The Abdus Salam International Centre for Theoretical Physics

Population data, mortality and morbidity rates

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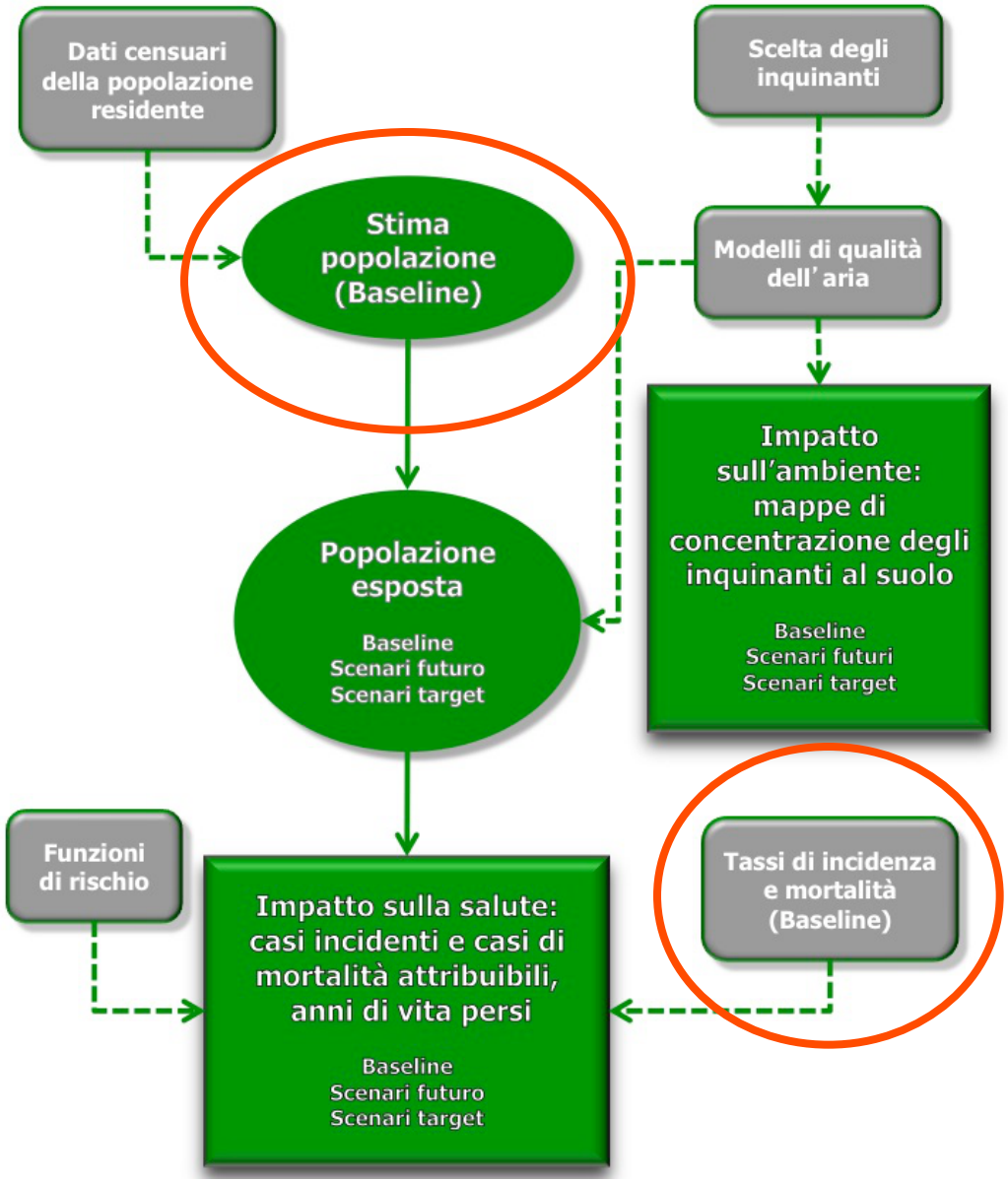
SISTEMA SANITARIO REGIONALE
ASL ROMA 1

REGIONE LAZIO

IEHIA scheme:

The VIIAS website



IEHIA components:

- Concentration increase
- Risk assessment

} weighted attributable fraction

- Population size exposed
- Rate observed in population

} events estimates (among exposed)

Why we need population?

If we have the number of events already calculated by design (e.g. cohort), populations and rates are already available in the results. e.g.:

education	observed	RR	AF	AE
high	200	1	0	0
medium	300	1.5	0.333	100
low	100	2	0.5	50
total	600			150

Why we need population?

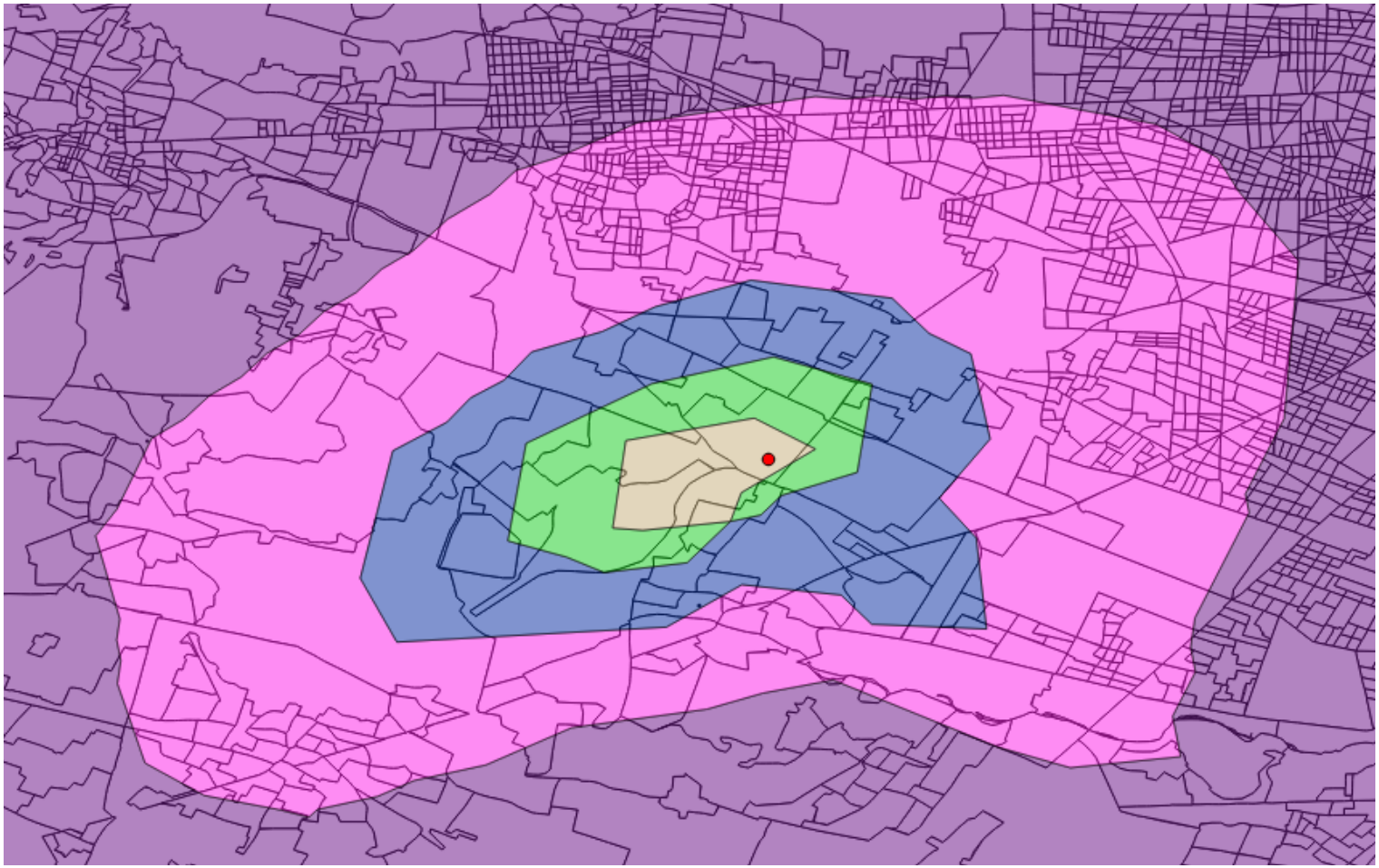
In environmental health impact assessment we assess the exposure on geographical basis, i.e.

- semi continuous surface

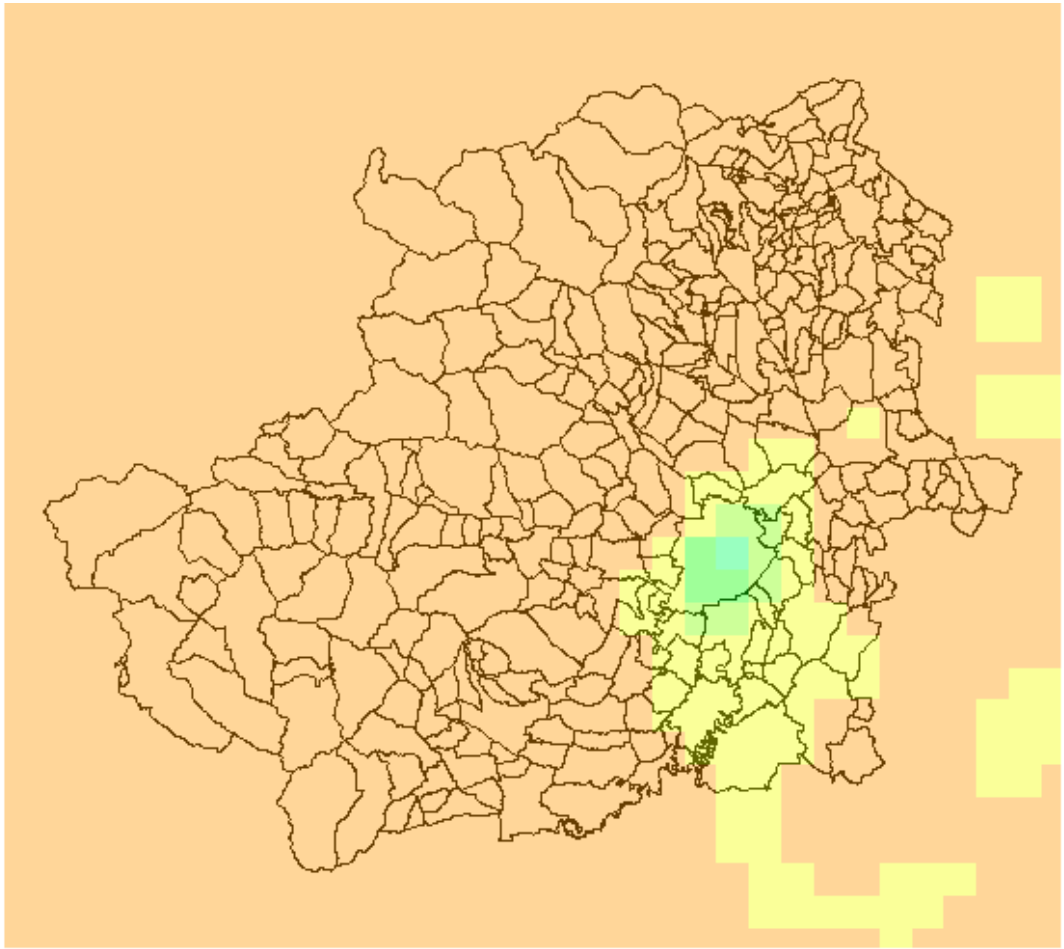
upon

- administrative boundaries

e.g. Pollution point source: iso-concentration areas
upon administrative boundaries
Turin waste incinerator and census block
(**fall-out dispersion model**)



e.g. air quality in Turin district
upon municipality boundaries
(**grid model**)



Why we need to estimate population?

The population (and events) are registered by specific administrative areas

The pollutant is widespread over a unlimited region

The population exposed to a pollutant's homogeneous exposed area isn't known

How to estimate exposed population?

Two approaches for "*change of support*":

1 from grid to administrative scale (as MedHiss project)

if some covariates in the proposed model are collected only at the municipality scale

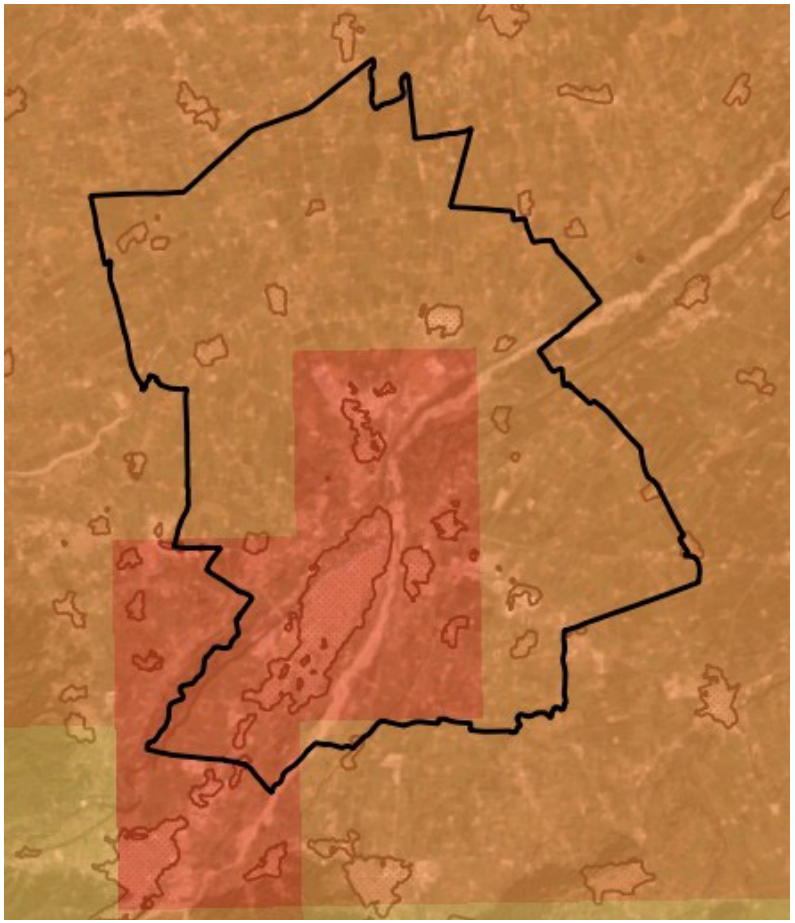
→ statistical unit: municipality, census block, …

2 from administrative boundaries to regular grid (as VIIAS)

to have a maximum specificity on exposure

→ statistical unit: 4x4 Km cell

How to get population?
1: from grid to administrative scale



Municipality area and 4x4 km regular spaced grid of iso-concentration

How much population of this municipality (black contour) is exposed to red level pollutant?

How much is exposed to brown?

Population non homogeneously distributed:

is it possible to take into account the built up areas?

(brown contour)

How to get population?
1: from grid to administrative scale

The aim is to develop a methodology (up scaling) to obtain a map at administrative area scale (municipality, census block) of **air pollution**, starting from:

➢ pollutant concentration fields on regular spaced grid provided by models,

➢ administrative area (cartographic data): boundary and detailed built-up areas (or land use data from CORINE Land Cover database)

Obviously if administrative boundaries are entirely included into the cell all the population will be exposed at the same estimated pollutant level

How to estimate the medium-high built up area?

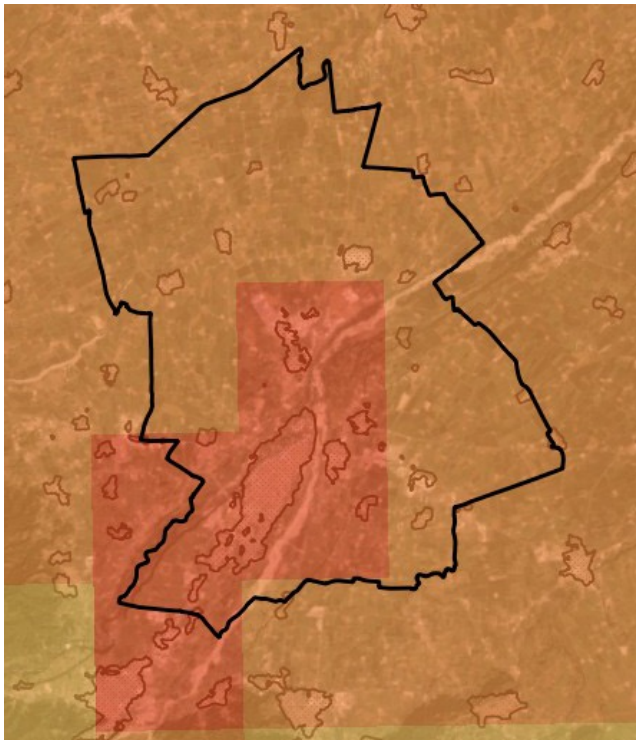
from CORINE programme
(COoRdination de l'INformation sur l'Environnement)
European Environment Agency.

Corine Land Cover

Soil coverage cartography based on satellite data with photo-interpretation, with the objective of providing land use coverage

How to get population?
1: from grid to administrative scale

$$C_i = \sum_{p=1}^{n_i} \gamma_{ip} y_p$$



where:

C_i = concentration mean on the *i*th municipality

y_p = concentration value of the *p*th cell,

γ_{ip}= weight of the pth cell of the *i*th municipality,

n_i = number of cells falling in the *i*th municipality.

a) *municipality area percentage* *(Munic.BA)*

$$\gamma_{ip} = A_{ip} / A_i$$

where

A_i = whole area of the *i*th municipality,

A_{ip} = portion of area of the *i*th municipality falling in the *p*th cell.

b) *built-up area percentage* *(BuiltBA)*

$$\gamma_{ip} = B_{ip} / B_i$$

where

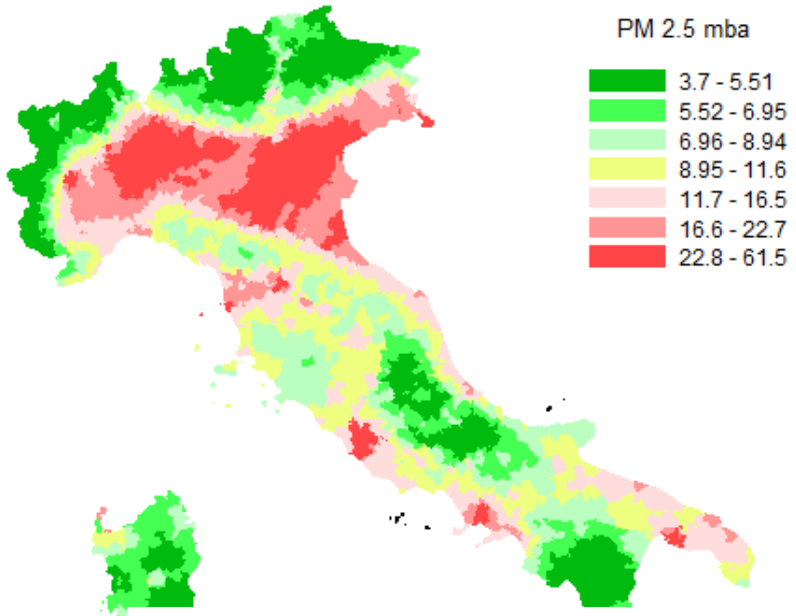
B_i = whole built area of the *i*th municipality

B_{ip} = portion of built area of the *i*th municipality falling in the *p*th cell.

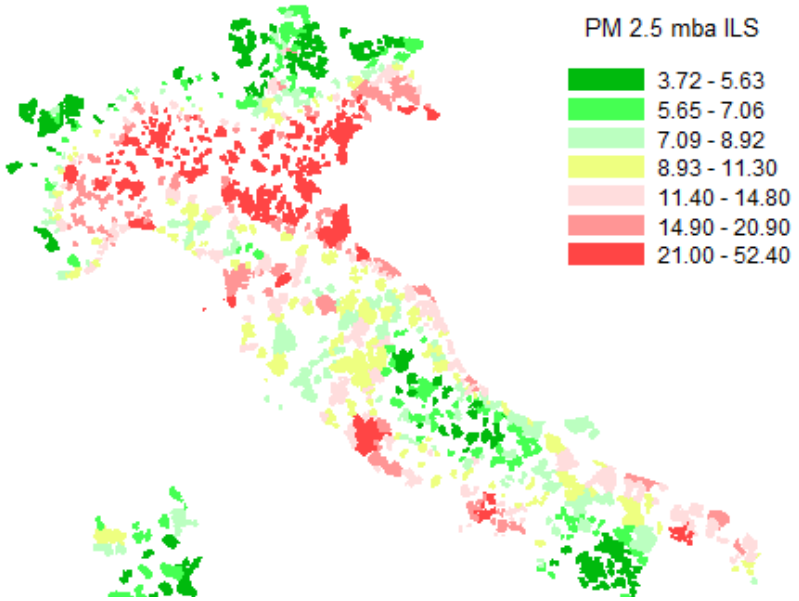
How to get population?
1: from grid to administrative scale

Esample: MED HISS exsposure assessment, PM2.5, 2005

Whole italian territory

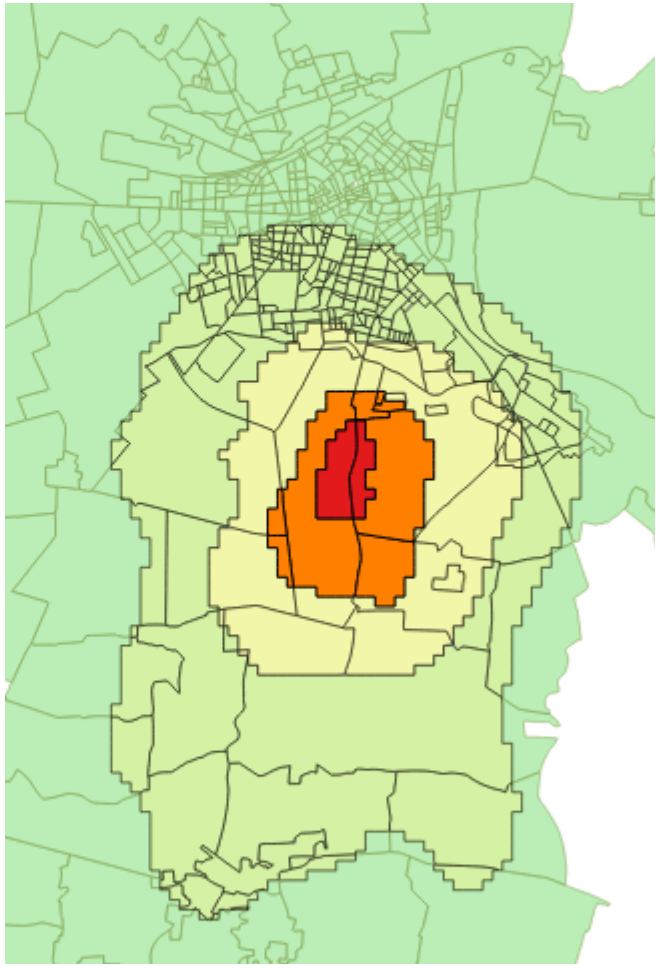


1449 municipalities in the italian survey



… then the population of interest is simply derived from ISTAT tables or from municipal population registry (cohort).

How to get population?
2 from administrative boundaries to regular grid



Census block was drawn around urban homogeneous build up areas:

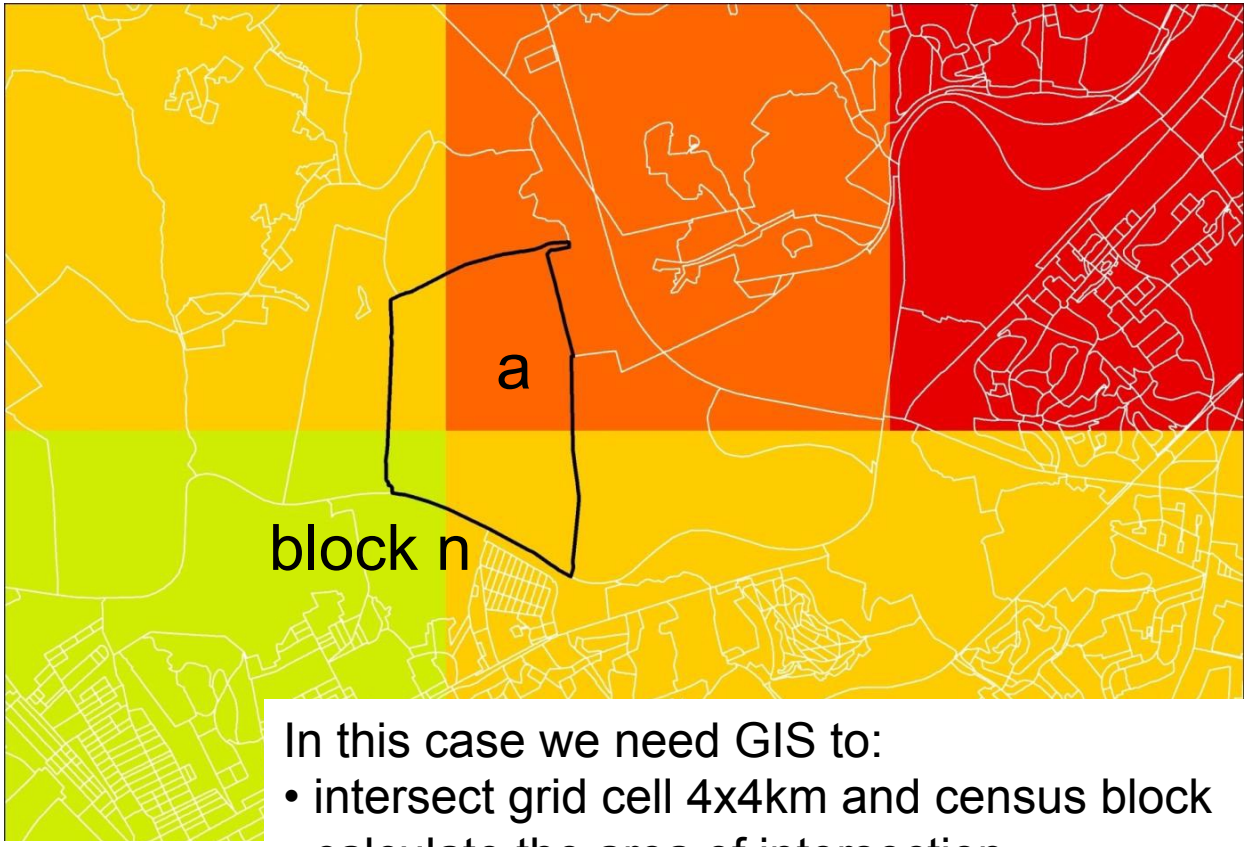
the population is inversely proportional to the census block area

but…

the population could not be homogeneously distributed into the block

How to get population?
2 from administrative boundaries to regular grid

2.1 Proportionally at the intersection area (homogeneity assumption)



$$POP_a = \frac{Area_a}{Area_n} * POP_n$$

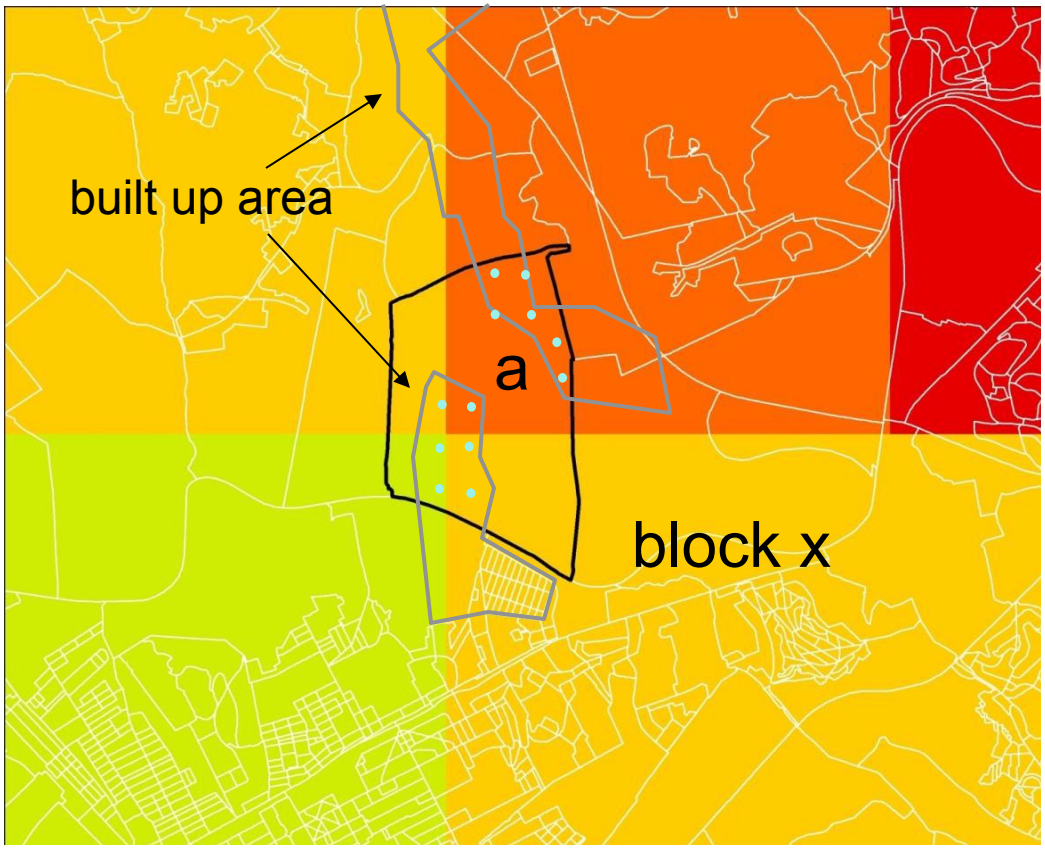
Pop. orange cell= $\sum POP_n$

for all blocks
where ∩ ^ empty

In this case we need GIS to:
- intersect grid cell 4x4km and census block
- calculate the area of intersection
- calculate the population proportionally of areas

How to get population?
2 from administrative boundaries to regular grid

2.2 proportionally to build up area



Define a 100^2 aggregation housing (ah) and its centre (blue points)

Population is re-distributed proportionally to the numbers of aggregation centres
and then summed up into the cell

In the example:
$Pop_{ah} = Pop_x/12$
$Pop_a = Pop_{ah}*7$

Pop. orange cell= $\sum POP_n$

for all blocks
where ∩ ^ empty

How to get population for municipality or census block?

We need population at the smallest scale coherent with our pollutant estimate and with our model design

National official statistics: http://demo.istat.it/index_e.html
smallest scale: municipality

Example
http://demo.istat.it/pop2014/index3.html
(one district a time can be downloaded!)
Resident population on 1st January, (2012-2014)
By: municipality, one year age, gender, civil status.
In the calculation of rates we must use annual mean population (1 st July)

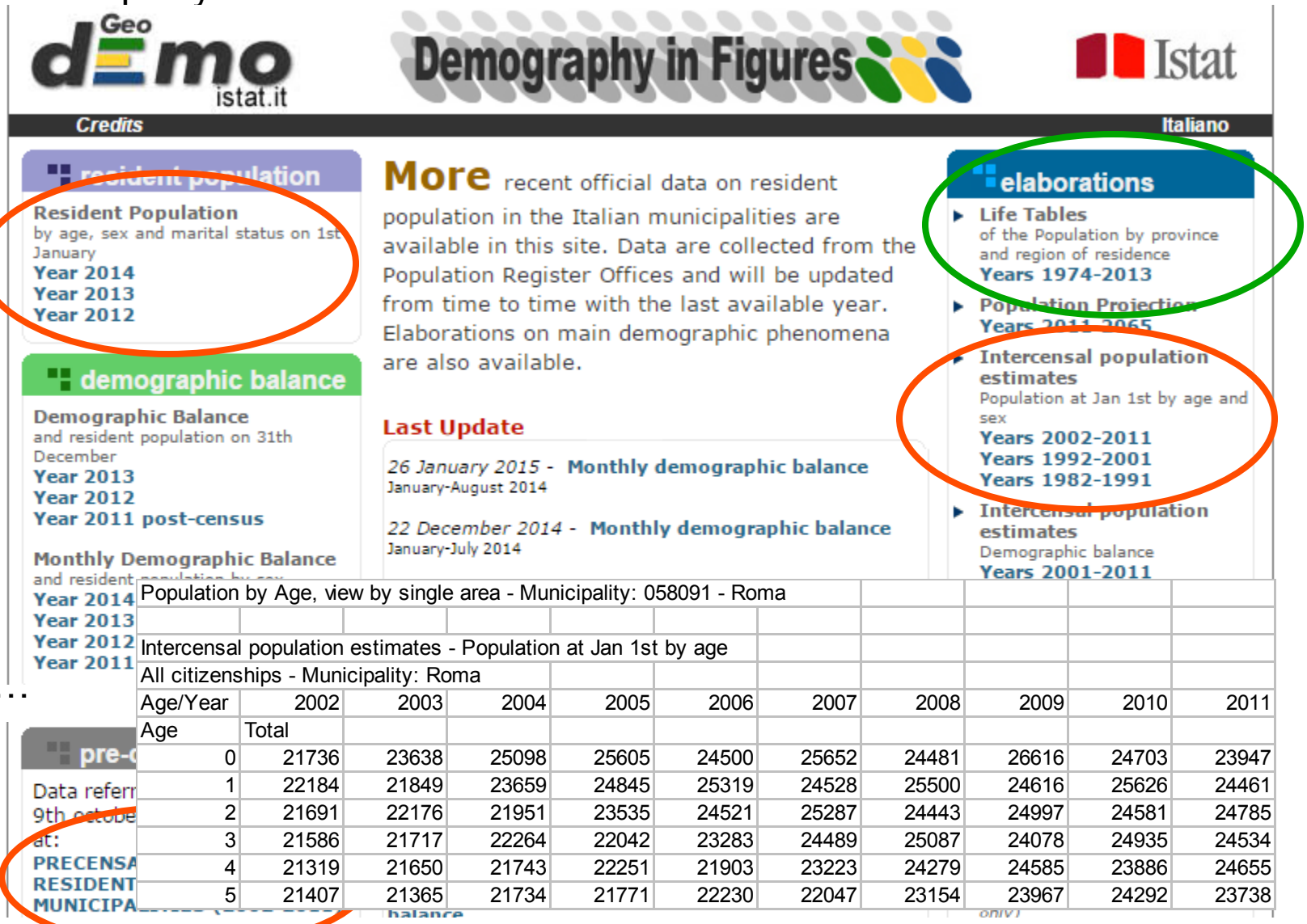
From POSAS (POpolazione residente comunale per Sesso, Anno di nascita e Stato civile), yearly, at Dec, 31th, since 1992, municipal registry data

A POSAS example

Provincia: Torino Codice Provincia: 1						
Codice Comune	Età	Celibi	Coniugati	Divorziati	Vedovi	Totale Maschi
1001	…	…	…	…	…	…
1001	60	0	3	11	2	16
1001	61	0	9	2	0	11
1001	62	2	14	2	1	19
1001	63	2	15	1	1	19
1001	64	2	17	0	1	20

How to get population for municipality or census block?

By municipality



Population by Age, view by single area - Municipality: 058091 - Roma

Intercensal population estimates - Population at Jan 1st by age

All citizenships - Municipality: Roma

Age/Year	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Age	Total									
0	21736	23638	25098	25605	24500	25652	24481	26616	24703	23947
1	22184	21849	23659	24845	25319	24528	25500	24616	25626	24461
2	21691	22176	21951	23535	24521	25287	24443	24997	24581	24785
3	21586	21717	22264	22042	23283	24489	25087	24078	24935	24534
4	21319	21650	21743	22251	21903	23223	24279	24585	23886	24655
5	21407	21365	21734	21771	22230	22047	23154	23967	24292	23738

.....

How to get population for municipality or census block?

If we are interested in areas smaller then municipality we can use ISTAT statistics at census block, (in this case only 1991, 2001 and 2011 (partially for now) data are available)
http://www.istat.it/it/archivio/104317 (English ISTAT version isn't allowed)

Basi territoriali e varial

Basi territoriali | Confini amminis

L'Istat pubblica i dati geografici del sistem
dati sono consultabili attraverso un *so*
zonizzazioni del territorio (per ulteriori pre

- Sezioni di censimento;
- Aree di censimento (solo nella versi capoluogo di provincia al 1 gennaic
- Ar d
- Lo

Nella sezione "Variabili ce popolazione e abitazioni e alle partizioni del sistema popolazione e delle abitazi del censimento della popol dei dati). Queste ultime ha abitanti, aree sub comunali località con meno di 200 a quota residua, comunque n la collocazione dei numeri civici e le linee di confine fra sezioni contigue. Errori che saranno corretti in ulteriori *release* dei dati, ma che non inficiano la validità dei dati definitivi degli aggregati territoriali superiori, visto che le verifiche sui i numeri civici posti a confine fra queste aree territoriali sono state completate.

Confini amministrativi						
Limiti regionali	zip	zip	zip	zip	zip	zip
Limiti provinciali	zip	zip	zip	zip	zip	zip
Limiti comunali	zip	zip	zip	zip	zip	zip
Limiti amministrativi	zip	zip	zip	zip	zip	zip

Variabili censuarie	1991	2001	2011
Censimento dell'industria e dei servizi (formato txt)	zip	zip	-
Censimento della popolazione e delle abitazioni (formato xls)	zip	zip	zip

What about population data in other countries?

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Type a keyword, a code, a title...

European Commission > Eurostat > Population and Housing census > Census data > 2011 Census Hub

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POPULATION AND HOUSING CENSUS

- Statistics Illustrated
- Overview
- Census data
- 2011 CENSUS HUB
- Database
- Census Atlas
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2011 CENSUS

The 2011 Census database is the result of a major joint effort by the European Statistical System (ESS) to better disseminate the results of the Population and Housing Censuses in Europe, providing users with easy access to detailed census data that are structured in the same way and methodologically comparable between countries.

The new tool (the "Census Hub") constructed for data dissemination is based on the concept of data sharing, where National Statistical Institutes (NSIs) provide access to their data according to standard processes, formats and technologies while Eurostat provides the IT structure that allows users to quickly and flexibly specify, compile and extract data stored in the different national census databases. NSIs remain 'proprietors' of the data and keep complete control over them. In addition, the Census Hub data are validated by the NSIs and are not re-validated by Eurostat. In the case of revisions or updates, NSIs need to upload the new data in their own system instead of sending a complete new data set to Eurostat.

It should be noted that the census data disseminated here are not microdata; they are

NEWS

The Census Hub: easy and flexible access to European census data

www. ec.europa.eu/eurostat/web/population-and-housing-census/census-data/2011-census

POPULATION AND HOUSING CENSUS

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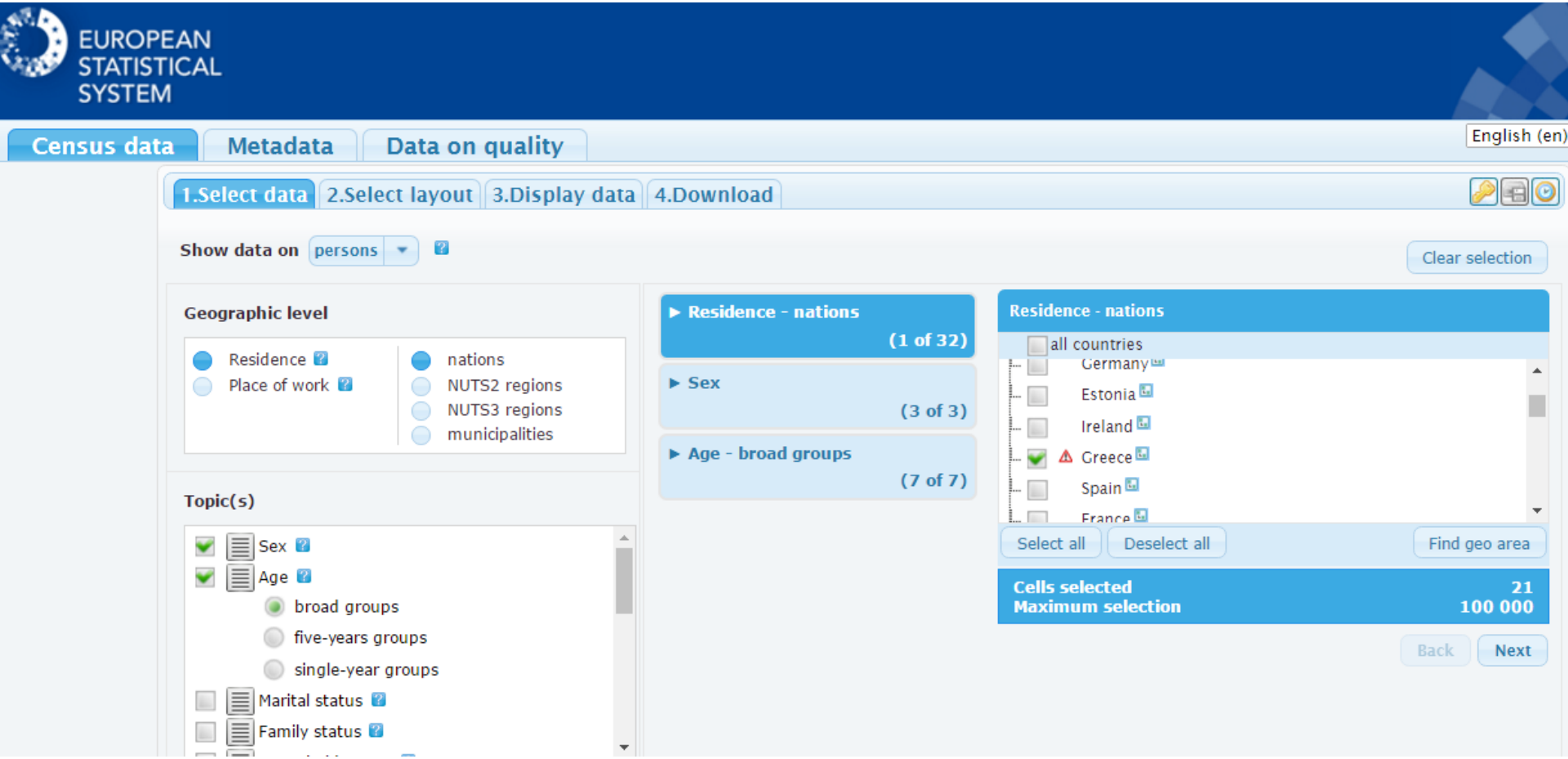
Publications
Links

DATABASE

- Population and housing census (cens)
  - Census - time series of selected indicators (cens_hn) M
  - Census 2011 round (cens_11r) M
    - Data on persons (cens_11rdp)
      - Population structure (cens_11rstr)
        - Population by single year of age and NUTS 3 region (cens_11ag_r3)
      - Population by family characteristics (cens_11rfc)
        - Population by marital status and NUTS 3 region (cens_11ms_r3)
        - Population by family status and NUTS 3 region (cens_11fs_r3)
      - Population by employment characteristics (cens_11rec)
        - Population by current activity status, educational attainment level and NUTS 2 region (cens_11aed_r2)
        - Population by current activity status, occupation and NUTS 2 region (cens_11ao_r2)
        - Population by current activity status, NACE Rev. 2 activity and NUTS 2 region (cens_11an_r2)
        - Population by status in employment, occupation and NUTS 2 region (cens_11empo_r2)
        - Population by status in employment, NACE Rev. 2 activity and NUTS 2 region (cens_11empn_r2)
      - Population by migration characteristics (cens_11rmc)
        - Population by country of citizenship at national level (cens_11ctz_n)
        - Population by group of citizenship, occupation and NUTS 2 region (cens_11ctzo_r2)
        - Population by country of birth at national level (cens_11cob_n)
        - Population by group of country of birth, educational attainment level and NUTS 2 region (cens_11cobe_r2)
        - Population by group of country of birth, current activity status and NUTS 2 region (cens_11coba_r2)
        - Population by group of country of birth, occupation and NUTS 2 region (cens_11cobo_r2)
        - Population by period of arrival in the country, country of birth and NUTS 2 region (cens_11arco_r2)
      - Data on families and households (cens_11rdf)


EUROPEAN STATISTICAL SYSTEM
Census data
Metadata
Data on quality
English (en)
1.Select data
2.Select layout
3.Display data
4.Download
Show data on persons
Clear selection
Geographic level
Residence
Place of work
nations
NUTS2 regions
NUTS3 regions
municipalities
Topic(s)
Sex
Age
broad groups
five-years groups
single-year groups
Marital status
Family status
Residence - nations (1 of 32)
Sex (3 of 3)
Age - broad groups (7 of 7)
Residence - nations
all countries
Germany
Estonia
Ireland
Greece
Spain
France
Select all
Deselect all
Find geo area
Cells selected 21
Maximum selection 100 000
Back
Next

EUROPEAN STATISTICAL SYSTEM

Census data | Metadata | Data on quality

1.Select data | 2.Select layout | 3.Display data | 4.Download

Sex

Columns

Tables

Rows

Age

Age (7 selected)
Sex (3 selected)
Residence (1 selected)

EU 2011 Population

Date of extraction : 04.02.2017 18:47:07

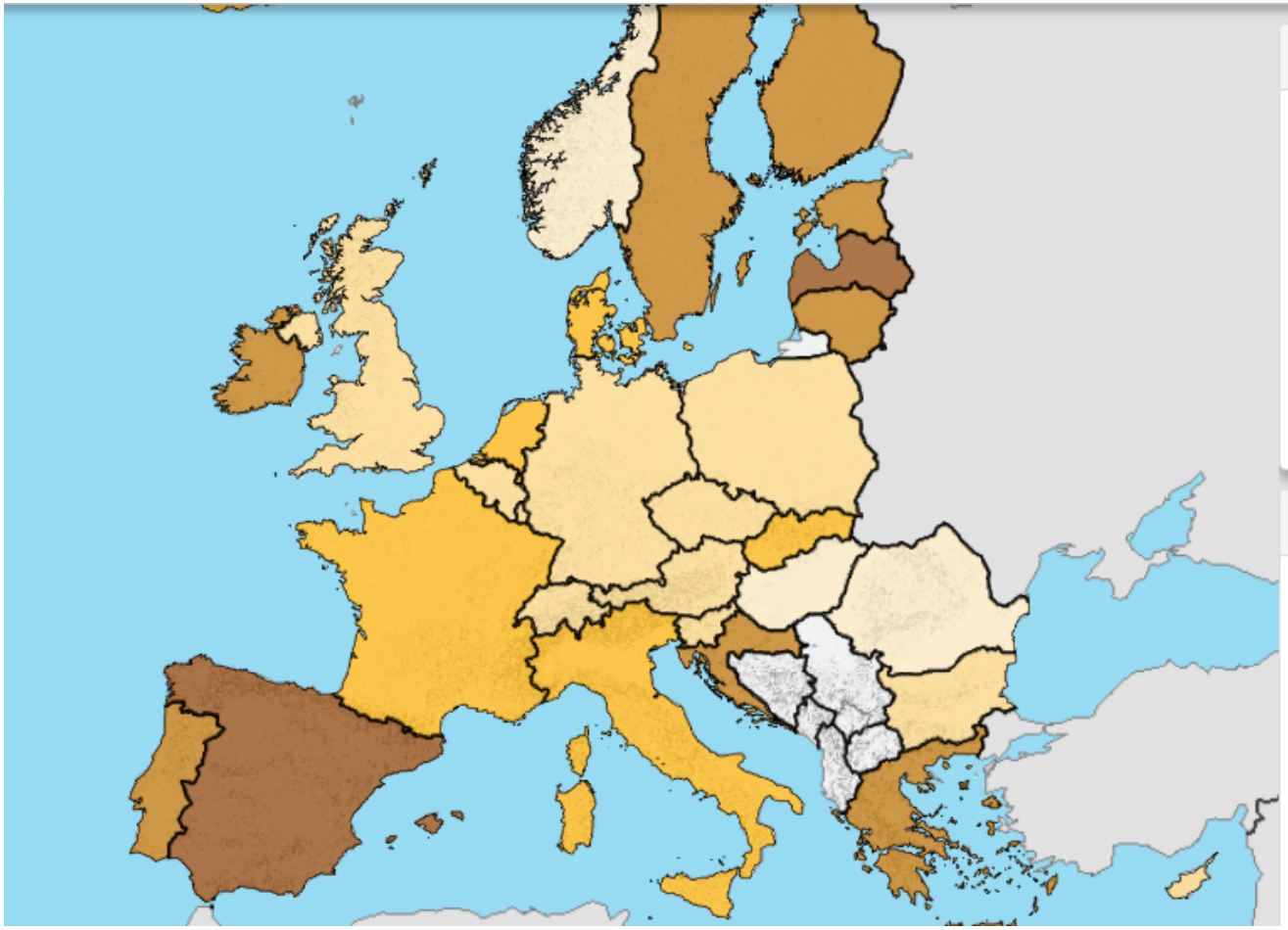
HC Note	Country	Response received	HC Note	Countr
	Czech Republic	Data retrieved		Greece

Data retrieved from dataset HC14 – for details see the data transmission plan

Census Data

Geographical area Czech Republic
Period of time Year 2011

Sex ▸ / Age ▾	Total	Male	Female
Total	10,436,560	5,109,766	5,326,794
under 15 years	1,488,928	763,949	724,979
15 to 29 years	1,968,595	1,006,707	961,888
30 to 49 years	3,143,124	1,605,672	1,537,452
50 to 64 years	2,155,450	1,049,411	1,106,039
65 to 84 years	1,490,155	621,201	868,954
85 years and over	154,681	42,924	111,757



Census 2011

4.4 Unemployment rate o

4.5 Share of foreign-born

4.6 Share of foreign-born arrived in 200...

4.7 Share of persons who changed resi...

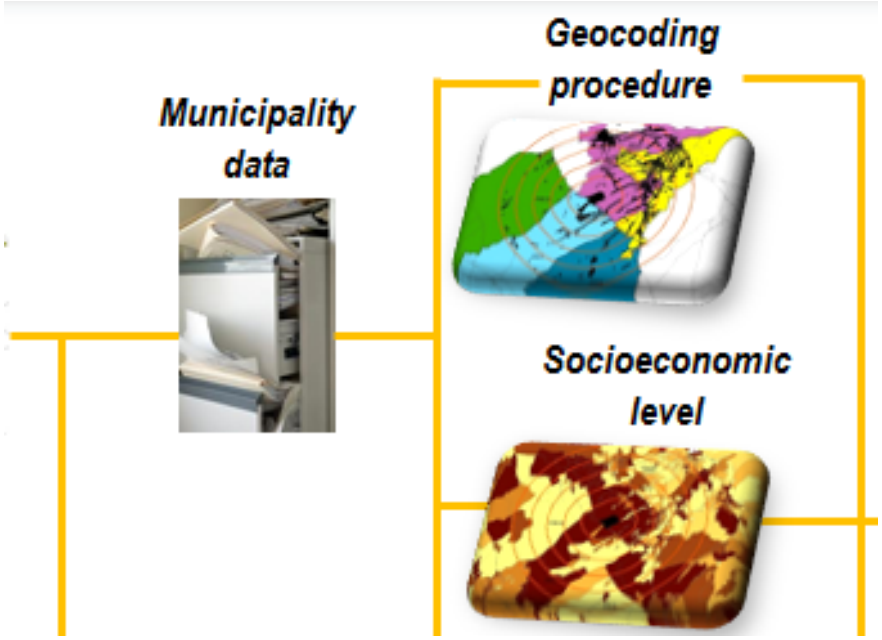
5. Elderly people

Legend

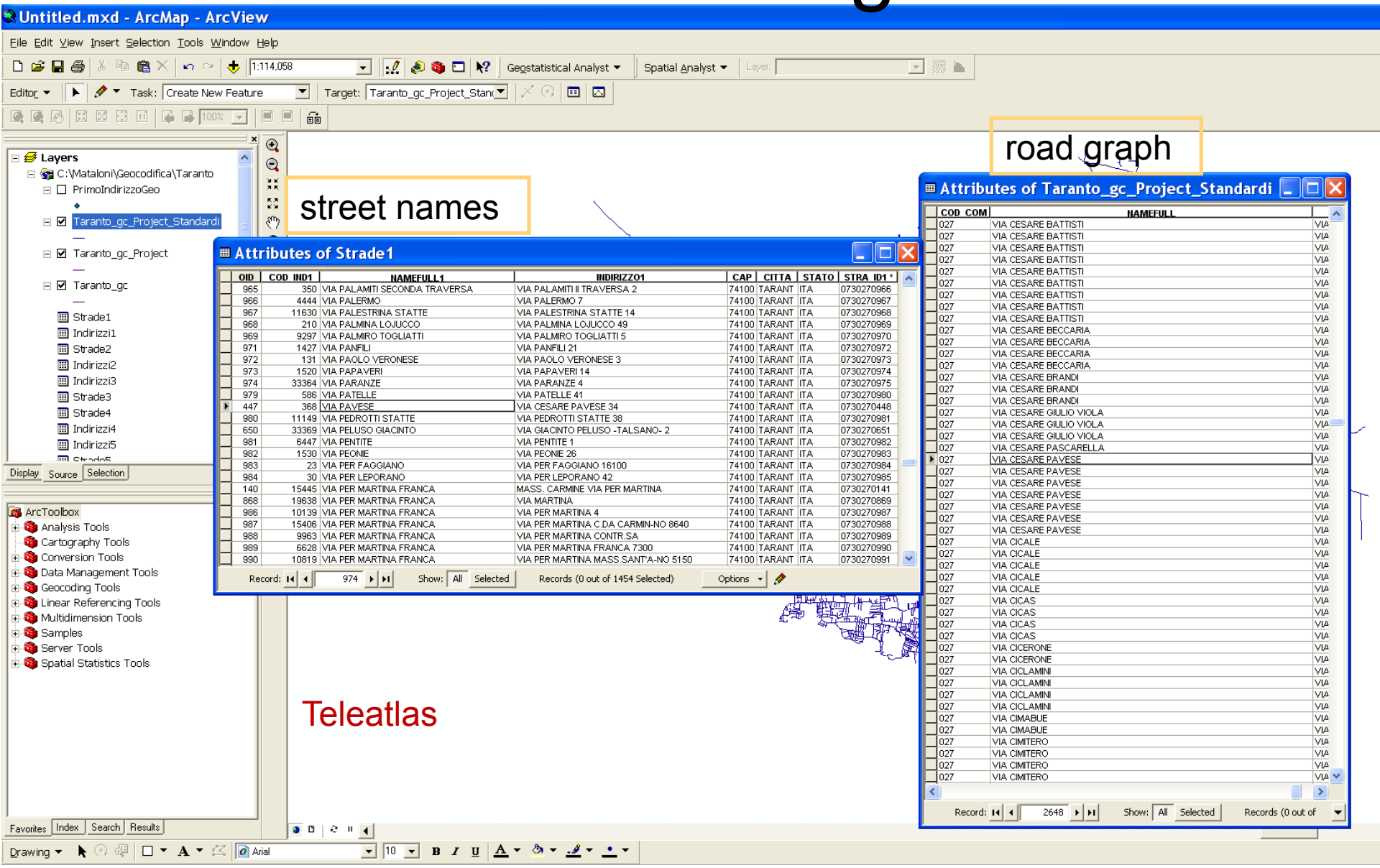
Unemployment rate of foreigners, persons aged 15-64, by NUTS level 0 region, 2011 (%)

- <= 5
- 5 - <10
- 10 - <20
- 20 - <30
- >= 30
- Data not available

residential population cohorts based on municipality registry data

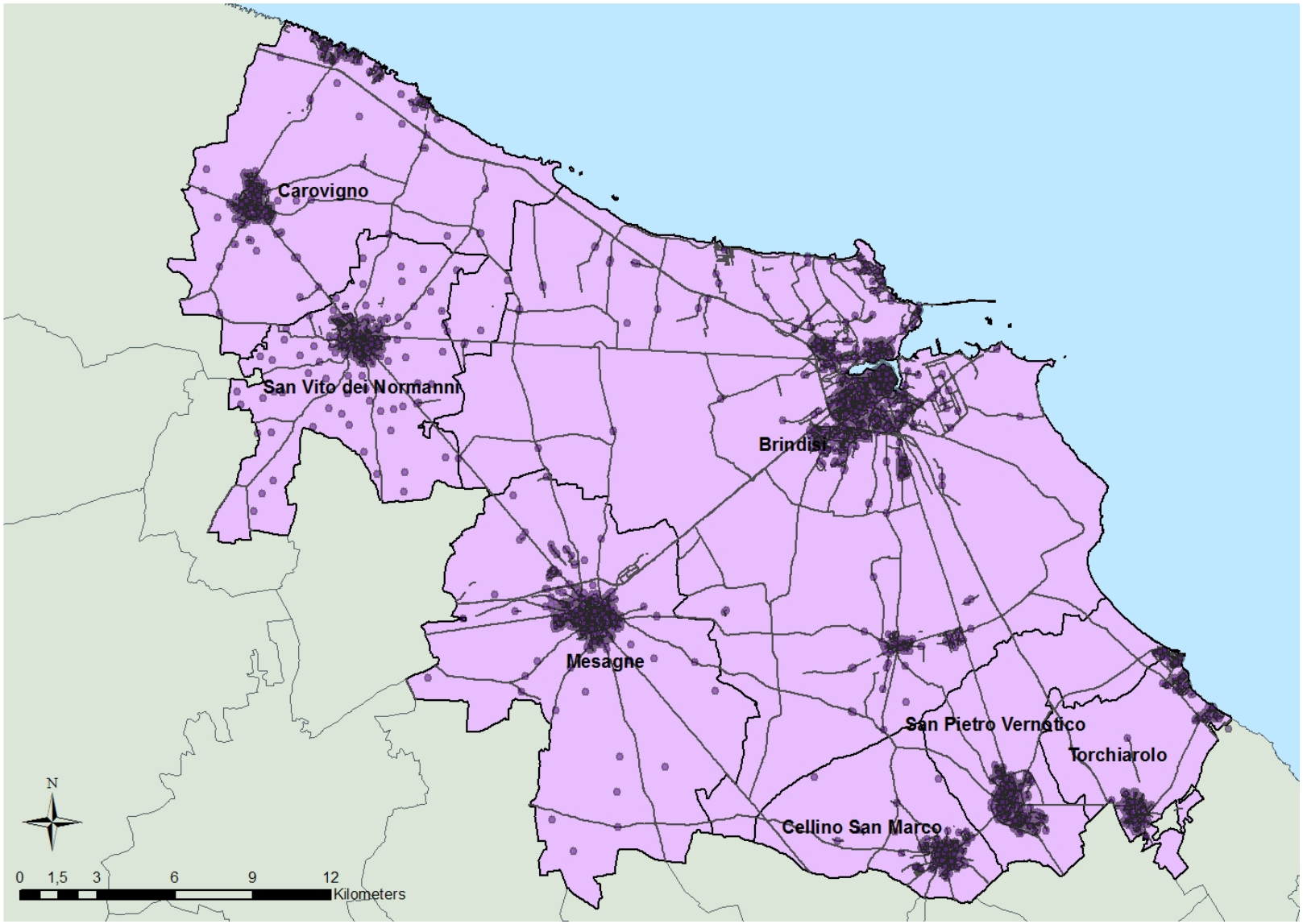


Geocoding



At each address are associated geographic coordinates (x, y)

geocoded addresses



GISCO: GEOGRAPHICAL INFORMATION AND MAPS

Overview
+ Geodata
+ GISCO ACTIVITIES
Frequently asked questions (FAQ)

GISCO ACTIVITIES

GISCO Activities

The main goal of GISCO's various activities and long-term projects is to better integrate statistical and geospatial information at the EU level.

1. UN-Global Geospatial Information Management (UN-GGIM)

Eurostat is closely involved in the activities of the UN-Global Geospatial Information Management (UN-GGIM) and its European committee, **UN-GGIM: Europe**. Eurostat's main interest in UN-GGIM lies in bringing together statistical and geospatial information. The aim is to provide better, more relevant statistics. In line with this, Eurostat is keen to raise awareness among European Statistical System (ESS) members of the benefits of data integration. UN-GGIM's activities now provide the framework for all location-related ESS activities, including:

- GEOSTAT
- Merging Statistics and Geospatial Information
- the activities of the European Forum for Geography and Statistics (EFGS).

2. GEOSTAT

GEOSTAT was launched in early 2010, in cooperation with the European Forum for Geography and Statistics (EFGS). It comprises a series of projects designed to set up geospatial statistics infrastructure in EU countries and at EU level.

GEOSTAT's main objective, in preparation for the 2021 census, is to establish a point-based

SEE ALSO

Statistics Explained - *Your guide to European Statistics*

European Statistical System (ESS)

UN-GGIM
UNITED NATIONS INITIATIVE ON GLOBAL GEOSPATIAL INFORMATION MANAGEMENT

UN-GGIM EUROPE

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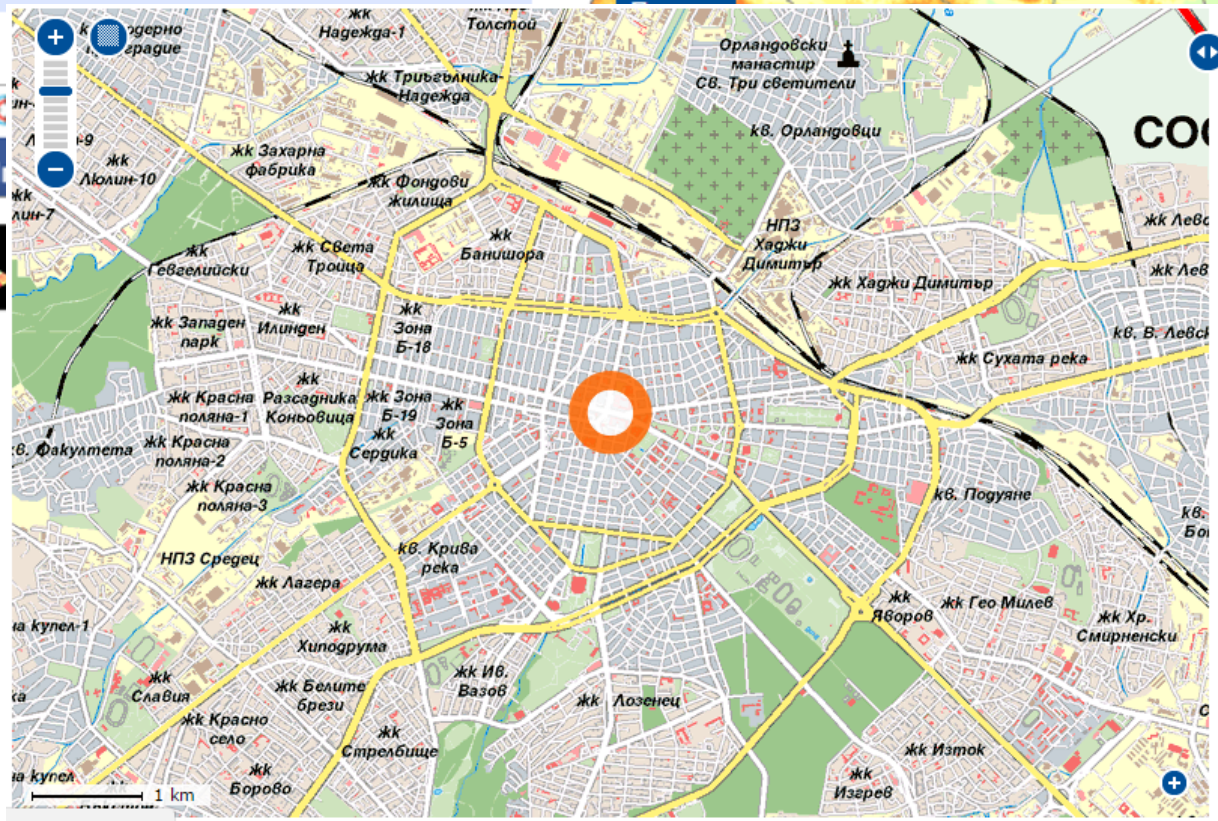

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To calculate attributable fraction among general population, if only a part of this is exposed, we need to know either the proportion of events exposed or the proportion of population exposed.

For widespread pollutant this is not necessary.

“… with special emphasis on air pollution“

in this case we consider all the population as exposed.

We need different population for IEHIA for short-term effect?

Generally no

depends on study specific considerations

EpiAir2 example (short term attributable mortality)

Dose response relationships estimated using surrounding events (deaths of resident in city occurring in an area 10km around).

The hypothesis is that the short term effect of pollutant affects the health of the whole area (comprising surrounding cities).

Then the impact may be calculated on population of whole considered area

Why we need crude rates?

We apply (stable) crude rates, geographically coherent with municipality or grid map, to the estimated population for calculating expected events

$$T_j = \frac{e_j}{n_j}$$

Where

T_j is the rate at *j* age strata,

e_i are the observed,

n_j is the mean population at July, 1 st

Why we need crude rates?

Given T, the observed mortality (morbidity) rate of the adverse effect on health under the current exposure obtained from available health statistics

$$T_0 = \frac{T}{[1+(RR-1)*(C/10)}$$

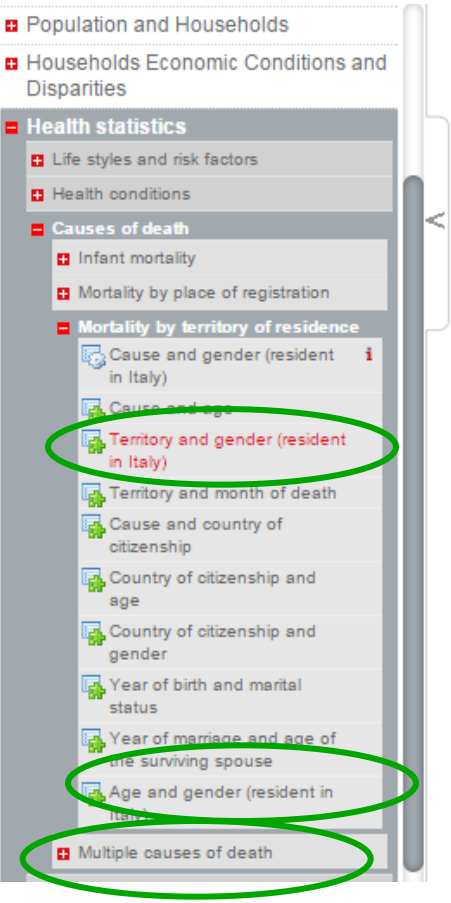
T_0 is the mortality (morbidity) rate that would be observed at the given counterfactual level (for other terms in equation see later)

So, from rates and population, we get estimated events by area or cell

How to get mortality?

At http://dati.istat.it/ mortality data are available by cause, district, gender, annual age

but… not disaggregated by these dimensions.



Mortality by territory of residence : *Territory and gender (resident in Italy)*

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Age	total
Marital status	total
Educational level	total
Month of death	year
Underlying cause of death - European Short List	all causes of death
Year of birth	all items
Age group of the surviving spouse	total
Year of marriage	all items
Country of citizenship	All countries of the world

Year	2012						
Data type	deaths			mortality rate (per ten thousand values)			standar
Gender	males	females	total	males	females	total	males
Territory							
Italy	293 425	316 471	609 896	101.86	102.98	102.44	
Nord-ovest	78 480	87 552	166 032	102.63	107.29	105.04	
Piemonte	23 927	26 305	50 232	113.6	116.41	115.06	
Torino	11 619	12 487	24 106	107.41	106.97	107.18	

Causes of death selected for the IEHIA of air pollution

Mortality outcomes	**ICD IX**	**Age (years)**
Chronic effects		
All causes (excluding accidents)	0-799	> 30
Lung cancer	162	> 30
Infarction	410-414	> 30
Cerebrovascular diseases (stroke)	430-438	> 30
Acute effects		
All causes (excluding accidents)	0-799	> 30
Cardiovascular diseases	390-459	> 30
Respiratory diseases	460-519	> 30

Adapted from WHO,MPACT OF
PM10 AND OZONE IN 13 ITALIAN CITIES, M Martuzzi, F Mitis, I Iavarone, M Serinelli

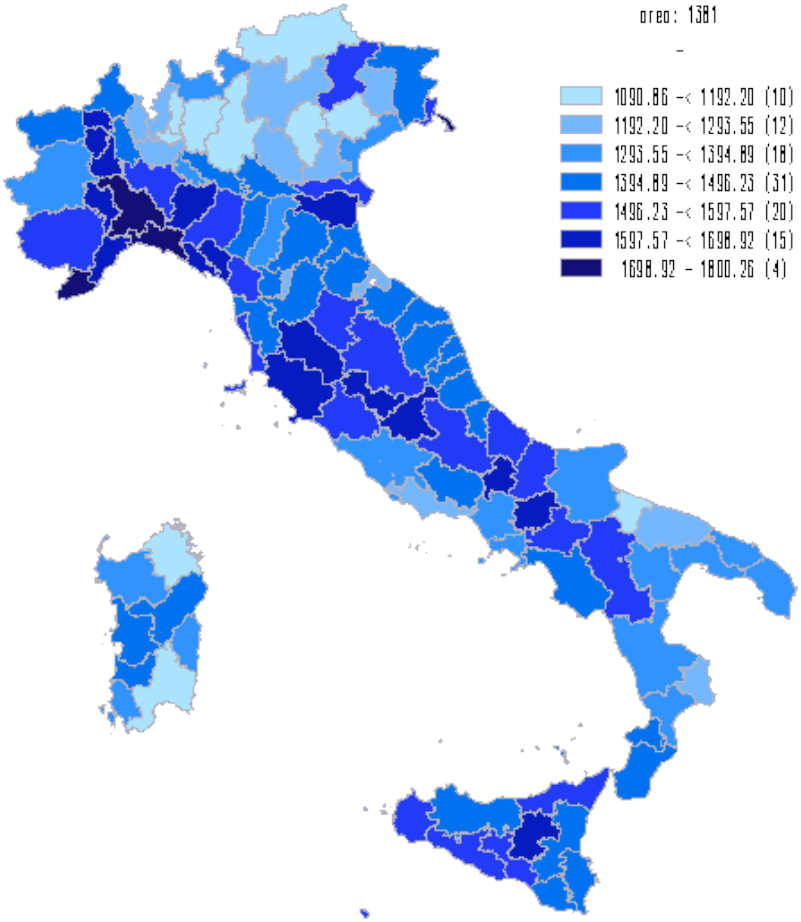
Crude rates

An overview of some causes: acute and chronic effects

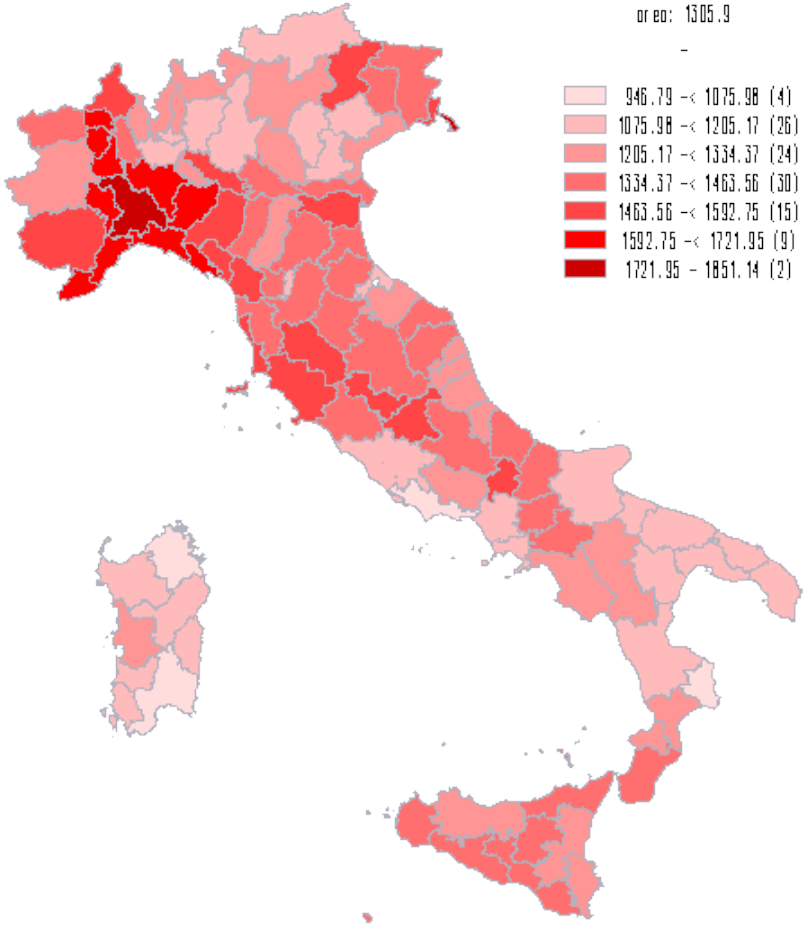
Mortality 2000-2003, 2006-2010

All natural causes, 30 +

Males



Females



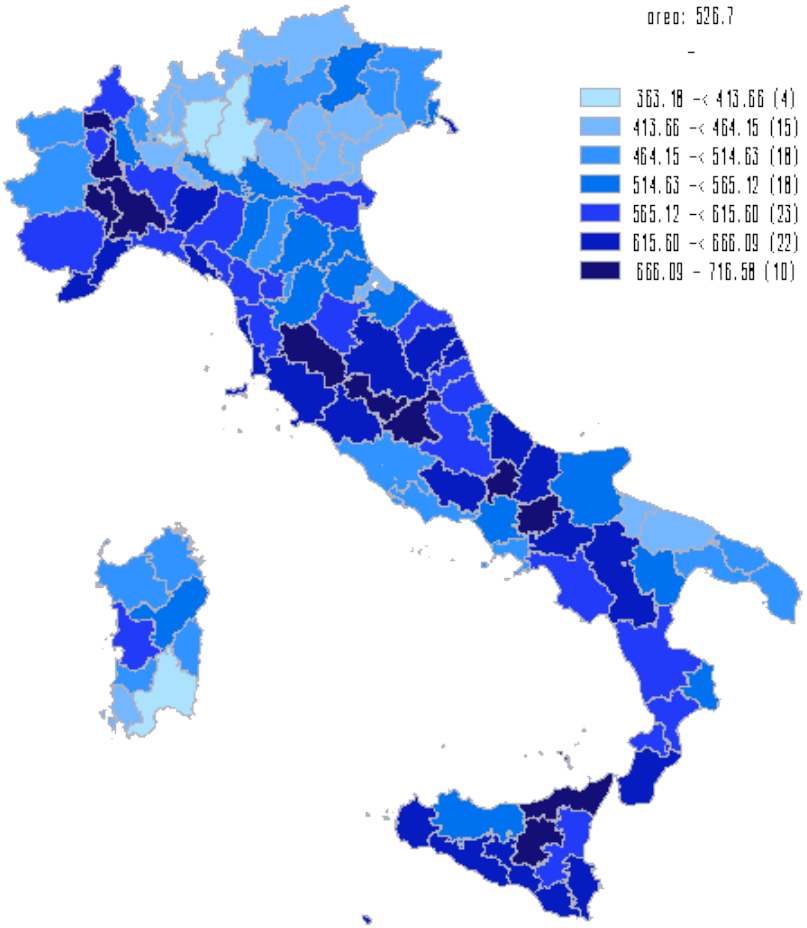
Crude rates

An overview of some causes: acute effects

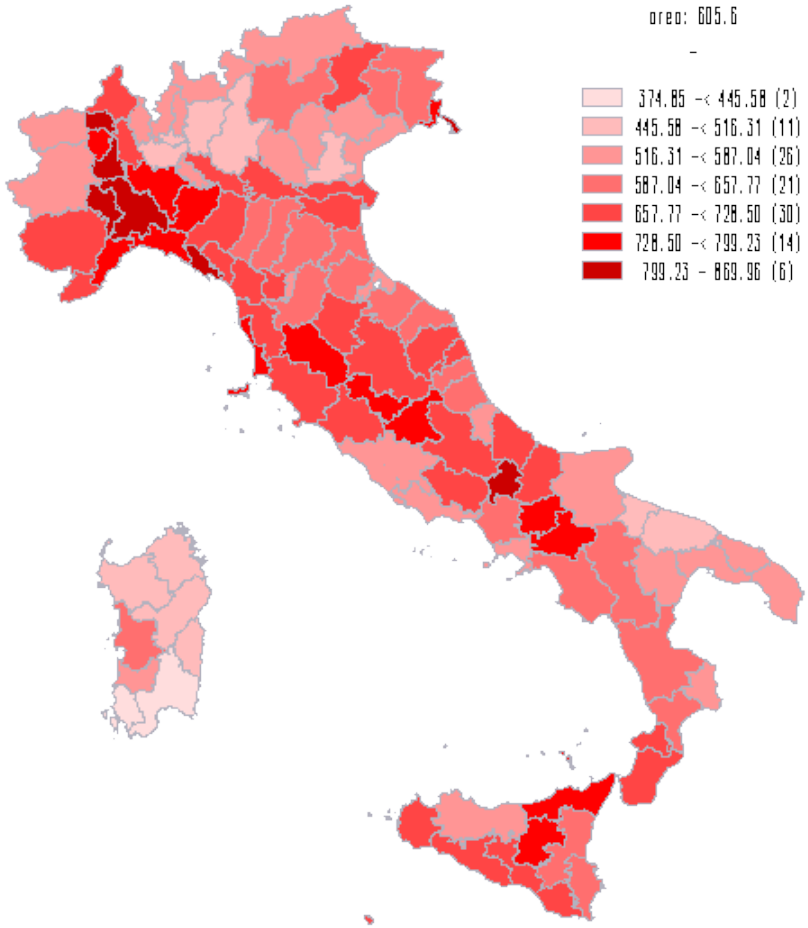
Mortality 2000-2003, 2006-2010

Circulatory diseases, 30 +

Males



Females



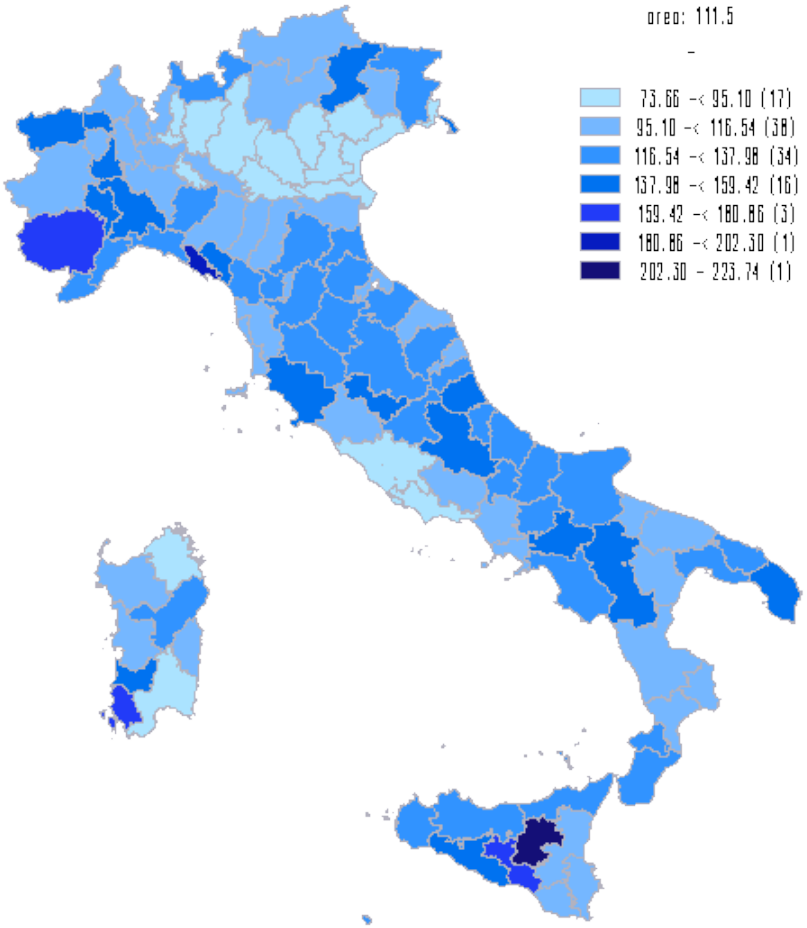
Crude rates

An overview of some causes: acute effects

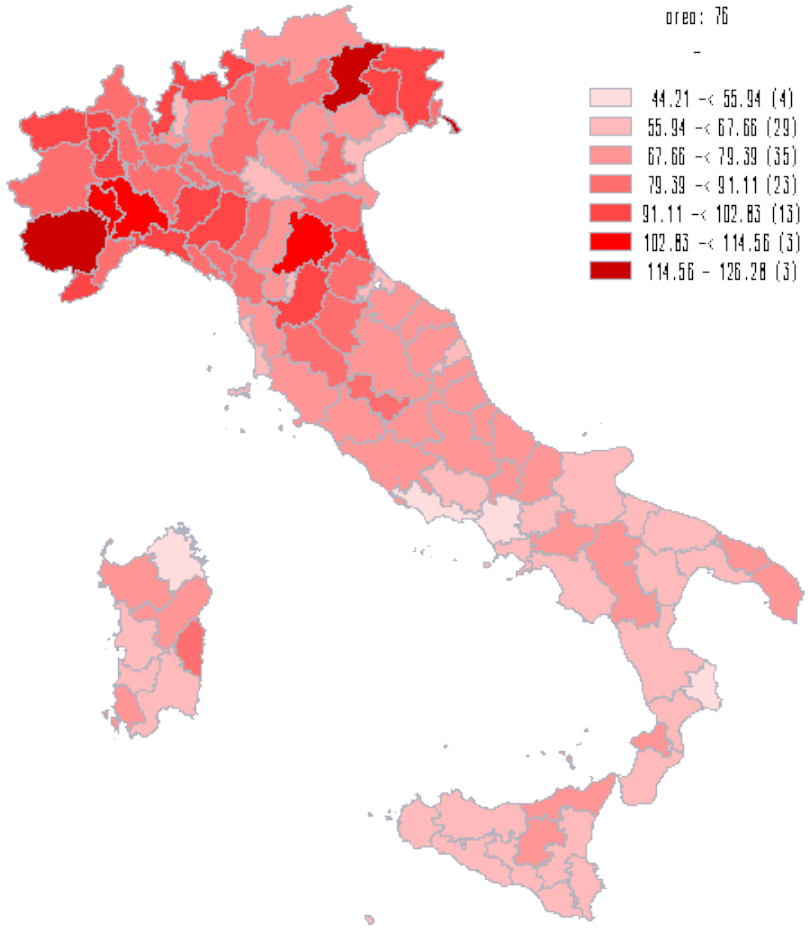
Mortality 2000-2003, 2006-2010

Respiratory diseases, 30 +

Males



Females



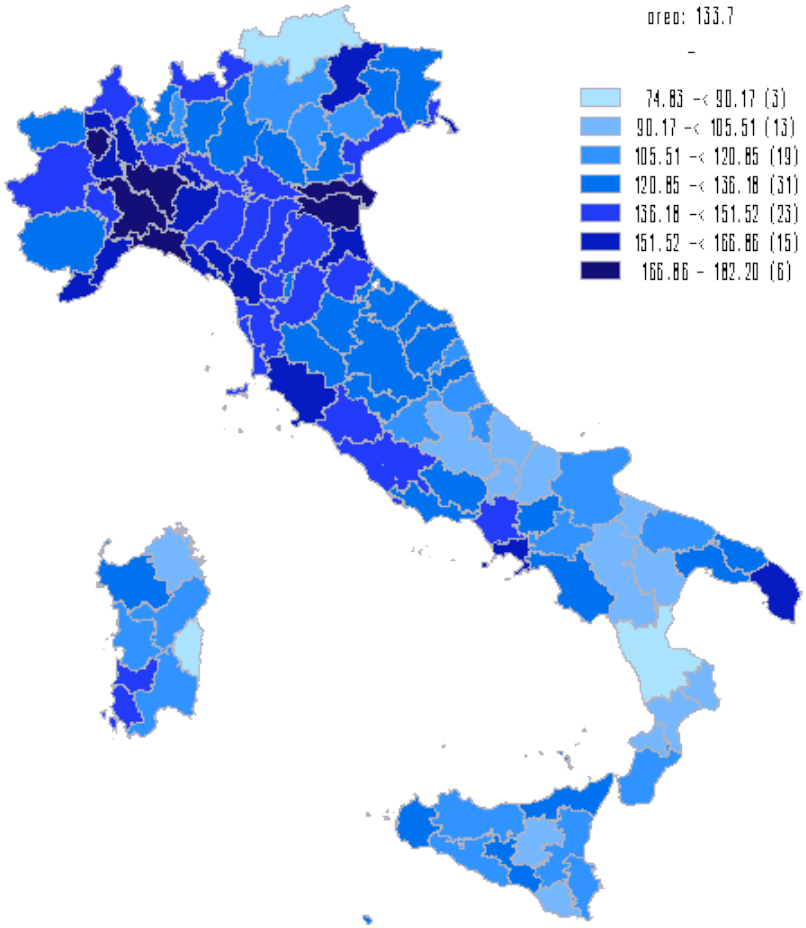
Crude rates

An overview of some causes: chronic effects

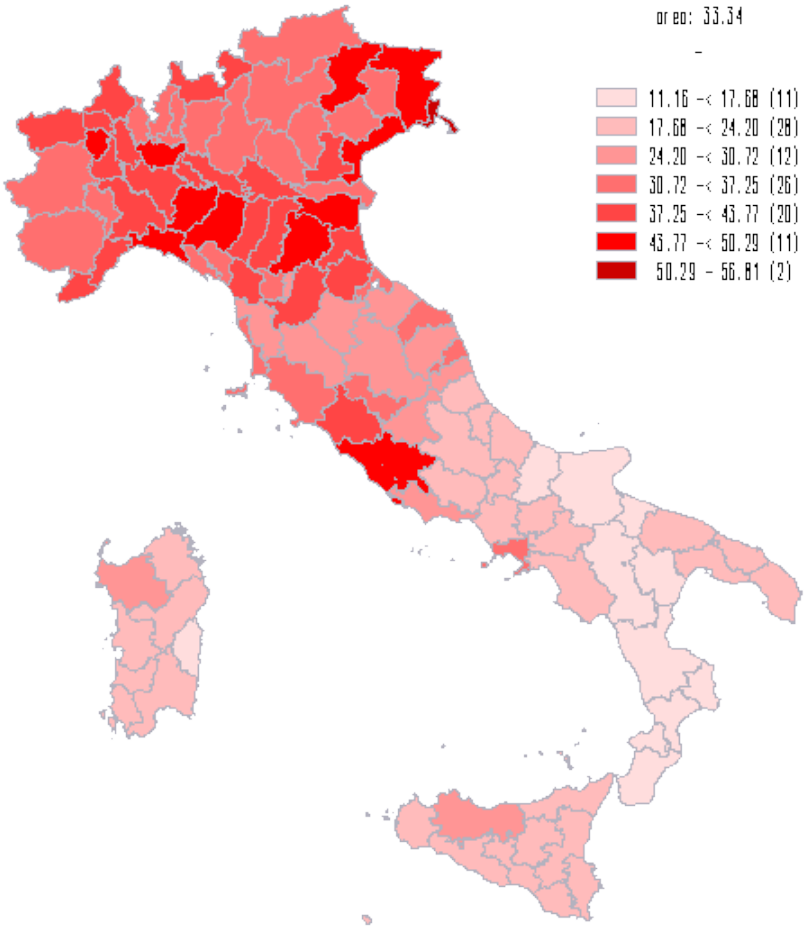
Mortality 2000-2003, 2006-2010

Lung cancer, 30 +

Males



Females



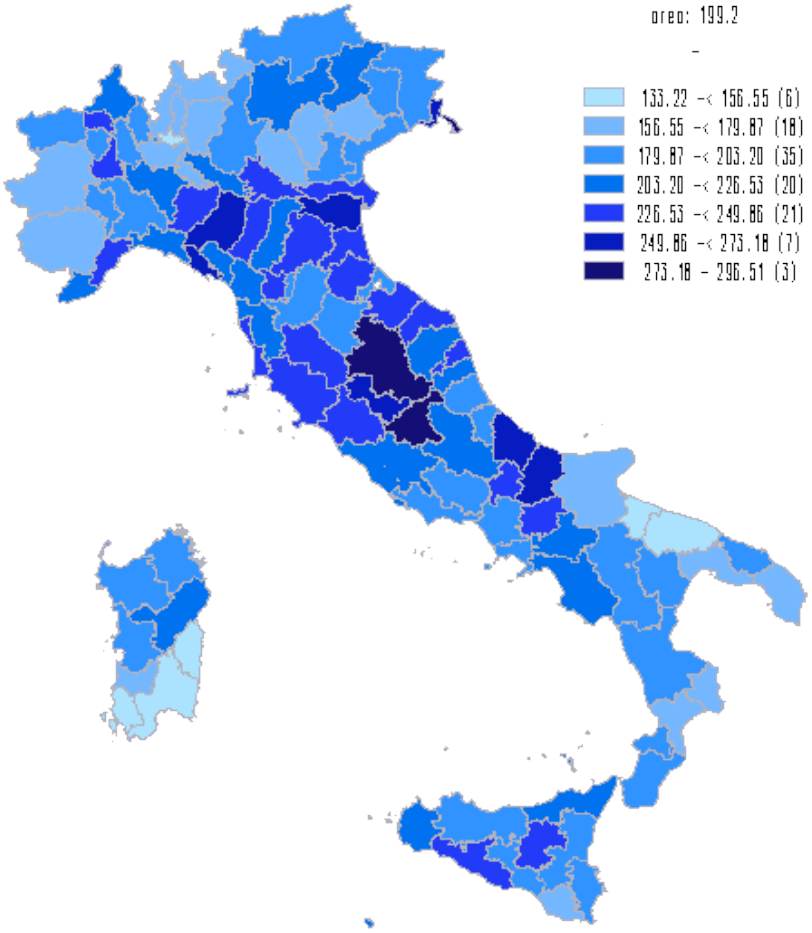
Crude rates

An overview of some causes: chronic effects

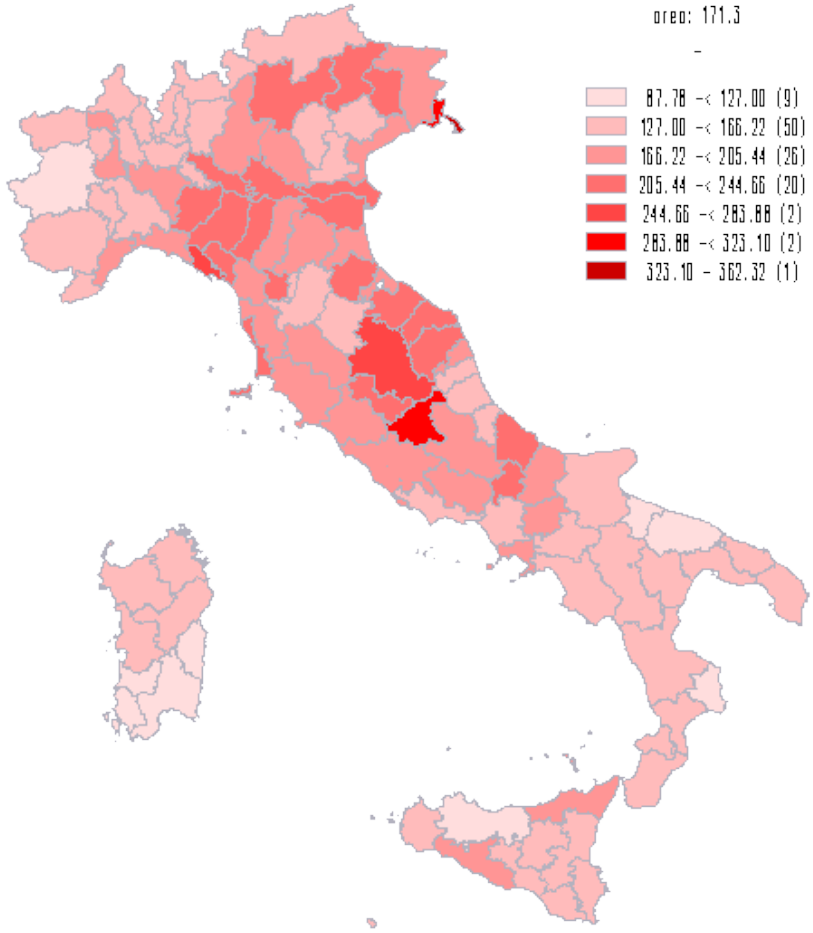
Mortality 2000-2003, 2006-2010

Infarction , 30 +

Males



Females



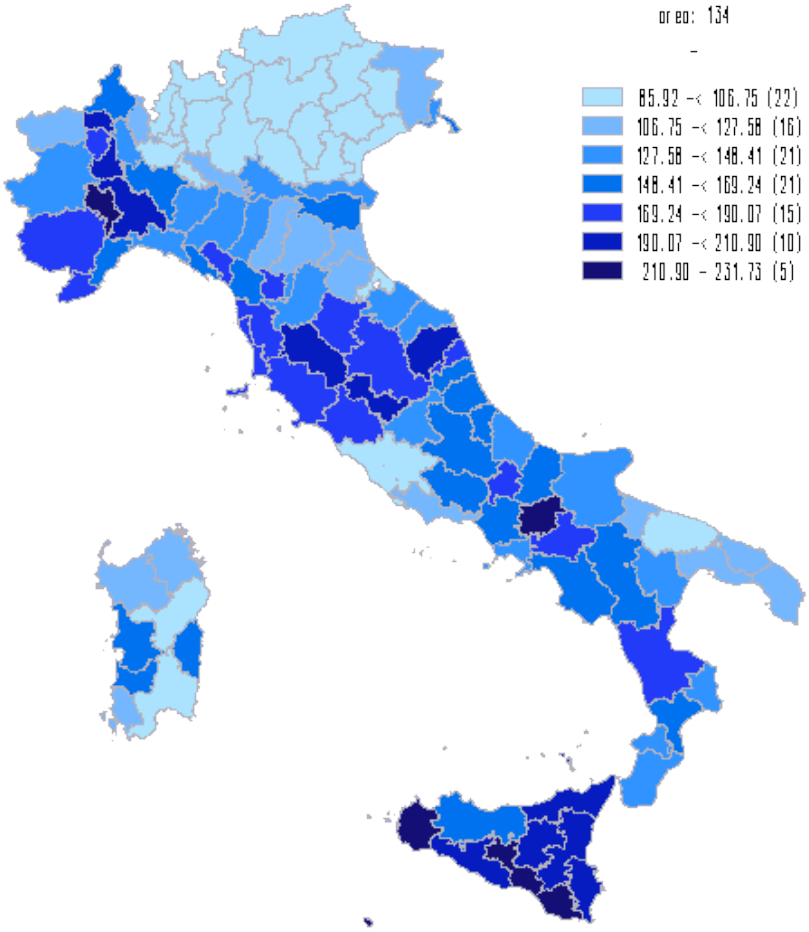
Crude rates

An overview of some causes: chronic effects

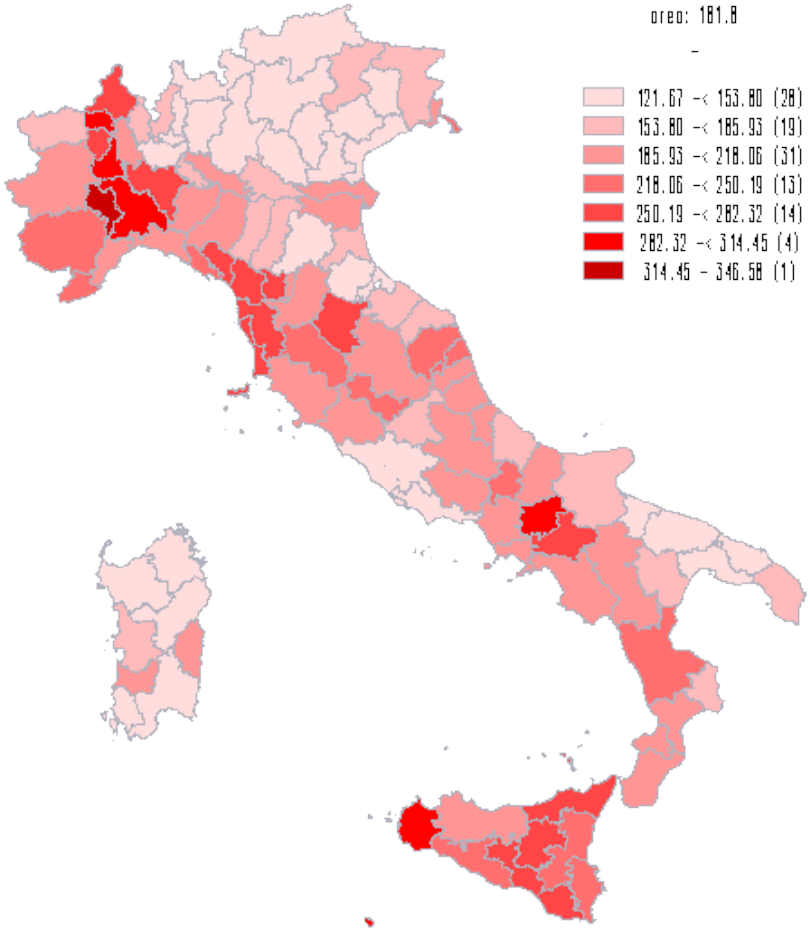
Mortality 2000-2003, 2006-2010

Cerebrovascular diseases, 30 +

Males



Females



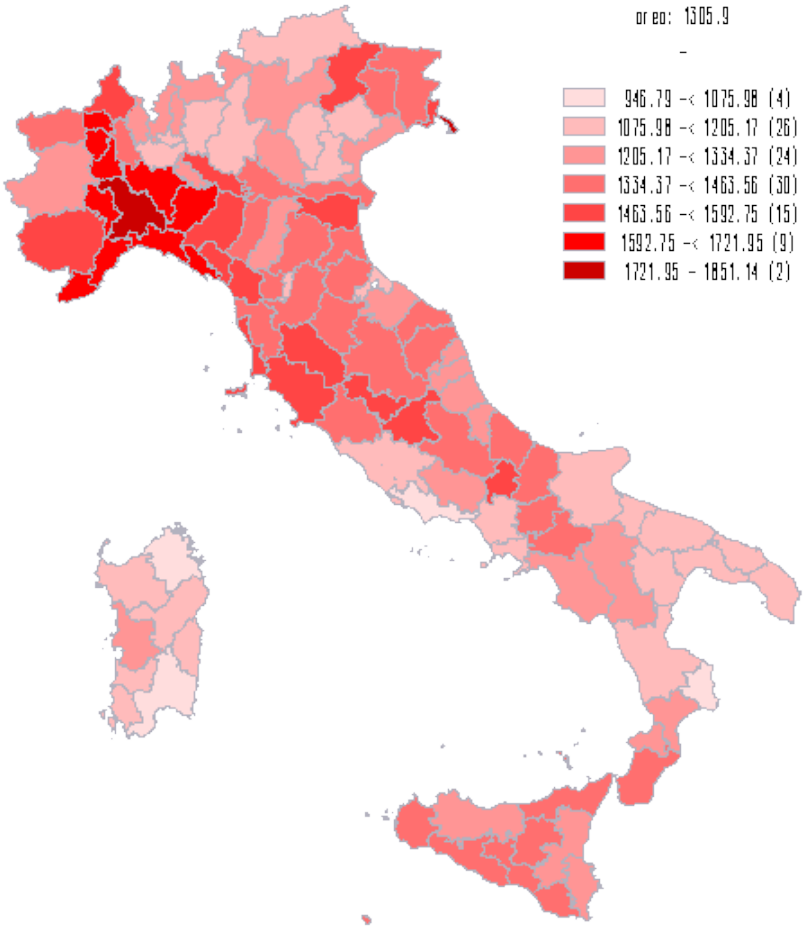
Crude rates

The population structure effect on rates

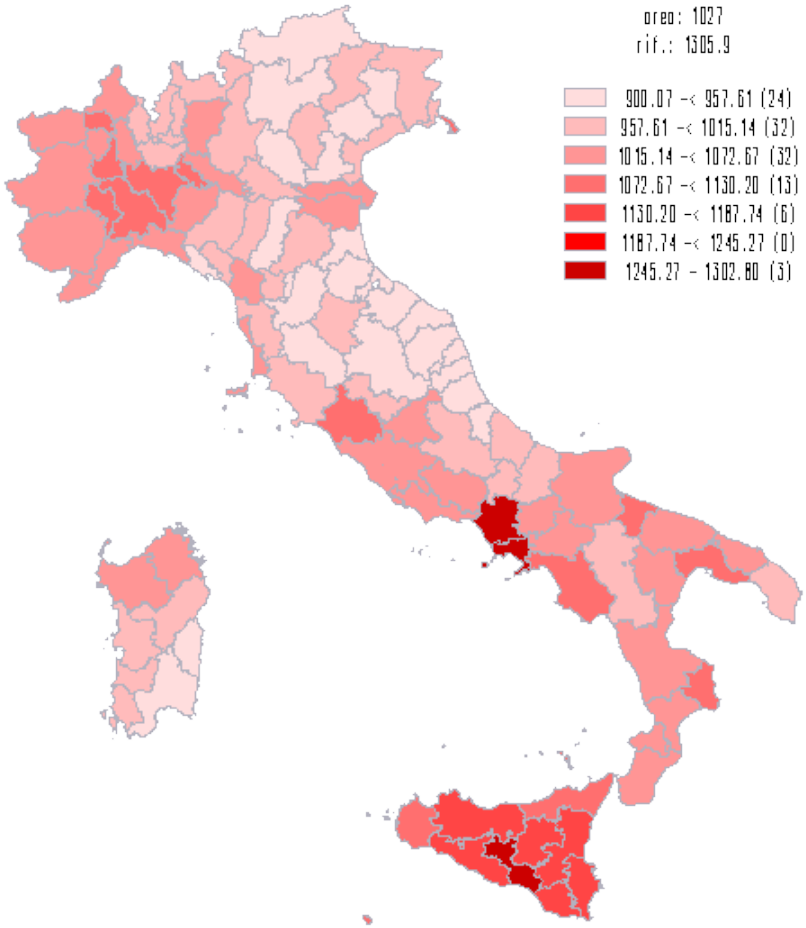
Mortality 2000-2003, 2006-2010

All natural causes, 30 +

Females, crude rates



Females, standardized (Ita2001) rates



Why we need to calculate morbidity rates?

In IEHIA we are interested in avoidable events in term of impact on

Population health profile	incidence rates
Population suffering	hospitalization
Health system financing	costs
Health system organization	days of hospitalization

How to calculate morbidity rates?

This is depending from study aim and design:

For acute effects of air pollution we are interested in:

- principal code of hospitalization (?)
- not rehabilitation or long-term department for admission
- unplanned hospitalization, day hospital excluded
- hospitalization institute reasonably near of residence
- first event for hospitalization incidence, then we need criteria for prevalent events selection

For long term effects of air pollution we are interested in:

- all codes of hospitalization (?)
- all departments of admission
- total hospitalization (repeated hospitalization comprised)
- hospitalization institute reasonably near of residence to consider pollutant exposition

Discussion is necessary …

For noise impact calculation we consider stroke, hypertension, … with appropriate definition of event.

Morbidity outcomes selected for IEHIA of air pollution

Morbidity outcomes	**ICD IX CM**	**Age (years)**	**Selection criteria**
Hospital admissions for cardiac diseases	390-429	>30	Acute
Hospital admissions for respiratory diseases	460-519	>30	Acute
Chronic bronchitis	491	>30	Hospitaliz.
Acute bronchitis	4660	<15	Acute
Asthma	493	<15	Acute
Asthma	493	>=15	Hospitaliz.

Acute: first event looking backward 5 years, principal diagnosis, acute care

Hopitaliz.: hospitalization, all diagnosis, no other selection

Adapted from WHO, IMPACT OF
PM10 AND OZONE IN 13 ITALIAN CITIES, M Martuzzi, F Mitis, I Iavarone, M Serinelli

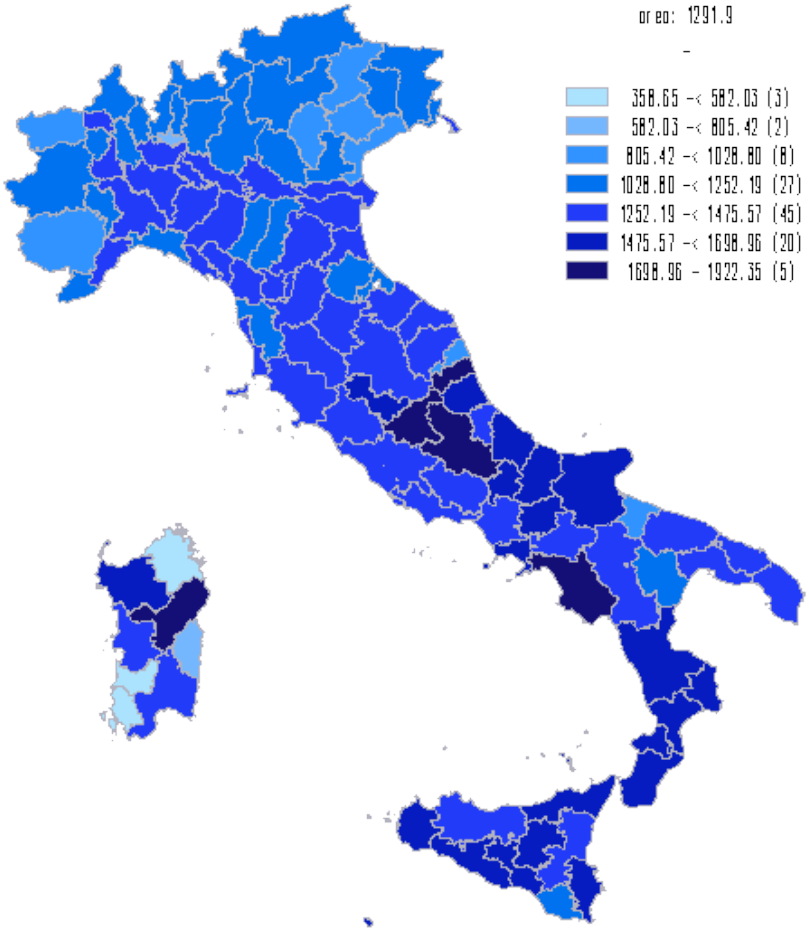
Crude rates

Selection for acute care

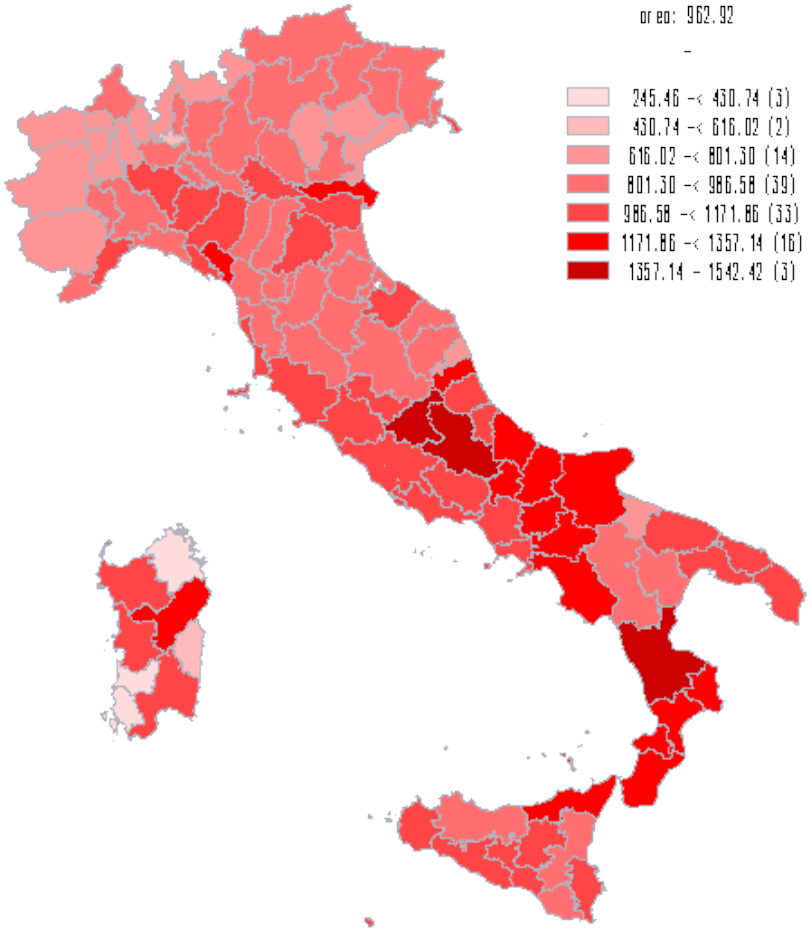
Morbidity 2004-2006

Cardiac diseases, 30 +

Males



Females



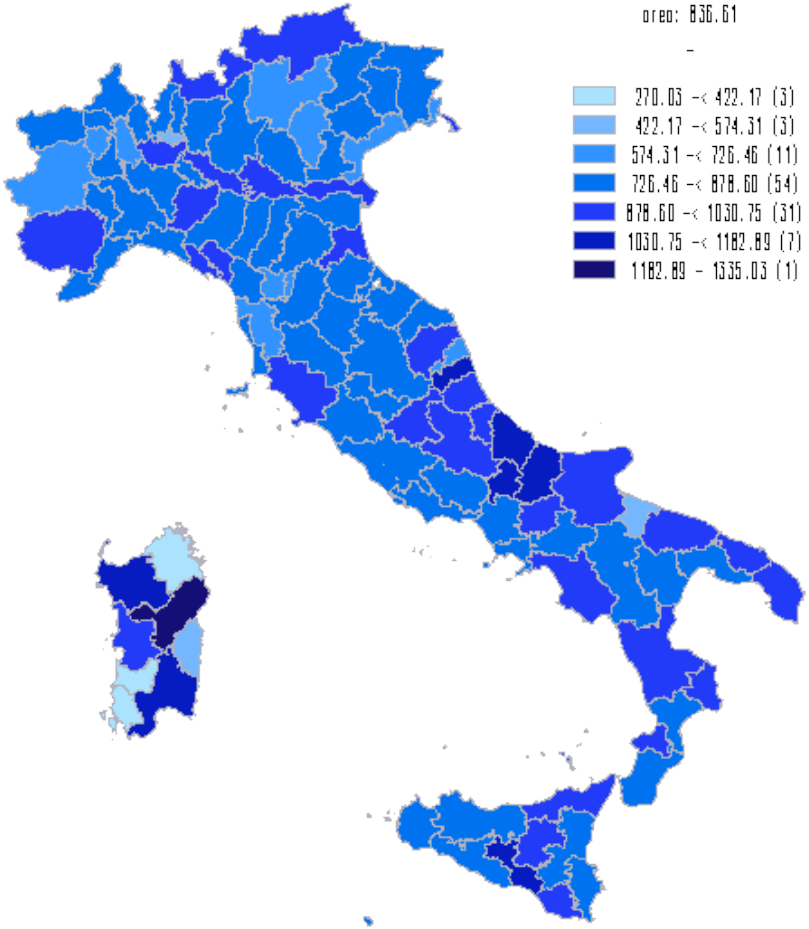
Crude rates

Selection for acute care

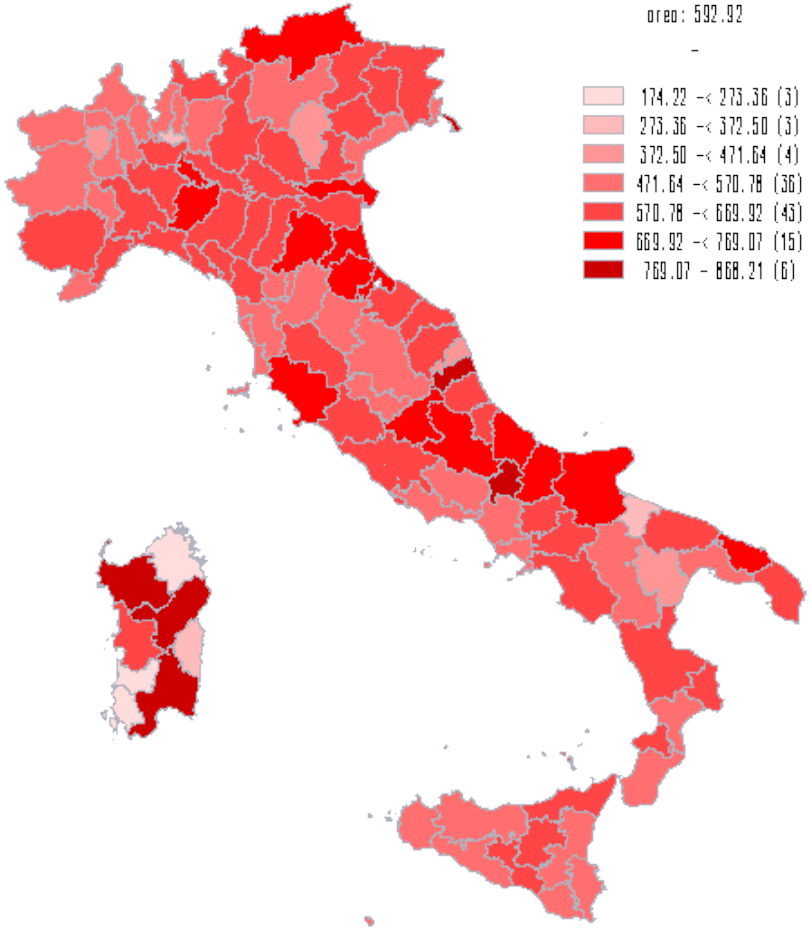
Morbidity 2004-2006

Respiratory diseases, 30 +

Males



Females



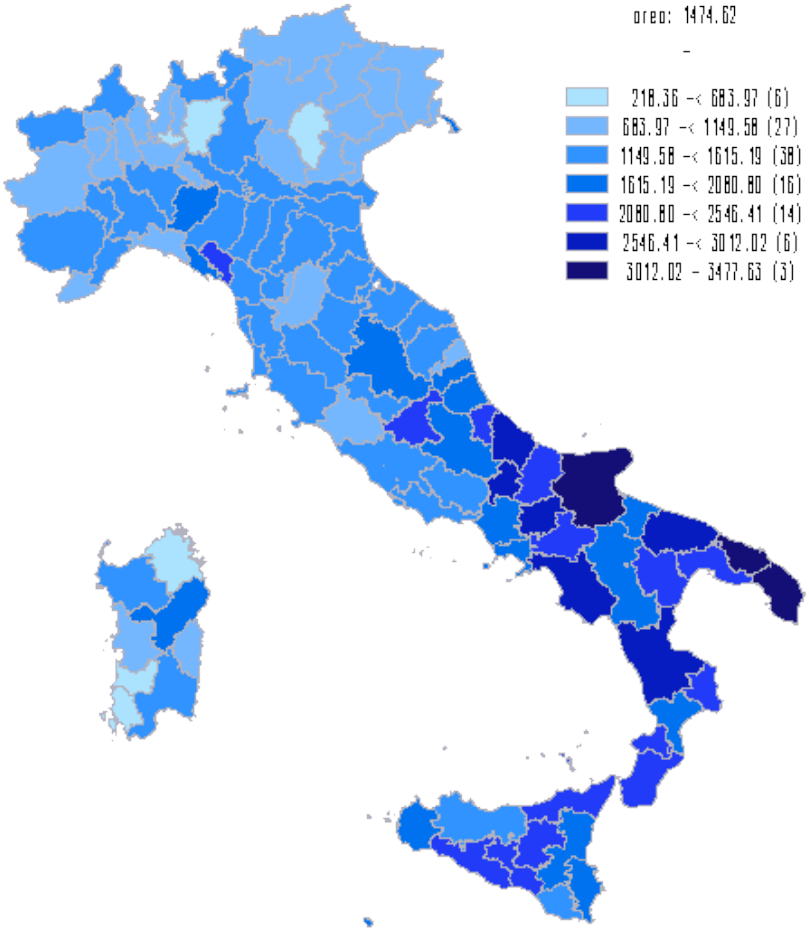
Crude rates

Selection for hospitalization

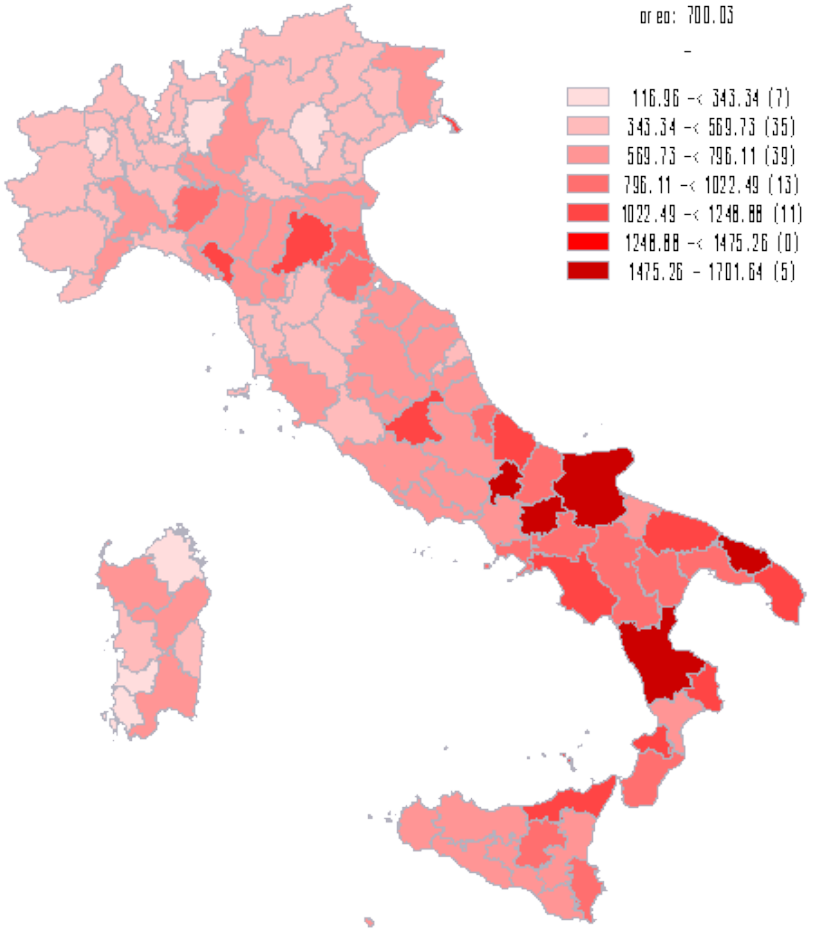
Morbidity 2004-2006

Chronic bronchitis, 30 +

Males



Females



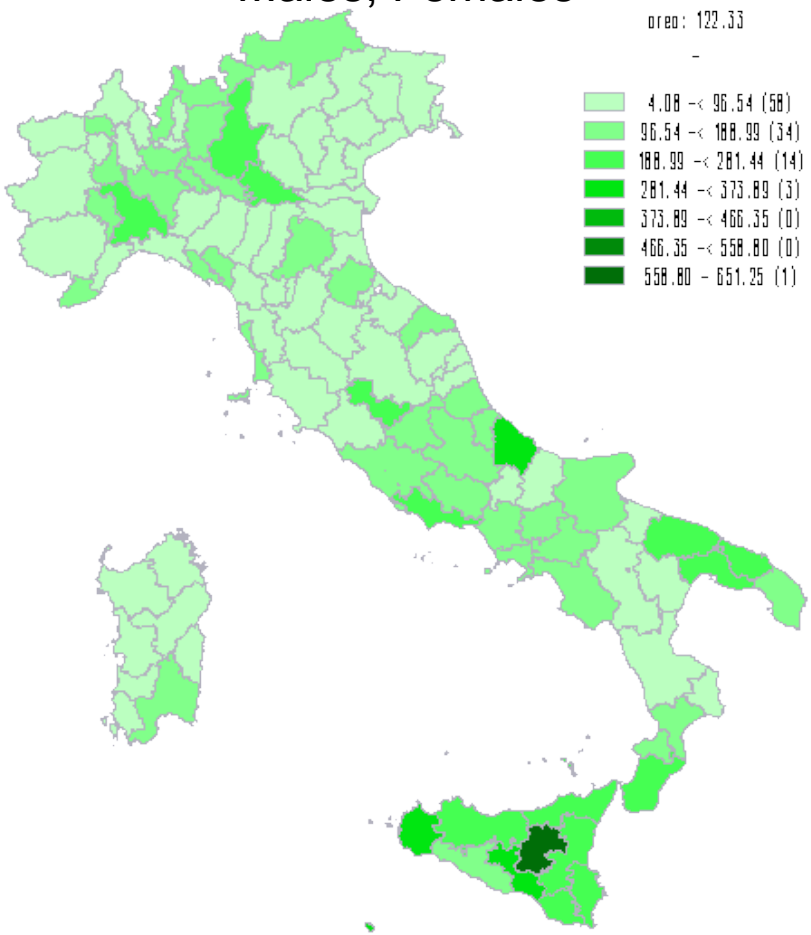
Crude rates

Selection for acute care

Morbidity 2004-2006

Acute bronchitis , 0-14

Males, Females



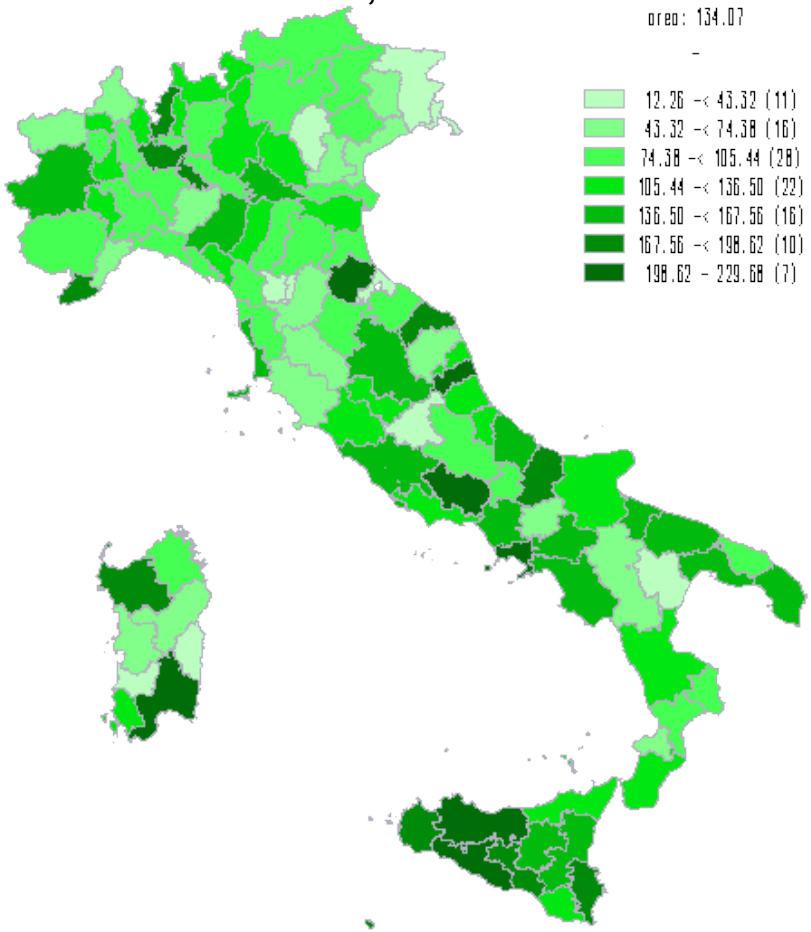
Crude rates

Selection for acute care

Morbidity 2004-2006

Asthma , 0-14

Males, Females



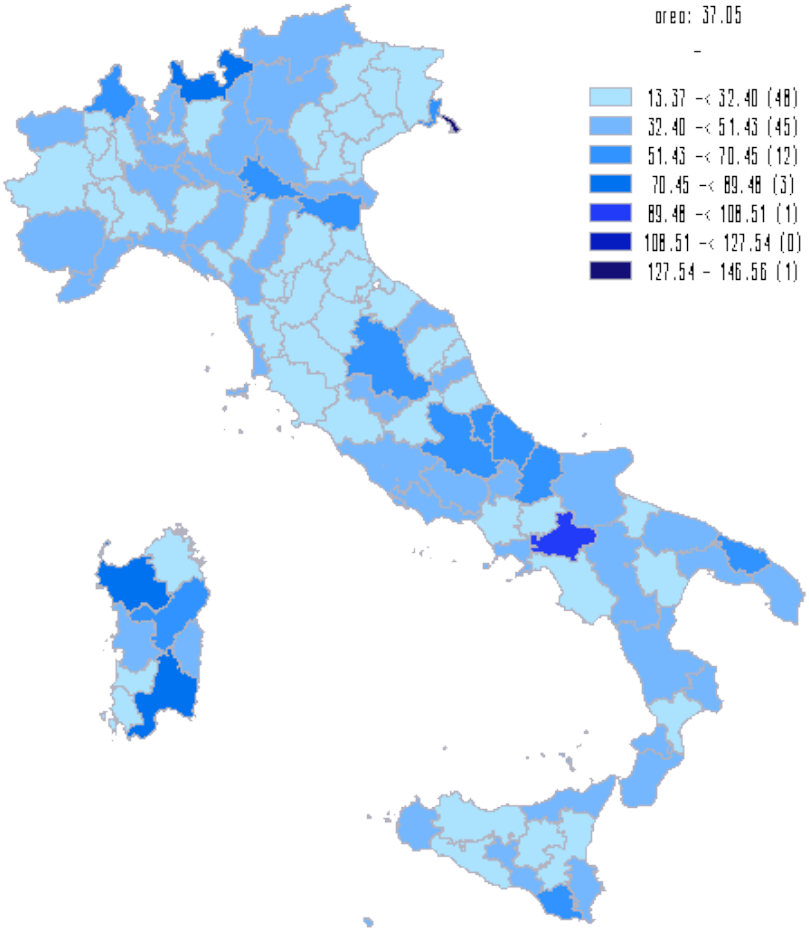
Crude rates

Selection for hospitalization

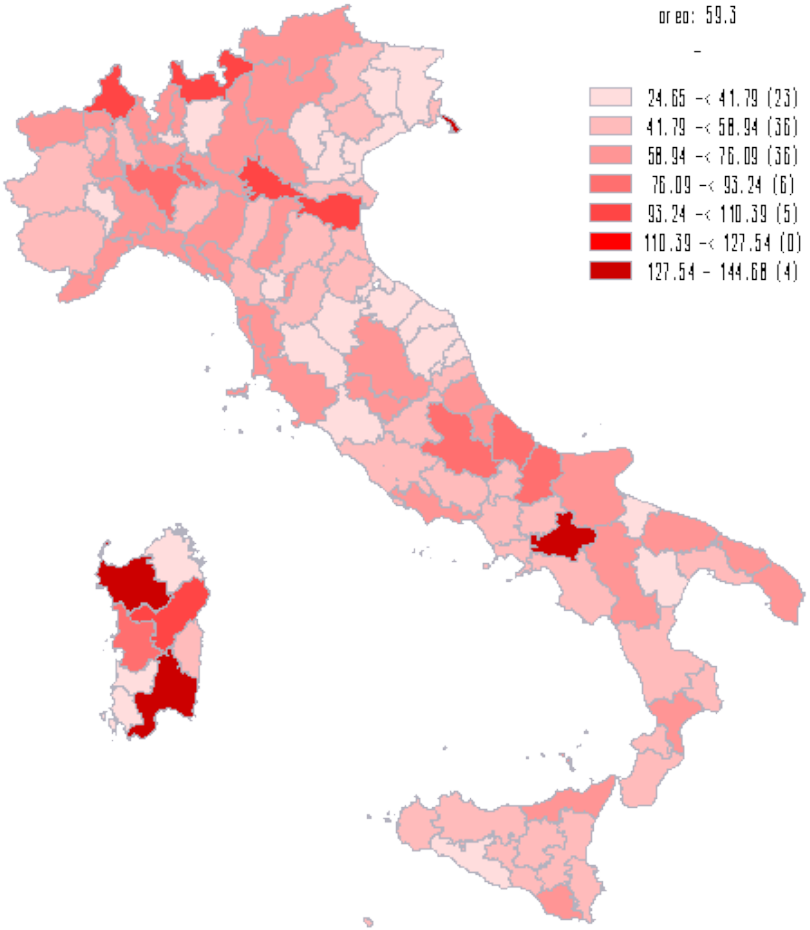
Morbidity 2004-2006

Asthma , 15 +

Males



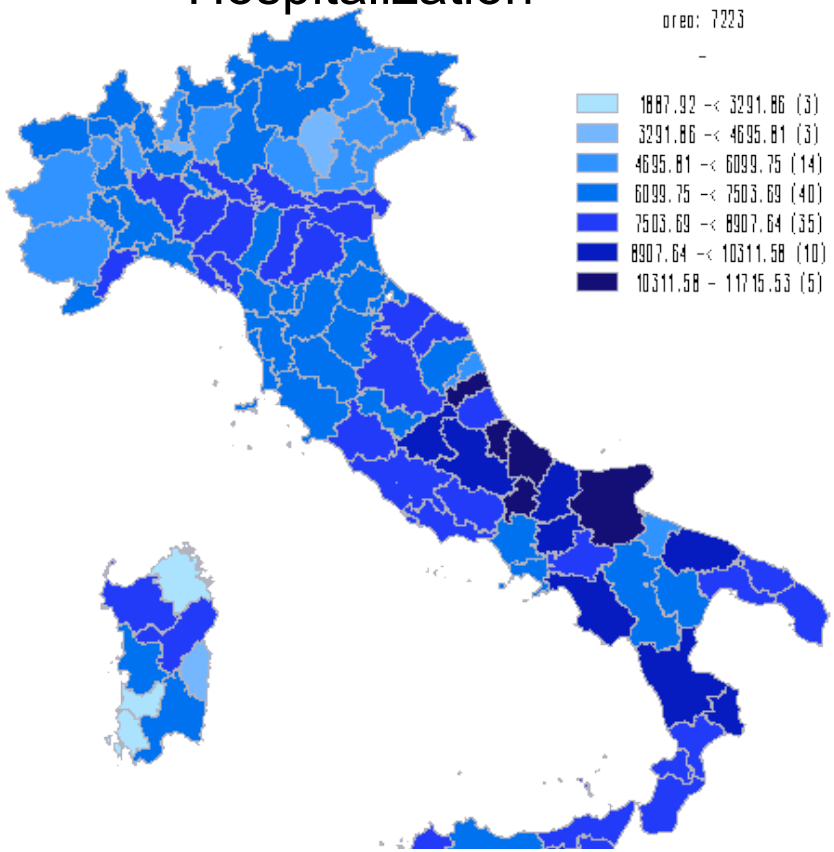
Females



Crude rates

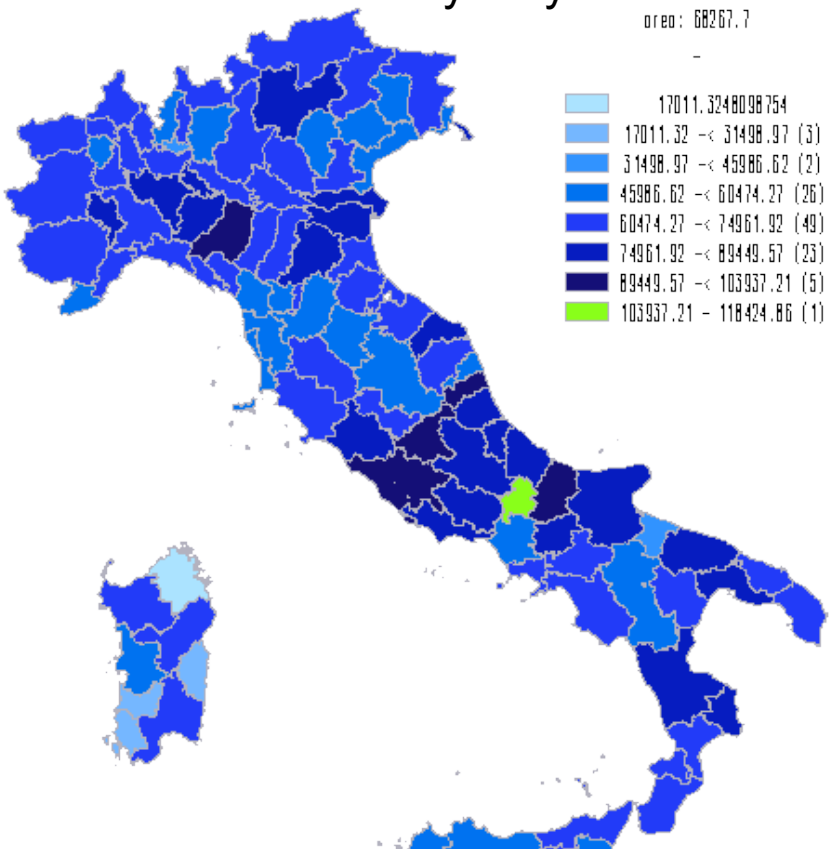
Morbidity 2004-2006
males, circulatory diseases, 30 +

Hospitalization



4,140,297 occurred among
2,331,634 subjects

Day stay



39,131,677 occurred among
2,331,634 subjects

- How to get morbidity?

events by district, gender, age, cause of hospitalization

- In Italy, for respiratory and cardiac causes data can be derived from multicentric studies (MISA, EpiAir), (only at city level)
- Asthma, bronchitis from SIDRIA studies
- At national level at the Ministry of Health (but publications don't have the necessary dimensions)
- A copy is available at the Statistical Office of the ISS
- At regional level for each region (Regional db)

What about health data in other countries?

- Health for all database WHO
- Disease registries
- Health Information Systems
- ad hoc survey(questionnaire)

Data and evidence

- News
- European health information gateway
- Health statistics app
- **Databases**
- Interactive atlases
- Evidence resources
- European Health Information Initiative (EHII)
- Cultural contexts of health
- Environment and Health Information System (ENHIS)

European Health for All database (HFA-DB)

Updated: July 2016

HFA-DB provides a selection of core health statistics covering basic demographics, health status, health determinants and risk factors, and health-care resources, utilization and expenditure in the 53 countries in the WHO European Region. It allows queries for country, intercountry and regional analyses, and displays the results in tables, graphs or maps, which can be exported for further use.

The data are compiled from various sources, including a network of country experts, WHO/Europe's technical programmes and partner organizations, such as agencies of the United Nations system, the statistical office of the European Union (EUROSTAT) and the Organisation for Economic Cooperation and Development. HFA-DB is updated twice a year.

HFA-DB can be used online or downloaded for work on a personal computer.

European health for all database (HFA-DB)
WHO/Europe
July 2016

Select parameters Maps Graphs Tables Definitions Languages Help Quit

Follow the below steps	
1.	• Click on "Select parameters" to open dialogue window for selecting indicators, regions and time points • Click on a box with sign+ in front of indicator group title to access the list of indicators • Select required indicators, regions and years by ticking appropriate boxes in front of their titles and then click on OK
2.	Select required graphical or tabular data display option from the menu
3.	Repeat steps 1-2 to select and display data on other indicators, regions or time points
4.	Click on Definitions to view definitions and notes on data quality and sources for selected indicators
5.	If another supported language required, click on menu item "Language"
6.	Check Help for more detailed instructions. Make sure that your browser allows popup windows from this Web site
7.	Download and use off-line version of DB for more advanced data display and export options

http://data.euro.who.int/hfadb/

Surveys

periodic surveys which allow the monitoring of behaviors associated with the disease, the condition and individual characteristics associated with the risk of disease, use of medical facilities, the occurrence of symptoms and illness (self-reported)

Health Information Systems

- Hospital data
- Mortality data
- outpatient specialist
- drugs prescriptions
- birth certificates

Thank you

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Department of Epidemiology
Lazio Regional Health Service, Italy

SISTEMA SANITARIO REGIONALE
ASL ROMA 1

REGIONE LAZIO