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BARCELONA SYNCHROTRON PARK

HEALTH IMPACT ASSESSMENT AND SPECIFYING MONITORING INDICATORS FOR THE UDMP FOR THE DEMARCATION AND PLANING OF THE CENTRE DIRECCIONAL IN CERDANYOLA DEL VALLÈS

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Credits

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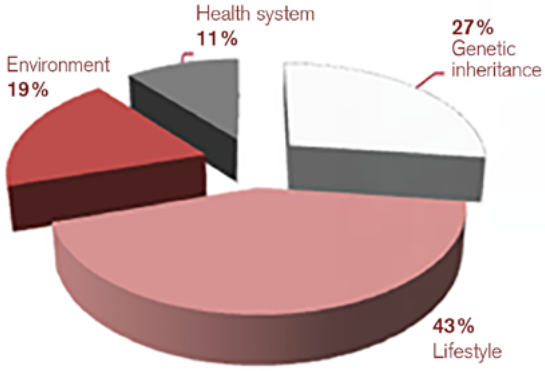
1. INTRODUCTION

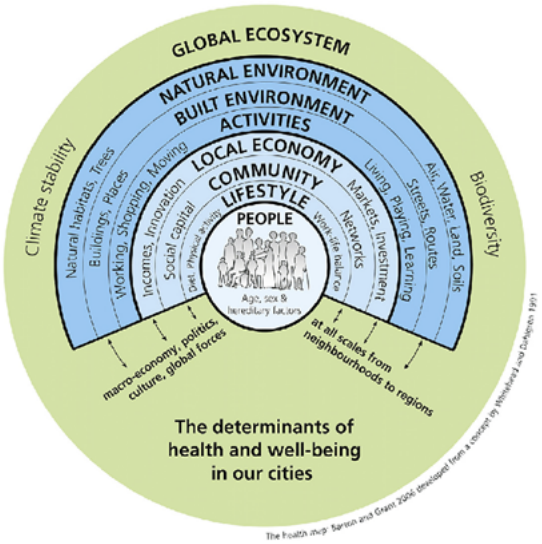
BACKGROUND

Urban planning is the main tool which local councils have to decide how their town or city should develop. Its growth, the location of facilities and green areas, conversion areas and mobility patterns all depend on the approach taken in urban planning.

Furthermore, approximately 70% of people's health depends on the space and environment where they live; that is, the combination of lifestyles, the built environment, the natural environment and social relations.



The health map (Barton & Grant) shows the complexity of the factors impacting health.



This map personal characteristics (age, sex and hereditary factors) are not the most decisive factor in people's health, but rather they are influenced by lifestyle, community, social relations, the local economy (which will determine the level of income) and the activities people do. Yet more than anything else, the most decisive factors stem from the environment: the built environment and the natural environment.

This is why the UDMP for the demarcation and planning of the *Centre Direccional in Cerdanyola del Vallès* includes the Healthy City concept in its planning criteria and sets the health of its residents as an target to be achieved through the various actions planned.

Against this backdrop, the Master Plan includes both healthy urban planning criteria and also a selection of indicators and a monitoring methodology which allows the subsequent evaluation of the actions implemented.

This is the purpose of this "Assessment of Health Impact and Implementation of Healthy City Indicators" study, which should make it possible to evaluate over the coming years the fit between the actions envisaged and the health targets set.

URBAN PLANNING FOR HEALTH

In urban planning, health should be addressed in its broadest sense and include factors concerning environmental health and others which foster healthy habits and the wellbeing of the public: environmental, physical and social health.

The Plan needs to contain specifications related to social cohesion, facilities, open spaces, housing, sustainability, mobility and the restoration of former degraded spaces (landfills and others) to achieve a positive impact on physical activity and on noise and air pollution.

The end purpose is to connect scientific evidence with local urban planning to ensure that right from the outset one of the core aspects of the city of the next few years will be health.

Placing health at the heart of the Plan's approach means rethinking all actions and strategies in terms of the impact they will have on people's health.

Urban planning needs to consider the health of today and the health of the future, taking into account the progressive rise in life expectancy and therefore the ageing of the population along with the dynamics of living, working, leisure and lifestyle patterns in general.

A holistic vision of health leads to actions concerning aspects as varied as physical activity, social relations, the environment and the urban landscape on the grounds that all of them will have a constructive impact on the health of the city and therefore of its inhabitants. Likewise, the health of the city involves encouraging urban recycling and regenerating degraded spaces, promoting new urban centers, bringing leisure and culture into public space and building in sustainability criteria.

It should be borne in mind that physical inactivity is the fourth most important risk factor for mortality worldwide, behind only high blood pressure, smoking and high blood sugar. This indicator is symptomatic of the fact that cardiovascular diseases are the leading cause of death in Spain.

Hence the WHO contends that individual risk factors are responsible for 60% of the disease burden, with overweight, lack of physical activity, smoking, alcohol and food habits being the main causes.

This is the context in which cardiovascular diseases are associated with urban environments and people's lifestyles in which drinking alcohol and sedentary behaviour are a harmful combination for this type of disease. There are also other socioeconomic and social determinants which have a considerable impact on quality of life indicators and consequently it is argued that health determinants have economic and social roots.

As a place where social interactions are generated and where all the individual and community aspects of people become meaningful, cities are constantly evolving and changing, and their actions have a direct impact on their inhabitants.

URBAN DEVELOPMENT MASTER PLAN (UDMP) FOR THE CENTRE DIRECCIONAL IN CERDANYOLA DEL VALLÈS

The *Centre Direccional in Cerdanyola* had been defined in the General Metropolitan Plan in 1976 and was set up in a key part of the Barcelona Metropolitan Area as a new offsetting and counterweight urban centre in the Barcelona area. Sited between the towns of Cerdanyola and Sant Cugat del Vallès and between the Autonomous University and Collserola Park, it is a well-connected area suitable for hosting scientific and technological activities, Cerdanyola's residential growth and also creating a large open space which fosters the connection from Collserola Park northwards as far as Sant Llorenç del Munt and the Obac mountain range along what is called the Vallès greenway.

Since it was set out in the General Metropolitan Plan, the *Centre Direccional* has undergone several planning amendments designed to address a range of conditioning factors and requirements. As a result its implementation, which began with the Sector Zoning Plan in 2005, has yet to be completed. This means there are pre-existing facilities such as the Alba Synchrotron, which opened in 2010, and 15% of the Alba Park sector which has already taken shape and basically includes the urban development work for the science and technology park, restoration work on land which is not compatible with the new planned uses (dismantling and land remediation) and the first stage of restoration of the green corridor. The Alba Park sector currently hosts three corporate buildings, three technology centres and a block of 24 flats.

Covering an area coming to approximately 407 hectares, the UDMP consists of two sectors: the Alba Park sector and the Can Costa sector. It has a compact layout made up of three areas: **the Science and Technology Park,** directly connected to the Autonomous University of Barcelona along Av. de la Ciència, the **residential neighbourhood** as a natural extension of Cerdanyola in the eastern part of the sector, and the **Green Corridor** as a wide strip of open space in the western part of the sector.

DESCRIPTION OF THE LAYOUT

The main features of the layout in the Master Plan are set out below:

SYSTEMS

• Open spaces

The UDMP proposes a system of public green spaces founded on the goals of ecological connectors and open spaces consistent with the territorial matrix proposed by the Barcelona Metropolitan Spatial Plan and the UDMP for the Metropolitan Area. These main spaces are combined with other areas which make up a matrix of green areas surrounding the built-up areas and integrated into the planning as open spaces.

The nature corridor is defined as a transition area between the Collserola Areas of Natural Interest Plan and the areas which will make up the greenway to Sant LLorenç del Munt and l'Obac to the north of the AP-7 motorway.

To ensure maintenance and improvement of the environmental features of the green corridor, measures are in place for:

- *Maintenance of the agro-forestry mosaic.*
- *Restoration of degraded areas.*
- *Mapping out wildlife paths to ensure permeability with the infrastructures, especially roads, which cross it.*
- *Restoration of riverside woods on the banks of watercourses and streams.*
- *Retaining some unique buildings such as Can Fatjó dels Xiprers farmhouse and its immediate surroundings.*

Likewise, a wide strip of open space is reserved for the protection and recovery of the Sant Cugat stream as a river park.

In the eastern part of the area, it is proposed to recover the land occupied by the former Can Planes landfill as a central park. A number of studies have been conducted which conclude that this land can be used as an open space. Given its size and central location, this new park will be significant for the whole of Cerdanyola del Vallès.

The watercourses running through the area will be maintained, recovered and integrated as far as possible as open structuring spaces.

• Roads

The UDMP establishes a basic road system which is largely orthogonal running in a north-south and east-west direction. It will provide appropriate connections between the current town and the new sector which include sustainable modes (pedestrian priority roads and bike lanes on all roads in the conventional road network). The idea is that the road network in the new sector should deepen its relationship with the existing urban network while also enhancing and ensuring better connections for the Autonomous University and with the Technology Park along Av. de la Ciència and the future Rambla dels Gorgs (Av. de la Universitat Autònoma).

• Facilities

It is proposed to set aside three large areas for structuring facilities: the first where most of the new residential uses are and connected with Cerdanyola; a second in the south of the area at the junction of the BP-1413 road and the Av. de la Ciència at the entrance to Collserola Park; and a third adjacent to the green corridor and the Science Park. These structuring facility areas are accompanied by other smaller ones strategically laid out to deliver local services to the various areas.

ZONES

• Residential

The residential districts are in the north-eastern part of the area. They are a model of natural and continuous growth of the current town and consequently avoid the formation of isolated residential areas which are functionally disconnected from the current urban

system.
The proposed development seeks to reinforce the complexity and flexibility of uses in residential areas.

• Economic activity

It is proposed that uses for economic activities and the Science Park should primarily concern new technology along with other supplementary or supporting ones. Two areas are envisaged which are principally designed for tertiary uses: one in the southern part of the Sant Marçal Castle axis and the other in the north-western part of the area. The latter zone is strategically located within the area as frontage with the AP-7 / B-30.

An area is also planned that will primarily be for commercial uses in the north-eastern part of the area next to Cerdanyola del Vallès and adjacent to the future intermodal station. This area has excellent road connections with the immediate urban environment as it is at the crossroads of two major future roads (the future Nova Rambla and the east-west bypass).

• Private green areas

Several zones are planned for private green areas: Sant Marçal Castle, Can Fatjó dels Xiprers, Can Planas and Can Costa. They are sited where there is existing architectural heritage compatible with the new planning. Their purpose is to ensure that the features to be conserved are appropriately adapted to the new buildings, with some allowed to be rounded off with new uses.

GENERAL SPECIFICATIONS

FACILITIES	261.459,71 m²l			
OPEN SPACES	1.648.897,91 m²l			
RIVERS	124.435,74 m²l			
SYSTEMS PROTECTION	135.837,94 m²l			
SYNCHROTRON	61.208 m²l			
TECHNICAL SERVICES	24.871,38 m²l			
RAILWAYS	108.996,27 m²l			
ROADS	608.878,15 m²l			
TOTAL SYSTEMS	**2.974.585,09 m²l**	**72.91%**		
RESIDENTIAL / ECONOMIC ACTIVITY ON GF AREAS	222.598,65 m²l		610.344,65 m²gfa	28.66%
SCIENCE PARK AREAS	694.312,68 m²l		1.487.805,35 m²gfa	69.64%
OTHER PRIVATE USE AREAS	188.156,58 m²l		38.420,00 m²gfa	1.80%
TOTAL AREAS	**1.105.067,91 m²l**	**27.09%**	**2.136.570,00 m²gfa**	
TOTAL	**4.079.653,00 m²l**	**100.00%**	**2.136.570,00 m²gfa**	**100.00%**

2. METHODOLOGY

• Health impact Assessment

Health impact assessment is not very widespread in Spain, notwithstanding the consensus on its positive outcomes.

The little progress made in this respect has left urban planning actions to one side and focused on other very specific measures or ones concerning management of unique elements.

Consequently, assessing the health impact of planning is much more complex as it involves multiple actions at the same time which makes it difficult to draw conclusions in one way or another.

Despite this difficulty, what can be done is to analyse the relationship of the planned actions with the health indicators based on scientific research into the studies and published literature.

The purpose is to identify the potential health impacts of specific actions to be used for self-assessment of the plan, thus making it easier to take decisions and include recommendations.

• Methodology for implementing indicators

The methodology for implementing valid monitoring indicators to assess the Master Plan's health impact consists of three successive stages which make it possible to draw up monitoring and self-assessment strategies for the Plan.

The Plan's initial approval document includes details of each of the three stages along with an initial estimate of the Master Plan's health impact.

1. Description of the Master Plan proposals

Based on the proposals contained in the Master Plan document, this study provides a list of specific actions broken down by topic and/or area so they can be examined in terms of health.

Each proposal has been summarised in a file so that its health impact can be assessed.

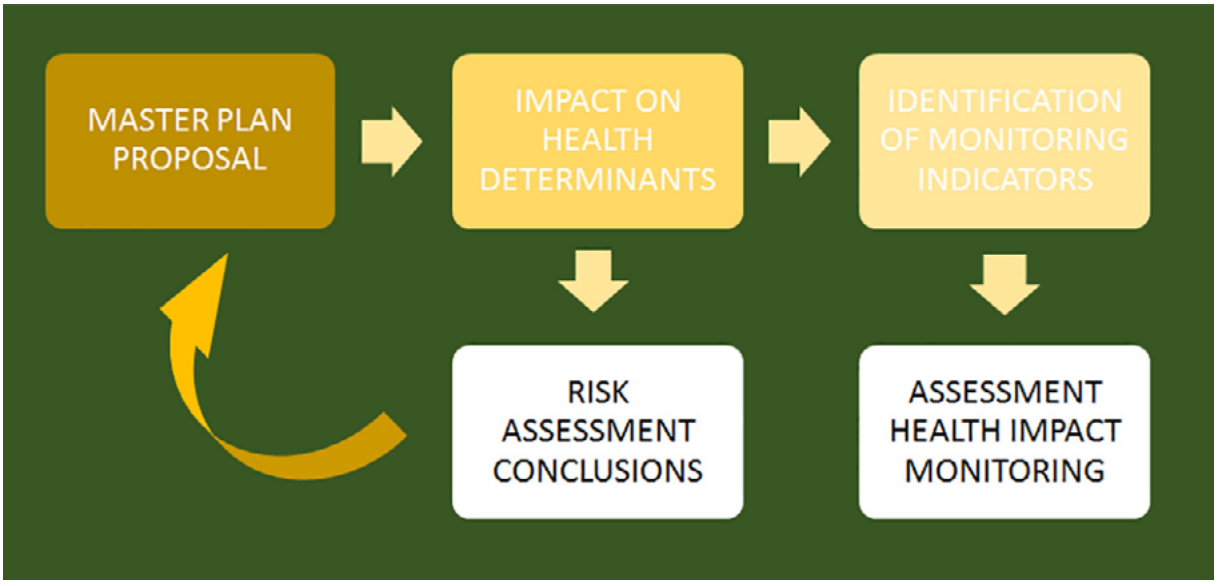


Diagram of the methodology for implementing health indicators in the Master Plan

2. Identification of impact on health determinants

The above analysis makes it possible to identify and describe the changes which planning might bring about in the issues that are most likely to impact health (urban planning determinants) so that priority can be given to the ones likely to have the greatest impact.

The relevance of these determinants is assessed qualitatively by considering three key aspects of the impacts: their likelihood, intensity and potential permanence or irreversibility.

The identification of health determinants and their assessment has enabled the first conclusions to be drawn on the impact of the proposals contained in the Master Plan and is thus a useful tool for including recommendations for the subsequent stages of its development.

The health determinants are classified into environmental, socioeconomic, mobility and landscape factors.

3. Identification of indicators

Once the health determinants have been identified, which health indicators they impact will be assessed and the ones most likely to be altered by the measures taken under the Plan will be selected.

Careful selection of the indicators will allow a preliminary assessment of health in the area likely to be affected by the Master Plan.

The appropriate assessment and monitoring scale and the sources of information for each one will be shown along with an estimate of the Master Plan's health impact.

The Master Plan's health impact

Implementation of the Plan's health monitoring indicators will make it possible to confirm the suitability of the proposals and they will provide support for subsequent decision-making about the Plan's development.

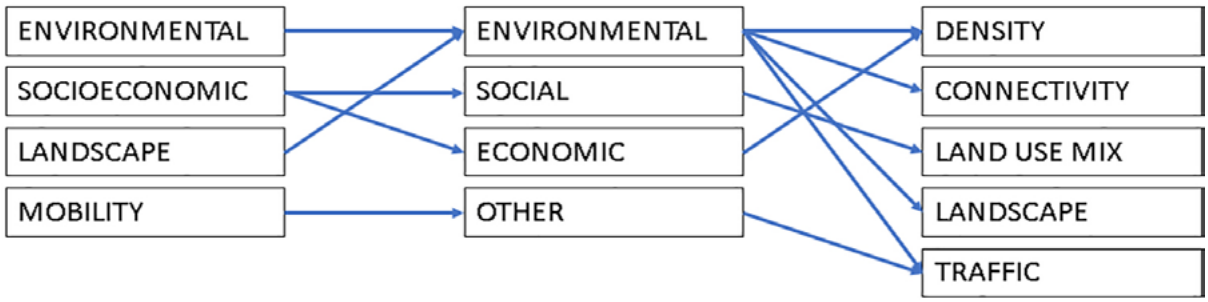
Likewise, having a series of indicators and a methodology for their monitoring and assessment will make it possible to consider the final health impact of the proposals.

SELECTING URBAN PLANNING DETERMINANTS

• Urban planning determinants

Are actions where there is scientific evidence that they may have an impact on health.

There are several classifications of urban planning determinants:



Traditionally these health determinants have been clustered in environmental, socioeconomic, mobility and landscape factors along with social, economic, environmental and other factors.

Although this is the traditional classification, examination of scientific studies shows that the health determinants would be clustered into the following five major groups: density, connectivity, land use mix, landscape and traffic.

Below are the 16 urban planning determinants identified and clustered into each of these five groups:

Density	01	Population and residential density
	02	Business density
Street connectivity (accessibility)	03	Number and type of intersections
	04	Bike lanes / cyclability
	05	Routes for pedestrians / walkability
	06	Public transport
Land use mix (diversity)	07	Health, wellbeing and community services
	08	Entertainment, culture and recreation services
	09	Physical and sport infrastructures (leisure & sport)
	10	Public open spaces
Landscape	11	Green and blue areas (greenness index, trees, vegetation, lakes, rivers, etc.)
	12	Aesthetic
	13	Urban furniture
	14	Maintenance and lighting
Traffic	15	Type of traffic
	16	Traffic density

• DENSITY

Aerial view of the new residential district in the UDMP interlinked with Cerdanyola

01.- Population and residential density

DEFINITION:

· Population density refers to the number of people per area unit. Residential density refers to the type of housing (single-family, multi-family).

· Living in areas with higher density is associated with greater walkability, an increase in physical activity and a decrease in obesity as well as a reduction in the risk of depression.

· However, it is also associated with higher levels of particulate air pollution.

MEASURING INSTRUMENT:

· Inhabitants/km^2

02.- Business density

DEFINITION:

Business density refers to the number of businesses or economic activities per area unit.

MEASURING INSTRUMENT:

· Retail per inhabitant ratio

· No. of companies per area unit

· Gross income per capita

• CONNECTIVITY

03.- Intersections

Artist's impression of a junction in the lower part of Avinguda de la Ciència

DEFINITION:

It refers to the ability to move easily between destinations as well as the number and type of intersections.

MEASURING INSTRUMENT:

· Number of intersections with three or more streets per km^2

04.- Intersections

Artist's impression of a bike lane in the central reservation on Avinguda de la Ciència

DEFINITION:

· It refers to the presence or absence of bike lanes or a road network suitable for cycling or other non-motorised modes of transport.

·Interruptions in the layout of the bike lanes will discourage physical activity.

· Cycling for active leisure is related to the network of paths connecting points of natural interest, while cycling for daily transport is related to actual connectivity between points of interest in the city or activity areas.

MEASURING INSTRUMENT:

· Linear m of bike lanes

· Interruption points per km

05.- Walkability

Artist's impression of a pedestrian priority street in the new UDMP residential neighbourhood

DEFINITION:

· It refers to the ability to travel conveniently and safely to different parts of the city. Pavements, benches, fountains and trees will facilitate walkability, as will the existence of retail facilities and activities.

MEASURING INSTRUMENT:

· % of streets with pavements over 1.5 m wide

· Availability of pedestrian crossings (% of total junctions)

06.- Public transport

Current minibus line connecting Alba Park with FGC trains at the UAB and Renfe trains

DEFINITION:

· It refers to easy and nearby access to public transport.

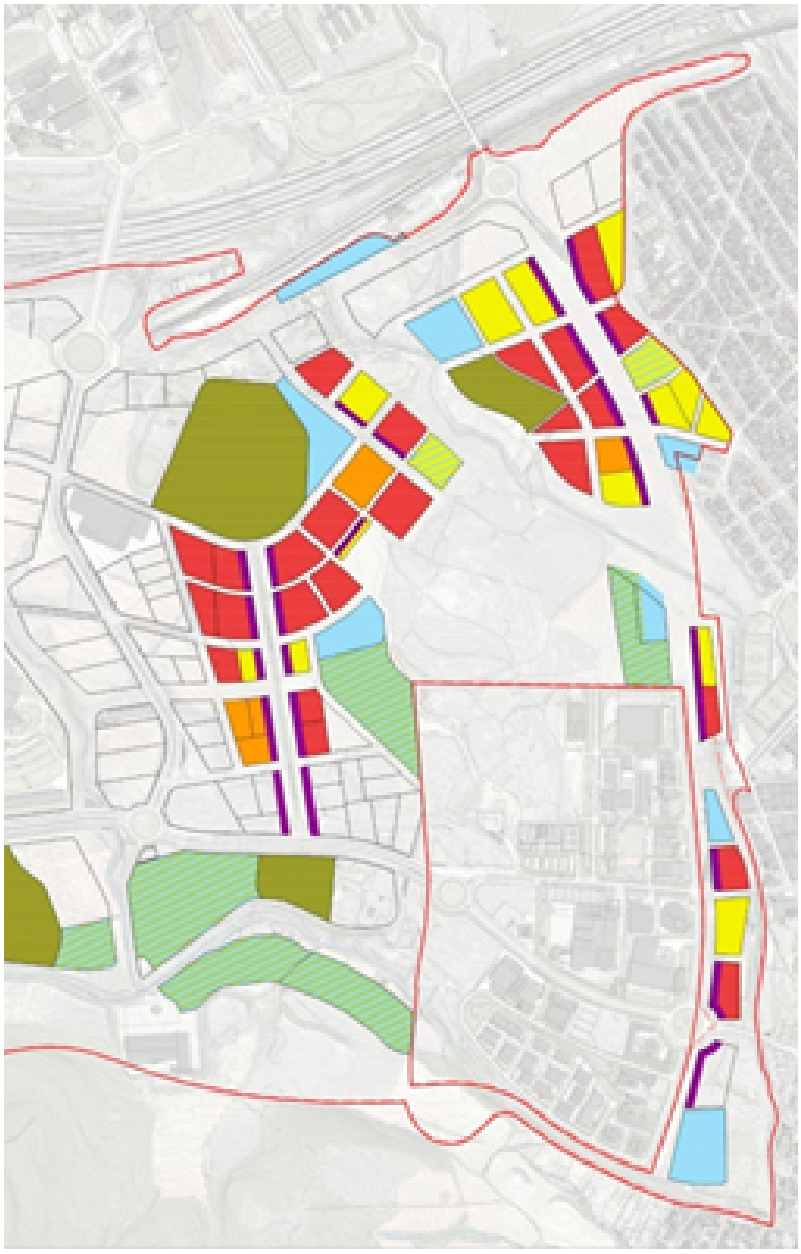
MEASURING INSTRUMENT:

· A public transport stop less than 400 m. away

· Average distance to the nearest stop

• LAND USE MIX

07.- Health, welfare and community services



KEY

FREE MARKET HOUSING

SOCIAL HOUSING-RG

SOCIAL HOUSING-PC

FACILITIES

OPEN AIR FACILITIES

GF FACILITIES

PRIVATE GREEN AREA

Analysis of uses in the UDMP residential neighbourhood

DEFINITION:

· It refers to the existence and closeness of various types of general services.

MEASURING INSTRUMENT:

· Average distance to the nearest store

· Health services per 20,000 people

08.- Entertainment, culture and recreation services

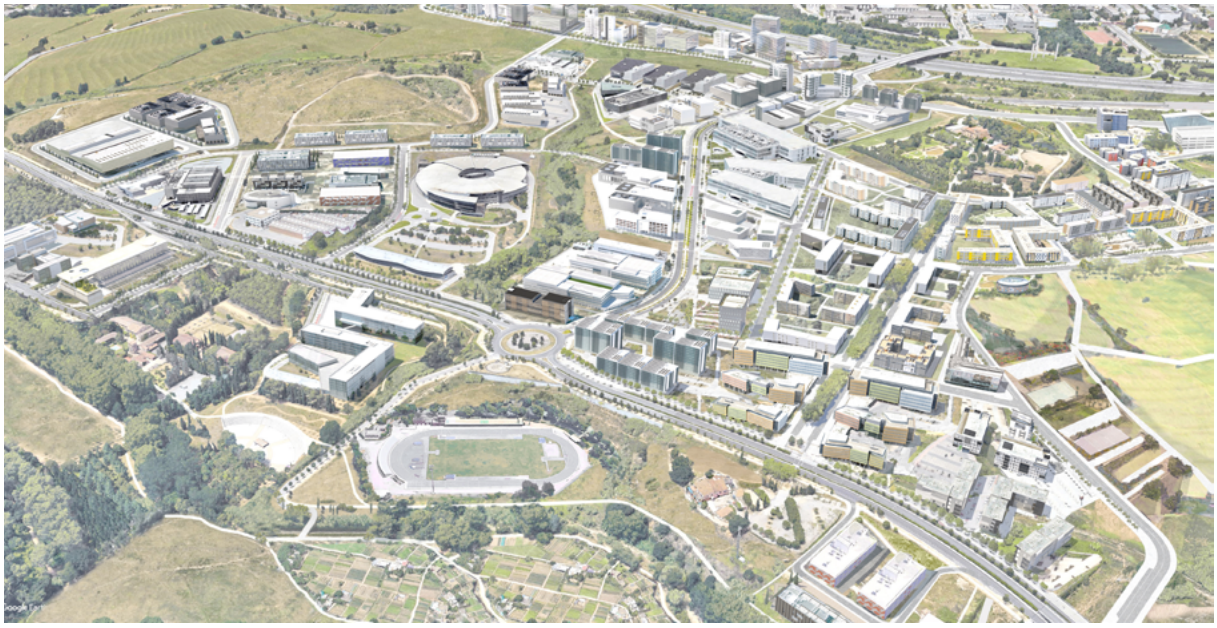
DEFINITION:

· It refers to the existence and closeness of various types of services for leisure or social interaction

MEASURING INSTRUMENT:

· Nearness to neighbourhood facilities (average distance)

09.- Physical and sports infrastructure (free time and sports)



Rendered aerial view of open spaces and sports infrastructure in the UDMP

DEFINITION:

· It refers to the existence and closeness of sports facilities (both outdoor and indoor)

MEASURING INSTRUMENT:

· Nearness to sports services (average distance)

10.- Public open spaces

View of the green corridor from the Mirador del Torrent del Bosque

DEFINITION:

· It refers to the existence and closeness of various types of services for leisure or social interaction

MEASURING INSTRUMENT:

· Nearness to neighbourhood facilities (average distance)

• LAND USE MIX

11.- Green and blue areas (greenness index, trees, vegetation, lakes, rivers, etc.)

Using nature-based solutions is encouraged in the Alba Park buildings, as is the case with this green roof at the Alba Synchrotron

Schematic view of the green and blue areas in the UDMP

DEFINITION:

· It refers to the amount of green areas
(areas zoned as green areas), the presence of urban green space in general (street trees, vegetation, flowerbeds, private green areas, etc.) and the presence of blue areas (rivers, lakes, springs, etc.)

MEASURING INSTRUMENT:

· M^2 of green area per inhabitant

· M^2 of vegetation per inhabitant

· M^2 of blue area per inhabitant

· No. of trees per km^2

· Tree types

12.- Aesthetic

Artist's impression of the future residential neighbourhood in the north of Can Planas Park

DEFINITION:

· It refers to the overall image of the town, its global appeal.

MEASURING INSTRUMENT:

· Perception survey

13.- Urban furniture

DEFINITION:

· It refers to the presence of facilities appropriate to the environment (benches, fountains, etc.)

MEASURING INSTRUMENT:

· Perception survey

· No. of benches, litter bins, fountains per 1,000 inhabitants

14 Maintenance and lighting

Green maintenance of tree pits

DEFINITION:

· It refers to appropriate maintenance and cleaning of the environment as well as the degree of street lighting and public spaces.

MEASURING INSTRUMENT:

· Perception survey

- **TRAFFIC**

15.- Type of traffic

Artist's impression of modes of transport on the future Rambla del Castell

DEFINITION:

· It refers to the presence of heavy vehicle traffic, trucks and goods transport and their speed.

MEASURING INSTRUMENT:

· Nearness to truck routes

· Average traffic speed

16 Traffic density

Current view of the BP-1413 road

DEFINITION:

· It refers to the number of vehicles on a given road or in a given area.

MEASURING INSTRUMENT:

· Car traffic / day

SELECTING HEALTH INDICATORS

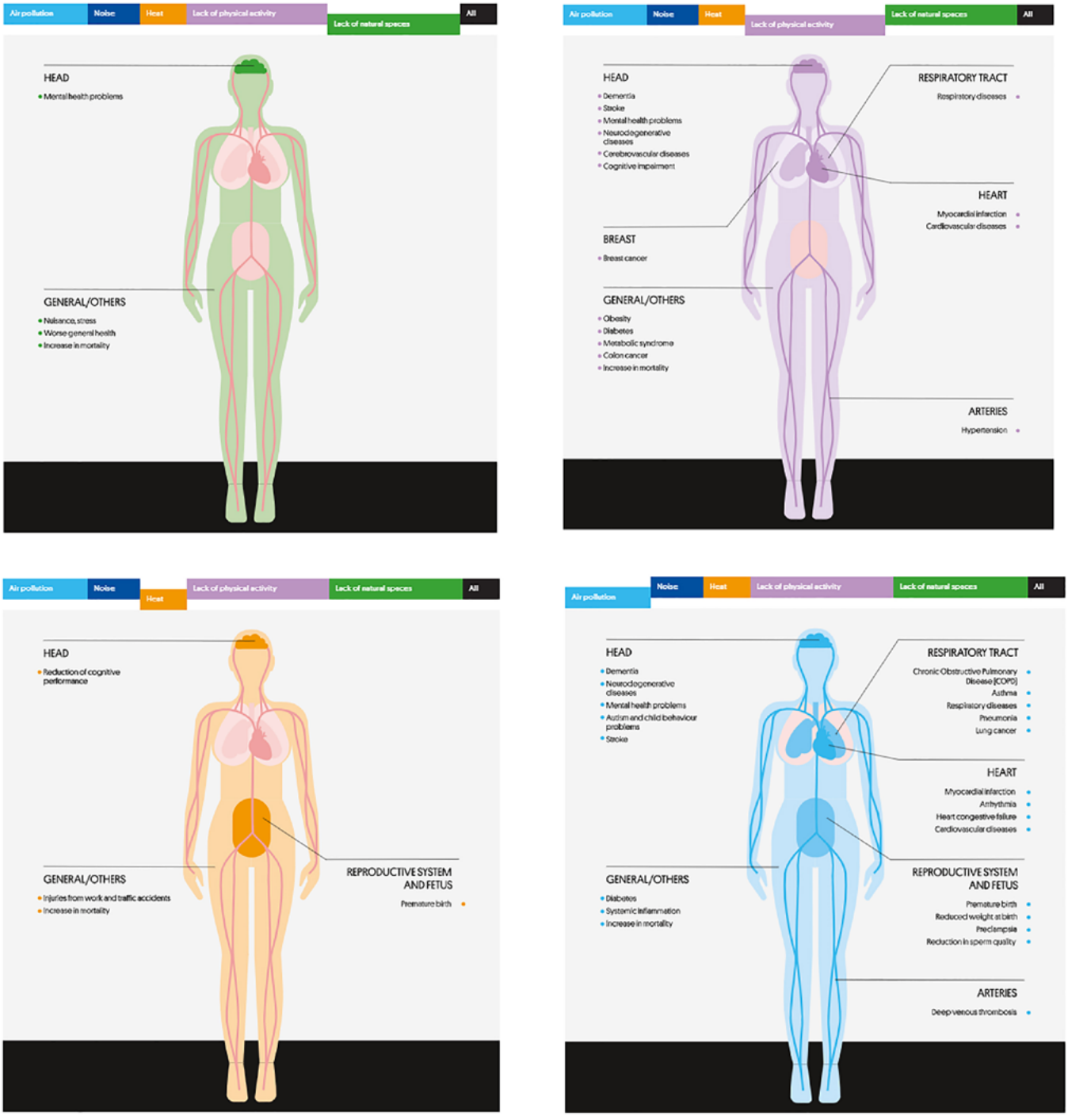
The scientific evidence acknowledges the relationship of urban development measures with 23 health indicators. These are grouped into Physical Health, Social Health, Environmental Health and Global Health Indicators:

PHYSICAL HEALTH	PHYSICAL	F01	Obesity and overweight
		F02	Type 2 diabetes
		F03	Cardiovascular diseases
		F04	Asthma and respiratory diseases
		F05	Functional capacity
		F06	Accidents and falls
		F07	Pain
	BEHAVIOURAL	F08	Physical activity
		F09	Sedentary behaviour
		F10	Food habits
SOCIAL HEALTH	PSYCHIC, EMOTIONAL OR SOCIAL	S01	Support & social skills
		S02	Stress and anxiety
		S03	Depression
		S04	Cognitive function
		S05	Emotional wellbeing
		S06	Attention deficit
		S07	Mental health & psychological disorder
ENVIRONN	ENVIRONMENTAL	A01	Noise pollution
		A02	Air pollution
GLOBAL	GLOBAL	G01	Wellbeing and quality of life
		G02	Vitality & happiness

Source: UVIC-UCC. Centre for Health and Social Studies

Point 4 of this document explains how to monitor, track and assess these indicators.
Each of these indicators is impacted by some type of urban development measure, some by more than one.

The main diseases related to urban development factors are as follows:



Global HI. Diseases related to lack of physical activity, heat, air pollution and lack of green spaces, respectively

RELATIONSHIP BETWEEN URBAN PLANNING DETERMINANTS AND HEALTH INDICATORS

The relationship between urban planning determinants and health indicators is complex and not simply cause and effect. Rather it involves multiple factors in each case in addition to causes independent of urban planning yet overlapping with the former.

However, the scientific evidence drawn from published research makes it possible to estimate the relationship between the determinants and the indicators:

Taking the five groups of determinants identified, the relationship would be as follows:

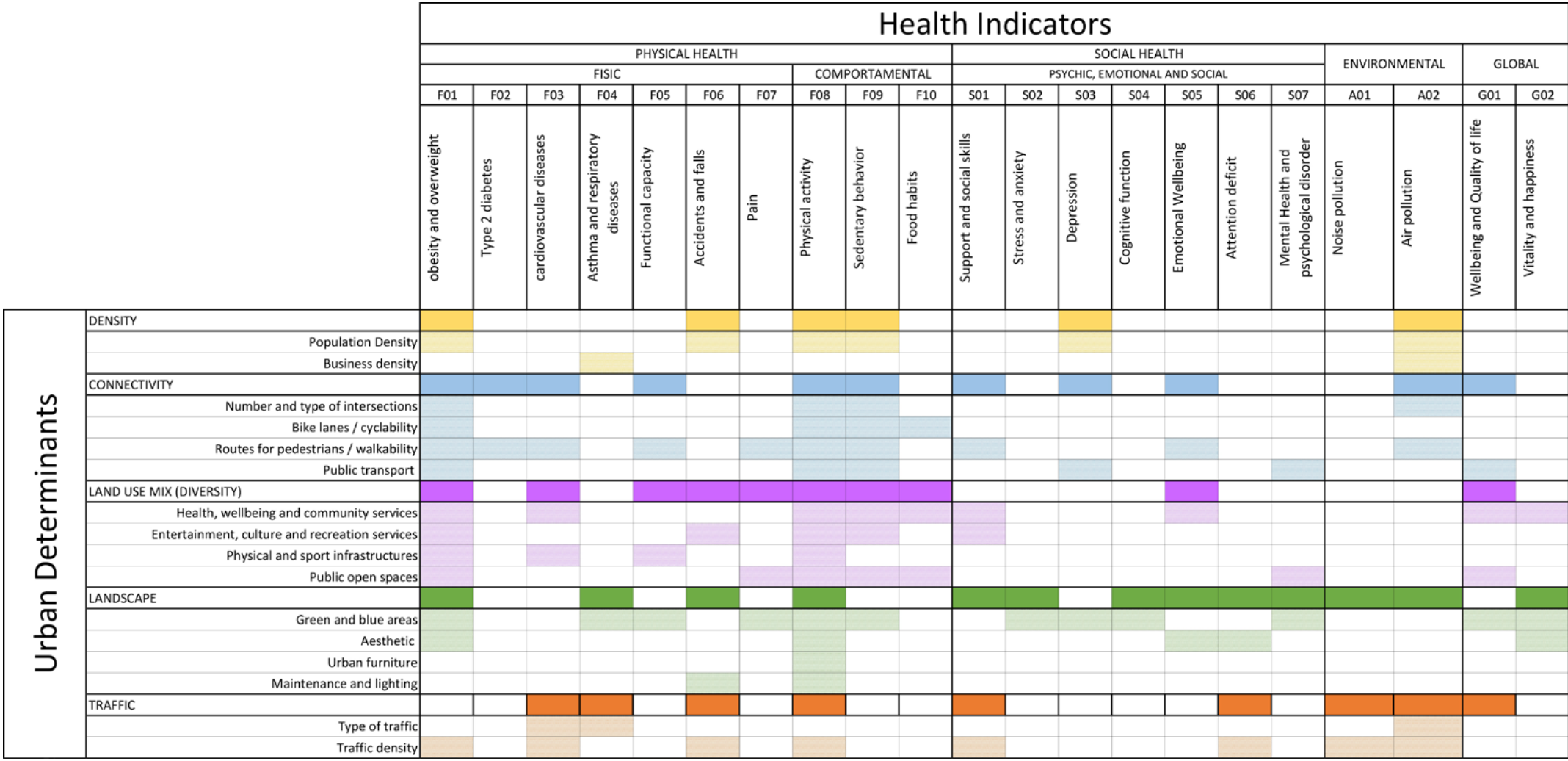
				Urban Determinant Groups				
				Density	Connectivity	Land use mix	Landscape	Traffic
PHYSICAL HEALTH	PHYSICAL	F01	Obesity and overweight					
		F02	Type 2 diabetes					
		F03	Cardiovascular diseases					
		F04	Asthma and respiratory diseases					
		F05	Functional capacity					
		F06	Accidents and falls					
		F07	Pain					
	BEHAVIOURAL	F08	Physical activity					
		F09	Sedentary behaviour					
		F10	Food habits					
SOCIAL HEALTH	PSYCHIC, EMOTIONAL OR SOCIAL	S01	Support & social skills					
		S02	Stress and anxiety					
		S03	Depression					
		S04	Cognitive function					
		S05	Emotional wellbeing					
		S06	Attention deficit					
		S07	Mental health & psychological disorder					
ENVIRONM	ENVIRONMENTAL	A01	Noise pollution					
		A02	Air pollution					
GLOBAL	GLOBAL	G01	Wellbeing and quality of life					
		G02	Vitality & happiness					

Source: UVIC-UCC. Centre for Health and Social Studies

This summary table is useful to see the interrelationship between health and urban planning determinants since it is clear that most indicators are influenced by more than one group of determinants. It also reveals interesting relationships such as that active behaviours are especially fostered by environments with a mix of uses and types.

Before assessing the Master Plan's health impact, the specific determinants within each group which are being proposed need to be established in order to define more precisely their impact on the health indicators.

This relationship between determinants and indicators is the first step in describing the relationship between urban development actions and their impact on health:

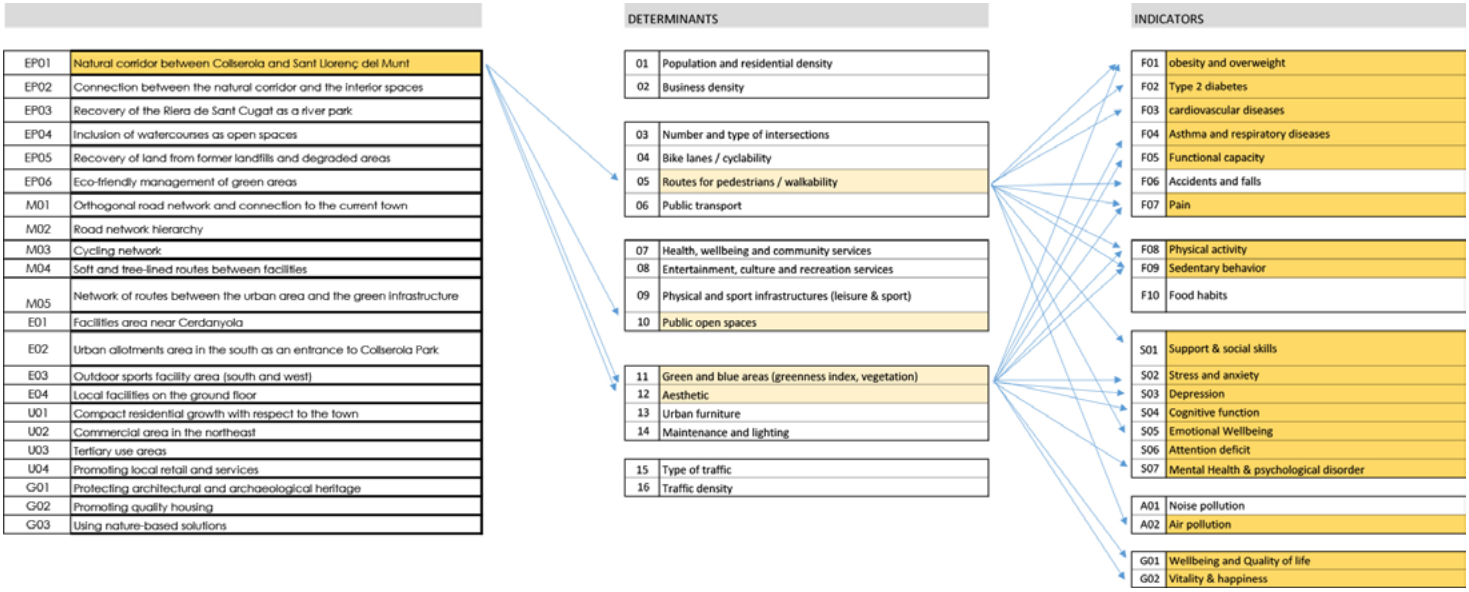

Health Indicators
PHYSICAL HEALTH
FISIC
COMPORTAMENTAL
SOCIAL HEALTH
PSYCHIC, EMOTIONAL AND SOCIAL
ENVIRONMENTAL
GLOBAL
F01 obesity and overweight
F02 Type 2 diabetes
F03 cardiovascular diseases
F04 Asthma and respiratory diseases
F05 Functional capacity
F06 Accidents and falls
F07 Pain
F08 Physical activity
F09 Sedentary behavior
F10 Food habits
S01 Support and social skills
S02 Stress and anxiety
S03 Depression
S04 Cognitive function
S05 Emotional Wellbeing
S06 Attention deficit
S07 Mental Health and psychological disorder
A01 Noise pollution
A02 Air pollution
G01 Wellbeing and Quality of life
G02 Vitality and happiness
Urban Determinants
DENSITY
Population Density
Business density
CONNECTIVITY
Number and type of intersections
Bike lanes / cyclability
Routes for pedestrians / walkability
Public transport
LAND USE MIX (DIVERSITY)
Health, wellbeing and community services
Entertainment, culture and recreation services
Physical and sport infrastructures
Public open spaces
LANDSCAPE
Green and blue areas
Aesthetic
Urban furniture
Maintenance and lighting
TRAFFIC
Type of traffic
Traffic density

Analysis of each action makes it possible to specify the urban planning determinants it is related to and therefore estimate the health indicators which may be most impacted.

Each action impacts several health indicators, and conversely each indicator is impacted by more than one action. This is sometimes positive and sometimes negative, so subsequent monitoring and assessment will be needed over time to determine the final impact on the health indicators.

For example, creating a natural green corridor between Collserola Park and Sant Llorenç del Munt connected to the interior areas of Can Domènech and Torrent de Sant Marçal is related to the urban planning determinants "Walkability /pedestrian infrastructure "; "public open spaces"; "green areas" and "aesthetic".

Likewise, each of these determinants is related to a number of health indicators: obesity and overweight, diabetes, cardiovascular diseases, respiratory diseases, functional capacity, level of physical activity, stress, depression, cognitive function, emotional wellbeing, mental health, air pollution, quality of life and happiness.



Each of the associations between the Master Plan's actions and the urban planning determinants has been made based on the criteria and objectives of each of the actions as described in the planning report for the initial approval of the Master Plan.

3. HEALTH IMPACT ASSESSMENT

LIST OF ACTIONS

From the global health standpoint, there are several areas determined by urban planning which generate an impact on the health determinants: Open Spaces, Social Cohesion, Facilities, Housing, Risk Protection and Mobility are examples.

The planning report includes the objectives in each of these areas. However, the main strategic strands for each of them in terms of health are set out below.

- **Open spaces**

Public space is one of the main indicators of urban quality and plays a key role in enhancing people's physical and mental health. The goal should be to achieve a network of well-equipped and interconnected public spaces which foster active daily life and provide open spaces for physical activity and sport.

More specifically, interconnection of the different types of green spaces is envisaged: natural green spaces, urban green spaces and promoting green areas in building.

In terms of management, the Master Plan enhances "green infrastructure", based on five main action strands: ecological restoration (conservation of the green corridor, restoration of river courses, restoration of forests, permeabilisation of road infrastructures and restoration of land occupied by former non-compatible activities), using nature-based solutions (naturalised drainage systems, naturalised flood control basin project, promotion of green infrastructure in buildings), ecological management of green spaces and sectors pending construction (maintenance of habitats and crops, ecological gardening practices, recovery of unique trees), support for agriculture and the network of healthy/educational trails.

- **Social Cohesion and Housing**

The planning outlines a balanced combination of sectors where business and residential areas are alongside ones for crops, streams, rivers and forests, and where an extensive ecological connector is preserved.

The blending and mix of uses and spaces is part of the origin of the Master Plan.

Social cohesion means fostering the mix of uses and types and promoting a rich and diverse network which, insofar as this may be possible, encourages interaction between its inhabitants, thereby averting their physical and social isolation. There are several indicators of psychological health which are influenced by these parameters.

Thus one of the Master Plan's goals is to promote the complex city by generating areas with housing, offices, working spaces, schools, public services and open spaces.

The residential and economic activity districts are a model of natural and continuous growth of the current town and avoid the formation of residential areas which are functionally disconnected from the current urban system.

- **Facilities**

The Plan includes reservations that enable integrated approaches between facilities and open spaces, seeking a symbiosis between both systems, enhancing the relationship between them and generating a complex network conducive to sustainable mobility. Similarly, it includes the proposal to locate facilities on the ground floor of residential areas.

The land for facilities also connects the new residential area with Cerdanyola to draw both networks together.

- **Mobility**

In terms of the Master Plan's basic road structure, roads built in the course of the previous plan are retained while adding and prioritising the network for pedestrians and cyclists on all the main routes.

The development of these soft routes connecting the facilities should allow the creation of tree-lined itineraries which encourage travel by non-motorised modes of transport.

- **Risk protection and restoration of landfills and formerly degraded areas**

The purpose of the planning proposal is to guard against potential natural and technological risks, especially as a result of noise pollution, flooding risk, infill soil, former industrial warehouses and facilities, wildfire risk, light impact, air pollution and chemical hazards.

The Plan includes measures in each of these areas as stated in the planning report.

In the case of regenerating land occupied by former landfills or degraded spaces, the environmental restoration measures to be implemented are connected to the uses envisaged by the planning. In these cases, the proposal contained in the Master Plan is based on the premise that the land has been properly restored and that assessments have been made to ensure the compatibility of the land uses specified in the Master Plan by means of quantitative risk analysis (QRA) if needed.

Based on the foregoing, the Master Plan's proposals have been summarised in 22 actions. Below is a list of them and the information sheets for each one.

OPEN SPACES	EP01	Natural corridor between Collserola and Sant Llorenç de Munt
	EP02	Connection between the natural corridor and the interior
	EP03	Recovery of the Riera de Sant Cugat as a river park
	EP04	Inclusion of watercourses as open spaces
	EP05	Recovery of land from former landfills and degraded areas
	EP06	Recovery of land from former landfills and degraded areas
MOBILITY	M01	Orthogonal road network and connection with the current town
	M02	Road network hierarchy
	M03	Cycling network
	M04	Soft and tree-lined itineraries between facilities
	M05	Network of routes between the urban area and the green infrastructure
FACILITIES	E01	Facilities area near Cerdanyola
	E02	Urban allotments area in the south as an entrace to Collserola Park
	E03	Outdor sports facility area (south and west)
	E04	Local facilities on the ground floor
USES	U01	Compact residential growth with respect to the town
	U02	Commercial area in the north-east
	U03	Tertiary use areas
	U04	Promoting local retail and services
GENERAL	G01	Protecting architectural and archaeological heritage
	G01	Promoting quality housing
	G01	Using nature-based solutions

RELATIONSHIP BETWEEN ACTIONS AND DETERMINANTS

A summary table of the Plan's health impact can be drawn up by identifying the impact of each of the Master Plan proposals on the health indicators.

This table provides a graphic display of which determinants and indicators are being impacted to a greater or lesser extent and therefore makes it possible to assess the overall balance of the proposal.

This table has a twofold purpose: firstly, to reveal this impact with a view to its subsequent monitoring; and secondly, to make it possible to self-assess the Plan during its drafting process, since it shows the presence or absence of actions that impact a given indicator.

As for the impact on urban planning determinants, it can be seen that all of them are influenced to a greater or lesser extent by the actions of the Master Plan, which suggests it is balanced (see Figure 1).

In terms of the impact of the actions on health indicators, there is a greater effect on behavioural health indicators (physical activity and sedentary behaviour) and this means the physical health indicators most influenced are obesity and cardiovascular diseases (see Figure 2).

Secondly, the increase in green areas and green spaces is directly correlated with social health indicators such as the ones concerning emotional wellbeing.

				DETERMINANTS															
				Connectivitat de la xarxa				Mixticitat d'usos (diversitat)				Paisatge urbà				Densitat		Trànsit	
				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
	CODI	NOM	TIPOLOGIA	Nombre i tipus d'interseccions (cruïlles)	Carrils bici /ciclabilitat	Rutes per a vianants / caminabilitat	Transport públic	Serveis de salut, benestar i comunitaris	Serveis d'entreteniment, cultura i recreació	Infraestructures físico-esportives (lleure i esport)	Espais públics oberts	Zones verdes i blaves (coberta verda, arbrat, vegetació, llacs, rius, etc.)	Estètica	Mobiliari urbà	Manteniment i il·luminació	Densitat de Població i residencial	Densitat Econòmica	Tipus de trànsit	Volum de trànsit
ESPAIS LLIURES	EP01	Corredor natural entre Collserola i Sant Llorenç del Munt	ESPAIS LLIURES			X					X	X	X						
	EP02	Connexió entre el corredor natural i els espais interiors	ESPAIS LLIURES		X	X													
	EP03	Recuperació de la Riera de Sant Cugat com a parc fluvial	ESPAIS LLIURES			X				X	X	X		X					
	EP04	Incorporació dels torrents com a espais lliures	ESPAIS LLIURES			X				X	X	X		X					
	EP05	Recuperació dels sòls dels antics abocadors i espais degradats	ESPAIS LLIURES								X	X	X	X	X				
	EP06	Gestió ecològica dels espais verds	ESPAIS LLIURES									X	X						
MOBILITAT	M01	Xarxa viària ortogonal i connectora amb l'actual nucli urbà	MOBILITAT	X	X	X	X												X
	M02	Jerarquització de la xarxa viària	MOBILITAT		X	X							X	X	X		X		X
	M03	Xarxa ciclista	MOBILITAT	X	X									X					
	M04	Itineraris tous i arbrats entre equipaments	MOBILITAT		X	X								X	X				
	M05	Xarxa d'itineraris entre la zona urbana i la infraestructura verda	MOBILITAT		X	X									X				
EQUIPAMENTS	E01	Zona d'equipaments pròxima al nucli urbà de Cerdanyola	EQUIPAMENTS					X	X										
	E02	Zona d'horts urbans al sud, com a entrada al Parc de Collserola	EQUIPAMENTS						X	X			X						
	E03	Zona d'equipaments esportius a l'aire lliure (sud i oest)	EQUIPAMENTS							X	X								
	E04	Equipaments de proximitat, en planta baixa	EQUIPAMENTS					X	X										
USOS	U01	Creixement residencial compacte respecte el nucli urbà	USOS			X		X								X	X		X
	U02	Zona comercial al nord-est	USOS														X	X	X
	U03	Zones destinades a usos terciaris	USOS														X	X	X
	U04	Impuls al comerç i als serveis de proximitat	USOS			X		X	X								X		
GENERAL	G01	Protecció del patrimoni arquitectònic i arqueològic	GENERAL										X						
	G02	Foment de la qualitat dels habitatges	GENERAL										X		X	X			
	G03	Aplicació de solucions basades en la natura	GENERAL									X	X						

Fig. 2_ Impact of Master Plan actions on health indicators. Source: author's own compilation

				SALUT FISICA											SALUT SOCIAL							AMBIENTAL		GLOBAL	
				FISIC							COMPORTAMENTAL				PSÍQUIC, EMOCIONAL O SOCIAL										
	CODI	NOM	TIPOLOGIA	F01	F02	F03	F04	F05	F06	F07	F08	F09	F10	S01	S02	S03	S04	S05	S06	S07	A01	A02	G01	G02
				Obesitat i sobrepès	Diabetis tipus 2	Malalties cardio-vasculars	Asma i malalties respiratòries	Capacitat funcional	Accidents i caigudes	Dolor	Activitat física	Comportament sedentari	Alimentació	Suport i competències socials	Estrès i angoixa	Depressió	Funció cognitiva	Benestar Emocional	Déficit d'atenció	Salut Mental i trastorn psicològic	Contaminació acústica	Contaminació de l'aire	Benestar i Qualitat de vida	Vitalitat i felicitat
ESPAIS LLIURES	EP01	Corredor natural entre Collserola i Sant Llorenç del Munt	ESPAIS LLIURES	XXXX	X	X	X	XX		XXX	XXXX	XXXX	X	X	X	X	X	XX	X	XX		X	XX	XX
	EP02	Connexió entre el corredor natural i els espais interiors	ESPAIS LLIURES	XX	X	X		X		X	XX	XX	X	X				X				X		
	EP03	Recuperació de la Riera de Sant Cugat com a parc fluvial	ESPAIS LLIURES	XXXX	X	XX	X	XXX		XXX	XXXXX	XXX	X	X	X	X	X	X		XX		X	XX	X
	EP04	Incorporació dels torrents com a espais lliures	ESPAIS LLIURES	XXXX	X	XX	X	XXX		XXX	XXXXX	XXX	X	X	X	X	X	X		XX		X	XX	X
	EP05	Recuperació dels sòls dels antics abocadors i espais degradats	ESPAIS LLIURES	XXX			X	X	X	XX	XXXX	XX	X		X	X	X	X	X	XX			XX	XX
	EP06	Gestió ecològica dels espais verds	ESPAIS LLIURES	XX			X	X		X	XX	X			X	X	X	X	X	X			X	XX
MOBILITAT	M01	Xarxa viària ortogonal i connectora amb l'actual nucli urbà	MOBILITAT	XXXXX	X	XX		X	X		XXXX	XXXX		XX		X		X	X		X	XXX	X	
	M02	Jerarquització de la xarxa viària	MOBILITAT	XXXX	X	XX	X	X	XX	X	XXXX	XX	X	XX				XX	XX		X	XXX		X
	M03	Xarxa ciclista	MOBILITAT	XX							XXX	XX	X									X		
	M04	Itineraris tous i arbrats entre equipaments	MOBILITAT	XX	X	X		X	X	X	XXX	XX	X	X				X				X		
	M05	Xarxa d'itineraris entre la zona urbana i la infraestructura verda	MOBILITAT	XX	X	X		X	X	X	XXX	XX	X	X				X				X		
EQUIPAMENTS	E01	Zona d'equipaments pròxima al nucli urbà de Cerdanyola	EQUIPAMENTS	XX		X			X		XX	XX	X	XX				X					X	X
	E02	Zona d'horts urbans al sud, com a entrada al Parc de Collserola	EQUIPAMENTS	XXX		X		X	X		XXX	X	XX	X				X	X					X
	E03	Zona d'equipaments esportius a l'aire lliure (sud i oest)	EQUIPAMENTS	XX		X		X		X	XX	X	X							X			X	
	E04	Equipaments de proximitat, en planta baixa	EQUIPAMENTS	XX		X			X		XX	XX	X	XX				X					X	X
USOS	U01	Creixement residencial compacte respecte el nucli urbà	USOS	XXXX	X	XXX	X	X	XX	X	XXXX	XXX	X	XXX		X		XX	X		X	XXXX	X	X
	U02	Zona comercial al nord-est	USOS	X		XX	XX		X		X			X					X		X	XXX		
	U03	Zones destinades a usos terciaris	USOS	X		XX	XX		X		X			X					X		X	XXX		
	U04	Impuls al comerç i als serveis de proximitat	USOS	XXX	X	XX	X	X	X	X	XXX	XXX	X	XXX				XX				XX	X	X
GENERAL	G01	Protecció del patrimoni arquitectònic i arqueològic	GENERAL	X							X							X	X					X
	G02	Foment de la qualitat dels habitatges	GENERAL	XX					XX		XXX	X				X		X	X			X		X
	G03	Aplicació de solucions basades en la natura	GENERAL	XX			X	X		X	XX	X			X	X	X	X	X	X			X	XX

FILES

An individualised file has been drawn up for each of the 15 actions summarising the Master Plan.

Each file includes the impact of the actions on health determinants and indicators along with an assessment of the qualitative health impact.

The content of the files is as follows:

- Type:
  - Mobility
  - Public space
  - Facilities
  - Uses
  - General
- Location within the UDMP area
- Description of the action
- Impact on health determinants
- Impact on health indicators
- Conclusions / Recommendations

Natural corridor between Collserola and Sant Llorenç del Munt **EP01**

TYPE:
OPEN SPACES

TYPES:
MOBILITY
PUBLIC SPACE
FACILITIES
USES
GENERAL

DESCRIPTION OF THE ACTION

The Master Plan allocates a large part of its western half to a natural corridor between Collserola and Sant Llorenç del Munt and l'Obac. Agricultural space is maintained and the entire strip is preserved from construction, ensuring the passage of wildlife.

IMPACT ON HEALTH DETERMINANTS

CONNECTIVITY	
intersections	0
cyclability	0
walkability	X
public transport	0

LAND USE MIX	
facilities	0
leisure	0
free time and sport	0
public open spaces	X

LANDSCAPE	
green and blue areas	X
aesthetic	X
furniture	0
lighting/maintenance	0

DENSITY	
population	0
business	0

TRAFFIC	
type	0
density	0

IMPACT ON HEALTH INDICATORS

PHYSICAL	
obesity and overweight	xxxx
diabetes	x
cardiovascular diseases	x
respiratory diseases	x
functional capacity	xx
accidents and falls	o
pain	xxx

BEHAVIOURAL	
physical activity	xxxx
Sedentary behaviour	xxxx
food habits	x

SOCIAL	
Social skills	x
stress and anxiety	x
depression	x
cognitive function	x
emotional wellbeing	xx
attention deficit	x
mental health	xx

ENVIRONMENTAL	
noise pollution	o
air pollution	x

GLOBAL	
wellbeing and quality of l	xx
happiness	xx

CONCLUSIONS / RECOMMENDATIONS

The presence of this corridor fosters maintenance of species native to the area. Likewise, this green area allows maintenance of agricultural land and the trails it includes help active mobility.

Health impact assessment files for the Cerdanyola del Vallès Centre Direccional Master Plan

Connection between the natural corridor and the interior spaces **EP02**

TYPE:
OPEN SPACES

TYPES:
MOBILITY
PUBLIC SPACE
FACILITIES
USES
GENERAL

DESCRIPTION OF THE ACTION

The Master Plan allocates almost half of its area to the restoration of an ecological connector that fosters the continuity of the system of natural spaces in the metropolitan region. Permeability measures are envisaged for wildlife. Appropriate re-vegetation with native species to guarantee the connection of the habitats and animal populations of the Alba Park with their counterparts in Collserola.

IMPACT ON HEALTH DETERMINANTS

CONNECTIVITY	
intersections	0
cyclability	X
walkability	X
public transport	0

LAND USE MIX	
facilities	0
leisure	0
free time and sport	0
public open spaces	0

LANDSCAPE	
green and blue areas	0
aesthetic	0
furniture	0
lighting/maintenance	0

DENSITY	
population	0
business	0

TRAFFIC	
type	0
density	0

IMPACT ON HEALTH INDICATORS

PHYSICAL	
obesity and overweight	xx
diabetes	x
cardiovascular diseases	x
respiratory diseases	o
functional capacity	x
accidents and falls	o
pain	x

BEHAVIOURAL	
physical activity	xx
Sedentary behaviour	xx
food habits	x

SOCIAL	
Social skills	x
stress and anxiety	o
depression	o
cognitive function	o
emotional wellbeing	x
attention deficit	o
mental health	o

ENVIRONMENTAL	
noise pollution	o
air pollution	x

GLOBAL	
wellbeing and quality of l	o
happiness	o

CONCLUSIONS / RECOMMENDATIONS

Health impact assessment files for the Cerdanyola del Vallès Centre Direccional Master Plan

Recovery of the Riera de Sant Cugat as a river park **EP03**

TYPE:
OPEN SPACES

TYPES:
MOBILITY
PUBLIC SPACE
FACILITIES
USES
GENERAL

DESCRIPTION OF THE ACTION

The Sant Cugat stream is preserved and restored, reclaiming it and promoting it for civic use and with water criteria to reduce flooding risk.
One of the basic premises of the Master Plan is the improvement and preservation of the existing water courses, both hydraulically and ecologically. These watercourses also constitute the structural and structuring axes of the green areas in Alba Park.

IMPACT ON HEALTH DETERMINANTS

CONNECTIVITY	
intersections	0
cyclability	0
walkability	X
public transport	0

LAND USE MIX	
facilities	0
leisure	0
free time and sport	X
public open spaces	X

LANDSCAPE	
green and blue areas	X
aesthetic	0
furniture	X
lighting/maintenance	0

DENSITY	
population	0
business	0

TRAFFIC	
type	0
density	0

IMPACT ON HEALTH INDICATORS

PHYSICAL	
obesity and overweight	xxxx
diabetes	x
cardiovascular diseases	xx
respiratory diseases	x
functional capacity	xxx
accidents and falls	0
pain	xxx

BEHAVIOURAL	
physical activity	xxxx
Sedentary behaviour	xxx
food habits	x

SOCIAL	
Social skills	x
stress and anxiety	x
depression	x
cognitive function	x
emotional wellbeing	x
attention deficit	0
mental health	xx

ENVIRONMENTAL	
noise pollution	0
air pollution	x

GLOBAL	
wellbeing and quality of l	xx
happiness	x

CONCLUSIONS / RECOMMENDATIONS

This action will encourage sport and active mobility. A positive impact on physical health indicators is expected, especially ones associated with behaviour.

Health impact assessment files for the Cerdanyola del Vallès Centre Direccional Master Plan

Inclusion of watercourses as open spaces **EP04**

TYPE:
OPEN SPACES

TYPES:
MOBILITY ○
PUBLIC SPACE ●
FACILITIES ○
USES ○
GENERAL ○

DESCRIPTION OF THE ACTION

The Can Fatjó, Sant Marçal, Can Domènech and Torrent del Bosc streams are preserved, recovering them for civic use and with water criteria to reduce flooding risk.
One of the basic premises of the Master Plan is the improvement and preservation of the existing water courses, both hydraulically and ecologically. These watercourses also constitute the structural and structuring axes of the green areas in Alba Park.

All the watercourses in the UDMP area constitute the structuring elements of the green network.The UDMP provides for their restoration. Picture of the Torrent del Bosc riverbed restored and replanted.

IMPACT ON HEALTH DETERMINANTS

CONNECTIVITY	
intersections	0
cyclability	0
walkability	X
public transport	0

LAND USE MIX	
facilities	0
leisure	0
free time and sport	X
public open spaces	X

LANDSCAPE	
green and blue areas	X
aesthetic	0
furniture	X
lighting/maintenance	0

DENSITY	
population	0
business	0

TRAFFIC	
type	0
density	0

IMPACT ON HEALTH INDICATORS

PHYSICAL	
obesity and overweight	xxxx
diabetes	x
cardiovascular diseases	xx
respiratory diseases	x
functional capacity	xxx
accidents and falls	o
pain	xxx

BEHAVIOURAL	
physical activity	xxxx
Sedentary behaviour	xxx
food habits	x

SOCIAL	
Social skills	x
stress and anxiety	x
depression	x
cognitive function	x
emotional wellbeing	x
attention deficit	o
mental health	xx

ENVIRONMENTAL	
noise pollution	o
air pollution	x

GLOBAL	
wellbeing and quality of l	xx
happiness	x

CONCLUSIONS / RECOMMENDATIONS

This action will encourage sport and active mobility. A positive impact on physical health indicators is expected, especially ones associated with behaviour.
Moreover, promoting biodiversity and its enjoyment has a positive impact on psychological indicators.

Recovery of land from former landfills and degraded areas **EP05**

TYPE:
OPEN SPACES

TYPES:
MOBILITY
PUBLIC SPACE
FACILITIES
USES
GENERAL

DESCRIPTION OF THE ACTION

The Plan provides for the restoration of land occupied by former activities not compatible with use as open spaces. In these areas, natural habitats and ecological flows in the green corridor need to be restored.
In all of them it will be essential to verify beforehand their compatibility for their subsequent use as open space.

IMPACT ON HEALTH DETERMINANTS

CONNECTIVITY	
intersections	0
cyclability	0
walkability	0
public transport	0

LAND USE MIX	
facilities	0
leisure	0
free time and sport	0
public open spaces	X

LANDSCAPE	
green and blue areas	X
aesthetic	X
furniture	X
lighting/maintenance	X

DENSITY	
population	0
business	0

TRAFFIC	
type	0
density	0

IMPACT ON HEALTH INDICATORS

PHYSICAL	
obesity and overweight	xxx
diabetes	o
cardiovascular diseases	°
respiratory diseases	x
functional capacity	x
accidents and falls	x
pain	xx

BEHAVIOURAL	
physical activity	xxxxx
Sedentary behaviour	xx
food habits	x

SOCIAL	
Social skills	o
stress and anxiety	x
depression	x
cognitive function	x
emotional wellbeing	x
attention deficit	x
mental health	xx

ENVIRONMENTAL	
noise pollution	o
air pollution	o

GLOBAL	
wellbeing and quality of l	xx
happiness	xx

CONCLUSIONS / RECOMMENDATIONS

The new green areas provide more space for interaction and consequently better quality of life for people. In this respect, it is important to highlight the impact on physical activity, mental health and wellbeing and quality of life indicators.
The compatibility of the uses envisaged by the Master Plan needs to be ensured beforehand by means of environmental monitoring of the degraded areas, which will have to be validated by the relevant authorities.

Health impact assessment files for the Cerdanyola del Vallès Centre Direccional Master Plan

Eco-friendly management of green areas **EP06**

TYPE:
OPEN SPACES

TYPES:
MOBILITY
PUBLIC SPACE
FACILITIES
USES
GENERAL

DESCRIPTION OF THE ACTION

Management involves conserving spontaneous natural habitats and not working during the nesting and breeding seasons of the main species in them. Furthermore, retention of dry farming is encouraged on all land where it is possible. To this end, agreements are signed with farmers in the area who mainly grow cereals and legumes. This will help safeguard the land by controlling access roads, maintaining edges and clearing areas to reduce the risk of fire. Furthermore, the use of non-organic herbicides and pesticides in landscaped area management is minimised.
On land pending construction or in sectors that have not yet been developed, the Plan envisages the possibility of introducing herbaceous or shrubby plant communities native to the area or planting dry farming crops.

IMPACT ON HEALTH DETERMINANTS

CONNECTIVITY	
intersections	0
cyclability	0
walkability	0
public transport	0

LAND USE MIX	
facilities	0
leisure	0
free time and sport	0
public open spaces	0

LANDSCAPE	
green and blue areas	X
aesthetic	X
furniture	0
lighting/maintenance	0

DENSITY	
population	0
business	0

TRAFFIC	
type	0
density	0

IMPACT ON HEALTH INDICATORS

PHYSICAL	
obesity and overweight	xx
diabetes	0
cardiovascular diseases	0
respiratory diseases	x
functional capacity	x
accidents and falls	0
pain	x

BEHAVIOURAL	
physical activity	xx
Sedentary behaviour	x
food habits	0

SOCIAL	
Social skills	0
stress and anxiety	x
depression	x
cognitive function	x
emotional wellbeing	x
attention deficit	x
mental health	x

ENVIRONMENTAL	
noise pollution	0
air pollution	0

GLOBAL	
wellbeing and quality of l	x
happiness	xx

CONCLUSIONS / RECOMMENDATIONS

There is a very broad impact on all social health and emotional wellbeing indicators as well as the ones for physical activity and obesity.

The Alba Park has published its 'Guide to Promoting Green Infrastructure and Biodiversity in Alba Park Buildings'.

Health impact assessment files for the Cerdanyola del Vallès Centre Direccional Master Plan

Orthogonal road network and connection with the current town **M01**

TYPE:
MOBILITY

TYPES:
MOBILITY ●
PUBLIC SPACE ○
FACILITIES ○
USES ○
GENERAL ○

DESCRIPTION OF THE ACTION

The Master Plan envisages extending the road network, starting with the urban network in Cerdanyola, to connect with the new growth planned for the area.
The basic layout of the road network follows an orthogonal pattern and tailors its routes to the conditions of the environment.
Moreover, a better connection between the Autonomous University and the Technology Park is ensured based on Avinguda de la Ciència and in particular the urban axis of C/ de Can Magrans (Riera dels Gorgs).

IMPACT ON HEALTH DETERMINANTS

CONNECTIVITY	
intersections	X
cyclability	X
walkability	X
public transport	X

LAND USE MIX	
facilities	0
leisure	0
free time and sport	0
public open spaces	0

LANDSCAPE	
green and blue areas	0
aesthetic	0
furniture	0
lighting/maintenance	0

DENSITY	
population	0
business	0

TRAFFIC	
type	0
density	X

IMPACT ON HEALTH INDICATORS

PHYSICAL	
obesity and overweight	xxxxx
diabetes	x
cardiovascular diseases	xx
respiratory diseases	o
functional capacity	x
accidents and falls	x
pain	o

BEHAVIOURAL	
physical activity	xxxxx
Sedentary behaviour	xxxx
food habits	o

SOCIAL	
Social skills	xx
stress and anxiety	o
depression	x
cognitive function	o
emotional wellbeing	x
attention deficit	x
mental health	o

ENVIRONMENTAL	
noise pollution	x
air pollution	xxx

GLOBAL	
wellbeing and quality of l	x
happiness	o

CONCLUSIONS / RECOMMENDATIONS

Measures will have to be taken to ensure that speeds on these new stretches do not exceed ones appropriate for their urban environment, thus minimising the negative effects of accidents or pollution.
Based on the health determinants impacted by this action, it is concluded that the health indicators experiencing the greatest impact will be physical activity ones.

Health impact assessment files for the Cerdanyola del Vallès Centre Direccional Master Plan

Road network hierarchy **M02**

TYPE:
MOBILITY

TYPES:
MOBILITY
PUBLIC SPACE
FACILITIES
USES
GENERAL

DESCRIPTION OF THE ACTION

The Plan specifies the stretches of the various streets that make up the orthogonal road network. This identifies the routes that will potentially be able to absorb a higher density of traffic and defines the streets that are mainly for civic and pedestrian use.
The sections in the Master Plan specify the presence of street trees, the width of pavements, the layout of the bike lanes and the alignment of housing units with respect to the street line.

IMPACT ON HEALTH DETERMINANTS

CONNECTIVITY	
intersections	0
cyclability	X
walkability	X
public transport	0

LAND USE MIX	
facilities	0
leisure	0
free time and sport	0
public open spaces	0

LANDSCAPE	
green and blue areas	0
aesthetic	X
furniture	X
lighting/maintenance	X

DENSITY	
population	0
business	X

TRAFFIC	
type	0
density	X

IMPACT ON HEALTH INDICATORS

PHYSICAL	
obesity and overweight	xxxx
diabetes	x
cardiovascular diseases	xx
respiratory diseases	x
functional capacity	x
accidents and falls	xx
pain	x

BEHAVIOURAL	
physical activity	xxxx
Sedentary behaviour	xx
food habits	x

SOCIAL	
Social skills	xx
stress and anxiety	o
depression	o
cognitive function	o
emotional wellbeing	xx
attention deficit	xx
mental health	o

ENVIRONMENTAL	
noise pollution	x
air pollution	xxx

GLOBAL	
wellbeing and quality of l	o
happiness	x

CONCLUSIONS / RECOMMENDATIONS

The hierarchy makes it possible to anticipate which streets will be able to absorb more traffic and therefore defines routes for pedestrians. This has a direct impact on walkability and hence on physical activity indicators.

Cycling network **M03**

TYPE:
MOBILITY

TYPES:
MOBILITY ●
PUBLIC SPACE ○
FACILITIES ○
USES ○
GENERAL ○

DESCRIPTION OF THE ACTION

The Master Plan envisages the inclusion of connecting bike lanes in the main streets of the area. A network of accessible paths is also planned along the edges of the streams and throughout the green areas to enable cycling.

IMPACT ON HEALTH DETERMINANTS

CONNECTIVITY	
intersections	X
cyclability	X
walkability	0
public transport	0

LAND USE MIX	
facilities	0
leisure	0
free time and sport	0
public open spaces	0

LANDSCAPE	
green and blue areas	0
aesthetic	0
furniture	X
lighting/maintenance	0

DENSITY	
population	0
business	0

TRAFFIC	
type	0
density	0

IMPACT ON HEALTH INDICATORS

PHYSICAL	
obesity and overweight	xx
diabetes	0
cardiovascular diseases	0
respiratory diseases	0
functional capacity	0
accidents and falls	0
pain	0

BEHAVIOURAL	
physical activity	xxx
Sedentary behaviour	xx
food habits	x

SOCIAL	
Social skills	0
stress and anxiety	0
depression	0
cognitive function	0
emotional wellbeing	0
attention deficit	0
mental health	0

ENVIRONMENTAL	
noise pollution	0
air pollution	x

GLOBAL	
wellbeing and quality of l	0
happiness	0

CONCLUSIONS / RECOMMENDATIONS

The action promotes cycling by connecting all bike lane stretches.
Measures will have to be taken to ensure safety at all intersections with the rest of the road network.
Based on the health determinants impacted by this action, it is concluded that the health indicators experiencing the greatest impact will be physical activity ones.

Health impact assessment files for the Cerdanyola del Vallès Centre Direccional Master Plan

Soft and tree-lined itineraries between facilities **M04**

TYPE:
MOBILITY

TYPES:
MOBILITY
PUBLIC SPACE
FACILITIES
USES
GENERAL

DESCRIPTION OF THE ACTION

The whole area is woven by a network of soft paths and itineraries that connect the facilities. One of the most important development principles is the presence of trees, which encourages walking and provides shade in summer.

IMPACT ON HEALTH DETERMINANTS

CONNECTIVITY	
intersections	0
cyclability	X
walkability	X
public transport	0

LAND USE MIX	
facilities	0
leisure	0
free time and sport	0
public open spaces	0

LANDSCAPE	
green and blue areas	0
aesthetic	0
furniture	X
lighting/maintenance	X

DENSITY	
population	0
business	0

TRAFFIC	
type	0
density	0

IMPACT ON HEALTH INDICATORS

PHYSICAL	
obesity and overweight	xx
diabetes	x
cardiovascular diseases	x
respiratory diseases	o
functional capacity	x
accidents and falls	x
pain	x

BEHAVIOURAL	
physical activity	xxxx
Sedentary behaviour	xx
food habits	x

SOCIAL	
Social skills	x
stress and anxiety	o
depression	o
cognitive function	o
emotional wellbeing	x
attention deficit	o
mental health	o

ENVIRONMENTAL	
noise pollution	o
air pollution	x

GLOBAL	
wellbeing and quality of l	o
happiness	o

CONCLUSIONS / RECOMMENDATIONS

The healthy routes encourage people to do physical activity by providing easier connections between facilities and open spaces and enabling access to the network of connecting paths.
The health benefits this can bring mainly concern how physically active people are with the knock-on effect on quality of life.

Network of routes between the urban area and the green infrastructure **M05**

TYPE:
MOBILITY

TYPES:
MOBILITY
PUBLIC SPACE
FACILITIES
USES
GENERAL

DESCRIPTION OF THE ACTION

A network of paths and routes is set up from the current urban area of Cerdanyola and the green corridor which criss-cross the area and allow the creation of green and healthy routes which can become activity hubs.
In partnership with Cerdanyola Town Council, two routes have been activated (Can Fatjó stream route and the forest stream route) to publicise the actions carried out and the transformation of the area to enhance green infrastructure.

IMPACT ON HEALTH DETERMINANTS

CONNECTIVITY		LAND USE MIX		LANDSCAPE		DENSITY	
intersections	0	facilities	0	green and blue areas	0	population	0
cyclability	X	leisure	0	aesthetic	0	business	0
walkability	X	free time and sport	0	furniture	0	**TRAFFIC**	
public transport	0	public open spaces	0	**lighting/maintenance**	X	type	0
						density	0

IMPACT ON HEALTH INDICATORS

PHYSICAL		BEHAVIOURAL		SOCIAL		ENVIRONMENTAL	
obesity and overweight	xx	physical activity	xxx	Social skills	x	noise pollution	◦
diabetes	x	Sedentary behaviour	xx	stress and anxiety	◦	air pollution	x
cardiovascular diseases	x	food habits	x	depression	◦		
respiratory diseases	◦			cognitive function	◦	**GLOBAL**	
functional capacity	x			emotional wellbeing	x	wellbeing and quality of l	◦
accidents and falls	x			attention deficit	◦	happiness	◦
pain	x			mental health	◦		

CONCLUSIONS / RECOMMENDATIONS

The healthy routes encourage people to do physical activity by providing easier connections between facilities and open spaces and enabling access to the network of connecting paths.
The health benefits this can bring mainly concern how physically active people are with the knock-on effect on quality of life.

Health impact assessment files for the Cerdanyola del Vallès Centre Direccional Master Plan

Facilities area near Cerdanyola — E01

TYPE:
FACILITIES

TYPES:
MOBILITY
PUBLIC SPACE
FACILITIES
USES
GENERAL

DESCRIPTION OF THE ACTION

The Master Plan envisages placing several facilities, most likely educational and sports facilities, in the vicinity of Cerdanyola.
These local facilities are essential to ensure services for the new residential growth in the area and promote social interaction of the people living in the area.

IMPACT ON HEALTH DETERMINANTS

CONNECTIVITY	
intersections	0
cyclability	0
walkability	0
public transport	0

LAND USE MIX	
facilities	X
leisure	X
free time and sport	0
public open spaces	0

LANDSCAPE	
green and blue areas	0
aesthetic	0
furniture	0
lighting/maintenance	0

DENSITY	
population	0
business	0

TRAFFIC	
type	0
density	0

IMPACT ON HEALTH INDICATORS

PHYSICAL	
obesity and overweight	xx
diabetes	0
cardiovascular diseases	x
respiratory diseases	0
functional capacity	0
accidents and falls	x
pain	0

BEHAVIOURAL	
physical activity	xx
Sedentary behaviour	xx
food habits	x

SOCIAL	
Social skills	xx
stress and anxiety	0
depression	0
cognitive function	0
emotional wellbeing	x
attention deficit	0
mental health	0

ENVIRONMENTAL	
noise pollution	0
air pollution	0

GLOBAL	
wellbeing and quality of l	x
happiness	x

CONCLUSIONS / RECOMMENDATIONS

Physical health indicators will be most impacted by this action as services will be available close to the town. Moreover, quality of life in general and the emotional wellbeing of the people living this residential area will also be positively impacted by having a new social interaction venue in the neighbourhood.

Urban allotments area in the south as an entrance to Collserola Park **E02**

TYPE:
FACILITIES

TYPES:
MOBILITY
PUBLIC SPACE
FACILITIES
USES
GENERAL

DESCRIPTION OF THE ACTION

To the south of the Sant Cugat stream, the Plan includes an area for urban allotments, which will have to follow the organic farming standards set by the other agricultural areas in the Plan.
This area enables and facilitates both physical activity by users and also responsible consumption of local produce; it additionally has positive effects on social relations and community networks.

IMPACT ON HEALTH DETERMINANTS

CONNECTIVITY	
intersections	0
cyclability	0
walkability	0
public transport	0

LAND USE MIX	
facilities	0
leisure	X
free time and sport	X
public open spaces	0

LANDSCAPE	
green and blue areas	0
aesthetic	X
furniture	0
lighting/maintenance	0

DENSITY	
population	0
business	0

TRAFFIC	
type	0
density	0

IMPACT ON HEALTH INDICATORS

PHYSICAL	
obesity and overweight	xxx
diabetes	o
cardiovascular diseases	x
respiratory diseases	o
functional capacity	x
accidents and falls	x
pain	o

BEHAVIOURAL	
physical activity	xxx
Sedentary behaviour	x
food habits	xx

SOCIAL	
Social skills	x
stress and anxiety	o
depression	o
cognitive function	o
emotional wellbeing	x
attention deficit	x
mental health	o

ENVIRONMENTAL	
noise pollution	o
air pollution	o

GLOBAL	
wellbeing and quality of l	o
happiness	x

CONCLUSIONS / RECOMMENDATIONS

The health indicators most impacted are the ones concerning behaviour in terms of physical health. Both physical activity and food habits stand out from the other indicators.
The impact on social health indicators, especially emotional wellbeing, is also significant.

Outdoor sports facility area (south and west) **E03**

TYPE:
FACILITIES

TYPES:
MOBILITY
PUBLIC SPACE
FACILITIES
USES
GENERAL

DESCRIPTION OF THE ACTION

Several areas are planned for outdoor sports facilities to add to the green areas and the revitalisation and use of the spaces.
These facilities encourage active leisure and enable daily physical activity for workers and residents in the area.

IMPACT ON HEALTH DETERMINANTS

CONNECTIVITY	
intersections	0
cyclability	0
walkability	0
public transport	0

LAND USE MIX	
facilities	0
leisure	0
free time and sport	X
public open spaces	X

LANDSCAPE	
green and blue areas	0
aesthetic	0
furniture	0
lighting/maintenance	0

DENSITY	
population	0
business	0

TRAFFIC	
type	0
density	0

IMPACT ON HEALTH INDICATORS

PHYSICAL	
obesity and overweight	xx
diabetes	o
cardiovascular diseases	x
respiratory diseases	o
functional capacity	x
accidents and falls	o
pain	x

BEHAVIOURAL	
physical activity	xx
Sedentary behaviour	x
food habits	x

SOCIAL	
Social skills	o
stress and anxiety	o
depression	o
cognitive function	o
emotional wellbeing	o
attention deficit	o
mental health	x

ENVIRONMENTAL	
noise pollution	o
air pollution	o

GLOBAL	
wellbeing and quality of l	x
happiness	o

CONCLUSIONS / RECOMMENDATIONS

Overweight and quality of life are the two health indicators most impacted by this action.

Local facilities on the ground floor — E04

TYPE:
FACILITIES

TYPES:
MOBILITY
PUBLIC SPACE
FACILITIES
USES
GENERAL

DESCRIPTION OF THE ACTION

Several facilities are planned on the ground floor in the residential area near Cerdanyola. These facilities are intended to become neighbourhood facilities with the uses that residents may require.

IMPACT ON HEALTH DETERMINANTS

CONNECTIVITY	
intersections	0
cyclability	0
walkability	0
public transport	0

LAND USE MIX	
facilities	X
leisure	X
free time and sport	0
public open spaces	0

LANDSCAPE	
green and blue areas	0
aesthetic	0
furniture	0
lighting/maintenance	0

DENSITY	
population	0
business	0

TRAFFIC	
type	0
density	0

IMPACT ON HEALTH INDICATORS

PHYSICAL	
obesity and overweight	xx
diabetes	o
cardiovascular diseases	x
respiratory diseases	o
functional capacity	o
accidents and falls	x
pain	o

BEHAVIOURAL	
physical activity	xx
Sedentary behaviour	xx
food habits	x

SOCIAL	
Social skills	xx
stress and anxiety	o
depression	o
cognitive function	o
emotional wellbeing	x
attention deficit	o
mental health	o

ENVIRONMENTAL	
noise pollution	o
air pollution	o

GLOBAL	
wellbeing and quality of l	x
happiness	x

CONCLUSIONS / RECOMMENDATIONS

The main indicators related to this action concern overall health (quality of life and happiness) and also physical activity, since the proximity of neighbourhood facilities encourages travel on foot or by bicycle

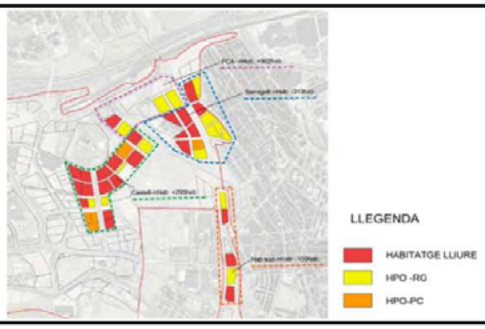
Compact residential growth with respect to the town **U01**

TYPE:
USES

TYPES:
MOBILITY
PUBLIC SPACE
FACILITIES
USES
GENERAL

DESCRIPTION OF THE ACTION

In terms of uses, the Plan provides for residential growth in relation to Cerdanyola while avoiding scattered and isolated growth to ease use of facilities, services and infrastructures together.
All this growth also envisages retail use on the ground floors, promoting local trading, and the option of moving around on foot.



IMPACT ON HEALTH DETERMINANTS

CONNECTIVITY		LAND USE MIX		LANDSCAPE		DENSITY	
intersections	0	**facilities**	X	green and blue areas	0	**population**	X
cyclability	0	leisure	0	aesthetic	0	**business**	X
walkability	X	free time and sport	0	furniture	0	**TRAFFIC**	
public transport	0	public open spaces	0	lighting/maintenance	0	type	0
						density	X

IMPACT ON HEALTH INDICATORS

PHYSICAL		BEHAVIOURAL		SOCIAL		ENVIRONMENTAL	
obesity and overweight	xxxx	physical activity	xxxx	Social skills	xxx	noise pollution	x
diabetes	x	Sedentary behaviour	xxx	stress and anxiety	o	air pollution	xxxx
cardiovascular diseases	xxx	food habits	x	depression	x		
respiratory diseases	x			cognitive function	o	**GLOBAL**	
functional capacity	x			emotional wellbeing	xx	wellbeing and quality of l	x
accidents and falls	xx			attention deficit	x	happiness	x
pain	x			mental health	o		

CONCLUSIONS / RECOMMENDATIONS

Compact residential growth with retail uses on the ground floor has a positive impact on walking and overall physical activity and also on mental health and social skills indicators.
The negative impact has to do with air pollution caused by higher populat density. Corrective measures need to be taken, especially on energy usag housing.

Commercial area in the north-east **U02**

TYPE:
USES

TYPES:
MOBILITY
PUBLIC SPACE
FACILITIES
USES
GENERAL

DESCRIPTION OF THE ACTION

The Master Plan provides for setting aside space for commercial use near the train station and the motorway. This is part of a larger scale geographical context and not designed to meet residential growth needs. Although the type of business envisaged is associated with transport by private vehicle, the fact that it is so close to the train station encourages travel by public transport.

IMPACT ON HEALTH DETERMINANTS

CONNECTIVITY	
intersections	0
cyclability	0
walkability	0
public transport	0

LAND USE MIX	
facilities	0
leisure	0
free time and sport	0
public open spaces	0

LANDSCAPE	
green and blue areas	0
aesthetic	0
furniture	0
lighting/maintenance	0

DENSITY	
population	0
business	X

TRAFFIC	
type	X
density	X

IMPACT ON HEALTH INDICATORS

PHYSICAL	
obesity and overweight	x
diabetes	o
cardiovascular diseases	xx
respiratory diseases	xx
functional capacity	o
accidents and falls	x
pain	o

BEHAVIOURAL	
physical activity	x
Sedentary behaviour	o
food habits	o

SOCIAL	
Social skills	x
stress and anxiety	o
depression	o
cognitive function	o
emotional wellbeing	o
attention deficit	x
mental health	o

ENVIRONMENTAL	
noise pollution	x
air pollution	xxx

GLOBAL	
wellbeing and quality of l	o
happiness	o

CONCLUSIONS / RECOMMENDATIONS

Air pollution is the main indicator which may be negatively impacted by the higher traffic density around the commercial area.
Development of C/ de la Serra de Galliners may be a key factor in promoting other alternative modes of transport.

Health impact assessment files for the Cerdanyola del Vallès Centre Direccional Master Plan

Tertiary use areas **U03**

TYPE:
USES

TYPES:
MOBILITY
PUBLIC SPACE
FACILITIES
USES
GENERAL

DESCRIPTION OF THE ACTION

The Plan provides for several tertiary use areas, mainly offices.
Although the best urban model in terms of health leans towards mixed with a blend of uses and types in the same area, the cases of large companies coupled with their logistical needs mean that these exclusively tertiary use areas have to be included in the Plan.

IMPACT ON HEALTH DETERMINANTS

CONNECTIVITY	
intersections	0
cyclability	0
walkability	0
public transport	0

LAND USE MIX	
facilities	0
leisure	0
free time and sport	0
public open spaces	0

LANDSCAPE	
green and blue areas	0
aesthetic	0
furniture	0
lighting/maintenance	0

DENSITY	
population	0
business	X

TRAFFIC	
type	X
density	X

IMPACT ON HEALTH INDICATORS

PHYSICAL	
obesity and overweight	x
diabetes	o
cardiovascular diseases	xx
respiratory diseases	xx
functional capacity	o
accidents and falls	x
pain	o

BEHAVIOURAL	
physical activity	x
Sedentary behaviour	o
food habits	o

SOCIAL	
Social skills	x
stress and anxiety	o
depression	o
cognitive function	o
emotional wellbeing	o
attention deficit	x
mental health	o

ENVIRONMENTAL	
noise pollution	x
air pollution	xxx

GLOBAL	
wellbeing and quality of l	o
happiness	o

CONCLUSIONS / RECOMMENDATIONS

In order to minimise the health risks of these exclusively tertiary use areas, connections to the urban network by non-motorised means should be made as easy as possible, with the emphasis on the path network and using bikes.

Promoting local retail and services **U04**

TYPE:
USES

TYPES:
MOBILITY
PUBLIC SPACE
FACILITIES
USES
GENERAL

DESCRIPTION OF THE ACTION

The Master Plan specifies some streets with compulsory retail and/or services on the ground floors. This generates shopping thoroughfares which will help to invigorate the newly created neighbourhood.

IMPACT ON HEALTH DETERMINANTS

CONNECTIVITY	
intersections	0
cyclability	0
walkability	X
public transport	0

LAND USE MIX	
facilities	X
leisure	X
free time and sport	0
public open spaces	0

LANDSCAPE	
green and blue areas	0
aesthetic	0
furniture	0
lighting/maintenance	0

DENSITY	
population	0
business	X

TRAFFIC	
type	0
density	0

IMPACT ON HEALTH INDICATORS

PHYSICAL	
obesity and overweight	xxx
diabetes	x
cardiovascular diseases	xx
respiratory diseases	x
functional capacity	x
accidents and falls	x
pain	x

BEHAVIOURAL	
physical activity	xxx
Sedentary behaviour	xxx
food habits	x

SOCIAL	
Social skills	xxx
stress and anxiety	0
depression	0
cognitive function	0
emotional wellbeing	xx
attention deficit	0
mental health	0

ENVIRONMENTAL	
noise pollution	0
air pollution	xx

GLOBAL	
wellbeing and quality of l	x
happiness	x

CONCLUSIONS / RECOMMENDATIONS

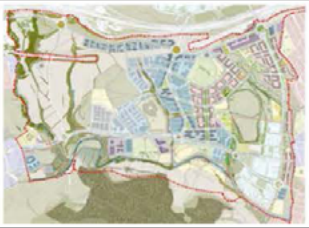
Having various activities on the ground floors has a special impact on physical health indicators related to behaviour: physical activity and sedentary behaviour. The urban environment's walkability is the key factor in this respect.

Health impact assessment files for the Cerdanyola del Vallès Centre Direccional Master Plan

Protecting architectural and archaeological heritage **G01**

TYPE:
GENERAL

TYPES:
MOBILITY
PUBLIC SPACE
FACILITIES
USES
GENERAL



DESCRIPTION OF THE ACTION

Respect for heritage, whether archaeological, architectural or natural, is ensured within the scope of the Master Plan.
The castle and farmhouses are identified and environments are created for their protection, which helps to maintain, dignify and enhance the pre-existing landscape in the area and the features that identify it.

IMPACT ON HEALTH DETERMINANTS

CONNECTIVITY	
intersections	0
cyclability	0
walkability	0
public transport	0

LAND USE MIX	
facilities	0
leisure	0
free time and sport	0
public open spaces	0

LANDSCAPE	
green and blue areas	0
aesthetic	X
furniture	0
lighting/maintenance	0

DENSITY	
population	0
business	0

TRAFFIC	
type	0
density	0

IMPACT ON HEALTH INDICATORS

PHYSICAL	
obesity and overweight	x
diabetes	◊
cardiovascular diseases	◊
respiratory diseases	◊
functional capacity	◊
accidents and falls	◊
pain	◊

BEHAVIOURAL	
physical activity	x
Sedentary behaviour	◊
food habits	◊

SOCIAL	
Social skills	◊
stress and anxiety	◊
depression	◊
cognitive function	◊
emotional wellbeing	x
attention deficit	x
mental health	◊

ENVIRONMENTAL	
noise pollution	◊
air pollution	◊

GLOBAL	
wellbeing and quality of l	◊
happiness	x

CONCLUSIONS / RECOMMENDATIONS

Improving the landscape is directly related to emotional indicators such as happiness and wellbeing while also encouraging physical activity along with active transport and leisure.

Promoting quality housing — G02

TYPE:
GENERAL

TYPES:
MOBILITY
PUBLIC SPACE
FACILITIES
USES
GENERAL

DESCRIPTION OF THE ACTION

The Master Plan's urban planning regulations include a number of aspects related to housing and its environment in order to achieve the highest quality living spaces/environments. The building depths ensure cross ventilation of the blocks and landscaping and greenery is encouraged in interior spaces.

IMPACT ON HEALTH DETERMINANTS

CONNECTIVITY	
intersections	0
cyclability	0
walkability	0
public transport	0

LAND USE MIX	
facilities	0
leisure	0
free time and sport	0
public open spaces	0

LANDSCAPE	
green and blue areas	0
aesthetic	X
furniture	0
lighting/maintenance	X

DENSITY	
population	X
business	0

TRAFFIC	
type	0
density	0

IMPACT ON HEALTH INDICATORS

PHYSICAL	
obesity and overweight	xx
diabetes	0
cardiovascular diseases	0
respiratory diseases	0
functional capacity	0
accidents and falls	xx
pain	0

BEHAVIOURAL	
physical activity	xxx
Sedentary behaviour	x
food habits	0

SOCIAL	
Social skills	0
stress and anxiety	0
depression	x
cognitive function	0
emotional wellbeing	x
attention deficit	x
mental health	0

ENVIRONMENTAL	
noise pollution	0
air pollution	x

GLOBAL	
wellbeing and quality of l	0
happiness	x

CONCLUSIONS / RECOMMENDATIONS

The psychological and social health indicators are the ones most impacted by good environmental quality housing.
Management measures should be envisaged to provide access to housing for all groups in order to avoid exclusion.

Using nature-based solutions **G03**

TYPE:
GENERAL

TYPES:
MOBILITY
PUBLIC SPACE
FACILITIES
USES
GENERAL

DESCRIPTION OF THE ACTION

The Master Plan provides for various measures to implement nature-based solutions in both public and private spaces.
Firstly, it promotes implementing natural drainage systems. The Alba Park has a grid which separates rainwater and wastewater. There are several systems planned for pre-treatment of rainwater before it is discharged into the waterways such as using green gutters.
The Plan also provides for fostering green infrastructure among the companies based in the area by building nature-based solutions into their projects such as green roofs, green garden management and green construction.

IMPACT ON HEALTH DETERMINANTS

CONNECTIVITY	
intersections	0
cyclability	0
walkability	0
public transport	0

LAND USE MIX	
facilities	0
leisure	0
free time and sport	0
public open spaces	0

LANDSCAPE	
green and blue areas	X
aesthetic	X
furniture	0
lighting/maintenance	0

DENSITY	
population	0
business	0

TRAFFIC	
type	0
density	0

IMPACT ON HEALTH INDICATORS

PHYSICAL	
obesity and overweight	xx
diabetes	o
cardiovascular diseases	o
respiratory diseases	x
functional capacity	x
accidents and falls	o
pain	x

BEHAVIOURAL	
physical activity	xx
Sedentary behaviour	x
food habits	o

SOCIAL	
Social skills	o
stress and anxiety	x
depression	x
cognitive function	x
emotional wellbeing	x
attention deficit	x
mental health	x

ENVIRONMENTAL	
noise pollution	o
air pollution	o

GLOBAL	
wellbeing and quality of l	x
happiness	xx

CONCLUSIONS / RECOMMENDATIONS

Emotional wellbeing and happiness are the health indicators most closely related to an improvement in the city's urban landscape.
Moreover, increasing the city's greenness index will have a positive impact on pollution indicators and physical activity indicators.

Health impact assessment files for the Cerdanyola del Vallès Centre Direccional Master Plan

4. MONITORING INDICATORS

HEALTH INDICATORS

The health indicators are assessed using the following measuring instruments:

PHYSICAL HEALTH	Behavioural risk factors	F01	Physical activity	Minutes per week of moderate and vigorous physical activity
		F02	Sedentary behaviour	Minutes per week sitting
		F03	Food habits	Eating five pieces of fruit and vegetables per day/ Drinking alcohol/ Drinking sweetened beverages
	Physical risk factors	F04 F05	Diabetes Obesity and overweight	Incidence of diabetes compared to the total population Body Mass Index
		F06	Cardiovascular diseases	Incidence of cardiovascular diseases compared to the total population
		F07	Respiratory diseases	Incidence of respiratory diseases compared to the total population
		F08	Pain	Perceived degree of pain
		F09	Functional capacity	Perception survey
		F10	Accidents and falls	Risk perception survey
SOCIAL HEALTH	Social risk factors	S01	Social support	No. of people attended to by the Department of Social Welfare and Family
		S02	Social skills	Perception survey on belonging, social isolation and trust in the neighbourhood
	Mental and emotional risk factors	S04	Cognitive function	Colour Trails Test (CTT)/ No. of children with attention deficit disorders
		S06	Depression	Prescription of antidepressants
		S07	Stress	Stress perception survey using the Stress Perception Scale (SPS)
ENVIRONMENTAL HEALTH	Environmental risk factors	A01	Noise pollution	Decibels by day and night
		A02	Air pollution	Levels of PM 10; PM 2.5; Ozone and NO2
GLOBAL HEALTH	Global Health	G01	Wellbeing	Perception survey: perceived health questionnaire (SF12)
		G02	General Health and quality of life	Perception survey: perceived health questionnaire (SF12)
		G03	Happiness	Perception survey
		F12	Mortality	Mortality rate

• BEHAVIOURAL RISK FACTORS

F01 Physical activity

Minutes per week of moderate and vigorous physical activity

This can be assessed objectively with accelerometers (ActiGraph) which are attached to people's waists for a week and the measurements obtained are the minutes of moderate and/or vigorous activity per week (frequency, duration and intensity). At the same time, subjective measurements using questionnaires provide us with information about the minutes of physical activity in particular settings (leisure time or transport) and the type of activity performed (walking, cycling, etc.) during the previous week. The most used questionnaire is the International Physical

Activity Questionnaire (IPAQ).

F02 Sedentary behaviour

Minutes per week sitting

This is assessed using non-standardised questions about time spent seated in a car or on public transport during the previous seven days.

F03 Food habits

Eating five pieces of fruit and vegetables per day

Drinking alcohol

Drinking sweetened beverages

It is assessed by means of a survey on monthly frequency, their perceptions of their overall diet, frequency of sugar with sugar, drinking beverages (SSB) and alcohol and smoking habits.

• PHYSICAL RISK FACTORS

F04 Diabetes

Incidence of diabetes compared to the total population.

F05 Obesity and overweight

Body Mass Index

Using a standardised protocol for clinical measurement of waist circumference and Body Mass Index (BMI) calculated by the formula weight (kg) / height (m2).

F06 Cardiovascular diseases

Incidence of cardiovascular diseases compared to the total population.

F07 Respiratory diseases

Incidence of respiratory diseases compared to the total population.

F08 Pain

Perceived degree of pain

Using the standardised CALI protocol.

F09 Functional capacity

Perception survey.

F10 Accidents and falls

Risk perception survey

Generally, a Likert scale has been used which assesses the fear of falling outdoors with the following type of question "I am worried about falling when I am in the street" and possible answers of strongly disagree, somewhat disagree, somewhat agree, strongly agree.

• MENTAL, EMOTIONAL AND SOCIAL RISK FACTORS

S01 Social support and skills

No. of people attended to by the Department of Social Welfare and Family

Perception survey on belonging, social isolation and trust in the neighbourhood.

S02 Stress and anxiety

Stress perception survey

Using the Stress Perception Scale (SPS)
Distress perception survey

K10 is a scale for assessing the level of psychological distress. It is a 10-item questionnaire designed to obtain an overall measure of distress based on questions about anxiety and depressive symptoms which a person has experienced in the most recent 4-week period.

S03 Depression

Prescription of antidepressants.

S04 Cognitive function

Colour Trails Test (CTT)

No. of children with attention deficit disorders

The Colour Trails Test is a neuropsychological test which measures visual attention and effortful executive processing abilities.

S05 Emotional wellbeing

Perception survey

S06 Attention deficit

Rating Scale for Disruptive Behaviour Disorders
It is measured using the Rating Scale for Disruptive Behaviour Disorders (RSDBD) which consists of nine items that parents answer about their children: the child is easily distracted, pays attention to details, is able to maintain attention over time, usually forgets things, does not like activities that demand attention, has difficulty organising activities, etc. Each item has a score of 0-3 ("never" - "very often") and a summary score is given (ranging from 0 to 27).

S07 Mental health and psychological disorder

No. of people attended to by primary care centres

• ENVIRONMENTAL RISK FACTORS

A01 Noise pollution

Decibels by day/night.

A02 Air pollution

Levels of PM 10; PM 2.5; Ozone and NO2

These parameters are assessed by means of fixed or mobile recording points

*A03 Pollution from former landfills and degraded areas

** Although this indicator is not one of the standard health impact assessment indicators for planning, it has been included given the significance of the restoration of former landfills and degraded land in the Master Plan.*

Analyses carried out on soil water and gases Monitoring systems set up by the public authorities once restoration work on former landfills or degraded land has been completed. Assessment to ensure the compatibility of the land uses in the Master Plan by conducting quantitative risk analysis (QRA) if need be.

GLOBAL HEALTH INDICATORS

G01 Wellbeing and quality of life

Perception survey: perceived health questionnaire

The most widely used instrument is the perceived health questionnaire (SF12) which is divided into mental and physical health.

G02 Vitality and happiness

Perception survey

By asking the question "How happy do you feel?" with a 5-point Likert scale from "Very happy" (5) to "Not happy at all" (1).

G03 Disease burden / Mortality

Annual mortality rate

The data for each indicator should be compiled using the standardised instruments shown. In summary, they are as follows:

- Shorter Warwick-Edinburgh Mental Well-being Scale (SWEMWBS)
- Colour Trails Tests (CTT)
- Perceived Stress Scale (PSS).
- Food Frequency Questionnaire (FFG)
- Children's Activity Limitation Interview (CALI-21)
- Community Healthy Activities Model Program for Seniors (CHAMPS) questionnaire
- Short Physical Performance Battery (SPPB)
- Kessler Psychological Distress Scale (K10)
- Neighbourhood Physical Activity Questionnaire (NPAQ)
- Public Open Space Desktop Auditing Tool (POSDAT)
- Health-related quality of life (SF-12)
- Behavioural Risk Factor Surveillance System (BRFSS)
- Catalonia Health Survey (ESCA)
- International Physical Activity Questionnaire (IPAQ)
- Global Physical activity Questionnaire (GPAQ)

RISK FACTOR CLASSIFICATION	FACTOR	INDICATOR	INSTRUMENT	OBJECTIVE	SOURCE
Physical	Obesity / overweight	Waist, BMI	BRFSS		
			Anthropometric measurements		
	Diabetes		Anthropometric measurements		
	Cardiovascular diseases	Presence and diagnosis of the pathology	*		
	Asthma and respiratory diseases	Presence and diagnosis of the pathology	Healthcare system database		
	Functional capacity		*		
	Road accidents	Number of events	Register		
	Falls		*		
	Pain	Perceived pain	CALI (children)		
Behavioural	Physical activity	Physical activity levels	Accelerometer (Actigraph)	150 minutes/week moderate physical activity 75 minutes/week Vigorous physical activity	WHO
			IPAQ, GPAQ, EURO-URHIS, NPAQ, CHAMPS (elderly)		
	Sedentary behaviour	Time seated	IPAQ, GPAQ		
	Food habits	Frequency and types of food and beverages consumed	FFQ		
Mental, emotional or social	Support and social skills (social wellbeing)	Degree of social support, socioeconomic level, etc.	*		
	Stress	Stress level	PSS		
	Psychological distress	Psychological disorder levels	K10		
	Depression		Antidepressant intake		
	Cognitive functions	Attention	CTT		
	Emotional wellbeing	Perception of mental wellbeing	SWEMWBS		
	Attention deficit		CTT		
	Mental health and	Psychological distress, depression, cognitive functions, emotional well-being, etc.	CTT, K10, PSS, SWEMWBS		
Environmental	Air pollution	Particulate matter (UFPs, PM2.5)	Mobile particle concentration meter (bicycle)	NO2 - 40µg / m3 (annual average) / 200µg / m3 (1 hour average) PM10 - 20µg / m3 (annual average) / 50µg / m3 (daily average) PM 2.5 - 10µg / m3 (annual average) / 25µg / m3 (daily average) O3 - 100µg / m3 (8 hour average)	WHO
	Noise pollution	Daily traffic noise exposure levels	Mobile dosimeter (Q-300 dosimeter) placed on the pedestrian's shoulder	65 db day 55 db night	WHO
Global health	Wellbeing and quality of life in adults	Perceived health	SF12		
	Wellbeing and quality of life in children	Physical health and wellbeing, emotional maturity and social skills	*		
	Vitality	Energy, vitality	SF12		
	Happiness		*		

MONITORING INDICATORS FOR URBAN PLANNING DETERMINANTS

The following table shows the measuring instruments for assessing urban planning determinants as well as the reference values:

	INDICATOR	CALCULATION METHOD	VALUE IN MAY 2020	REFERENCE VALUE: standard and/or objective	SOURCE
Density	Population and residential density	inhabitants per km²			
		housing units per ha	121 housing units/ha (residential areas) 56.6 housing units/ha (residential areas + systems)	100 housing units/ha	Global HI
		height of buildings	Av. no storeys: GF+5. Maximum GF+6. Occasionally GF+8	< GF+5 or 6	Global HI
		housing GFA per inhabitant	43 m²/inhabitant	>30 m²/inhabitant	Global HI
	Business density	stores per inhabitant /retail ratio			
		Gross income per capita			
Street connectivity (accessibility)	Number and type of intersections (junctions)	no. of intersections with 3 or more streets per km²			
		no. of physical barriers for pedestrians or cyclists	Very low	low	Global HI
		distance between block intersections	in the residential neighbourhood between 60 m and 100 m in the science park occasionally >120 m	<120 m	Global HI
	Bike lanes / cyclability	linear m of bike lanes			
		interruption points			
		separate bike lanes on the widest streets	on all streets, the bike lane is separated and with separate junctions, except in pedestrian priority streets	100%	Global HI
		width of bike lanes	Yes. 2-way bike lane width 2.5 m 1-way bike lane, width 2 m	>1.5 m	Global HI
		continuous vegetation on cycling infrastructure	Yes. Alignment of trees always to the side and with bushes in avenues	High	Global HI
	Pedestrian routes / walkability	% streets with pavements wider than 1.5 m			
		availability of pedestrian crossings			
		accessibility (ramps, level crossings, etc.)	Yes. Presence of ramps, level crossings, etc.	high	Global HI
		continuous vegetation on walking infrastructure	Yes. Tree alignment always and in avenues flowerbeds with bushes and draining paving (gravel or greenway)	high	Global HI
		Interconnection with other active modes of transport	Yes. 2 intermodal stations are proposed (RENFE+bus stops +train stations+park&ride) (RENFE+bus)	elevat	Global HI
	Public transport	access to a public transport stop	100% 70-80% 50%	<300 m to bus stops <600 m to metro/tram stop <800 m to train station	Global HI
		average distance to nearest stop			

	INDICATOR	CALCULATION METHOD	VALUE IN MAY 2020	REFERENCE VALUE: standard and/or objective	SOURCE
Land use mix (diversity)	Health, wellness and community services	average distance to nearest store health services per 20,000 people			
	Entertainment, culture and recreation services	closeness to facilities (average distance)		< 300m	
	Physical and sport infrastructures (leisure and sport)	closeness to sports services (average distance)		> 300m	
	Public open spaces	distance to public open space >0.5 ha	complies	< 300m	WHO
		distance to public open space >5 ha	There is Can Planas park	< 2 km	Global HI
		distance to public open space >15 ha	there is green corridor and Collserola	between towns	Global HI
		percentage of people who have a green area less than 300 m away			
		built-up land percentage	built-up land as a percentage of TL: 52.8% built-up land as a percentage of total TC 68.74%	<75%	Global HI
Urban landscape	Green and blue areas (greenness index, trees, vegetation, lakes, rivers, etc.)	m^2 of green area per inhabitant	20 m2 open-air green area per capita/TL 16 m2 open-air green area per capita/TC	>10 m^2/inhabitant	WHO
		no. trees / inhabitant			
		streets with vegetation	100%	100%	Global HI
	Aesthetic	perception survey			
	Urban furniture	no. of banks, bins, fountains per 1000 inhabitants			
	Maintenance and lighting	Perception survey			
Traffic	Types of traffic	nearness to truck routes			
		average speed of traffic			
		percentage of land used for streets and car parks	Percentage of land used for streets and car parks / TL: 14.11%/TS: Percentage of land used for streets and car parks / TC: 19.23%	<25%	Global HI
		traffic calming and speed reduction measures	Yes. In the residential district	high	Global HI
	Traffic density	car traffic / day			

5. ASSESSING THE HEALTH IMPACT

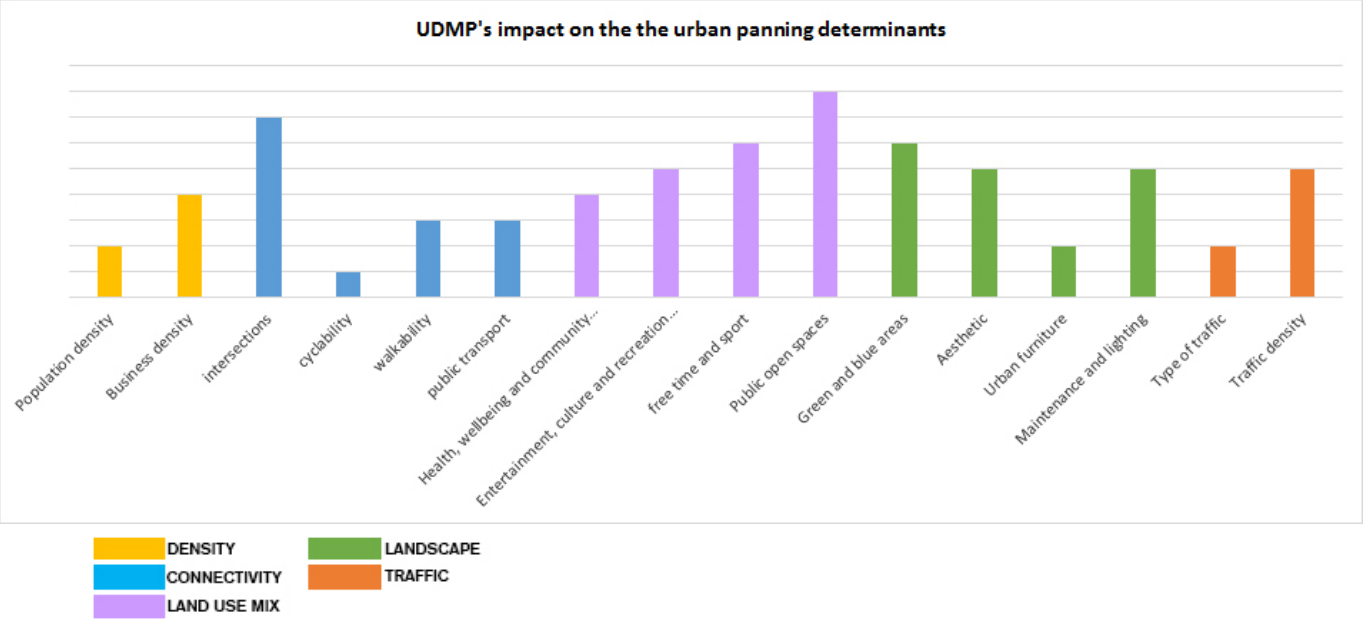
ASSESSING THE HEALTH IMPACT SUMMARY

Analysis of the health impact of the UDMP's proposals together with preparation of the files for each of the actions has made it possible to gain an overview of the Master Plan in terms of health, showing how urban planning is related to health determinants and indicators.
The following table summarises the UDMP's impact on the urban planning determinants related to health.

Based on the actions analysed and the health impact files, how many of them are related to the determinants has been calculated.

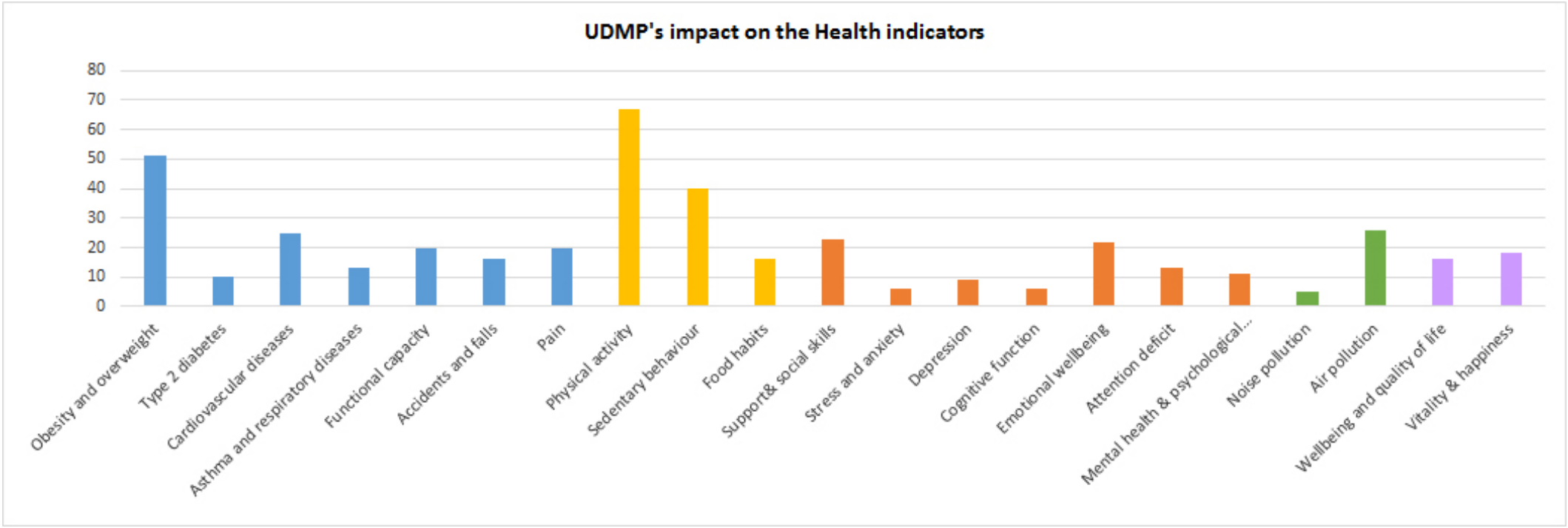
Almost half of the 15 actions in which the Master Plan has been summarised are related to or have an impact on walkability.

The second group of most heavily impacted determinants are the ones related to the landscape, urban green areas and improving green areas or urban parks:



The relationship between the actions and the health indicators has also been analysed. Significantly more than the rest, the indicator with the highest impact concerns physical activity.

In fact, all the planned actions are related to physical activity and obesity.


UDMP's impact on the Health indicators
80
70
60
50
40
30
20
10
0
Obesity and overweight
Type 2 diabetes
Cardiovascular diseases
Asthma and respiratory diseases
Functional capacity
Accidents and falls
Pain
Physical activity
Sedentary behaviour
Food habits
Support& social skills
Stress and anxiety
Depression
Cognitive function
Emotional wellbeing
Attention deficit
Mental health & psychological...
Noise pollution
Air pollution
Wellbeing and quality of life
Vitality & happiness

Here it should be noted that there are many more studies addressing the relationship between physical activity and urban planning than about the other topics. Hence the impact on and relationship between urban planning determinants and this group of indicators has been much more clearly demonstrated than for the other groups.

The scientific evidence for the remaining indicators has not been explored as much, so we have merely depicted the impact generated by the determinants which have been studied.

The environmental indicator most impacted by the UDMP is pollution, even though it is an indicator highly influenced by the environment and hard to address based on a single action.

Although the impact of urban planning can be seen in all the indicators, its impact is lower on the mental and social health indicators.

CONCLUSIONS

The main conclusions that can be drawn from the research are as follows:

√ The actions proposed in the Master Plan mostly impact the behaviour indicators: physical activity and sedentary behaviour.

√ This means that the most directly related physical health indicators are obesity and cardiovascular disease.

Here it should be noted that there are many more studies addressing the relationship between planning and physical activity than about the other indicators which means the relationship is more evident.

√ The social health indicators most impacted by urban planning actions are social support and skills and emotional wellbeing.

√ The environmental indicator most likely to be influenced by the actions of the Master Plan is atmospheric pollution.

√ Pollution from former landfills and degraded areas is covered by the monitoring procedures put in place to ensure the compatibility of the land uses established in the Master Plan.

√ The package of housing measures (ensuring ventilation and quality of housing through urban planning regulations, promoting interior garden spaces, etc.) has a positive health impact in the private housing realm.

√ It would be useful if the Master Plan were to include management measures (promotion, galvanisation, signage, etc.) designed to leverage everything that the Plan's implementation will bring to the town:

- Promoting healthy lifestyles, combining sport, leisure and environment
- Education on housing use
- Promoting healthy diets
- Good signposting of public spaces, healthy routes and the services available in public spaces
- Healthy routes
- Enhancing and stimulating supra-local sports trails, promoting physical activity and recovering the network of existing trails with heritage and landscape value

- Connecting nature areas with urban spaces
- Encouraging the use of healthy materials

In other words, the only way to generate a positive impact on the whole range of healthy city indicators is by combining planning and management measures.

√ An integrated management plan for open spaces should be envisaged in order to leverage an overview of the city to jointly organise and plan issues such as:

- Galvanising use of green areas: sport, social activities, etc.
- Provision of sports infrastructure
- Urban furniture and children's leisure areas
- Putting in place fountains and other support items for healthy routes
- Trees and plants
- Possibly setting up kiosks or services to support the park's activity
- Signage for healthy routes: destinations, time and calories burned, etc.
- Promoting partnerships with organisations and/or businesses to sponsor/drive/maintain the spaces
- Ensuring ecological management of open spaces and eliminating the use of non-organic pesticides

√ Measures should be taken for subsequent management of the actions in the Master Plan to ensure good health outcomes. Some of them might be:

- Initiatives to increase street activity (art facilities, street trading, car-free day, etc.)
- Promoting physical activity in schools through specific programmes
- Promoting electric vehicle use
- Improving signage at public transport stops and in public buildings showing distance, maps, routes, estimated time, calories burned, etc.

MONITORING INDICATORS

Alongside qualitative assessment of the Master Plan's health impact by analysing the health urban planning determinants altered by the various actions, this document also puts forward a number of indicators and measuring instruments to help monitor the Plan's implementation.

Assessing the health impact and laying down monitoring indicators is an innovative aspect of urban planning with few known benchmarks.

Existing initiatives in this field assess by using qualitative indicators.

However, in this case quantitative indicators are proposed as it is considered important to have quantifiable and representative parameters of the UDMP (ranging from environmental factors to quantifications of urban planning determinants).

This should make it possible over the course of the plan to corroborate achievement of the targets set and make adjustments if need be (if the targets are not achieved, if new scientific evidence appears or if there are changes in regulations which will become increasingly stringent, etc.).