The inaccessibility index: advantages and potential for improving transport planning and investment

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Content

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- Relevance of needs out of paternalistic approach
- Rights and Needs
- Existence needs
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- Integration of needs approach into infrastructure project and strategic planning. The Barcelona cases.

Needs-based vs. utility-based approach

- Costs and time saving are not sufficient for evaluating transport projects and investments in terms of equity (Martens.& Di Ciommo 2017, Guzman et al. 2013).

- The need to carry out specific daily tasks (i.e. health, schools, food shopping, taking care of other people's mobility) have a growing impact on the evaluation of the benefits of transport projects.

Relevance of needs

Relevant studies (Currie, 2004, Currie & Sembergs 2007, Lucas et al. 2016, Guimarães et al. 2017, Litman 2017, Di Ciommo et al. 2017) have shown the following:

- The transport system, essential for key human needs in terms of safety and security in health, employment and social stability
- Needs and physical, social, geographical and economic social exclusion.
- Observing the real needs of people is very challenging, especially in mobility.

Rights and Needs

- Needs are associated with rights:
-
  - The basic need to have a place to live and the right to housing;
  - Need to be in good health and the right to health care;
  - Need to carry out specific activities, therefore the right to mobility.
  - The EU has established the right to mobility as a passengers' right. The right to mobility per se for potential users who need to carry out certain essential tasks does not exist.

Existence Needs

- needs are: existence needs (exercise, health, safety and security, multi-tasking during travel, overcoming distance barriers to maintain life-opportunities,

- This paper is oriented to operationalize the concept of the existence needs.

Ingvardson, J. B., Kaplan, S., Nielsen, O. A., Di Ciommo, F., de Abreu e Silva, J., & Shiftan, Y. (2017). The Commuting Habit Loop: The Role of Satisfying Existence, Relatedness, and Growth Needs in Modal Choice (No. 17-03045).

Vía @miguelalvarez

Vía @miguelalvarez

Need-based Approach

DATA COLLECTION SUGGESTED METHODOLOGY

Goal:

- Collecting data about the **people´s aspirations on the extent to which their needs are satisfied** through activity participation.

Steps:

1. Sociodemographics
2. List of frequently conducted activities
3. Eliciting needs:
   1. Choice sets of 3 activities are created
   2. *" Assume that on a day there is time available to conduct an activity and that you can choose between the following three activities"*
   3. *"What are your considerations when choosing between the three activities?"*
   4. *A list of needs is created*
   5. *Grouping of closely related needs.*

Need-based Approach

DATA COLLECTION SUGGESTED METHODOLOGY

4. Needs satisfaction level

Likert scale: 1 to 5

	Activity 1	Activity 2	Activity 3	Activity 4
Need 1	1	1	3	5
Need 2	2	5	2	4
Need 3	1	1	2	1
Need 4	1	2	1	2

5. Focus on the unsatisfied needs

- List of activities
- " Can this activity potentially satisfy to a greater extent this need? "
- If yes, indicate what should be improved:
  - Travel time decrease
  - Travel cost decrease
  - Parking availability increase
  - Crowdedness in public transport decrease
  - Public transport quality of service increase
  - More destinations
  - More transport modes available

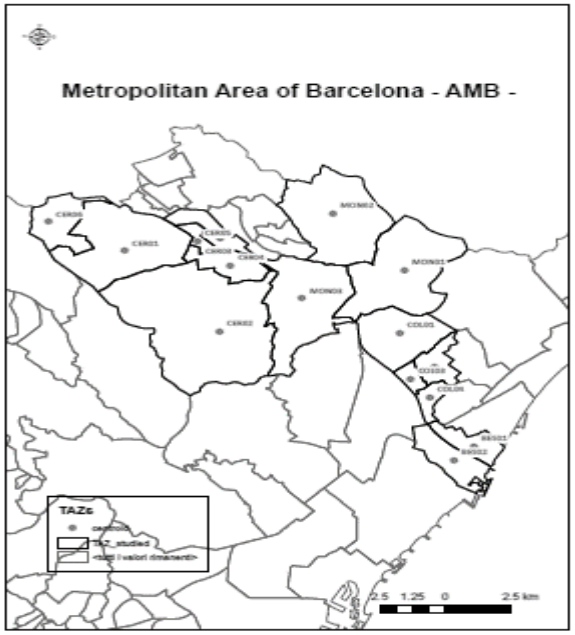
Methodology

The proposed methodology includes two main steps:

- Focusing on the unmet needs related to specific activities.
- Exploring activity characteristics such as the travel time.
- The starting point is the definition of the travel time threshold of a specific activity.

Selected geographical area: Eastern Barcelona Metropolitan Area:

- the proposed methodology implemented in lower scale areas related to the identified centroids. 15 specific analysis zones (AZs) have been created.



The data preparation includes six steps:

- Selecting the mobility survey data on people living inside a specific area

- Making a preliminary analysis of the new sample, including inhabitants

- Regrouping the filtered data by typology of trip: people with the same trip purpose, transport mode and length of trip were included in the same typology (Di Ciommo et al. 2016).

Methodological steps

- Defining a given time threshold for each of the categories in the above typology

- Highlighting the typologies of more problematic trips.

- Finding groups of population that seem to experience less satisfaction when it comes to meeting their needs.

Identified Time Threshold TT

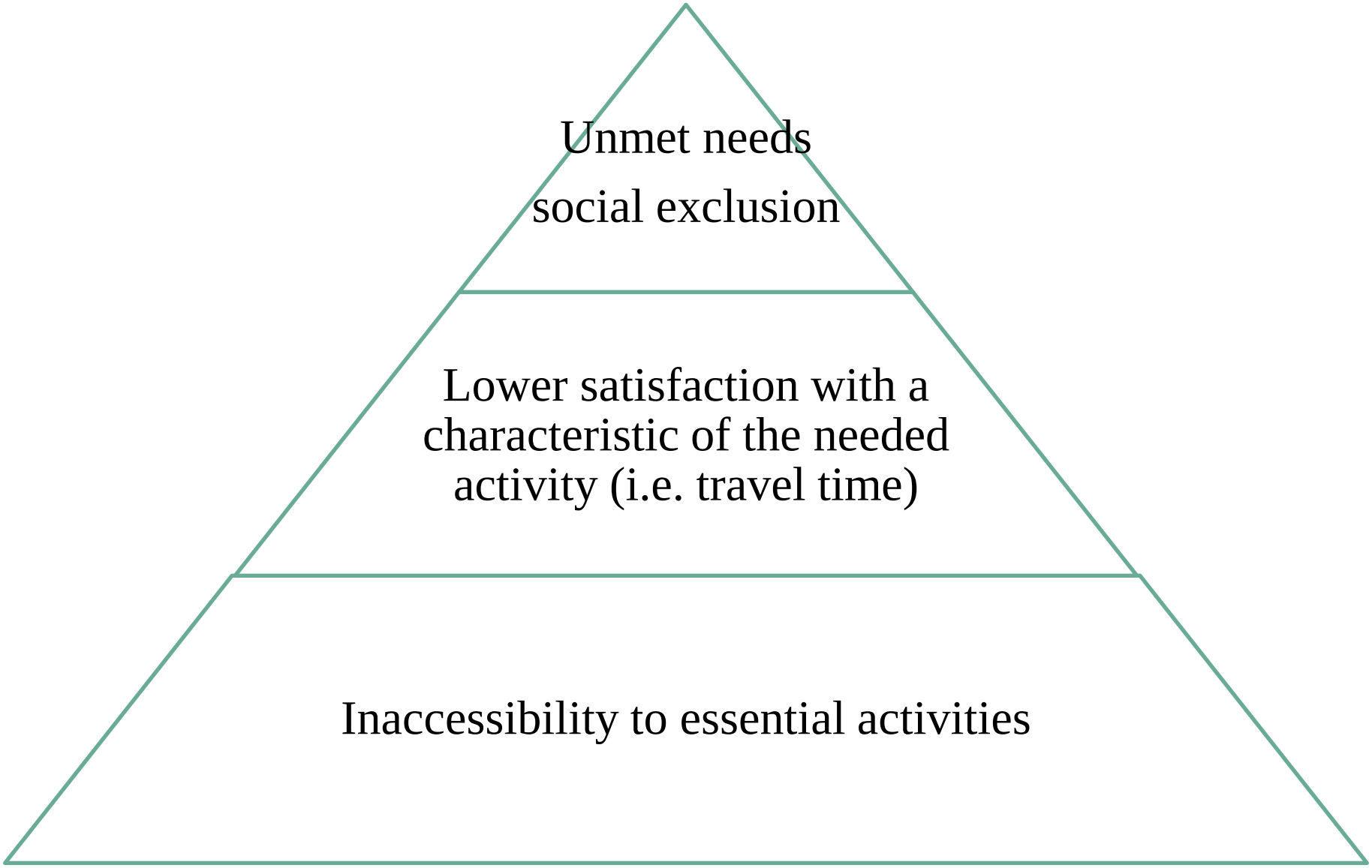
Trip typology	TT Average	TT Mode	TT Median			
CER04_CER06_2_3_2	18,5	15	15			
MON01_MON02_1_1_1	10,16	10	10			
BES02_COL03_4_2_3	32	30	25			
COL02_BES01_6_3_2	28	25	25			
Legend:						
Each code (i.e. CER04_CER06_2_3_2 includes: origin_destination_purpose_mode_length						
1) Origen and destination use the code of identified Azs						
2) Purposes refer to work=1, study=2, daily shopping=3, occasional shopping=4, medical=5, visit=6						
3) Modes of transport refer to NMT=1, PUBLIC=2, PRIVAT=3						
4) Length: 0-5 km=1, 6-15 km=2, 16-25km=3, etc.						

Selection of people groups in needs

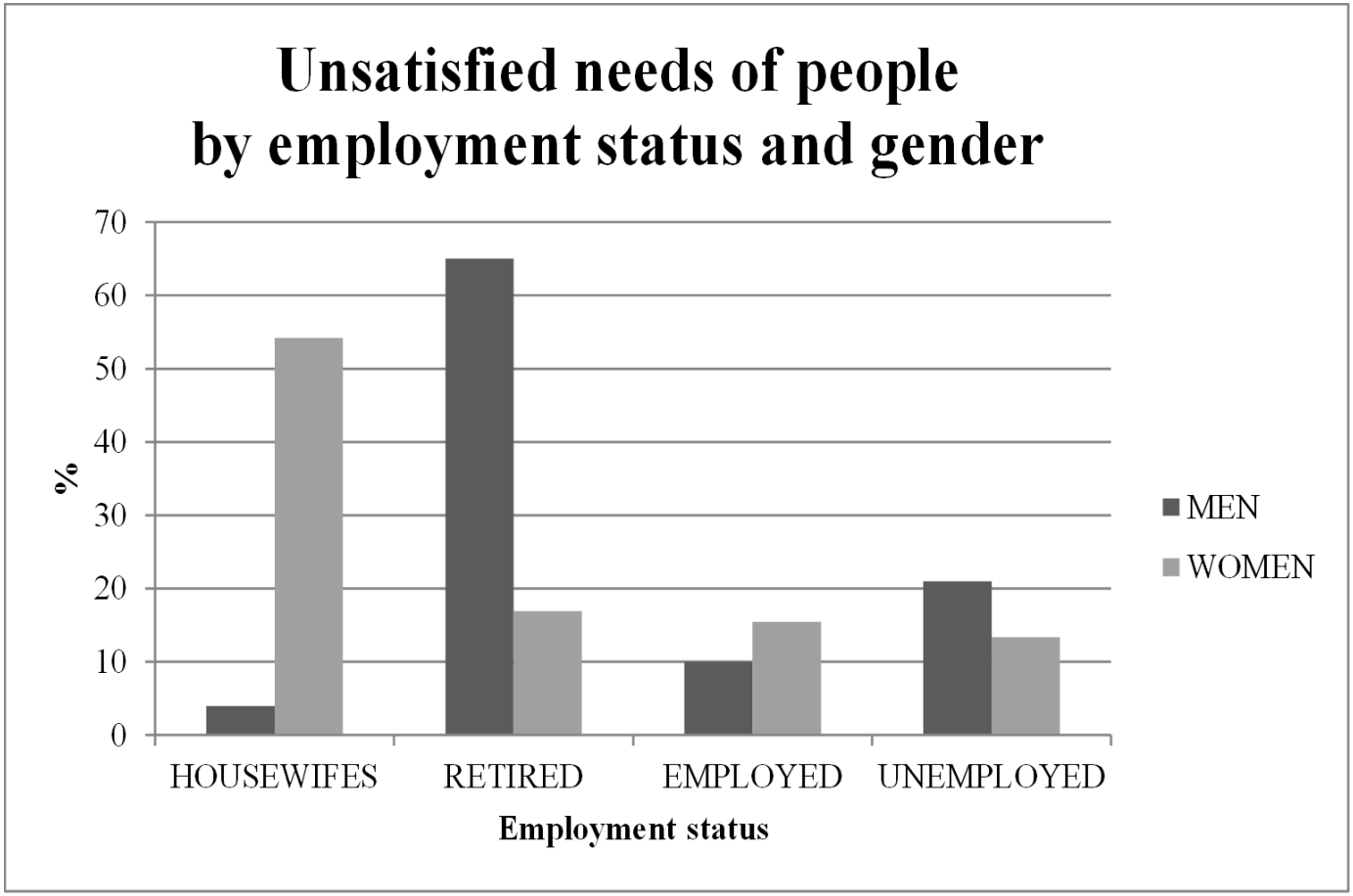
- Users' level of satisfaction is defined as follows:
- High satisfaction for likert points between 10-8
- Medium satisfaction for likert points between 7-4
- Low satisfaction for likert points between 3-0

Satisfaction/TT	Low 0-3	Medium 4-7	High 10-8
Above TT	X	?	?
Below TT	?	?	?

Identification of needs in transport through the inaccessibility index



Eliciting people's needs



Inaccessibility index

$$IA_{o,d}^{m,p,l} = 1 - \frac{\sum_{d=1}^{n} TT_{o,d}^{m,p,l} * \sum_{i=1}^{j} NU_{o,d}^{m,p,l}}{\sum_{i=1}^{g} NU_{o,d}^{m,p,l}}$$

where:

m represents the transport mode; p the trip purpose; l the length; o the trip origin and d the trip destination.

TT is the time threshold defined for a given trip typology; it is equal to 1 if the travel time is less or equal than the time threshold. Otherwise it is 0.

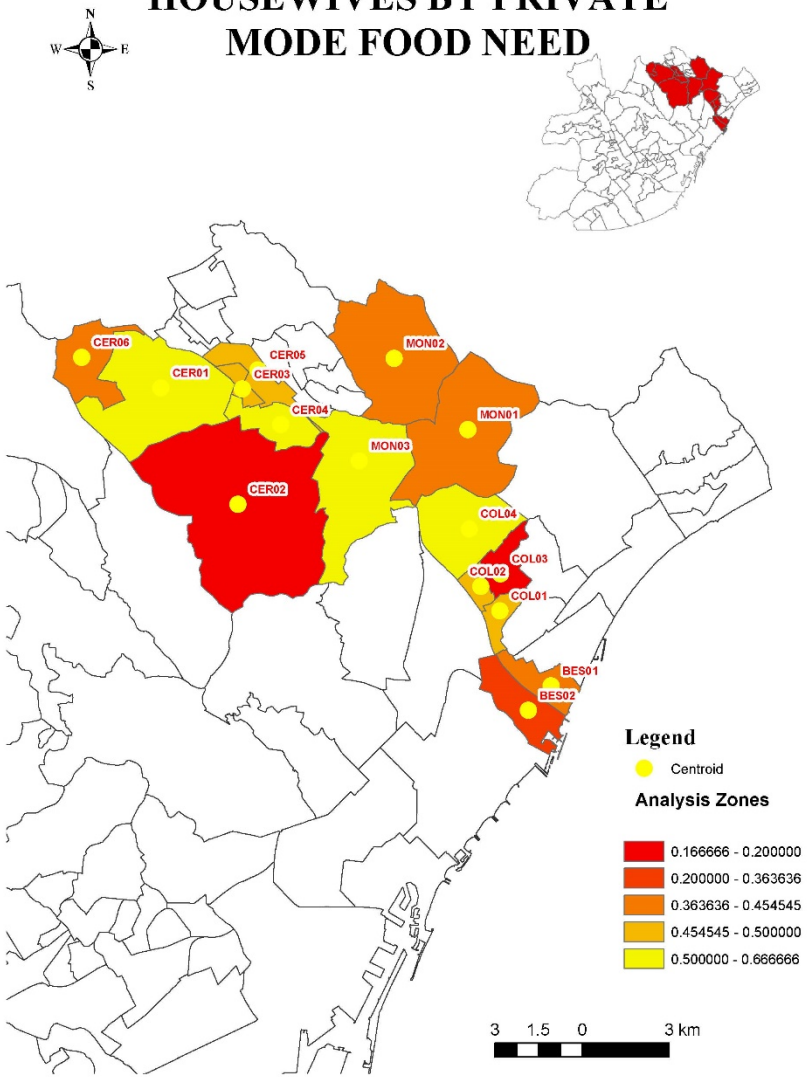
NU is the number of users making a given trip.

n is the number of the considered typologies.

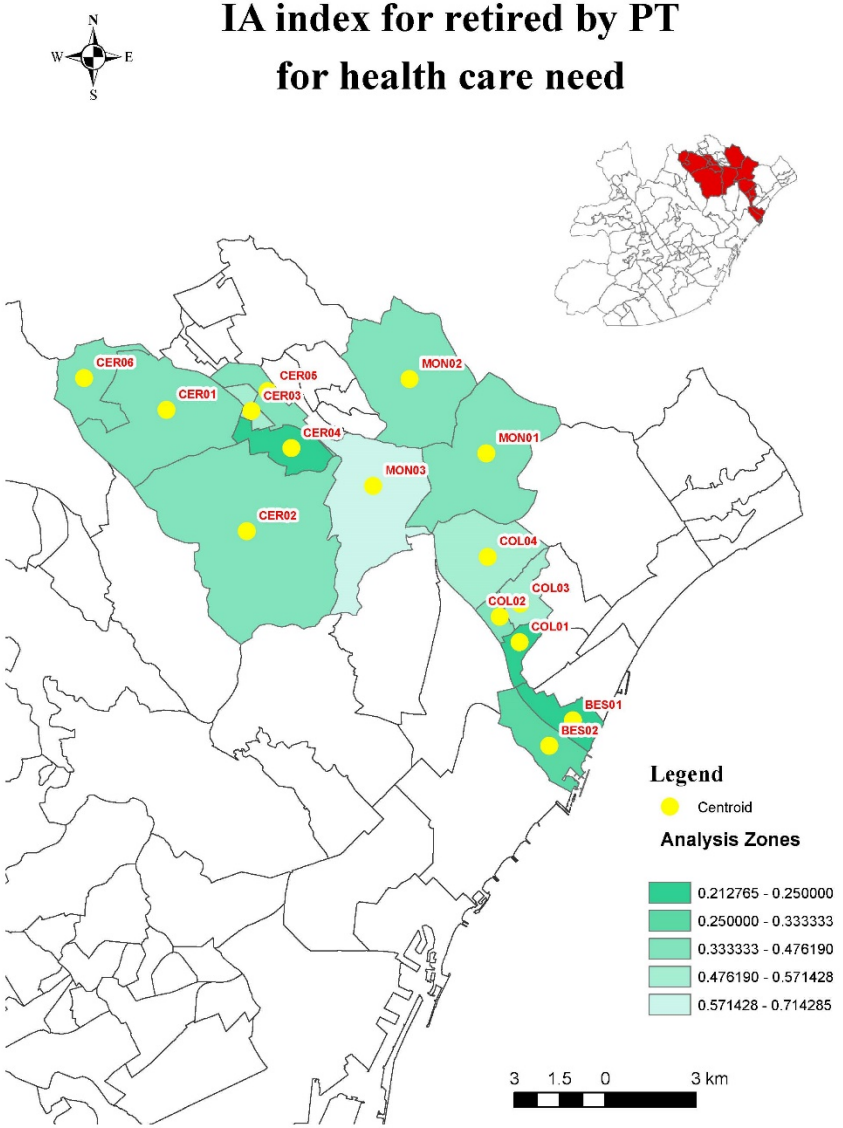
j is the number of users which are realizing the same trip and that are satisfied

g includes the number of both groups of satisfied and unsatisfied users, that are carrying out the same typology of trip

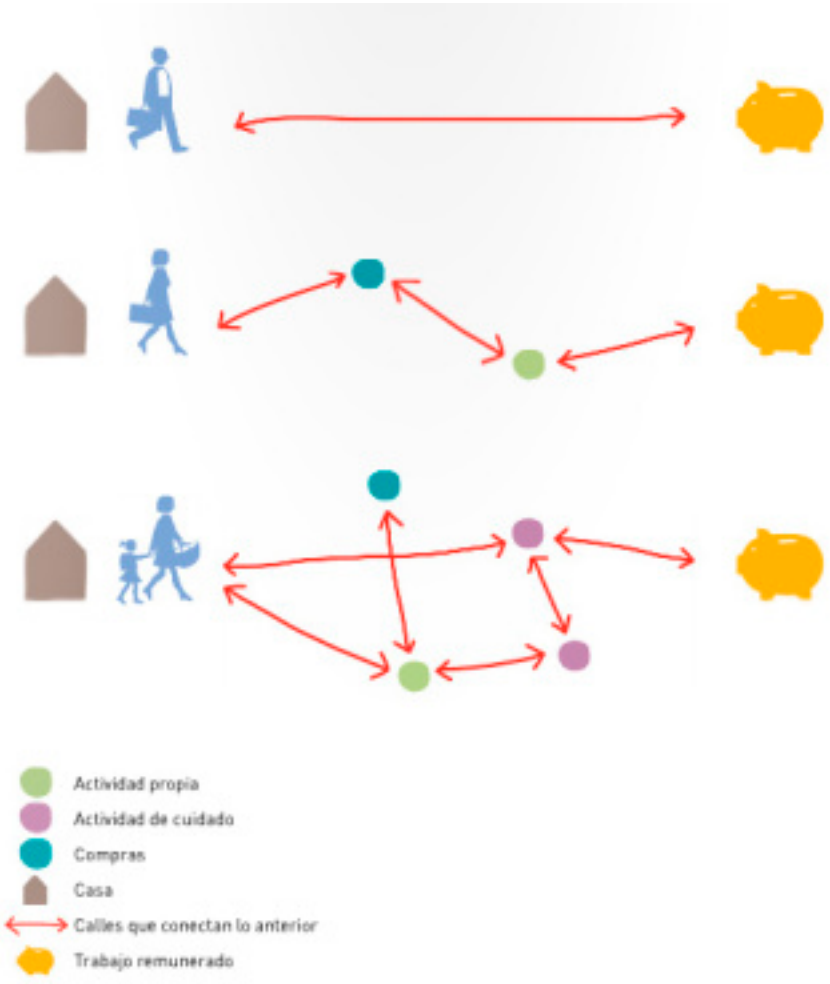
IA INDEX FOR HOUSEWIVES BY PRIVATE MODE FOOD NEED



IA index for retired by PT for health care need



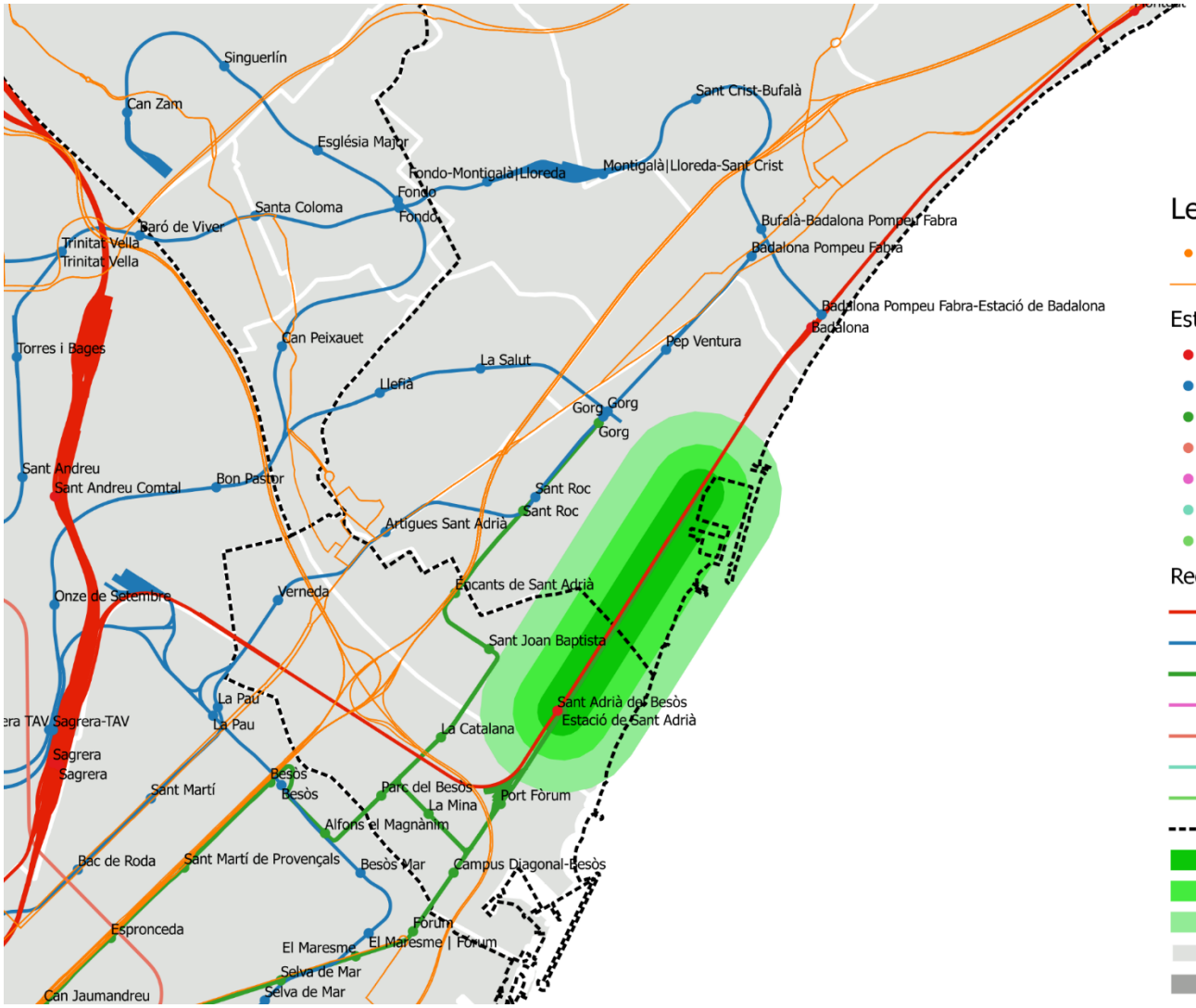
Feminization of Mobility



Vía @miguelalvarez, @**CollectiuPunt6**

Urban area of tramway extension: Sant'Adriá-Badalona port

Buffers for eliciting tramway information



Leyenda

- Bus stop
- Red bus

Estaciones red ferroviaria

- ADF
- MET
- TRM
- FGC
- ALT
- MER

Red ferroviaria

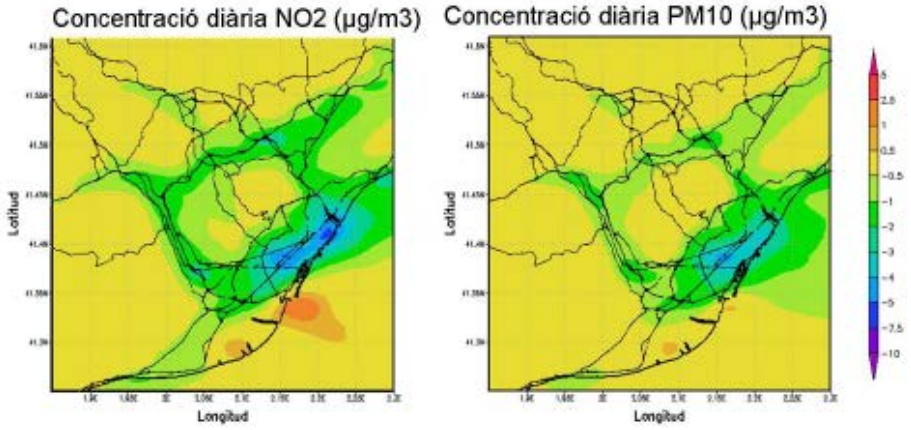
- ADF
- MET
- TRM
- ALT
- FGC
- MER

- Límites Municipios
- Buffer 150m
- Buffer 300m
- Buffer 500m
- Zonas Movilidad
- Zones_EMO_RMB2001

The IA index contribution to the BMA strategic plan for decreasing poverty

Identified poverty corridors: a BRT proposal

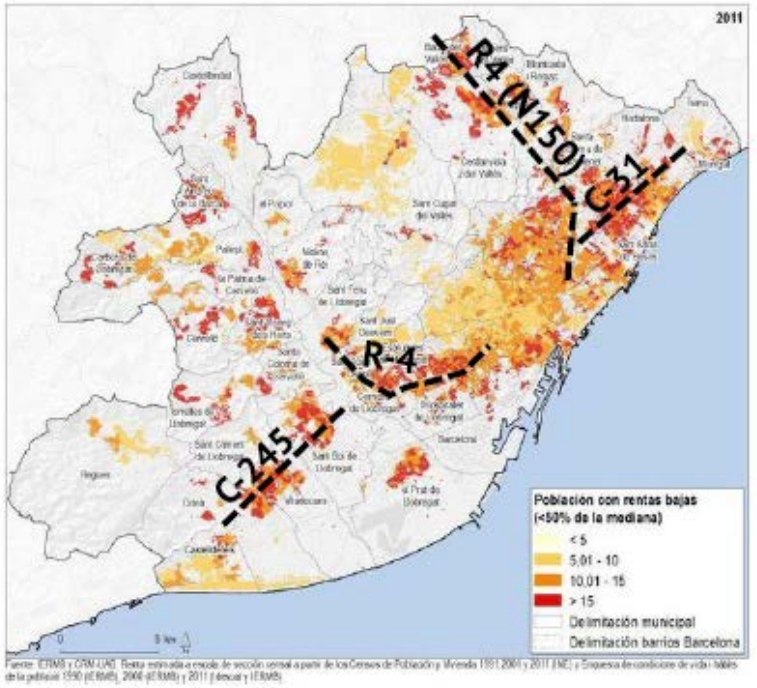
Mapa de contaminació associada als grans corredors de transport (B23-A2, C58, AP7 i Rondes)



Font: Agència d'Ecologia Urbana. Any 2008.

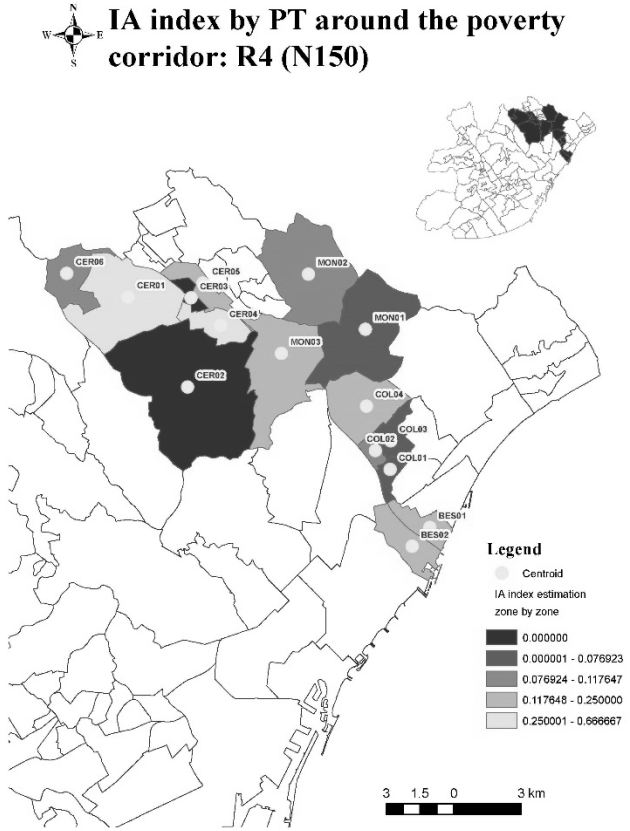
Traços sobre mapa de Direcció de Serveis d'Urbanisme AMB. Febrer 2017

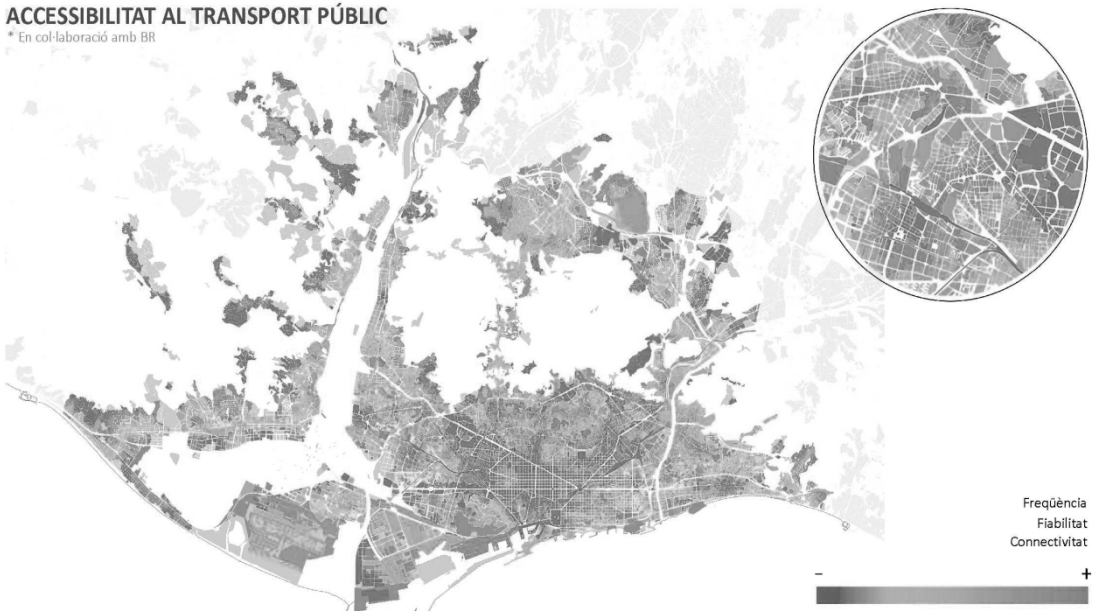
Mapa de pobresa



Estimation of the IA index for revealing people's needs

Estimation of the IA index for revealing people's needs/ Public transport accessibility through the supply side





Results and Conclusions

- Identification of population groups to whom transport policy should be mainly addressed so as to increase transport equity

- The opportunity of reaching activities in given areas is represented by time thresholds, transport networks location and the users' level of satisfaction regarding unmet needs.

Results for the low-income part of BMA

- 1. Policy makers should invest a greater effort in winning over vulnerable groups of the population who revealed their unmet needs.

- 2. The network effect that is to the detriment of low-income social groups when they face a sparse public rail transport network

- The inclusion of the inaccessibility index provides a way to consider equity in a non-paternalistic approach

Thanks
Discussion

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