positive impact on population health and highlights the importance of developing green spaces for healthier environments.

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4. HEALTHCARE ACCESS AND AVOIDABLE MORTALITY

WHY IT IS IMPORTANT?

There is today a consensus on the importance of the concept of avoidable mortality in order to assess and monitor the functioning of healthcare systems in Europe[1-3]. Such indicator appears to be easy to calculate and mobilise, and useful to consider in a context of monitoring public health policies[4].

Office for National Statistics (ONS) definitions for avoidable mortality and sub-categories, amenable and preventable mortality (2011)[5]

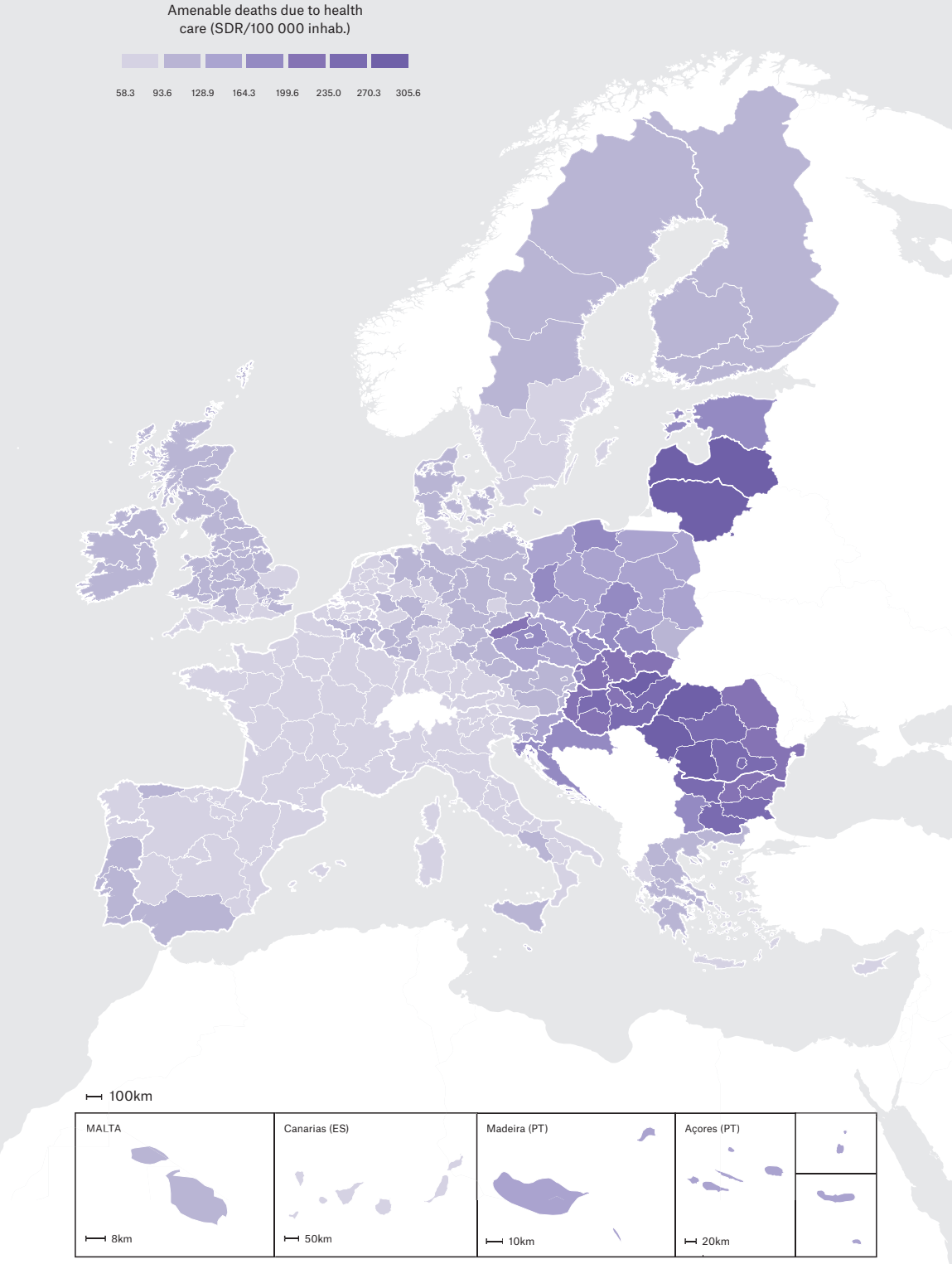
Amenable mortality A death is amenable if, in the light of medical knowledge and technology at the time of death, all or most deaths from that cause (subject to age limits if appropriate) could be avoided through good quality healthcare.

Preventable mortality A death is preventable if, in the light of understanding of the determinants of health at the time of death, all or most deaths from that cause (subject to age limits if appropriate) could be avoided by public health interventions in the broadest sense.

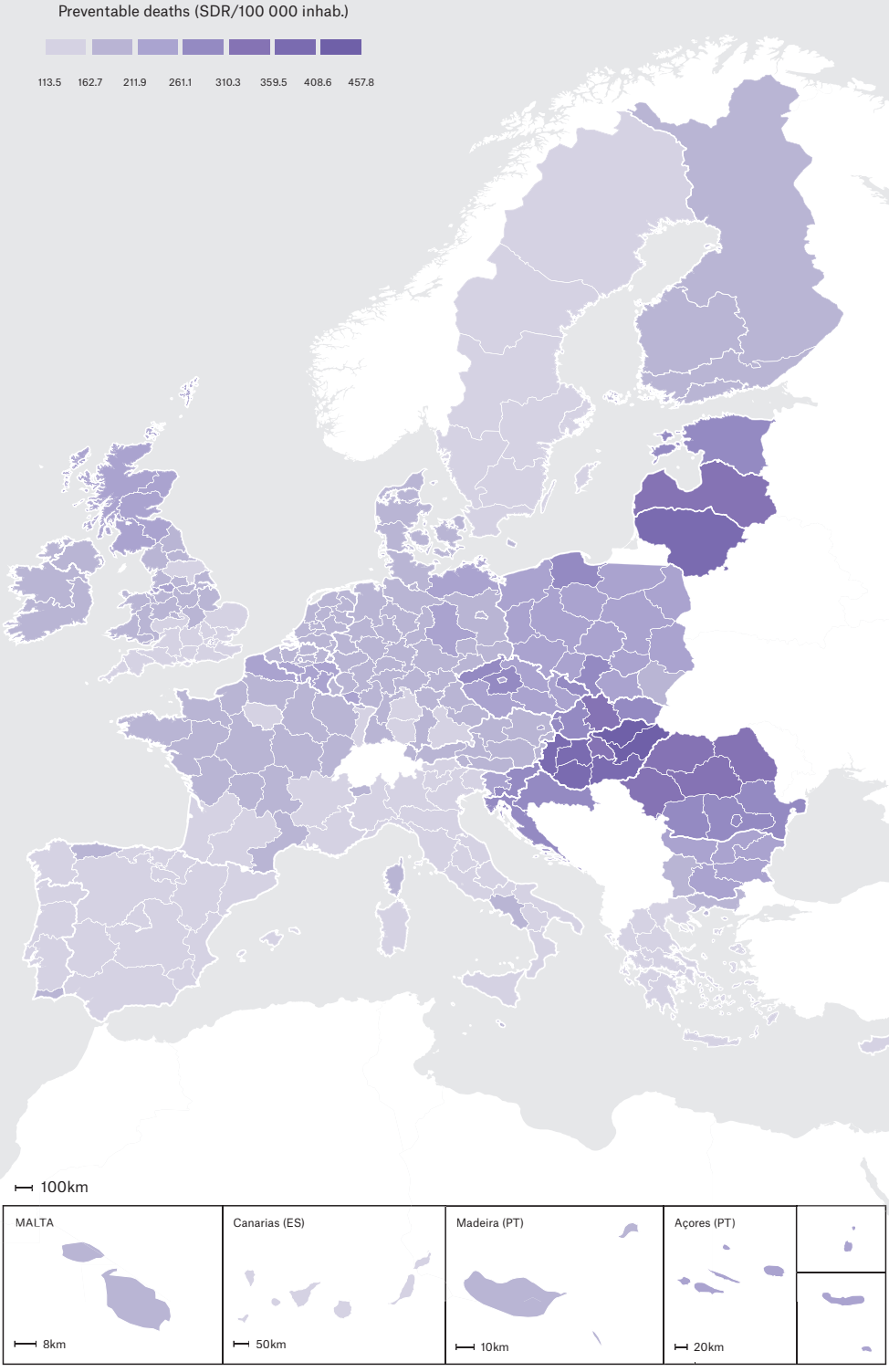
Avoidable mortality Avoidable deaths are all those defined as preventable, amenable, or both, where each death is counted only once. Where a cause of death falls within both the preventable and amenable definition, all deaths from that cause are counted in both categories when they are presented separately.

WHAT WE DID

WP4 focus on the spatiotemporal trends in Avoidable Mortality recorded in Europe at the regional level over the most recent period (2000-2015), and the determinants of this regional distribution.
The European regional organization is structured around two major dimensions: on the one hand demographic and economic factors tend to distinguish metropolitan and central poles, marked by high population densities and economic functions of management, and the more peripheral regions characterized by lower population densities and more production functions. On the other hand, the national framework always shapes the type of social organization and the guidelines for health policy. The spatiotemporal analysis explore the role of these two main dimensions in the regional distribution and redistribution of avoidable mortality in Europe, including the role of conjunctural socio-demographic factors (e.g. demographic trends, unemployment, disposal income, education, health equipment).



Map 1. Amenable mortality, Standardized death rate (both sex, 2011-2013, per 100 000 inhabitants) – NUTS2 level



Map 2. Preventable mortality, Standardized death rate (both sex, 2011-2013, per 100 000 inhabitants) – NUTS2 level

WHAT WE FOUND

Between 2000 and 2015, a decline in avoidable mortality has been recorded all over Europe, which tends to prove improvements in healthcare and public health efficiency. Preventable deaths are more frequent than amenable deaths and represent a major part of avoidable deaths. The decline over the period is more accentuated for amenable mortality (-33%) than for preventable mortality (-22%). However, significant disparities persist between regions. These disparities are more pronounced for amenable mortality than for preventable mortality.

KEY MESSAGES

- National contexts constitute a strong determinant for the regional distribution of avoidable mortality in Europe. This national context explain 30% of regional variations for preventable mortality and 40% for amenable mortality. These percentages are stable over the period 2000-2015.
- This national specificity for amenable mortality is in part associated with the level of financing, resources and provision in each national health system (Table 1). Standardized rate for amenable mortality are higher in the southern and eastern countries, characterized by less public and total health expenditures. The decline for amenable mortality is more pronounced in the countries with higher health expenditures and higher health resources (northern and central countries). In these countries regional disparities are also smaller for amenable mortality.
- The preventable mortality is less associated with the level of health financing or health resources in each country. Life-styles determinants, social and economic organisations are the main determinants. Progress in preventable mortality is lower than for amenable mortality, in particular in eastern countries.

List of countries	Type of national health system	Amenable mortality			Preventable mortality		
		Average mean of standardized death rates (both sex, for 100 000 inhabitants)		Rate of increase between the two periods (%)	Average mean of standardized death rates (both sex, for 100 000 inhabitants)		Rate of increase between the two periods (%)
		1999-2001	2011-2013		1999-2001	2011-2013	
Austria Germany	Financing + Resources + Provision +	150.4	94.7	-37.0	240.4	187.4	-22.0
Belgium England Finland France Ireland Netherland Sweden	Financing + Resources - Provision -	152.8	94.0	-37.3	235.4	176.6	-24.5
Czechia Greece Italia Portugal Slovenia Spain	Financing + Resources (ns) Provision (-)	163.8	112.6	-31.6	223.5	185.0	-22.4
Bulgaria Hungary Poland Romania Slovakia	Financing - Resources - Provision +	306.1	221.9	-27.6	363.3	293.2	-19.0

Table 1. Avoidable mortality by type of national health system.

- We observe better level of avoidable mortality (amenable and preventable) in metropolitan regions than in intermediate regions or more peripheral regions (table2). The decline of avoidable mortality is higher in metropolitan regions. The differences between regions became higher for preventable mortality in intermediate regions.
- The regional distribution of avoidable mortality is not related to the same determinants for each level of metropolization: in the non-metropolitan areas, the structure of working market appear to be the most influent; in the intermediate regions the structure of working market and the attractiveness of each region are the best predictor; in the metropolitan areas attractiveness and health resources are the most important determinants.

Type of metropolization	Amenable mortality			Preventable mortality		
Peripheral regions	Average mean of standardized death rates (both sex, for 100 000 inhabitants)		Rate of increase between the two periods (%)	Average mean of standardized death rates (both sex, for 100 000 inhabitants)		Rate of increase between the two periods (%)
	1999-2001	2011-2013		1999-2001	2011-2013	
	168.0	113.0	-32.7	246.0	193.0	-21.5
Intermediate regions	181.0	122.0	-32.6	258.0	200.0	-22.5
Metropolitan regions	172.0	109.0	-36.6	238.0	182.0	-23.5

Table 2. Avoidable mortality by type of metropolization.

KEY MESSAGES

The work led by the WP4 makes it possible to establish recommendations concerning the data collection and production for monitoring health systems performance, the attention to be paid in the social and political determinants of health disparities in Europe and categories of areas to be specifically monitored in order to tackle the health inequities in Europe.

- Preventable mortality remains a major component of avoidable mortality in Europe. Progress in prevention has been slower than that seen in amenable mortality. Efforts must be made to focus on the determinants upstream of care, as well as policies in education, employment, housing or land use planning.
- National issues remain important in defining health priorities. While countries with the capacity to invest in the curative health system have better outcomes in terms of amenable mortality, the relationship is not established for preventive mortality. It is more matter of historical and cultural processes, forms of social organization, and relationships to health that must be identified at the level of each country. Harmonization of practices for certification of causes of death should continue in order to improve the monitoring of avoidable mortality.
- While European policies priorities have long focused on the less densely populated and peripheral regions of Europe, this work makes it possible to emphasize that health situations become more worrying in the intermediate areas, composed of small and medium cities in decline or in difficulty of development in the face of the restructuring of industrial employment. The concentration of specialized care services to the largest cities, the increasing dependence on them, and the loss of industrial jobs are making the intermediate spaces more fragile overall. However, the situations are still very varied and marked by growing disparities. This observation implies the need to acquire tools for observation on the

scale of small and medium-sized cities and not only within major cities.

- Priorities for addressing health inequalities are different in each type of region. For metropolitan regions, the emphasis should be on the gradual harmonization of the health framework and a growing interest in addressing intra-urban inequalities in health. For the intermediate and peripheral regions, it is necessary to find the levers to make these regions more attractive while the efforts must be continued in the more rural regions.

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5. INVOLVING KEY STAKEHOLDERS IN THE EURO-HEALTHY

WHY IS IT IMPORTANT?

Population health improvement requires action on multiple determinants and as no single entity can be held accountable for achieving the goals of improved population health[1], such action must be sustained by a collective effort bridging the gap between research and policy[2] and involving stakeholders whose actions and decisions potentially affect population health[3,4].
In the EURO-HEALTHY project, the participation of stakeholders from different sectors and fields of expertise was considered critical to support the development of a comprehensive and multidimensional Population Health Index (PHI). This measure is expected to enable the measurement of population health in multiple dimensions and provide relevant information for analysing the impacts of policies on population health, across EU regions and metropolitan areas.
Furthermore, through the direct involvement of stakeholders in research activities, the project endeavoured to advance their understanding in: i) complex interactions between multiple determinants of health and well-being and ii) awareness concerning policies with the highest potential to improve health and to decrease health inequities in Europe, thus maximizing the project's impact on the public debate.

WHAT WE DID

From the beginning, the project has progressively invited a large number of stakeholders from distinct European countries with both a broad interest in and a knowledge of population health improvement issues and related policies. Stakeholders were identified by the EURO-HEALTHY consortium partners and selected based on a variety of characteristics, namely: I) their ability to influence policy at various decision levels (national, regional and metropolitan), II) their scope for intervention (public sector, private sector and civil society), III) their area of work (e.g. environment, public health, urban planning, groups at risk) and iv) geographic location (to reflect Europe's diversity). Their knowledge was used in developing and applying methods and tools to evaluate population health at the European Union level and to evaluate policies with the potential to improve health and health equity across regions and in the two city case studies (Lisbon and Turin).
In total 96 relevant stakeholders (*inter alia*: national, regional and local authorities; advisors and technicians; international bodies; political parties; health care professionals; urban planners) were actively engaged in a varied set of participatory processes over the three years of the project. These processes,

performed as web-based Delphi panels, decision conferences and workshops were used to bring together stakeholders, along with experts, to collect their insights and views on:

- Relevant indicators to evaluate and monitor regional European population health (Web-Delphi for the selection of indicators to be considered in the PHI);
- Importance of closing gaps in indicators across EU regions (Web-Delphi weighting process);
- Added value to population health by improving performance along the indicator range (Web-Delphi value function process);
- Future scenarios of population health inequalities in Europe (Web-Delphi process for building scenarios);
- Policies with the highest potential to improve population health and reduce inequities at the urban level, namely in the city case studies of Lisbon and Turin (Workshops and Decision conferences).

In addition to their involvement in the participatory processes, the stakeholders were systematically contacted with information on the project's findings via newsletter and leaflet communication. The stakeholders showing high interest and power in the EURO-HEALTHY project were invited to participate in several events organized by the project:

- *Expert Policy Forum: Addressing health inequities across Europe- from evidence to policy*. A pre-conference at the European Public Health Conference 2016, November 2016, in Vienna;
- *Shaping policies to promote urban health equity: a socio-technical approach. Evidence from the EURO-HEALTHY case studies*. Pre-conference at the International Conference on Urban Health 2017, September 2017, in Coimbra;
- Workshops on policies with potential to promote urban health equity, 2017, in Lisbon and Turin;
- *EURO-HEALTHY Stakeholder's meeting*, November 2017, in Brussels.

The fundamental meaning for building a network of stakeholders relied on the collaboration amongst 12 participating institutions within the project that identified and approached two stakeholders from national, regional or local levels with power and interest in the EURO-HEALTHY project. This base of relevant stakeholders has been gradually advanced via contacts obtained through numerous dissemination activities, mainly scientific conferences and pre-conferences. In addition to that, dialogue with the EC project officer was crucial for reaching relevant stakeholders.

WHAT WE FOUND

Interactions with stakeholders provided essential feedback to the EURO-HEALTHY researchers dealing with population health measurement and policy evaluation. By involving key stakeholders with the power to shape policies and implement actions, not only was there a greater and more enhanced understanding of the multidimensional nature of population health but the potential of multilevel policies (in different health determinant domains) was also identified as a way to respond to the challenge of addressing population health inequities across the EU.

Overall, there was a high level of participation in the different participatory processes. The use of a Web-platform, to deliver and to follow-up the Web-Delphi processes, increased the efficiency in gathering the points of view of the stakeholders from distinct geographic locations.

In the case studies of Lisbon and Turin, prolific involvement was noted for the local panels of stakeholders in the exercise of evaluation of policies, which produced relevant evidence on the potential benefit of policies from different sectors and their contribution to improving population health. Through the lens of inequalities relative to the distribution of key health determinants, it was evident that the participation of stakeholders is fundamental to establish priorities for intervention.

KEY MESSAGES

- The participation of key stakeholders, including policymakers, in the evaluation of population health is critical to develop evidence-based policies to promote population health and to advance knowledge of the main drivers of health inequities at different geographical levels.
- Bridging the gaps between research, practice and policy demands more multi-, trans- and inter-disciplinary projects, engaging all relevant stakeholders; increasing the potential to reach more diverse audiences and targeting influential decision-makers is crucial.
- The involvement of stakeholders in all phases of the project development, as well as in the dissemination of project results (through the evaluation of policies and available tools) is key to realising the project objectives and maximising impacts within the European community, thus bridging the gap between scientists and the public and translating European research into more informed policy-making.

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6. THE SELECTION OF INDICATORS TO EVALUATE EUROPEAN POPULATION HEALTH

WHY IS IT IMPORTANT?

Evaluating population health represents challenges. When choosing indicators to characterize the health of the population presently living in the European Union regions, it is crucial to consider indicators from multiple health dimensions; going beyond the health outcomes and including those outside the healthcare sector in such a way that they provide an evidence-based perspective from which policies with the potential to promote health can be developed and evaluated [1,2].

A key issue to take into account in the indicator selection is assuring the involvement of stakeholders [3,4], representing a variety of interests and knowledge, in addition to that of experts, as they have a firm grasp on the data issues and demonstrate the scientific rigour regarding the proposed indicators [5]. The use of participatory techniques increases the chance that the indicators selected will be deemed more credible, scientific and policy-relevant, commonly understood and technically useful, which is directly linked to the need for indicators to reflect substantial health problems and to be useful in guiding policy action [5,6].

WHAT WE DID

The aim was to apply a participatory process to inform the selection of a set of indicators considered relevant to evaluate population health at the European regional level, combining scientific evidence and the points of view of experts and stakeholders. In a later path, this set was the basis for the construction of the EURO-HEALTHY Population Health Index.

A total of 130 indicators, of health determinants and health outcomes, were identified through literature review undertaken by the WPs 2, 3 and 4. A web-based Delphi process [7] was developed to involve a multidisciplinary panel and to ascertain their views on the relevance of the identified indicators, with specific rules in place for dealing with differences in opinion and for measuring the level of agreement. The Delphi panel included 51 experts and 30 stakeholders from different countries, with applicable knowledge in a variety of domains and a keen level of interest in the field of European population health. In an 'enchained' Delphi process, comprising a total of three rounds, panellists were required to indicate their level of agreement or disagreement with

the following statement "*This indicator is relevant to the evaluation of Europe's population health*", on a 5-level Likert scale, with *Strongly disagree, Disagree*, *Neither agree nor disagree, Agree* and *Strongly Agree*. The group opinion (aggregate of individual opinions) was defined by calculating the percentage of responses given in each Likert item, for each indicator. The group agreement for indicator approval was determined by absolute majority (agreement above 50% and disagreement below 33.3%) and qualified majority (agreement above 75%).

WHAT WE FOUND

From the list of proposed 130 indicators, a total of 80 indicators (61.5%) were selected to appraise population health in the following areas of concern: I) Economic and social environment (12), II) Demographic change (5), III) Lifestyle and health behaviours (8), IV) Physical environment (6), V) Built environment (12), VI) Healthcare (11) and VII) Health outcomes (26). One indicator was rejected and approximately ⅓ presented lack of agreement [8]. In addition, the high response rate from experts and stakeholders round-to-round (89% in the 1st round, 93% in the 2nd round and 96% in the last round) should be noted. In Figure 1, the dots represent the indicator and the colours represent the respective level of percentage agreement obtained. The green dots represent indicators where more than 50% of the panellists agreed or strongly agreed with its relevance. Along with Health outcomes, the indicators of Lifestyle and health behaviours and of Healthcare achieved higher convergence on group opinion about their relevance on population health measurement. On the other hand, significant differences in responses arose for 73% and 40% of the indicators proposed within the Physical environment and Built environment areas of concern, respectively. Although the relationship between environmental conditions and population health was recognized, concerns about the data availability at regional level may had an influence on the panel's responses.

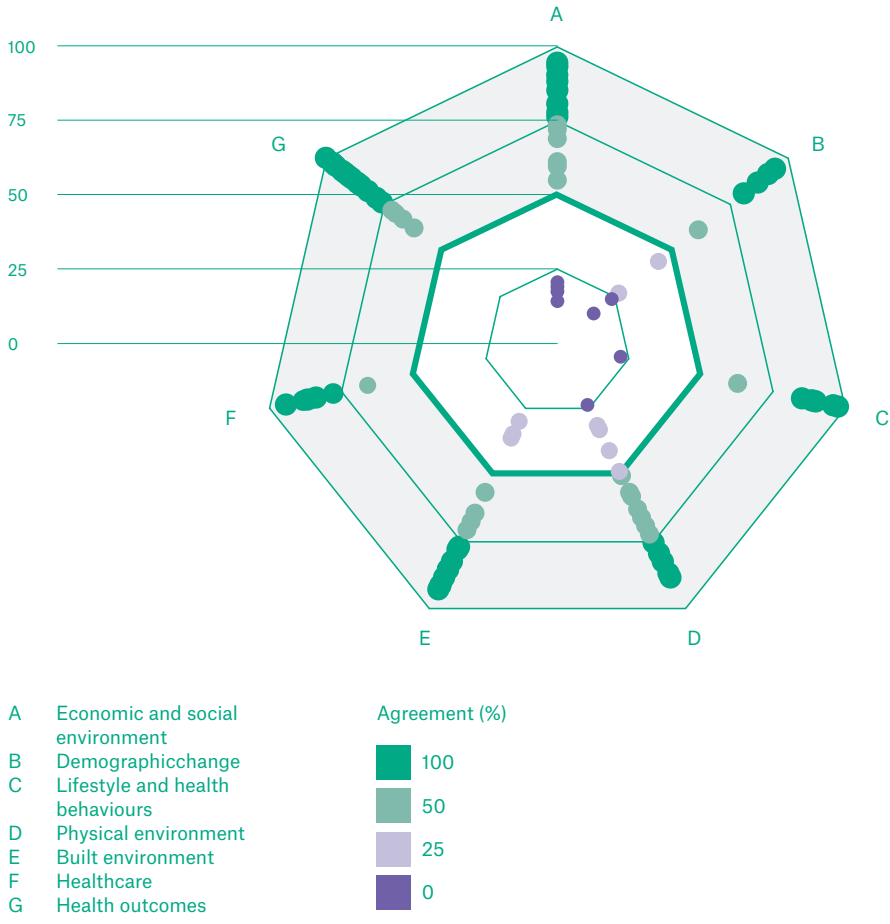

Figure 1. Level of agreement (%) achieved by each indicator by area of concern. *Note: The data plot includes the final percentage agreement achieved by each indicator at the end of the Delphi process. The areas of concern "Economic and social environment" and "Healthcare" were, in a later phase, each divided into two areas of concern. The former was split into "Economic conditions, social protection and security" and "Education" and the latter into "Healthcare resources and expenditure" and "Healthcare performance".*

KEY MESSAGES

- Selected indicators from the areas of concern that are part of traditional public health practice, namely Health outcomes, Lifestyle and health behaviours and Healthcare, attained the higher level of agreement amongst the panellists. At the same time, a considerable number of indicators of Economic and social environment, Physical environment and Built environment were considered crucial to evaluate population health despite the perceived potential problems of data availability at regional level.

- The set of indicators selected by the EURO-HEALTHY panel is consistent with a multidimensional approach of population health and, although it is reflective with the European regional context, it should be seen as a starting point to expand dialogue regarding what is relevant to appraise population health at other geographic levels and settings, namely at local contexts.
- Involving experts and stakeholders from different backgrounds and fields of expertise adds a diversity of points of view and validates the holistic perspective on health.

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7. THE AVAILABILITY OF POPULATION HEALTH INDICATORS ACROSS THE EUROPEAN REGIONS

WHY IS IT IMPORTANT

The ability to measure regional health inequalities across Europe and to build adequate population health indices strongly depends on the availability of reliable and comparable data at the regional level. Currently, there continues to be a lack of regionalized, reliable and comparable data on relevant dimensions of population health, which represents a challenge for measuring and monitoring regional health inequalities[1–3].

WHAT WE DID

The aim was to assess the data availability of the indicators selected to be included in the EURO-HEALTHY Population Health Index (PHI), a multidimensional measure built to evaluate population health of the 269 NUTS 2 regions of the European Union. The following three tasks were undertaken:

- Verification of the data availability and reliability of the indicators at the regional level for the last year with available data;
- Application of a protocol to overcome the cases of missing data and completing the database, based on three data requirements regarding availability at:
  - NUTS 2 level or another NUTS level,
  - reference year (the last year with available data) or a year prior to that year, and
  - reference data source or a different data source.
- Development of a scoring system ranging from 0 (no data available) to 1 (all data available) to assess the availability of data by indicator and EU region.

WHAT WE FOUND

A total of 14 indicators (out of 80 which were previously selected) were not included in the PHI model due to data constraints, namely lack of accurate and comparable data for all EU28 countries and lack of analytical soundness. The Physical environment area of concern presented the highest number of indicators with major constraints regarding data reliability. Finally, 27 indicators were not selected to be part of the PHI model due to redundancy between the indicators selected.

From the indicators included in the PHI model, the majority presented cases of missing data. Most had been completed with data: i) at NUTS 1 or 0 level (46.6%), ii) from a previous year (16.0%), iii) from a different data source (3.2%), iv) estimated (0.2%) or v) from regions with similar geographic and socioeconomic characteristics (0.1%)[4].

Overall, and despite the identified constraints, the EURO-HEALTHY PHI indicators availability score was high. The mean availability score is 0.8, ranging from 0.46 (worst) to 1 (best). Most of the dimensions present high scores (above 0.90), namely the dimensions of Employment, Education and Road safety. The lowest mean scores were found in the dimensions of Water and sanitation (0.50), Lifestyle and health behaviours (0.69), and Healthcare performance (0.68) (Figure 1). The lowest availability scores are mainly due to missing data at regional level (NUTS 2). In fact, none of the EU regions have all indicators available according to the requested data requirements[4] (Figure 2).

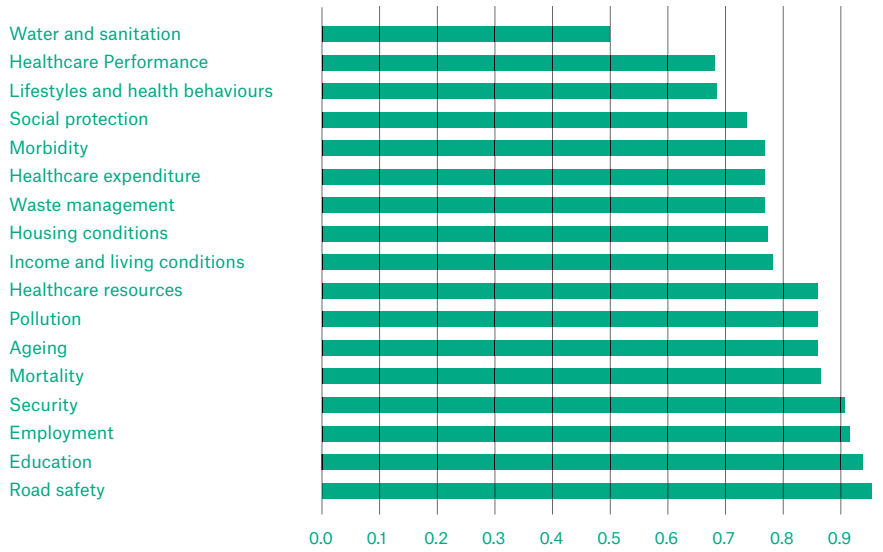

Figure 1. Mean availability score of the EURO-HEALTHY PHI indicators by Dimension.

KEY MESSAGES

- Despite the constraints on compiling data of multiple indicators at the regional level, the construction of a multidimensional database of population health is feasible for the EU28 regions.
- There are significant differences in the data availability across different population health dimensions.
- There is an urgent need for data collection at sub-national data in several domains, namely those associated with Physical environment, Healthcare performance and Lifestyle and health behaviours. Moreover, as the data collection process at European level follows EU policy, a clear prior statement on tackling regional inequalities within each policy is essential to leverage the data collection at sub-national level.
- Closing the data gaps between and within countries would greatly benefit from a synchronized and harmonized data collection process covering all the EU territory for the same reference year and from a more coordinated effort between producers of data at the local, regional, national and European level.

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8.

USING THE MACBETH SOCIO-TECHNICAL METHODOLOGICAL APPROACH TO BUILD THE EURO-HEALTHY PHI

WHY IS IT IMPORTANT

A first aim of the EURO-HEALTHY project was to develop a Population Health Index (PHI) able to measure population health (PH) on the European regions. Departing from the literature in the area, at the inception of the project, it was recognised the need to develop novel methodologies that:

- Enabled the construct of a PHI that not only considered the state of the art on the different areas of concern within the domain of PH, but also the perspectives and values of a representative group of experts and stakeholders; this was recognised as requiring innovative ways of combining evidence with the views and values of experts, stakeholders and policy makers in constructing health evaluation tools[1];
- Avoided the common critical mistakes that were often performed in the construction of indices and answered to challenges identified in PH measurement[2-5].

Accordingly, WP6 developed, applied and tested novel methodologies to building the EURO-HEALTHY PHI.

WHAT WE DID

Technically the PHI construction combined the multicriteria method MACBETH (standing for *Measuring Attractiveness by a Categorical Based Evaluation Technique*)[6] with Web-Delphi and decision conferencing social processes[7-8], in the sequence portrayed in Figure 1. These processes were conducted to inform the selection of PH indicators, to inform the shape of value functions and to qualitatively understand weighting coefficients. The outputs of the Delphi processes, together with scientific evidence collected, latter informed a decision conferencing face-to-face process in which a strategic group composed of 13 members, representing the diversity of viewpoints related to PH and covering the different areas of expertise and interest, successfully participated in the process of building the PHI model. The result was a set of multi-level PH indices based on the hierarchical multicriteria model depicted in Figure 2. The PHI model underwent a set of testing,

adjustment and validation procedures by the strategic group, until the PHI model has shown to be able to be a proper tool to assess PH across European regions.

A detailed description of the EURO-HEALTHY PHI building is detailed in Technical Report 6.1 Structuring a multicriteria model to evaluate Population Health and on Technical Report 6.2 Development of the multicriteria model to evaluate Population Health of the EURO-HEALTHY project.

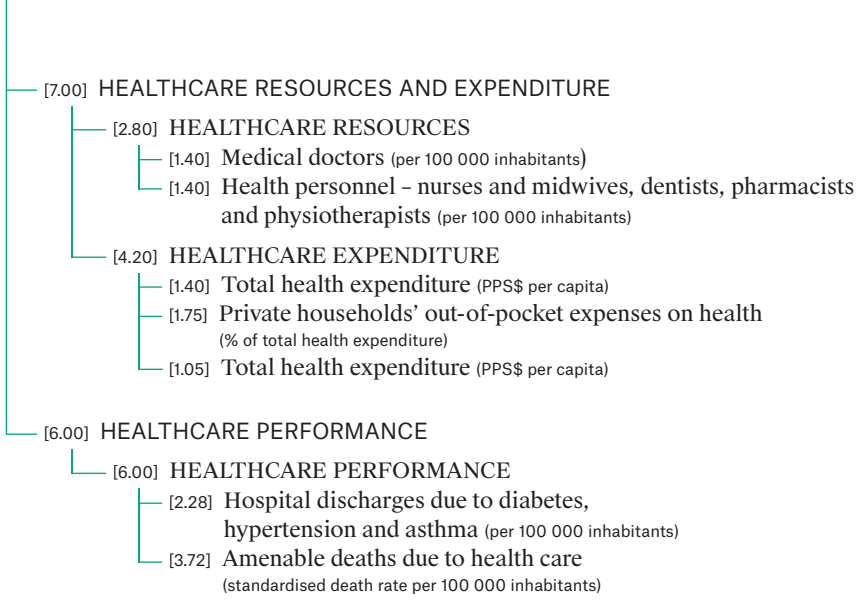
WEB-BASED				FACE-TO-FACE
STRUCTURING		EVALUATING		EVALUATING
Areas of concern / dimensions	Indicators	Weights	Value functions	Evaluating model
Identification of areas of concern and selection of dimensions	Selection of indicators to be considered in the model	Importance of closing gaps in indicators	Added value of improvements in different levels of indicator	Informed model building by the strategic group

Figure 1. Outline of participatory processes within the MACBETH socio-technical approach to build the EURO-HEALTHY PHI model.

HEALTH DETERMINANTS COMPONENT

- [23.00] ECONOMIC CONDITIONS, SOCIAL PROTECTION AND SECURITY
  - [8.28] EMPLOYMENT
    - [4.14] Unemployment rate (%)
    - [4.14] Long-term unemployment rate – 12 months and more (%)
  - [10.12] INCOME AND LIVING CONDITIONS
    - [2.53] Disposable income of private households per capita (Euro per inhabitant)
    - [4.14] People at risk of poverty or social exclusion (%)
    - [3.45] Disposable income ratio – S80/S20 (ratio)
  - [2.53] SOCIAL PROTECTION
    - [2.53] Expenditure on care for elderly (% of GDP)
  - [2.07] SECURITY
    - [2.07] Crimes recorded by the police (per 100 000 inhabitants)

- [20.00] EDUCATION
  - [20.00] EDUCATION
    - [10.00] Population aged 25–64 with upper secondary or tertiary education attainment (%)
    - [10.00] Early leavers from education and training (%)
- [3.00] DEMOGRAPHIC CHANGE
  - [3.00] AGEING
    - [1.80] At risk of poverty rate of older people – aged 65 years or over (%)
    - [1.20] Ageing index (ratio)
- [15.00] LIFESTYLE AND HEALTH BEHAVIOURS
  - [15.00] LIFESTYLE AND HEALTH BEHAVIOURS
    - [3.75] Adults who are obese (%)
    - [4.50] Daily smokers – aged 15 and over (%)
    - [3.00] Pure alcohol consumption – aged 15 and over (Litres per capita)
    - [3.75] Live births by mothers under age of 20 (%)
- [11.00] PHYSICAL ENVIRONMENT
  - [11.00] POLLUTION
    - [3.90] Annual mean of the daily PM2.5 concentrations (µg/m3)
    - [3.20] Annual mean of the daily PM10 concentrations (µg/m3)
    - [3.90] Greenhouse Gas (total tonnes of CO2 eq. emissions per capita)
    - [0.00] Population exposed to traffic noise – Lden 55–59db, during day (%)
  - [0.00] EXTREME WEATHER EVENTS
    - [0.00] Population affected by flooding (per 1 000 000 inhabitants)
- [12.00] BUILT ENVIRONMENT
  - [5.40] HOUSING CONDITIONS
    - [1.44] Average number of rooms per person
    - [2.52] Households without indoor flushing toilet (%)
    - [1.44] Households without central heating (%)
  - LAND USE
    - Population density (inhabitants/km2)
  - [4.56] WATER AND SANITATION
    - [2.52] Population connected to public water supply (%)
    - [2.04] Population connected to wastewater treatment plants (%)
  - [2.04] WASTE MANAGEMENT
    - [2.04] Recycling rate of municipal waste (%)
- [3.00] ROAD SAFETY
  - [3.00] ROAD SAFETY
    - [1.50] Victims in road accidents – injured and killed (per 100 000 inhabitants)
    - [1.50] Fatality rate due to road traffic accidents (per 1 000 victims)



HEALTH OUTCOMES COMPONENT

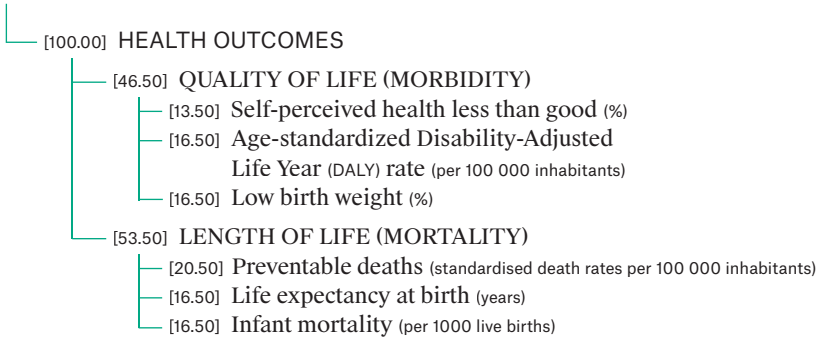
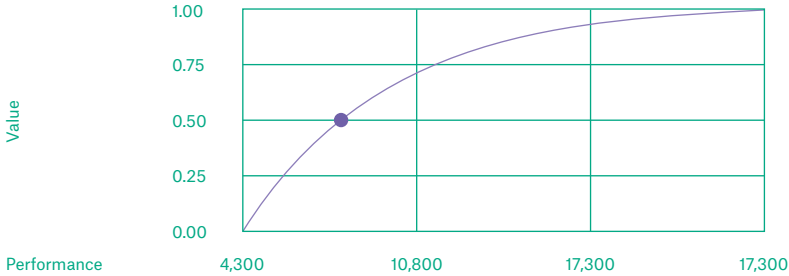
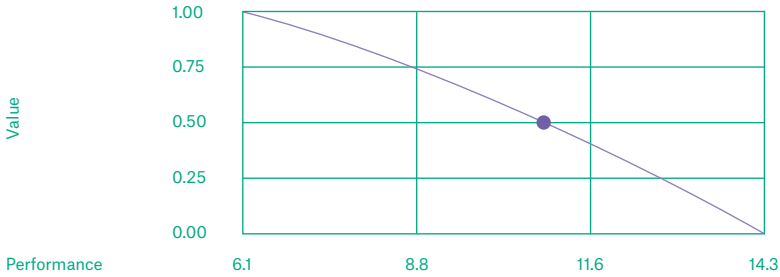


Figure 2. EURO-HEALTHY PHI model. Weights within the Determinants and Outcomes component, areas of concern, dimensions and indicators. Examples of value functions for selected indicators are on page 75.

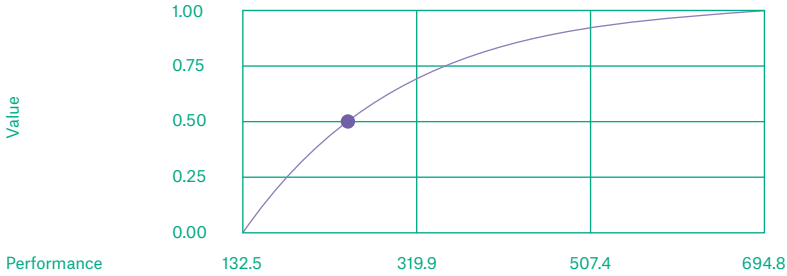
DISPOSABLE INCOME OF PRIVATE HOUSEHOLDS PER CAPITA
(Euro per inhabitant)



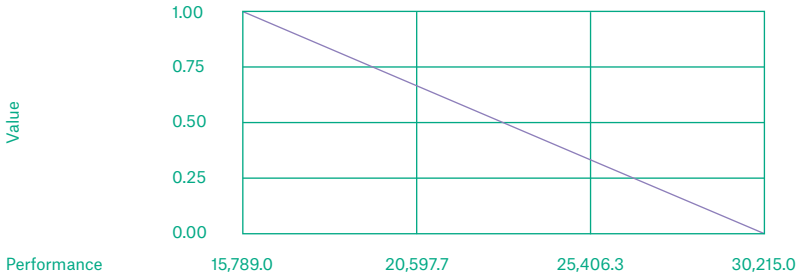
PURE ALCOHOL CONSUMPTION – AGED 15 AND OVER
(Liters per capita)



MEDICAL DOCTORS, PER 100 000 INHABITANTS



AGE-STANDARDIZED DISABILITY-ADJUSTED
LIFE YEAR (DALY) RATES



WHAT WE FOUND

Regarding the MACBETH socio-technical methodological approach it should be highlighted how the Web-Delphi's (making use of friendly and attractive interface) have been a rich and effective way to collect information from an enlarged and geographically dispersed number of participants. The Web-Delphi's intertwined with the decision conferencing process allowed for a high engagement of the participants enhancing a shared understanding and a sense of common purpose about measuring PH through the EURO-HEALTHY PHI. The MACBETH based intuitive protocols of questioning were key to promote transparency along the process, avoiding the eventual difficulty and cognitive uneasiness experienced by evaluators when trying to express their preference judgments numerically.
The PHI model (underlying the PHI) enables aggregate or disaggregated analyses of multi-level PHIs (e.g. for PH determinants vs. outcomes, for PH areas of concern and for PH dimensions), that supports different types of equity analyses (e.g. calculation of global PH inequalities and of inequalities in access to healthcare services) and that produces scores with an intuitive meaning. In practice, the approach defined a PHI model with a bottom up hierarchical structure with several enchained indices and with value functions and weights informed by evidence and produced with friendly protocols of questioning.

KEY MESSAGES

The MACBETH socio-technical methodological approach was successful in building the EURO-HEALTHY PHI:

- To avoid the common critical mistakes that are often performed in the construction of indices, namely an incomplete structure, meaningless scores, not testing and modelling of (preference) interdependencies[1], use of 'importance' weights and 'normalized' scores, the approach makes use of principles and concepts of multicriteria value measurement;
- To promote a constructive process in which the PHI is built with insights of a high number of geographically dispersed experts and stakeholders;
- By envisaging and applying a sound socio-technical process, the EURO-HEALTHY WebGIS now provides a wide range of information to analyse PH and health inequalities across European regions either at the global level, for PH determinants and outcomes, for PH areas of concern, for PH dimensions, and for PH indicators that are based on robust information.

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9. THE GEOGRAPHY OF THE EURO-HEALTHY POPULATION HEALTH INDEX

WHY IS IT IMPORTANT?

Despite the significant advances that have been made at the European Union (EU) level in terms of health inequality measurement[1], there is still a lack of comparable indicators able to afford a holistic understanding of population health, with multiple determinants involved[2]. Existing measures and indicators of health status and quality of life are considered inadequate, especially when measurements focus on different geographical levels. For this reason it is important to provide evidence on integrated and quantified key factors which impact population health and geographical health inequalities across European countries and regions.

WHAT WE DID

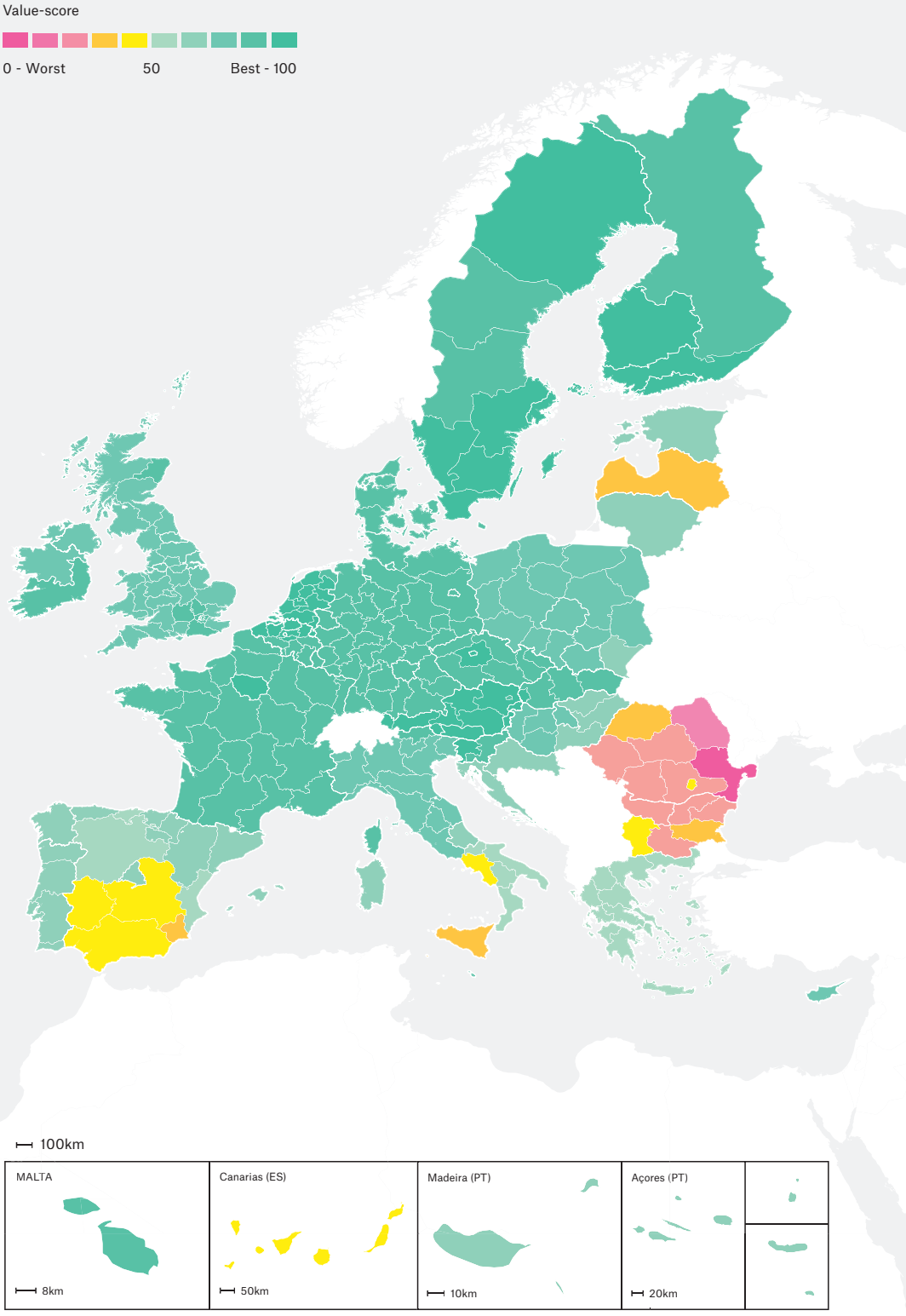
The EURO-HEALTHY project created the EURO-HEALTHY Population Health Index (PHI) – a multidimensional and multilevel robust measure to evaluate and monitor European population health as well as interactions between a wide range of areas of concern, dimensions and indicators. Presenting a bottom-up hierarchical structure, the PHI takes into consideration two main components of population health: Health Outcomes and Health Determinants, both disaggregated into areas of concern, dimensions and indicators.
To provide a snapshot of the health of the European population and to detect inequalities, the PHI was applied to 269 NUTS2 regions of the 28 EU countries. This level of analysis was adopted given that it is the statistical unit applied by the European Structural and Investment Funds (ESIF) to determine geographic eligibility for receiving funding that is aimed at reducing the economic, social and territorial disparities that still exist in the EU[3].
The PHI ranges from 0 to 100, where 0 represents the lowest value-score of population health and 100 the highest value-score. The colour coding of the classes uses a scale inspired by the common traffic light system: with red representing low scores and green colours representing high scores.

WHAT WE FOUND

The findings demonstrate a high degree of variation in the geographical distribution of health determinants and health outcomes[4].

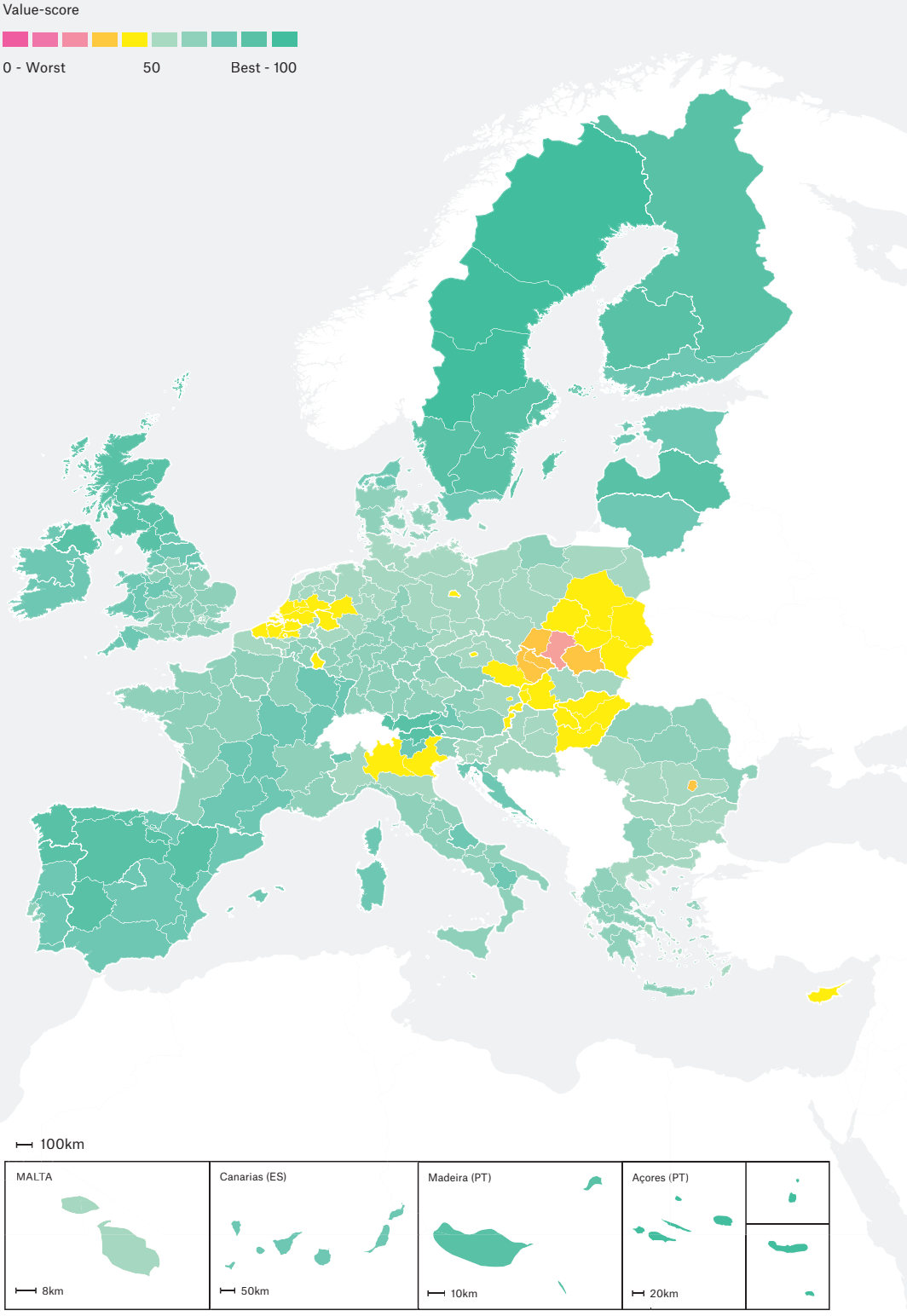
The spatial distribution of the multiple health determinants of population health is heterogeneous, showing differences between Northern regions and Southern and Eastern Europe regions. Overall, the more developed regions of the Northern countries present value-scores that are significantly higher (PHI > 80) than the ones presented by regions in transition from Southern and Eastern Europe (where 167 million people live) with worse population health (Health Determinants index < 50), with the exception of security, demographic change and education dimensions.

Income and living conditions present the largest inequalities (S80/S20): regions within the highest quintile (S80) have an income 11 times higher when compared with the regions in the lowest quintile (S20) where approximately 100 million people live (Map 1).

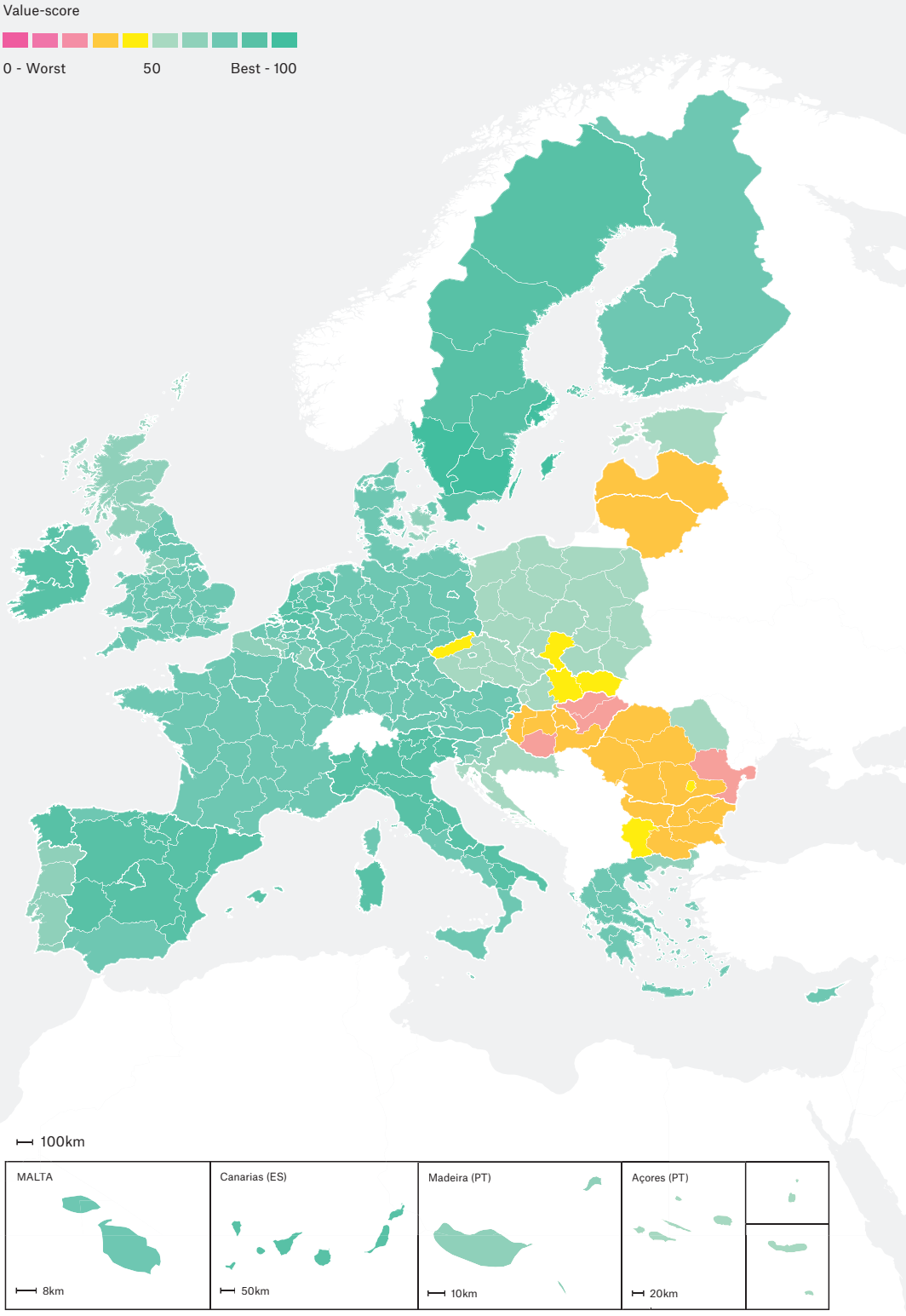


Map 1. Income and living conditions Index

In general, a positive contribution to overall population health is shown in the Education domain (index > 65); however, significant differences are observed between the highest value-scores in North-Central Europe, and the lowest value-scores concentrated in Southern European countries.
Different levels of development in the EU regions are presented through built environment indicators. Remarkably, there are still populations in the EU28 that live in households without flushing toilets, are not connected to the public water supply, and are not connected to wastewater treatment plants.
When looking at the within-countries inequality, the 28 EU capital regions present systematically better value-scores when compared with other regions in all health determinants. Nevertheless, capital regions struggle with increased rates of recorded crimes and air pollution. It was found that 50% of these regions registered PM_{10} concentrations higher than the 2005 WHO recommendations (20μg/m^3 per capita), and almost 80% exceeded the recommended (10μg/m^3 per capita) concentration of $PM_{2.5}$ (Map 2).
In the analysis of Health Outcomes, a similarity to Health Determinants appears, as there are clear differences between high scores (Health Outcomes index >70) observed in the Northern and Western regions of the EU and lower scores recorded in regions where ¾ of the EU population lives, with particularly low value-scores (Health Outcomes index <50) identified in the regions of Eastern Europe (Map 3).
Deaths from causes considered to be "avoidable" remain excessive, particularly in the regions of the Baltic States and Eastern European countries. These regions (where more than 100 million EU citizens live) show significant low value-scores (average Mortality index <37) for population health (measured by preventable mortality, infant mortality and life expectancy at birth).



Map 2. Physical Environment Index.



Map 3. Health Outcomes Index. (mapa 2.20)

KEY MESSAGES

The EURO-HEALTHY PHI:

- Is a useful and comprehensive tool with the capacity to illustrate: I) the most and the least healthy regions in EU, II) the current determinants shaping the future health outcomes of those regions and III) how health can be improved;
- Supports the transfer of knowledge from scientists to policy-makers to make better use of the ESIF funding instruments, as the PHI communicates fundamental information in a user-friendly way to inform the work of those concerned with understanding and reducing the health gap in Europe.

Evidence on geographical health inequalities

- There is a high degree of variation in the geographical distribution of Health determinants and Health outcomes, emphasizing that inequalities still persist in Europe;
- Health determinants value-scores are statistically significantly higher ($p<0.001$) in the more affluent regions (with GDP per inhabitant above 90% of the EU27 average) than in the ones presented by regions in transition and less developed regions (respectively, those with GDP per inhabitant between 75% and 90% and below 75% of EU27 average);
- Economic conditions and social protection remain the most important domain for reducing the EU regional health inequalities;
- ⅓ of Europeans live in regions, mostly capitals, of particular concern for air pollution. These regions are mainly concentrated in East-Central Europe;
- There is significant increase of crime, observed mostly in urban areas.

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10. DEVISING AND TESTING A NOVEL METHODOLOGY FOR THE EVALUATION OF POLICIES UNDER EUROPEAN POPULATION HEALTH SCENARIOS

WHY IS IT IMPORTANT?

Despite the relevance for health policy-makers of evaluating policies on a common ground, this is scarcely done in practice. Multiple challenges and needs regarding the evaluation of policies are recognised in the health literature, such as the use of theoretically sound methods, properly dealing with uncertainty in the future and adequately involving health policy-makers in evaluation[1-4]. This research component of the EURO-HEALTHY project aims at contributing to the health literature by developing transparent methodologies to evaluate policies in practical settings. These methodologies need specifically to consider the EURO-HEALTHY research project context in that the EURO-HEALTHY Population Health Index (PHI) is to be used as the starting point to analyse current Population Health (PH) and PH inequalities across European regions; and policies should be evaluated accordingly to the extent to which they promote PH and decrease PH inequalities in light of the EURO-HEALTHY PH scenarios, with conflicting issues also to be considered[5].

WHAT WE DID

A novel methodology was devised and successfully tested to the evaluation of policies – informed by European scenarios – at the local level. To make use of sound evaluation methods and to involve health stakeholders and experts in the evaluation of policies, the proposed methodology is socio-technical by nature and follows the process depicted in Figure 1. Technically, following a preparation phase, it includes a phase of evaluating policies through a multicriteria group value model built with MACBETH[6], and then a benefit-to-effort analysis and prioritization. Socially, the methodology includes a combination of face-to-face participatory methods – based on workshops and decision conferencing processes – for engaging stakeholders and political actors. This methodology was applied to evaluate policies in the Lisbon case-study. Furthermore, methods were also designed to evaluate policies at the European level, taking into account their holistic benefits, their doability in light of the EURO-HEALTHY PH scenarios, as well as power issues.

A detailed account of the methodology is available in the conference presentation from Correia et al. (2017) *Methodology for the evaluation of policies in the Lisbon case-study* (presentation in the pre-conference workshop *Shaping policies to promote urban health equity: a socio-technical approach. Evidence from the EURO-HEALTHY case studies*, 14th International Conference on Urban Health, 26-29 September 2017, Coimbra, Portugal).

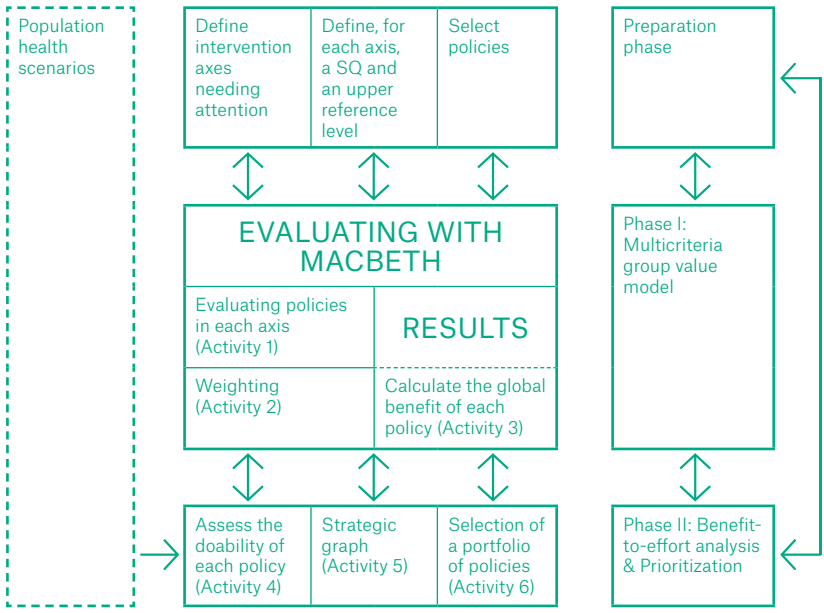

Figure 1. The phases of the proposed social-technical methodological approach for evaluation of policies in case-studies.

WHAT WE FOUND

We have designed powerful tools for evaluating policies, such as the graph shown in Figure 2: it enables visualising policies' benefits, as well as the effort to implement these policies (as captured by doability) when possible futures occur; and this can be further complemented with information on which stakeholders have a special interest in voting for these policies.

The methodology designed to evaluate policies at the local level enabled the successful evaluation of the benefits of a wide range of policies in light of the 'Failing Europe' and 'Sustainable Prosperity' scenarios in Lisbon. Participants from the Lisbon case-study have adhered to the process and provided a positive feedback regarding the evaluation process.

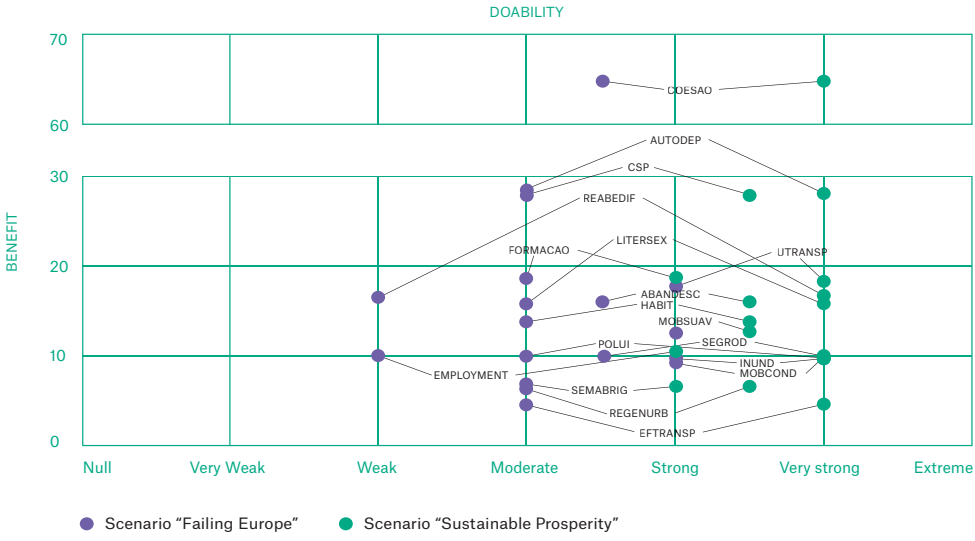

Figure 2. Benefit *vs.* Doability of the policies in the scenarios 'Failing Europe' and 'Sustainable Prosperity' in the Lisbon case study.

KEY MESSAGES

- Novel methodologies and tools were devised and tested for the evaluation of policies – informed by the EURO-HEALTHY PH scenarios– at both the local and European levels;
- The methods in use were successful to involve local stakeholders in the evaluation of policies to improve PH in the Lisbon case-study.

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11. BUILDING THE EURO-HEALTHY SCENARIOS TO UNDERSTAND WHICH DRIVING FORCES MAY PLAY A ROLE IN THE EVOLUTION OF POPULATION HEALTH INEQUALITIES IN EUROPE

WHY IS IT IMPORTANT?

In order to design and shape policies with a potential to promote health and health equity across European regions – the core objective of the EURO-HEALTHY project – policy-makers need to be assisted by reliable tools that allow them not only to holistically evaluate policies benefits and to reflect upon their doability and power issues, but also to anticipate the extent to which future events may affect those policies[1-3].

Although multiple studies have developed health scenarios, these are difficult to replicate and often rely on the views of individuals, there being a need to build transparent methodologies for scenario building and to generate scenarios that are informed by the views of a wide range of health stakeholders and experts[4-5]. Furthermore, we did not find in literature scenarios with a focus on the evolution of Population Health (PH) in Europe.

Hence, there is scope for developing EURO-HEALTHY PH scenarios that should be designed to incorporate the input of a large number of experts and stakeholders, be informed by future-oriented evidence, highlight drivers expected to affect the evolution of PH inequalities in Europe, as well as be developed through a transparent and replicable methodology.

WHAT WE DID

A novel transparent methodology was devised to build the EURO-HEALTHY scenarios. The methodology includes three main stages (within the logic of Figure 1) that go from the identification of drivers to the generation of scenario structures, and from these to the validation of scenario structures and generation of scenario narratives. The proposed methodology is grounded on Scenario Planning and Thinking, Horizon/Environmental Scanning and Strategy/Decision Theory literatures[6] .

To collect the views of a large number of stakeholders and experts and to generate a large set of drivers within scenario building, the methodology collects drivers from a large number of experts and stakeholders within a non-face-to-face and transparent format, namely through a Web-Delphi process. And then,

to build insightful scenarios, a strategic group works within a workshop face-to-face environment to generate scenarios that are informed by the results from the Web-Delphi and by information gathered within a future-oriented evidence frame. The proposed methodological approach was specifically applied to build two EURO-HEALTHY extreme Scenarios for future changes in PH inequalities across European regions: one where PH inequalities increase (worst) – Failing Europe and other where PH inequalities decrease (best) – Sustainable Prosperity. The structure of an interim scenario – named "Being Stuck" – has also been produced.

A detailed account of the methodological approach to build the EURO-HEALTHY PH scenarios can be found in Technical Report 6.3 Technical report on scenario building and analysis of policies of the EURO-HEALTHY project.

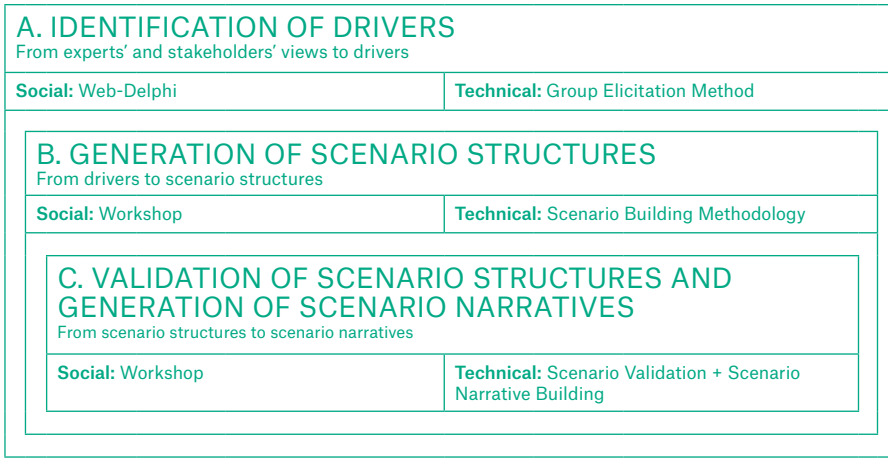

Figure 1. The three main stages of the proposed social-technical methodological approach.

WHAT WE FOUND

The proposed approach was successfully applied to build EURO-HEALTHY scenarios that highlight drivers expected to affect the evolution of PH inequalities in Europe, benefiting from the participation of a large number of experts. The EURO-HEALTHY scenarios are useful to reflect upon the future of PH inequalities in Europe, as well as were used as an input to the evaluation of methods to evaluate policies to improve health and health equity in Europe. The two EURO-HEALTHY extreme Scenarios for future changes in PH inequalities across European regions, Failing Europe (worst) and Sustainable Prosperity (best), shed light on possible futures relevant for the evaluation of policies, and on which drivers can affect health and health inequalities across European regions. Figure 2 and Figure 3 present both the narratives and scenario structures for each scenario.

An extra Interim scenario (to the best of our knowledge today) scenario was also generated. Full information about the scenarios is available in Technical Report 6.3 Technical report on scenario building and analysis of policies of the EURO-HEALTHY project.

Scenario 1

FAILING EUROPE

This year's edition of TIME's© Person of the Year seems to announce the end of Europe as we know it, with a simple question. But the experts appear to already know the answer: after years in denial, the union of countries of the old continent seems incapable of overcoming the serious and historical difficulties that is dealing with. The 2020 crisis can still be felt, with the unemployment rate reaching a new record levels; the COP 36 negotiations were, according to the independent evaluators, a "massive failure"; and Europe finds itself facing a humanitarian crisis, with one million migrants trapped between Hungary, Slovenia and Croatia, after the Croatians officially left the European Union, last month, only one year and a half after the legal procedures to exit the EU were triggered.

KEY IDEAS

- New economic crisis, longer and deeper
- Worsening of the refugees' situation
- Limited access to health care, with increase in non-communicable diseases
- Inability to stem the consequences of climate change
- Deepening of social inequalities
- Europe's fragmentation

POLITICAL DRIVERS

- Reduction of the cohesion funds available to support the development of less-favoured regions
- Weak political commitment and insufficient public support for fair health care policies
- Reductions of the public exp enditure in the health system
- Significantly weaker social protection for the elderly
- Significantly lower investments in national social security systems
- Limited and non-harmonized extent of compulsory public education
- Decrease of quality of public education

SOCIAL DRIVERS

- Higher concentration of people at risk of poverty and social exclusion
- Deterioration in medical quality and effectiveness of healthcare services especially in the public sector
- Increasing number of financial and social barriers will limit the access to health care services
- Significant reduction in the quality and accessibility of the primary public health care services
- Significant lower access and quality of EMS services in remote and/or rural areas
- Failure of restrictive policies in reducing tobacco consumption and postponement of new policies
- Significant rise in unhealthy nutrition
- Sedentary lifestyles have further increased
- Increase in non-communicable like diabetes and hypertension

ECONOMIC DRIVERS

- Significant decrease in healthcare efficiency
- Recurrent financial crises have deepened and worsened economic conditions
- Increase in people's material deprivation and social exclusion
- Increase in economic inequalities with more uneven wealth distribution
- Weakening of social insurance schemes, failing to meet social insurance needs
- Significantly higher unemployment rates throughout Europe
- Significant growth in long-term structural unemployment rates
- Significant increase in unemployment among 55+
- Significant increase in employment precariousness
- Significant increase in employment with critically low income

TECHNOLOGICAL DRIVERS

- Stagnation of medical innovation, including improved and affordable medicines, medical research and technologies

ENVIRONMENTAL DRIVERS

- Decrease in the quality of the built environment
- Declining quality of the natural environment
- Declining quality of the outdoor air
- Maladaptation due to international disengagement and local inaction towards climate change
- International disengagement towards climate change mitigation
- Very limited expansion of the green-economy, fossil-fuel-based economic model prevailed
- Slowdown of the development and penetration of renewable energy technologies

LEGAL DRIVERS

- Ineffective EU environmental policies and regulations
- Significant decrease in food security

Figure 2. Narratives and key-ideas regarding the 'Failing Europe' scenario.

Scenario 2

SUSTAINABLE PROSPERITY

29th of May of 2030 **The words of the President of the European Commission, last night, at the end of the meeting to present the latest EUROSTAT data, are all over the headlines today. When asked about the great goals achieved in the last 20 years, the President affirmed: "Many compared our objectives, stated after the debate about the future of Europe in 2017 (White Paper on the Future of Europe), to Hercules' Twelve Labours. But just as the hero, we were up to the task. So much things were done that it seems unfair to name only a few. I venture to leave with my Top 3: Europe powered by renewable energies, the lowest unemployment rate ever and HEFA – Health for all – the European program that already ensures free health care services to more than 95% of the citizens living in Europe."**

KEY IDEAS

- Investment in the health care system
- Significant improvements on the quality and coverage in Education, in Europe
- Investment in medical innovation
- Establishment of a green-based economy
- Reducing social inequalities
- Decrease in the unemployment rate
- Improved resilient adaptation towards climate change and engagement towards climate change mitigation

POLITICAL DRIVERS

- Maintaining of the cohesion funds available to support the development of less-favoured regions
- Strong political commitment towards universal access to healthcare
- Increases of the public expenditure in the health system
- Significantly stronger social protection for the elderly
- Significantly higher investments in national social security systems
- Extension and harmonization of compulsory public education throughout the EU
- Increase of quality of public education

SOCIAL DRIVERS

- Lower concentration of people at risk of poverty and social exclusion
- Significant improvement in medical quality and effectiveness of healthcare services
- Widening of the access to healthcare
- Steady growth in the quality and accessibility of the public primary health care services
- Significant higher access and quality of EMS services in remote and/or rural areas
- Stricter Smoking restriction policies
- Significantly more healthy nutrition
- Reduction in sedentary lifestyles
- Decrease in non-communicable diseases like diabetes and hypertension

ECONOMIC DRIVERS

- Economic drivers
- Significant increase in healthcare efficiency
- Mitigated cyclical global crises
- Significant decrease in people's material deprivation
- Decrease in economic inequalities
- Strengthening of social insurance schemes
- Significantly lower unemployment rates throughout Europe
- Significant decrease in long-term structural unemployment
- Decrease in the number of unemployed among 55+
- Decrease in employment precariousness
- There was a decrease in the proportion of the employment with low income

TECHNOLOGICAL DRIVERS

- Rapid growth in medical innovation, including improved and affordable medicines, medical research and technologies

ENVIRONMENTAL DRIVERS

- Significant improvement in the quality of the built environment
- Improvement in the quality of the natural environment
- Improvement in the quality of the outdoor air
- Improved resilient adaptation towards climate change
- Engagement towards climate change mitigation
- Successful transition from the fossil-fuel-based economic model to the green-based one
- Significant and rapid increase of the development and penetration of renewable energy technologies

LEGAL DRIVERS

- Effective EU environmental policies and regulations
- Improvement in food security for all sections of society

Figure 3. Narratives and key-ideas regarding the 'Sustainable Prosperity' scenario

KEY MESSAGES

- EURO-HEALTHY scenarios make use of the input of a large number of experts and stakeholders and of future-oriented evidence;
- The EURO-HEALTHY scenarios are useful to reflect upon the future of PH inequalities in Europe and inform the evaluation of policies to improve health and health equity in Europe.

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12. AIR QUALITY STRATEGIES ON PUBLIC HEALTH AND HEALTH EQUITY IN EUROPE

WHY IS IT IMPORTANT?

Despite efforts to control and reduce the air pollution in many countries, ambient air pollution in both urban and rural areas is estimated to have been associated with up to 3.7 million premature deaths worldwide in 2012[1]. Air pollution has been associated with multiple diseases, such as cardiovascular diseases, asthma exacerbations, lung cancer, and diminished life expectancy[2-6]. Further, these negative health impacts disproportionately affect the economical weaker and vulnerable parts of society, thus contributing to health inequity[7]. Although an increasing number of strategies have already been introduced from EU level to local level, no comprehensive assessments of the effectiveness of the air pollution control strategies on public health in EU, particularly on health equity, have been carried out. This review aimed to review the effectiveness of air pollution control strategies in the EU and to understand their impacts on public health and health equity based on the published scientific evidence.

WHAT WE DID

The literature review was conducted using the databases of Web of Science, PubMed and Trials Register of Promoting Health Interventions (TRoPHI). Four key themes, air quality, strategies, health and effectiveness, were selected, and search terms for each theme were defined. Those publications containing at least one term of each theme and adhering to predefined inclusion and exclusion criteria were included in the review. Only English language considering assessed health outcomes associated with concentration changes of air pollutants in EU member states were retrieved. Regarding health equity impact, we summarized the effectiveness of the strategies on health equity (if assessed), or commented on the potential capacity of the strategies' influence on health equity.

WHAT WE FOUND

Retrieved studies could be divided into three categories, namely articles addressing air pollution within the scope of general guidelines at WHO Europe, EU or EU member states level, articles with specific interventions, and articles assessing air quality change and health benefits under different scenarios. Target pollutants were mostly particulate matter (PM_{10}, $PM_{2.5}$), followed by NO_x, SO_2 and ozone. Strategies could be divided into four categories: general regulations on air quality control, energy efficiency or saving, transport related emission reductions, and greenhouse gas emission reductions. All studies with simulated or monitored pollutant concentration demonstrate that the strategies could bring a decrease in ambient air pollution and would lead to health benefit.

KEY MESSAGES

- All studies with simulated or monitored pollutant concentration demonstrate that the strategies could bring a decrease in ambient air pollution and thus would lead to health benefit. However, on the exact extent to which the air pollution control strategies contribute to health improvements should be interpreted with caution, as most studies were based on model simulations. Uncertainties remain in terms of concentration-response relationships, air pollutant mixtures, population-specific time-activity characteristics, and unintended consequences of the interventions.
- This review illustrates that health benefit from air pollution reductions can be gained through a variety of strategies, actions or plans, either as the result of the main objective or as a co-benefit from strategies aiming for example at climate change mitigation.
- The health co-benefits obtained from the air pollution control strategies indicate that there is a strong case for promoting Health in All Policies, enabling thus possible health improvement from all perspectives.
- Air quality control strategies mainly address air pollution related health inequity by targeting two major pathways: by recognising the different susceptibilities among population groups, and through the uneven distribution of pollutant concentration at various geospatial levels.

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13. EUROPEAN STRUCTURAL AND INVESTMENT FUNDS – A TOOL WITH POTENTIAL TO REDUCE HEALTH INEQUITY IN EUROPE?

WHY IS IT IMPORTANT?

The European Structural and Investment Funds (ESIF) represent half of all EU-financing and work together to support economic development across EU countries in line with the objectives of the Europe 2020 strategy[1]. As the public health status is a result of the complex interaction between multiple economic, physical and built characteristics of a residence area, the ESIF funding framework can provide important opportunities for investing in policies addressing inequity in health, within and beyond the health sector and across several determinants of health[2]. Therefore, this research aims to review ESIF initiatives from 2000-2017, whilst exploring and assessing their linkages with the Population Health Index (PHI) outcomes of the EURO-HEALTHY Project[3].

WHAT WE DID

We conducted a systematic literature review including scientific and grey literature. The scientific literature review was based on the databases of Medline, Embase, Web of Science, Global Health, Science Direct and Google Scholar. Search terms were selected in accordance with the specific ESIF funds (ERDF, ESF, CF, EAFRD, and EMFF), the EU geographic territory, and with disparities in the PHI dimensions that fall within the eight domains (Economic and Social Environment, Demographic Change, Lifestyle and Health Behaviours, Physical Environment, Built Environment, Health Services, Health Outcomes). Articles containing at least one term in each of these categories were selected for further review. The grey literature review was based on the partnership agreements between the European Commission and each of the member states receiving ESIF support, for the funding period of 2014-2020. We further scrutinised the corresponding operational programmes composed by member states, to obtain a more detailed insight in intended ESIF fund allocation. No specific search strategy or inclusion and exclusion criteria were therefore needed.

WHAT WE FOUND

In the scientific literature review, 1,522 records were retrieved. The scope of the review included journal articles, book chapters, presentations, abstracts, and conference proceedings, among others. Preliminary results show that the aim of the retrieved articles varied, and included various types of analyses (impacts of ESIF on domestic policy, regional funding absorption, and expenditure efficiency), opinion pieces on current ESIF performance, and reflections on future challenges and recommendations regarding ESIF fund allocation. Most retrieved articles did not mention health or health impact specifically. Regarding the grey literature review, the structure ESIF fund allocation differed tremendously between member states. Where some countries only disseminated nationwide allocation intentions, many had operational programmes in place for each of their NUTS 2 regions. Further differences were seen in the structuring of operational programmes, as countries either disseminated intended fund allocation per investment theme, or per specific fund. Intended investments differed per member state in accordance with the local context. A comprehensive database of ESIF-funded projects or project evaluations was lacking and prevented a more detailed insight in ESIF project allocations.

KEY MESSAGES

- ESIF offer opportunities to reduce inequalities among EU regions thus indirectly contributing to health equity.
- While ESIF contribute to reduce health inequalities in Europe it is difficult to assess the actual impact as health implications are not in the focus of most of the studies analysing ESIF funds.
- As health interventions within the ESIF are not always labelled as health, policy makers should draw to adopt the health in all policies approach.
- The potential of ESIF for improving health equity in EU needs further understanding by national, regional and local decision makers.
- Data on the use of structural funds is not comprehensively collected at EU or member state level. A comprehensive data base on ESIF projects would be beneficial for analysing distribution patterns and help with transparency of funding allocation.

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14. EFFECTIVE PROGRAMMES FOR EQUITY IN POPULATION HEALTH IN THE EUROPEAN UNION

WHY IS IT IMPORTANT?

Health equity is caused by different life experiences such as area of residence, socioeconomic position, the built and physical environment and service provision, among others[1,2]. Adverse circumstances and context may affect lifestyles and health behaviours causing negative health outcomes[3]. These may be addressed by providing a portfolio of evidence-based policies, interventions and delivery system[4]. Providing a synthesis of examples of population health programmes taking into account the multidimensional nature of factors which influence health can be a useful tool for policy and decision makers and implementers[5]. The review focuses on examples of implementation of strategies to increase the body of evidence of effective actions. The aim of the review was to collate and asses the evidence on the effects of programmes and policies with potential to improve population health in European countries.

WHAT WE DID

The following review question guided the research: a) which policies and programmes aiming at improving population health in Europe are effective, b) which dimensions of population health are targeted by programmes on population health?
A literature search was performed in the databases of 'PubMed', 'The International Bibliography of the Social Sciences (IBSS)' and 'Science Direct'. Search terms were based on the eight dimensions of the population health index (Economic and Social Environment, Demographic Change, Lifestyle and Health Behaviours, Physical Environment, Built Environment, Health Services, Health Outcomes). Articles were accepted or rejected based on the preselected inclusion and exclusion criteria. The review was restricted to scientific articles with English language abstracts, published between February 1992 and June 2017. Only articles reporting evidence-based good practice interventions delivered within the EU member states and with assessed and positive effects on health were included.

WHAT WE FOUND

The search identified selected programmes from 16 EU member countries. Employed study designs included randomised control trials, quasi-experiments, and mixed methods assessments. Programmes were grouped following the dimensions of the EURO-HEALTHY Population Health Index. In the order of frequency, programmes were predominantly aimed on Lifestyle and Health Behaviours, Economic and Social Environment, the Built Environment, Health Services, and Demographic Change. The vast majority of articles hence aimed at improving healthy lifestyles and healthy behaviours. They focused on increasing physical activity, reducing sedentary behaviours or improving nutrition.

Further, most interventions were successful in terms of improving health behaviour, skills and health knowledge among participants. This was mostly achieved through educational programmes focussing directly on lifestyles and health behaviours. Lifestyle and health behaviour- related educational programmes were further effective in reducing health risk factors, and achieving improvements in well-being and depressive symptoms. Policies targeting the economic and social environment providing financial transfers to deprived regions had positive long-term health effects, and interventions aimed at the built environment (for instance through urban renewal) had some effect on physical and mental health.

KEY MESSAGES

- This review suggests that programmes targeting different dimensions of population health in schools, the workplace and communities have improved health knowledge, skills and behaviours and contributed to reduce health risk factors.
- Most articles assessed programmes promoting healthy lifestyles and healthy behaviours, reducing sedentary behaviours and improving nutrition, physical and mental health by developing participants' skills and health knowledge.
- Fewer studies evaluated programmes that were focussed on the built environment, health services or on issues related to demographic change.
- Tailored programmes with extensive baseline assessments were more effective in changing behaviours, reducing health risk factors, improving mental health and having long term impact.

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