

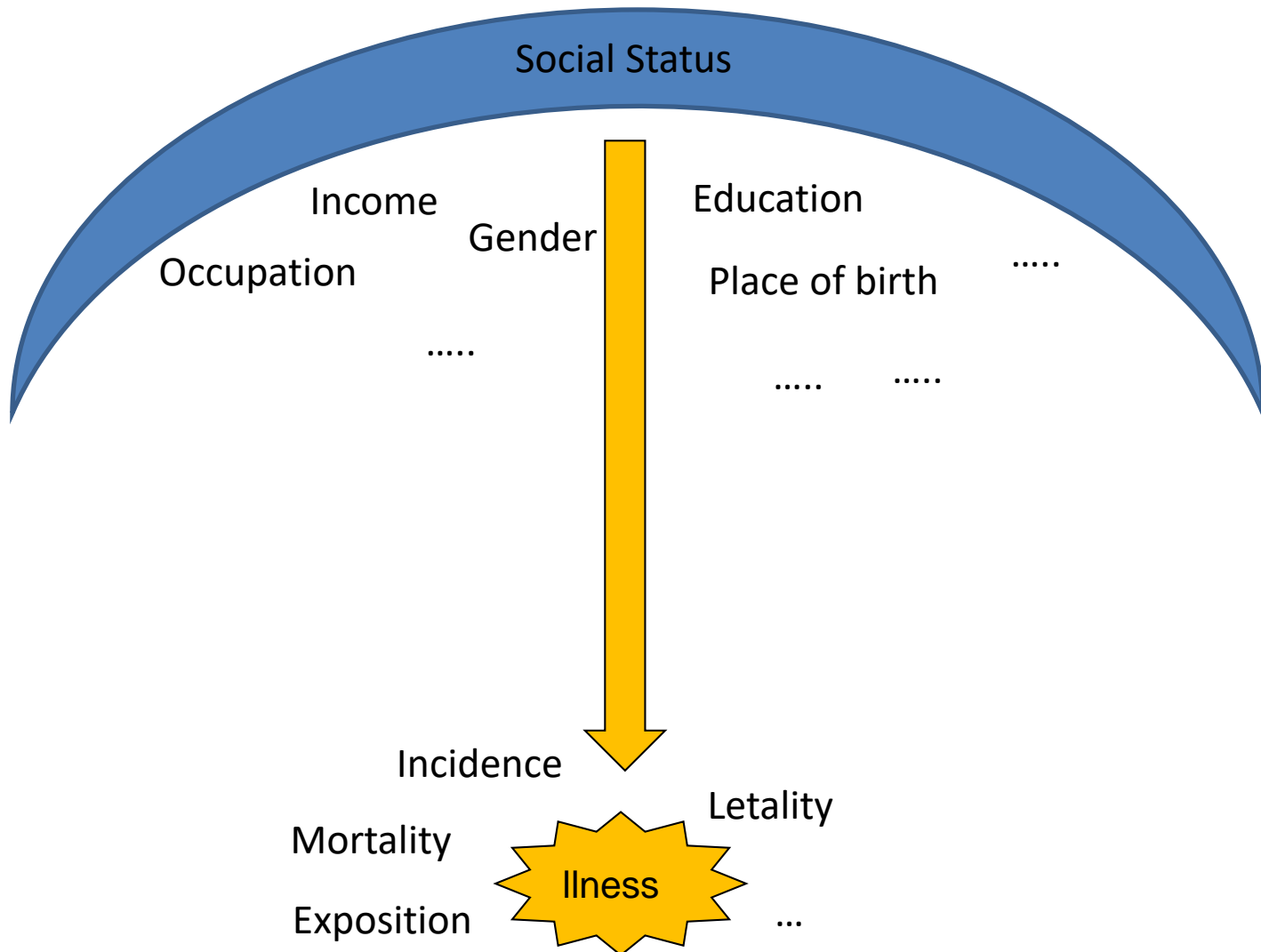
Social inequalities in cancer incidence and survival.

Quantitative approaches in France and Europe

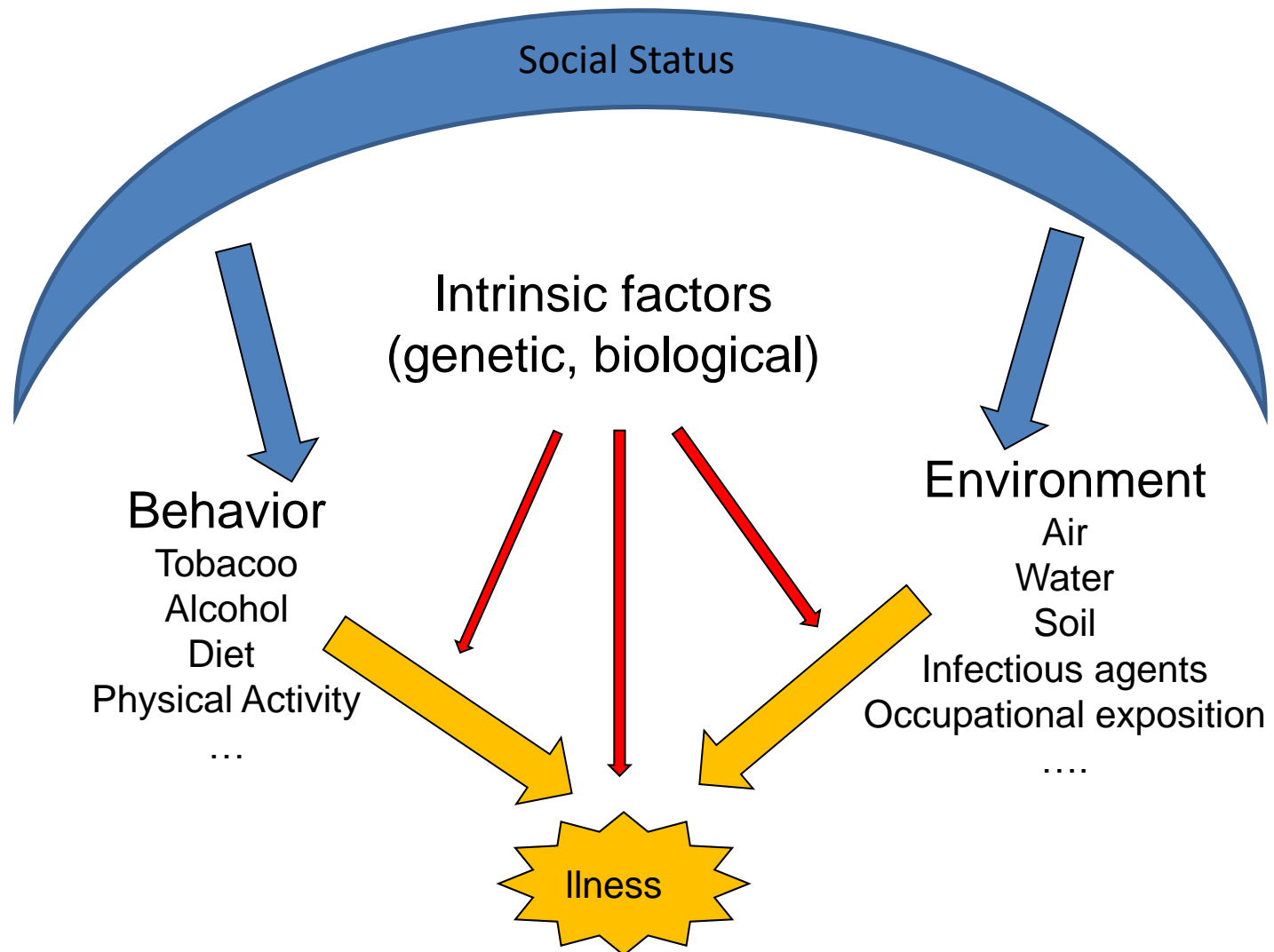
Pr Guy Launoy April 2024

Social inequalities in health.

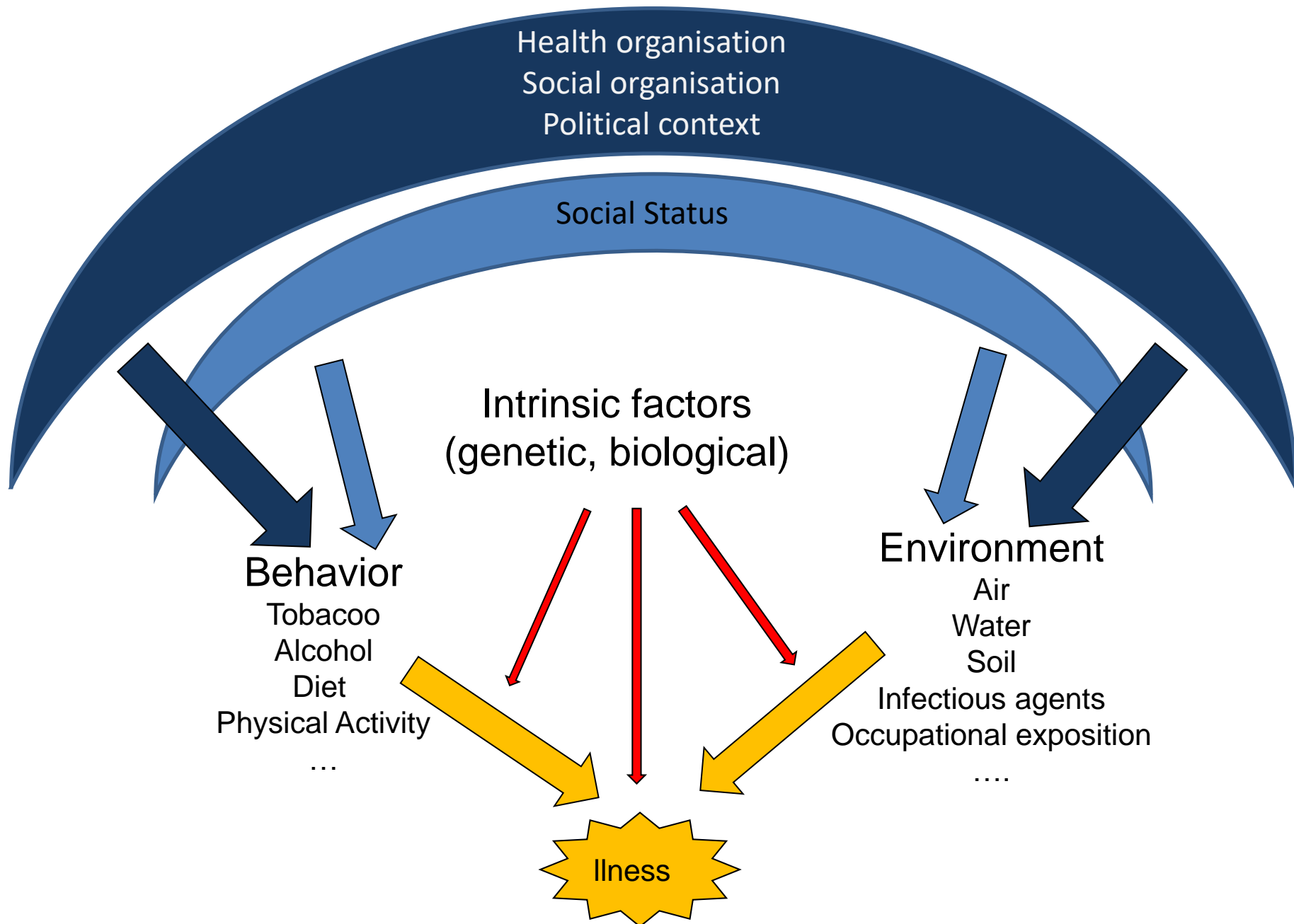
What do we talk about ?



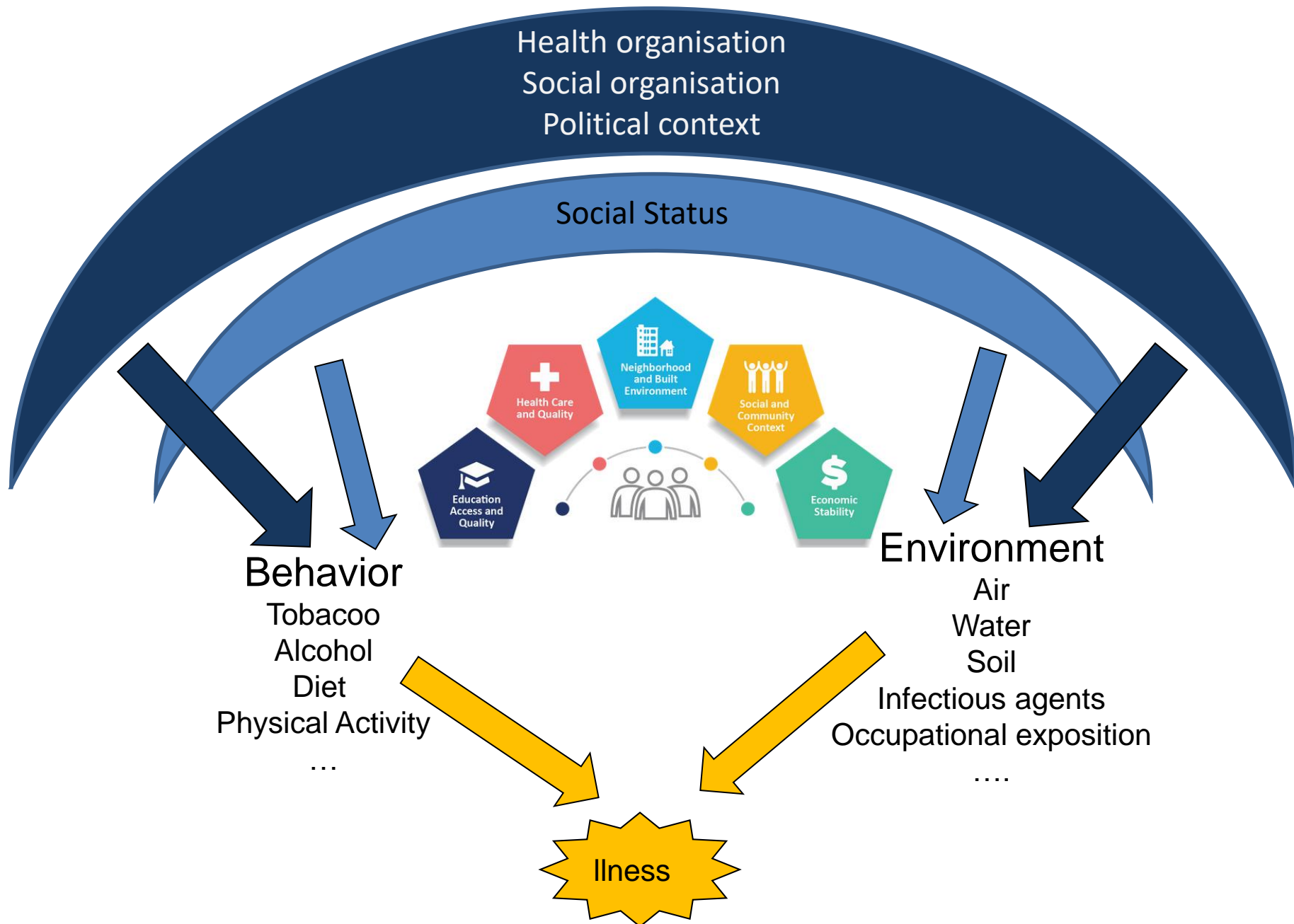
General model of social determination of health



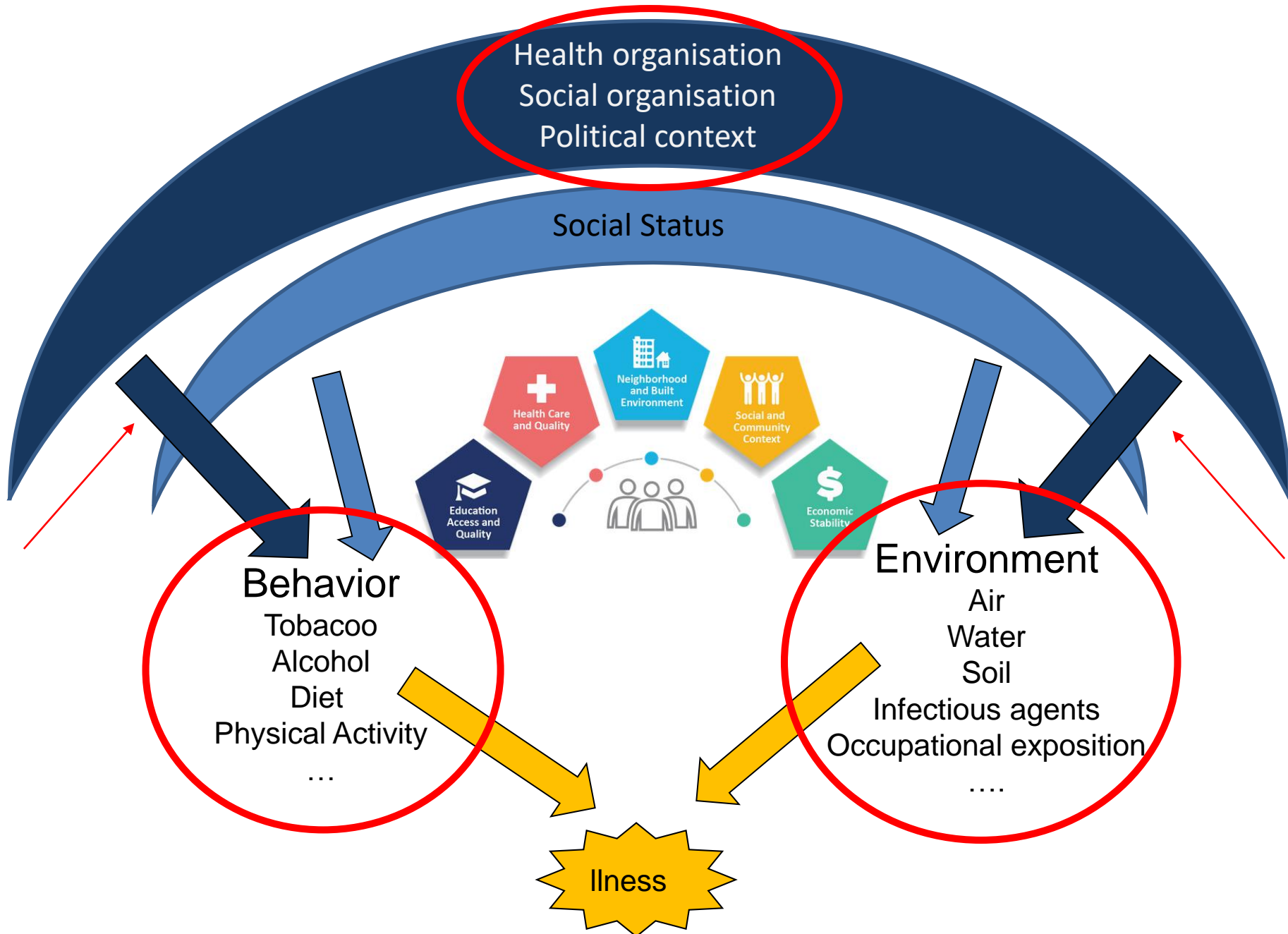
General model of social determination of health



General model of social determination of health



General model of social determination of health



SOCIAL DETERMINANTS IN HEALTH

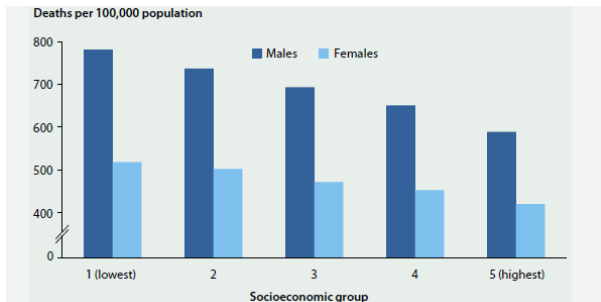
A long story



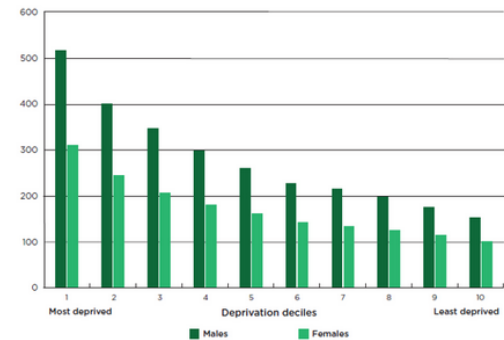
SOCIAL DETERMINANTS IN HEALTH

A long story with useful observations

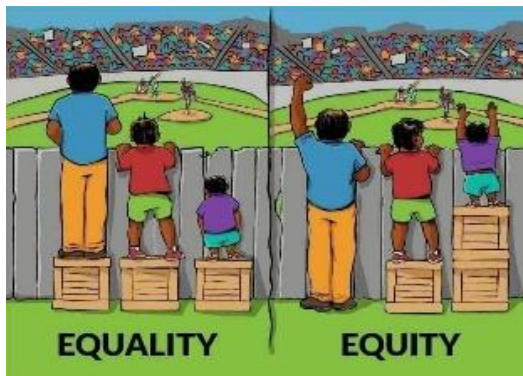
The social gradient in health



The Health Gradient



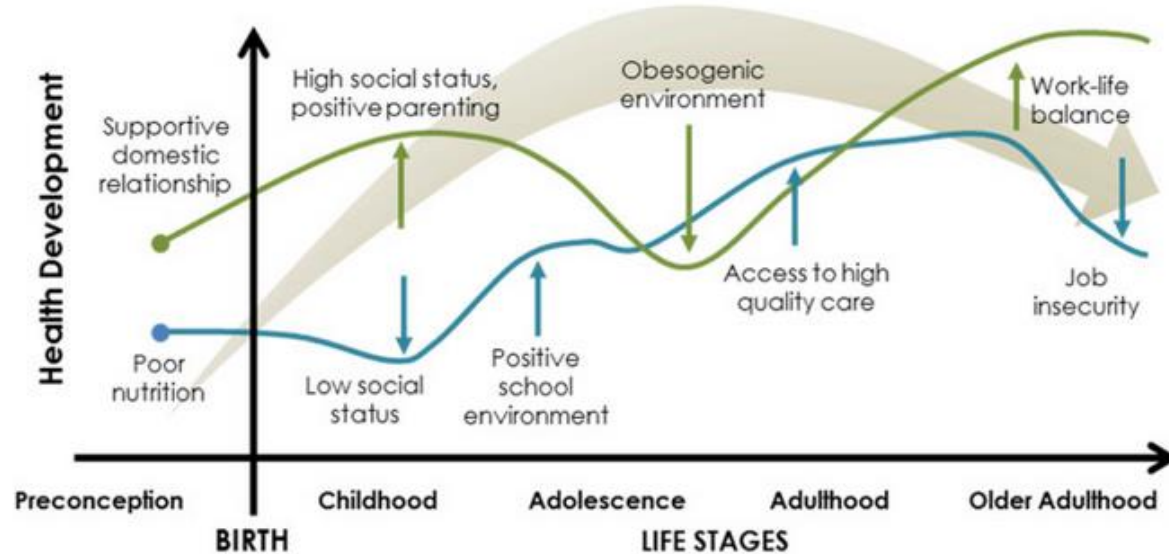
Source: *Making Partners: Intersectoral Action for Health 1988 Proceedings and outcome of a WHO Joint Working Group on Intersectoral Action for Health, The Netherlands.*



Proportionnal
Universalism

SOCIAL DETERMINANTS IN HEALTH

A long story with useful observations



Lifecourse Epidemiology

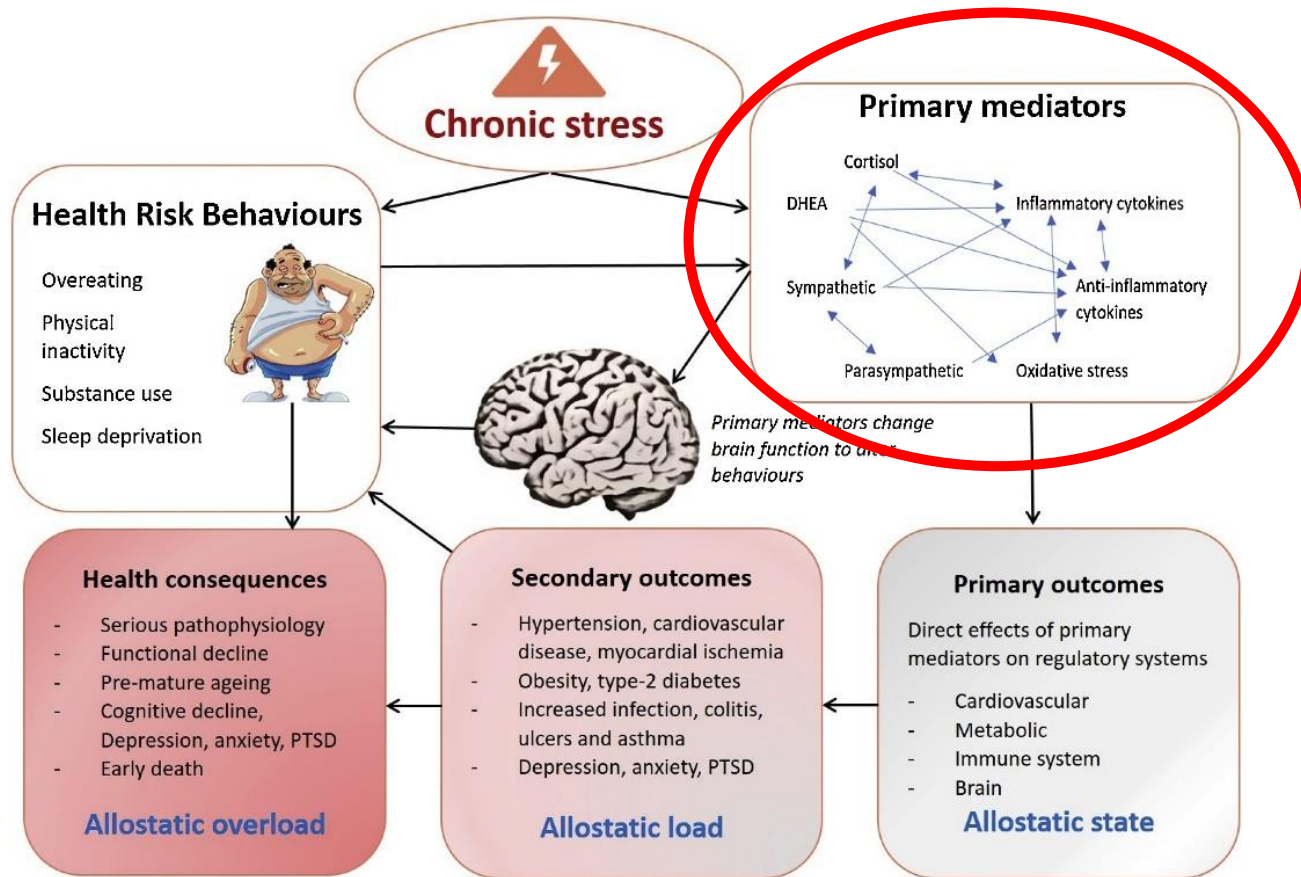


Bidonville à Jakarta en Indonésie



SOCIAL DETERMINANTS IN HEALTH

A long story with useful observations



How deprivation can
« get under the skin »



Reducing health inequalities in the European Union

European Commission

.....the level of inequalities between different social groups and between people living in different parts of the European Union remains unacceptably large. Health inequalities are not only unfair, they also have a huge economic and social cost.

Paying greater and more regular attention to the social determinants of health in working and living conditions can help us reduce the factors which lower life expectancy and impact negatively on people's lives, productivity levels and health care spending.....

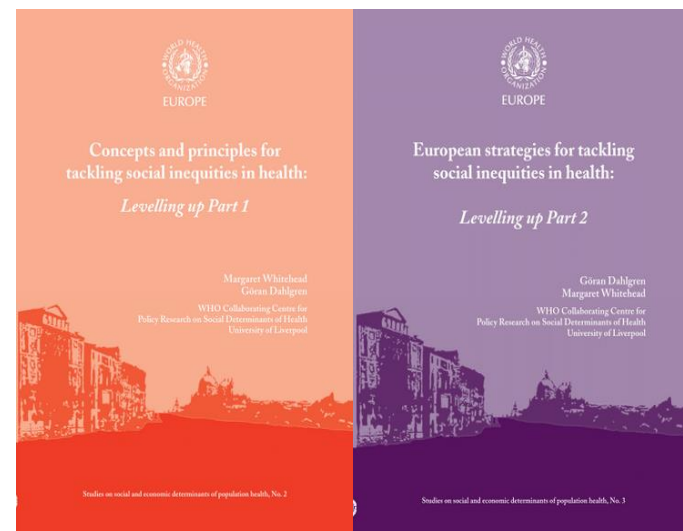




Reducing health inequalities in the European Union

Three axis for action :

- ➡ Improve everyday living conditions;
- ➡ Deal with inequalities in the distribution of power, money and resources
- ➡ **Measure the problem, analyze it and evaluate the effectiveness of action**

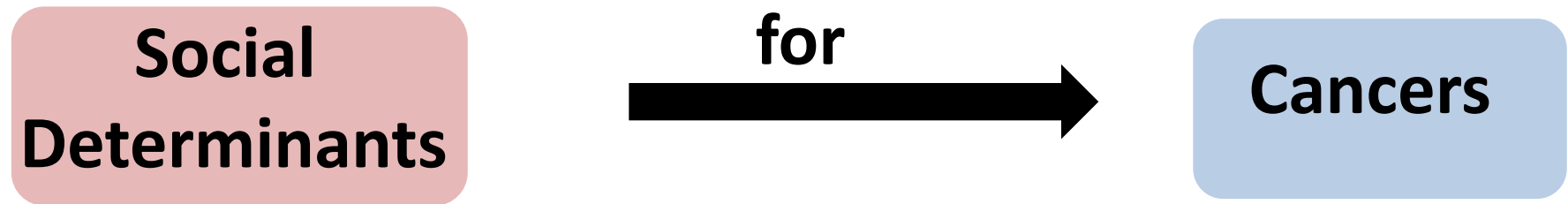


➔ Ensure that systematic observation systems for health equity and the social determinants of health exist at local, national and international levels.

➔ At the European level, obtain more comparative data and make more systematic transnational comparisons..

Social determinants for cancers in France and Europe

Available , reliable, precise data



In Europe



Comparable data

Social determinants for cancers in France and Europe

Available , reliable, precise data



Comparable data

Social determinants for cancers in France and Europe

Available , reliable, precise data



In Europe



Comparable data

General model of social determination of health



The purpose of a European Deprivation Index



- To propose an aggregated-level social deprivation index based on **relevant and proven and common concepts ...**
- Which **measure the social environment in a comparable manner, or at least transferable way across countries, despite the differences the social and cultural specificities of each country concerned**

a way of construction identical in every European country

Relative Deprivation concept

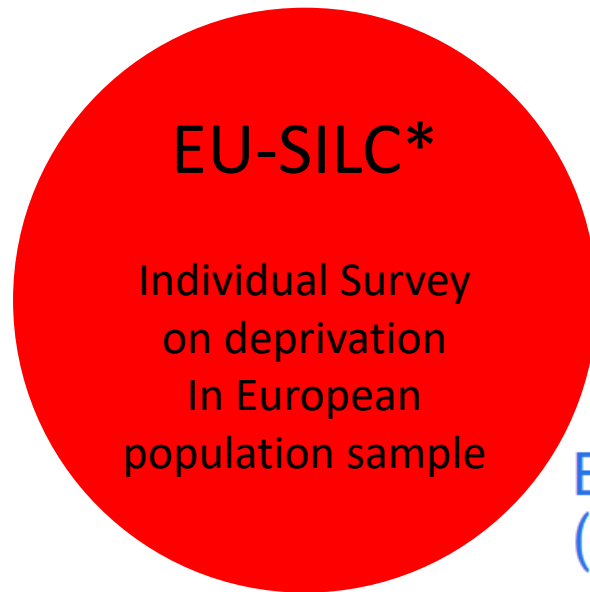
Townsend in 1979: *“Poverty can be defined objectively and applied consistently only in terms of the **concept of relative deprivation**. [...] Individuals, families and groups in the population can be said to **be in poverty when they lack the resources to obtain the type of diet, participate in the activities and have the living conditions and amenities which are customary, or at least widely encouraged or approved, in the societies to which they belong.**”* (Townsend, 1979)

Deprivation is thus defined by the impossibility of satisfying these fundamental needs associated with a decent life in the society to which they belong, fundamental needs may differ from one society to another.

a way of construction identical in every European country

European Deprivation Index

Main steps of construction



EU statistics on income and living conditions
(EU-SILC) methodology

Cross-sectionnal and longitudinal sample survey providing data on income, poverty, social exclusion and living conditions

European standardised questionnaire specifically devoted to relative deprivation : ***Nine questions , common to EU members, evaluating fundamental needs***

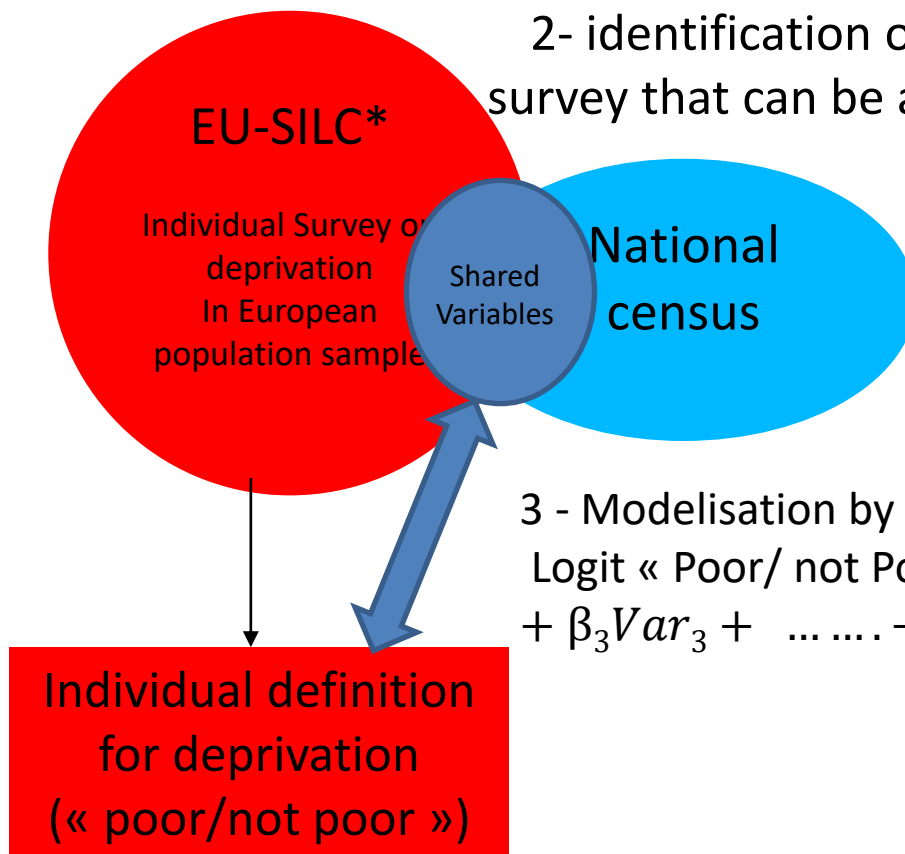
a way of construction identical in every European country

European Deprivation Index

Three steps of construction

1 – Identification of fundamental needs and building of a bimodal indicator « poor/ not poor »

2- identification of variable available in EU SILC survey that can be also used in the national census



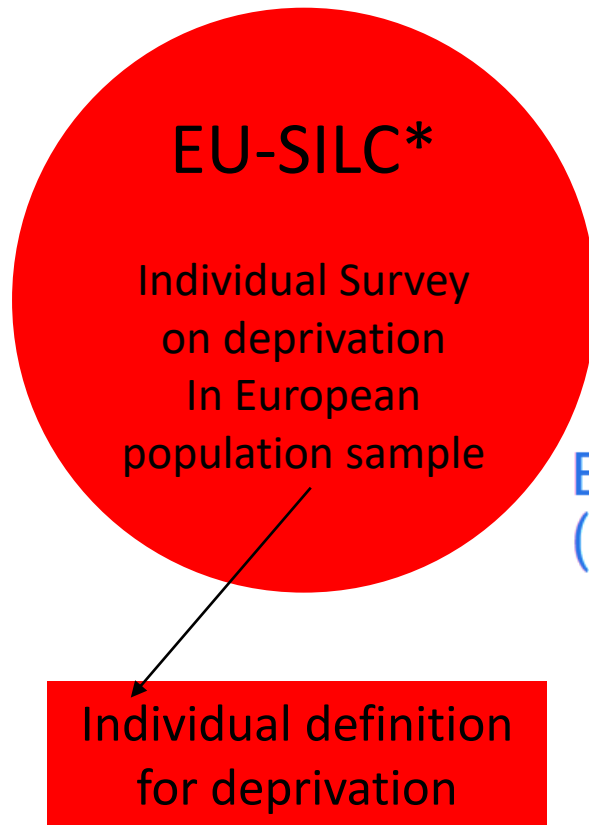
3 - Modelisation by logistic regression :

$$\text{Logit « Poor/ not Poor »} = \beta_1 Var_1 + \beta_2 Var_2 + \beta_3 Var_3 + \dots + \beta_n Var_n$$

a way of construction identical in every European country

European Deprivation Index

First step of construction



EU statistics on income and living conditions
(EU-SILC) methodology

Selection of fundamental needs associated
with objective and subjective poverty










a way of construction identical in every European country

European Deprivation Index

First step of construction

Fundamental Needs : The goods/services that less than 50% of households does not have because they cannot afford it

% people **not** having

Goods/services not possessed by less than 50% Of households because they could not afford it									
Eating a meal containing some meat or some fish or the vegetarian equivalent once every two days	7.9	3.5	12.4	13.2	3.3	5.4	10.9	15.7	26.8
Taking a week's annual holiday away from home	28.5	36.5	35.4	46.8	40	28	24.5	**	**
Using your own means to cover a necessary yet unplanned expense	32.5	29.7	11	39.5	37.5	35	37.4	**	**
Keeping your house adequately warm	6.6	26.9	6.4	18.5	6.4	6.6	6.1	15.4	37.9
Having a phone (including mobile phone)	0.2	2.8	0.3	0.2	0.7	0.1	0.5	1.3	3.2
Having a colour TV	0.3	0.7	0.7	0.4	0.2	0.2	0.7	0.7	0.8
Having a computer	3.9	8.8	5.6	3.4	5.2	3.4	6.9	8.4	11.9
Having a washing machine	1.1	2.5	0.5	0.5	0.3	0.5	1.0	0.9	5.2
Having a personal car	4.0	9.7	5.5	3.3	5.7	6.5	11.3	12	16.7

European Deprivation Index

First step of construction

Selection of fundamental needs
associated with objective and subjective poverty

Fundamental Needs : The goods/services that less than 50% of households does not have because they cannot afford it

Objective poverty : Eurostat definition : An individual is considered as poor when her/his household has a standard of living below 60% of the median standard of living among the whole national population

Subjective poverty : Question on « Ability to make ends meet »

European Deprivation Index

First step of construction
Selection of fundamental needs










associated with objective and subjective poverty

Fundamental needs for people in Spain	Objective poverty OR (95% CI)	Subjective poverty OR (95% CI)
Eating a meal containing some meat or some fish or the vegetarian equivalent once every two days	1.12 (0.85-1.48)	1.96 (1.24-3.09)
Taking a week's annual holiday away from home	2.68 (2.34-3.06)	5.65 (4.92-6.48)
Using your own means to cover a necessary yet unplanned expense	1.90 (1.67-2.17)	5.34 (4.50-6.32)
Keeping your house adequately warm	1.47 (1.22-1.76)	1.28 (0.94-1.74)
Having a phone (including mobile phone)	2.17 (1.04-4.52)	2.85 (0.77-10.6)
Having a colour TV	1.39 (0.39-4.91)	0.27 (0.06-1.21)
Having a computer	1.22 (1.01-1.48)	3.36 (2.44-4.64)
Having a washing machine	1.84 (0.77-4.39)	2.69 (0.32-22.76)
Having a personal car	1.23 (0.95-1.59)	1.87 (1.20-2.92)

European Deprivation Index

Selection of fundamental needs

associated with objective and subjective poverty

Goods/services not possessed by less than 50% Of households because they could not afford it									
Eating a meal containing some meat or some fish or the vegetarian equivalent once every two days	x	x		x		x	x	x	x
Taking a week's annual holiday away from home	x		x	x	x	x	x		
Using your own means to cover a necessary yet unplanned expense	x	x		x	x		x		
Keeping your house adequately warm	x	x	x		x		x	x	
Having a phone (including mobile phone)		x		x		x		x	
Having a colour TV									
Having a computer	x		x		x		x	x	x
Having a washing machine		x						x	x
Having a personal car	x	x	x	x	x	x	x	x	
Number minimal of lacking needs to be considered as deprived	2	2	1	2	2	1	2	2	1

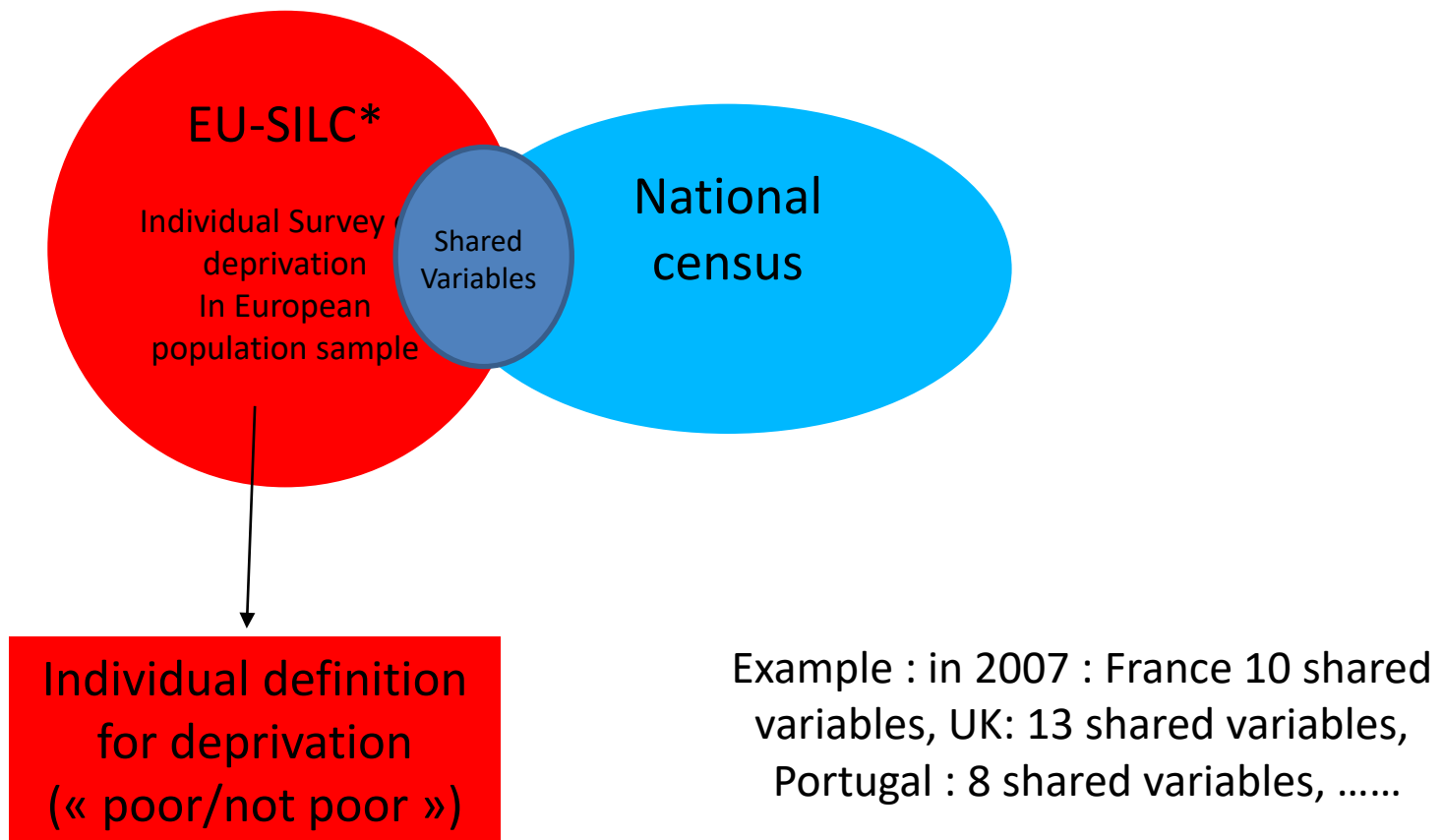
Example :

➔ In the French sample, all people lacking at least two
of relevant fundamental needs is defined as poor.

European Deprivation Index

Second step of construction

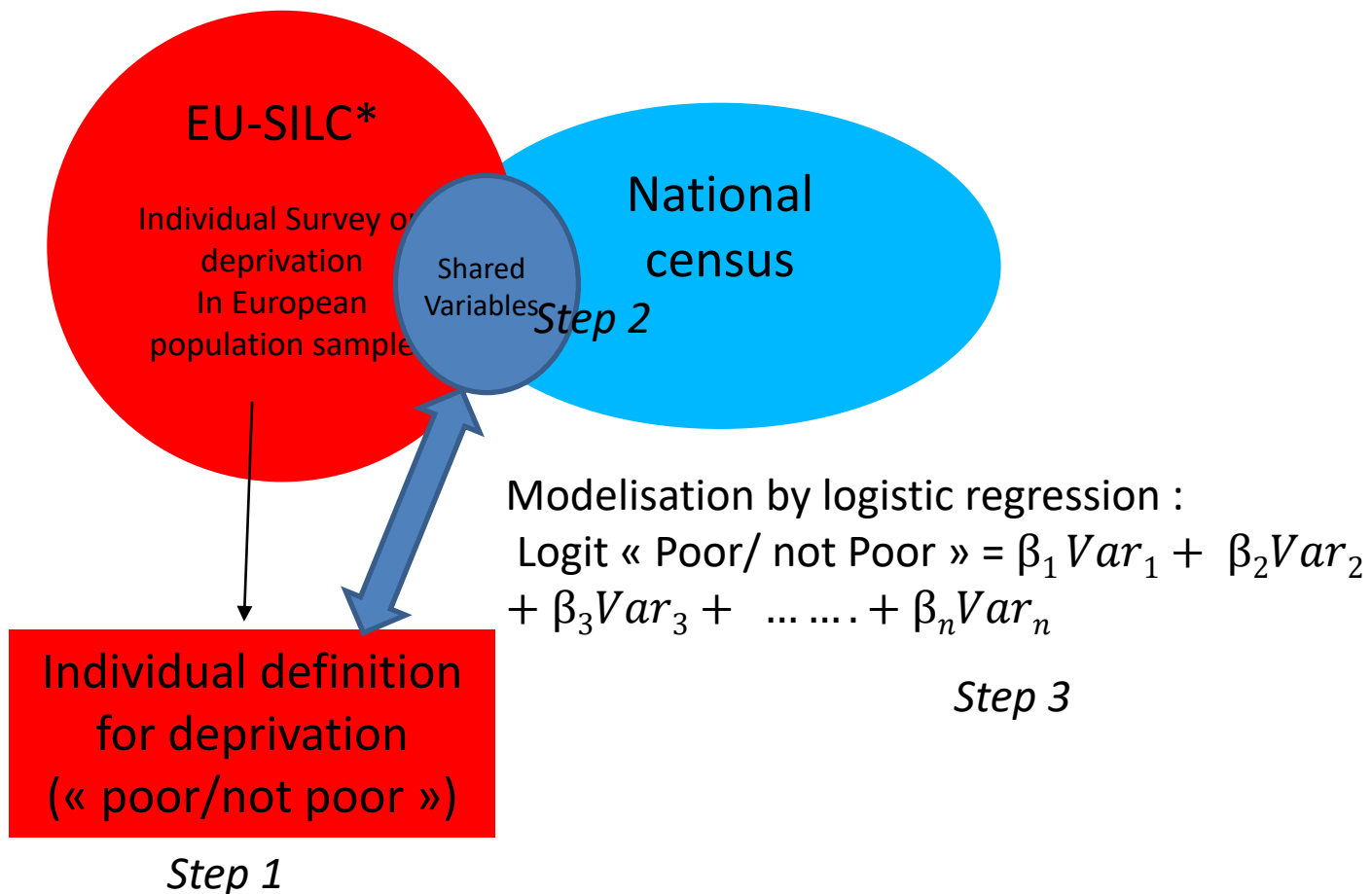
For each country, identification of variable available in EU SILC survey that can be also used in the national census



European Deprivation Index

Third step of construction

For each country, among the shared variables, selection of those associated with the variable « poor / not poor »



European Deprivation Index

Third step of construction

For each country, among the shared variables, selection of those associated with the variable « poor / not poor »

In France	β	95% CI	P-value
Overcrowding	0.13	0.04-0.23	0.0058
No exclusive use of bath or shower	0.33	0.11-0.55	0.0032
No business leaders-company managers/intermediate occupations	0.57	0.50-0.64	<.0001
Foreign nationality	0.16	0.06-0.25	0.0014
No access to a car	0.29	0.23-0.35	<.0001
Lone parent household	0.57	0.45-0.69	<.0001
Household with ≥ 6 persons	0.46	0.34-0.59	<.0001
Low level of education	0.14	0.09-0.19	<.0001
Unemployment	0.56	0.47-0.65	<.0001
Not owner	0.54	0.49-0.59	<.0001

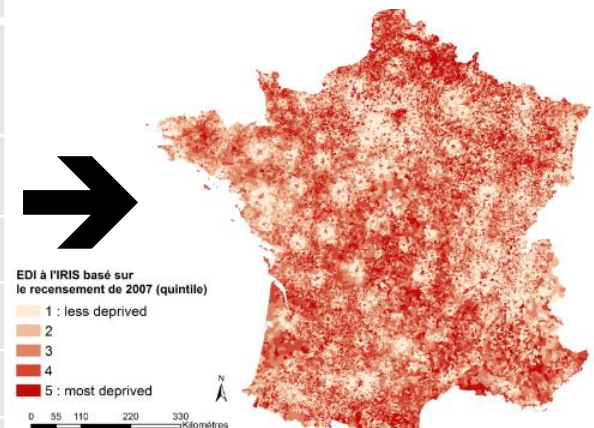
N =18 264 *Data weighted on non-response and adjusted on sample design of the French EU-SILC survey 2006.

Example: analysis in 2007 : results of logistic regression for France

European Deprivation Index

Final product at aggregated level: RL coefficients used to weight census variables at ecological level (after centering and reducing variables)

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Example: analysis in 2007 : results of logistic regression for France

European Deprivation Index

Third step of construction

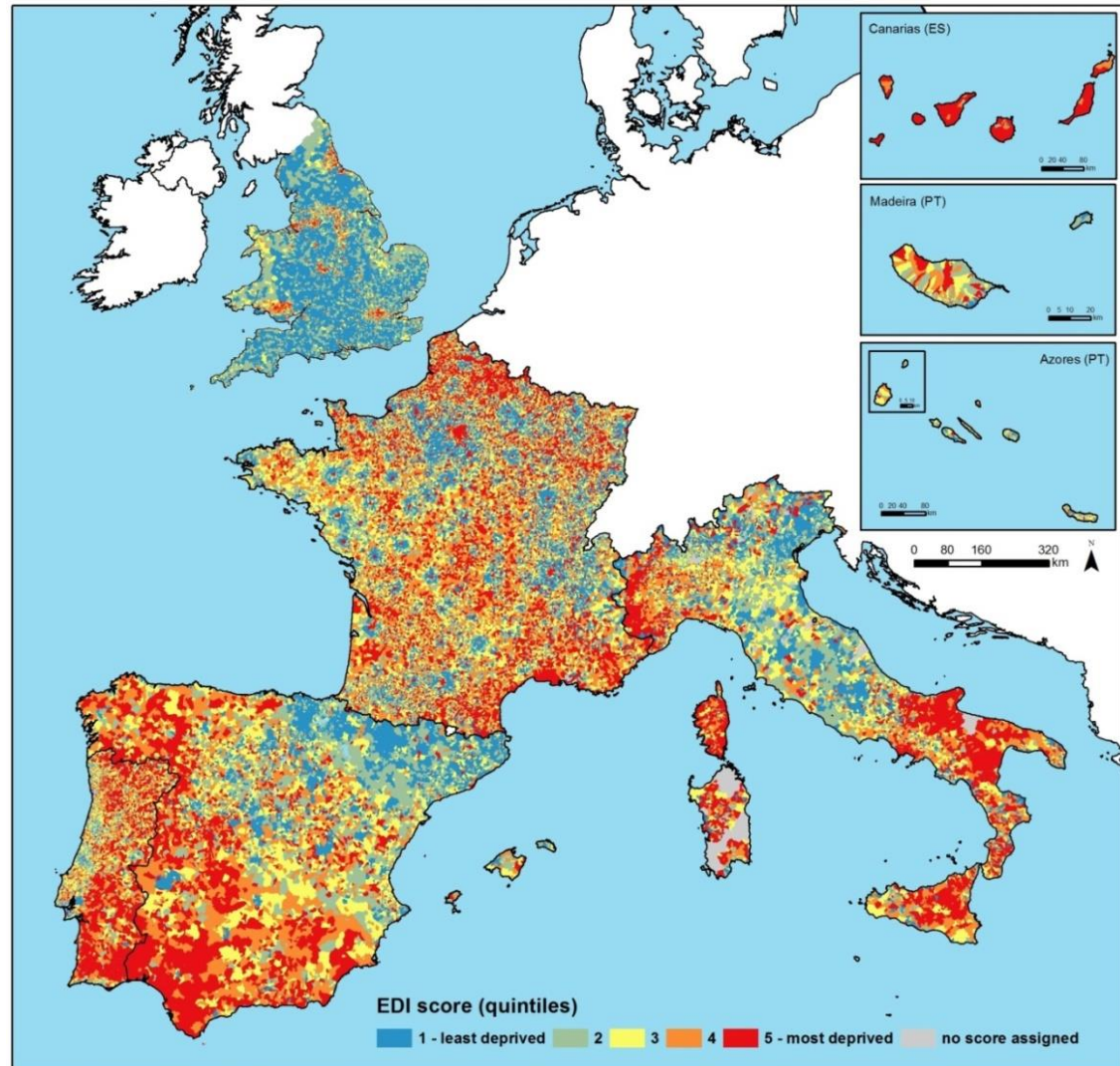
Example : analysis in 2007

Census variable (Rate)						
No-high education level	+0.94	+0.51	+0.87	+1.07	+1.30	+0.31
No bath or shower	+0.91		+2.42	+ 2.08	+1.33	-----
Non-owner	+1.10	+1.19	+0.22	+1.19	+0.73	+1.46
No Indoor flushing	-----	+1.73		+ 0.56	-----	-----
No Married	-----	-----	+0.36	+0.15	+0.37	+0.45
Women aged > 65 years	-----			+ 0.33	-----	-----
Promiscuity	0.24	+0.96		0.83	0.99	0.95
Low-income occupations	+0.65	+0.37	+0.70	+0.19	+0.62	+0.39
Unemployed	+0.93	+0.27	+0.81	+1.18	-----	-----
Foreign nationality	+0.51	+1.04	+0.37	-----	-----	-----
Household with ≥6 persons	+0.87	-----	+0.32	-----	-----	-----
Crim/Vandalism	-----	-----		-----	+0.49	-----
No employer	-----	+0.62	+0.55	-----	+0.95	-----
No car	+0.95	-----		-----	+1.74	+0.83
Single-parent household	+1.13	-----		-----	-----	+1.35
No detached house	-----	-----		-----	-----	+0.85
Permanently disabled	-----	-----		-----	-----	+0.98
No country of birth			+0.32			

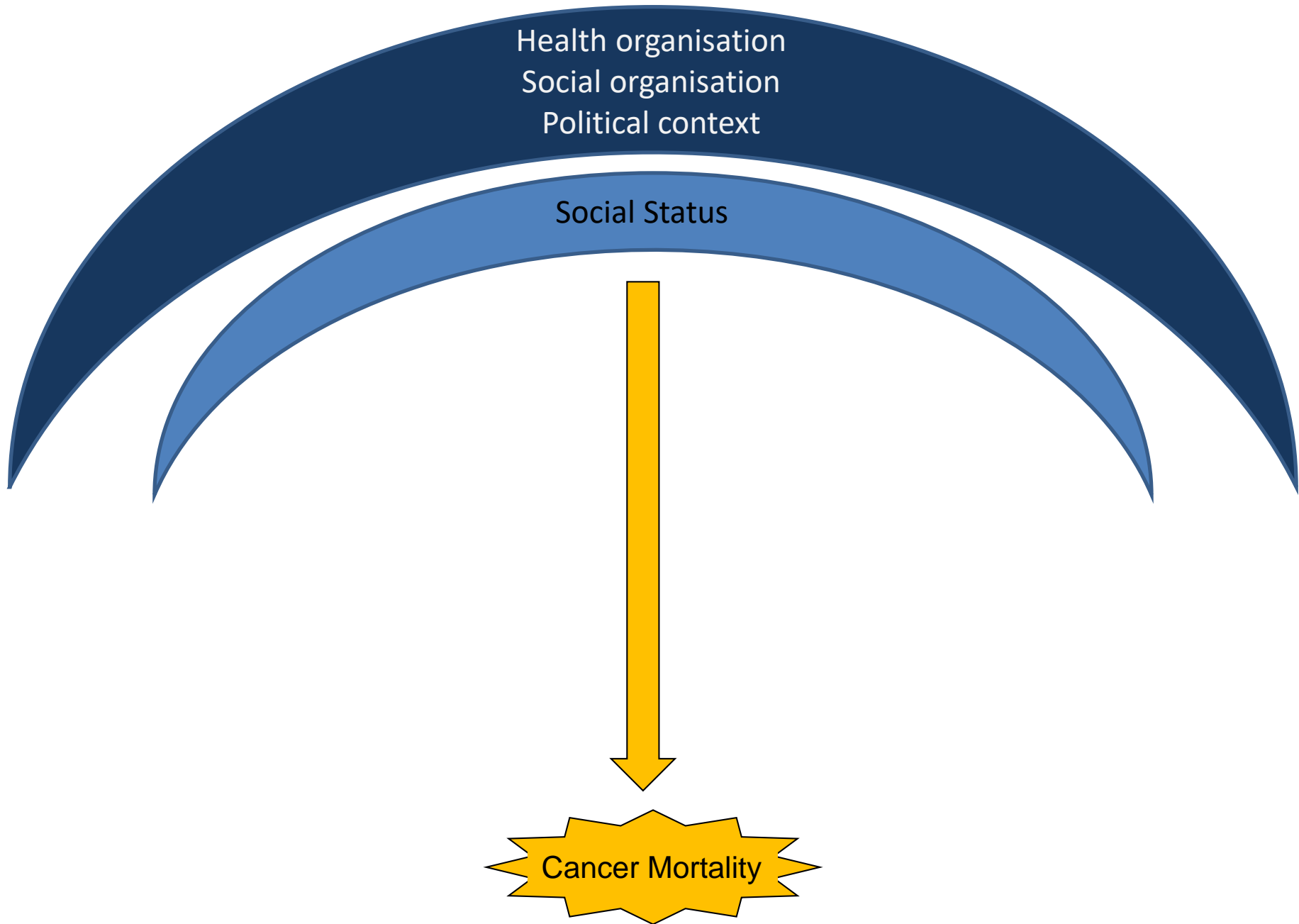
European Deprivation Index



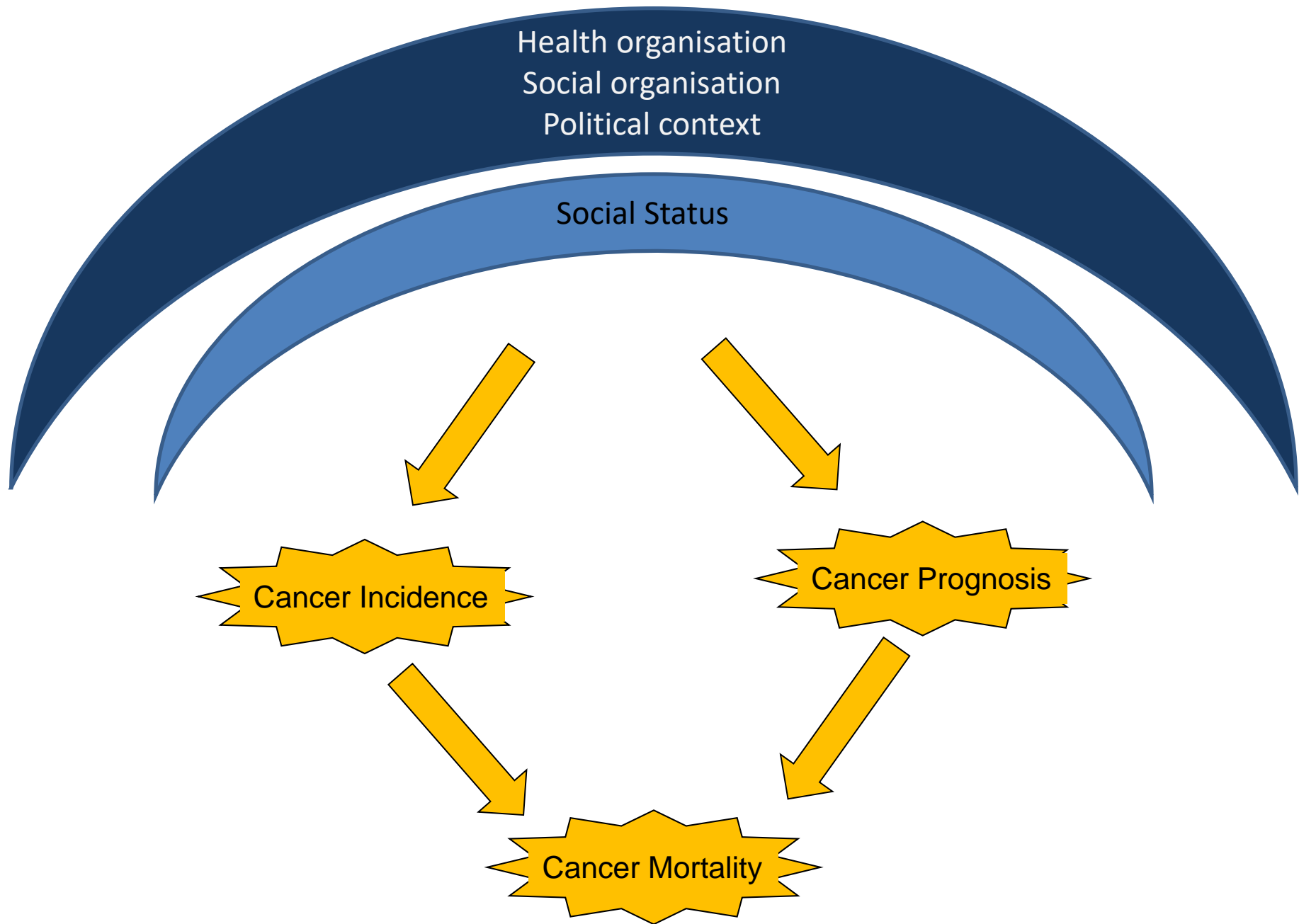
Guillaume et al 2015



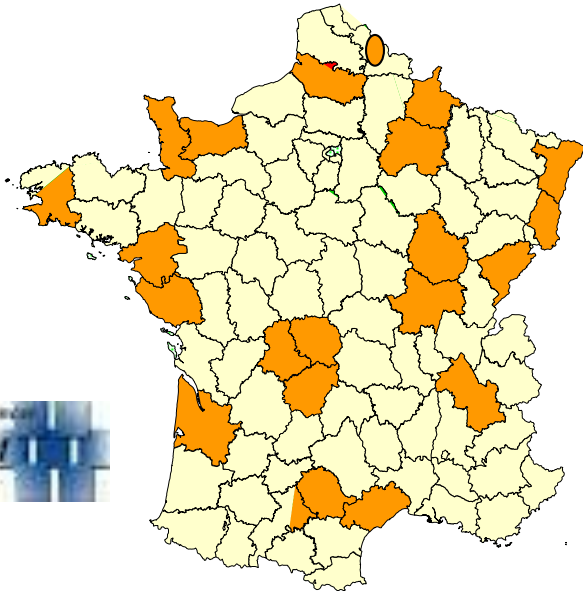
Social status and cancer



Social determination of incidence and prognosis of cancer



Geolocalisation and assessment of deprivation level of place of residence for all cancer patients registered in French Network of cancer registries using precise adress

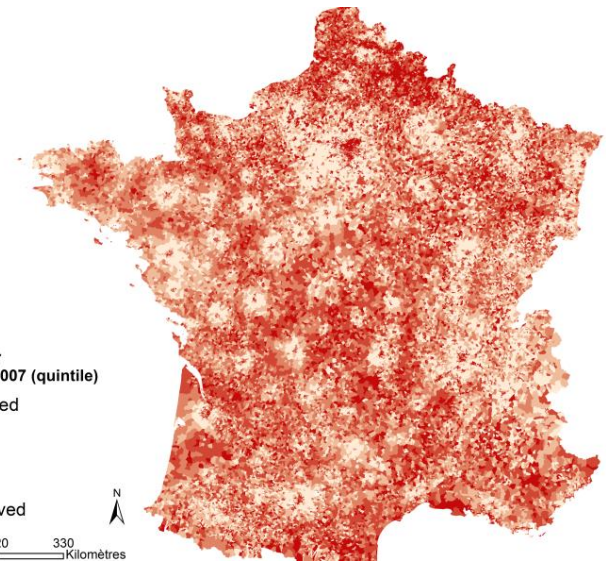


Réseau Français des Registres de Cancer
FRANCIM

EDI à l'IRIS basé sur
le recensement de 2007 (quintile)

- 1 : less deprived
- 2
- 3
- 4
- 5 : most deprived

0 55 110 220 330 Kilomètres

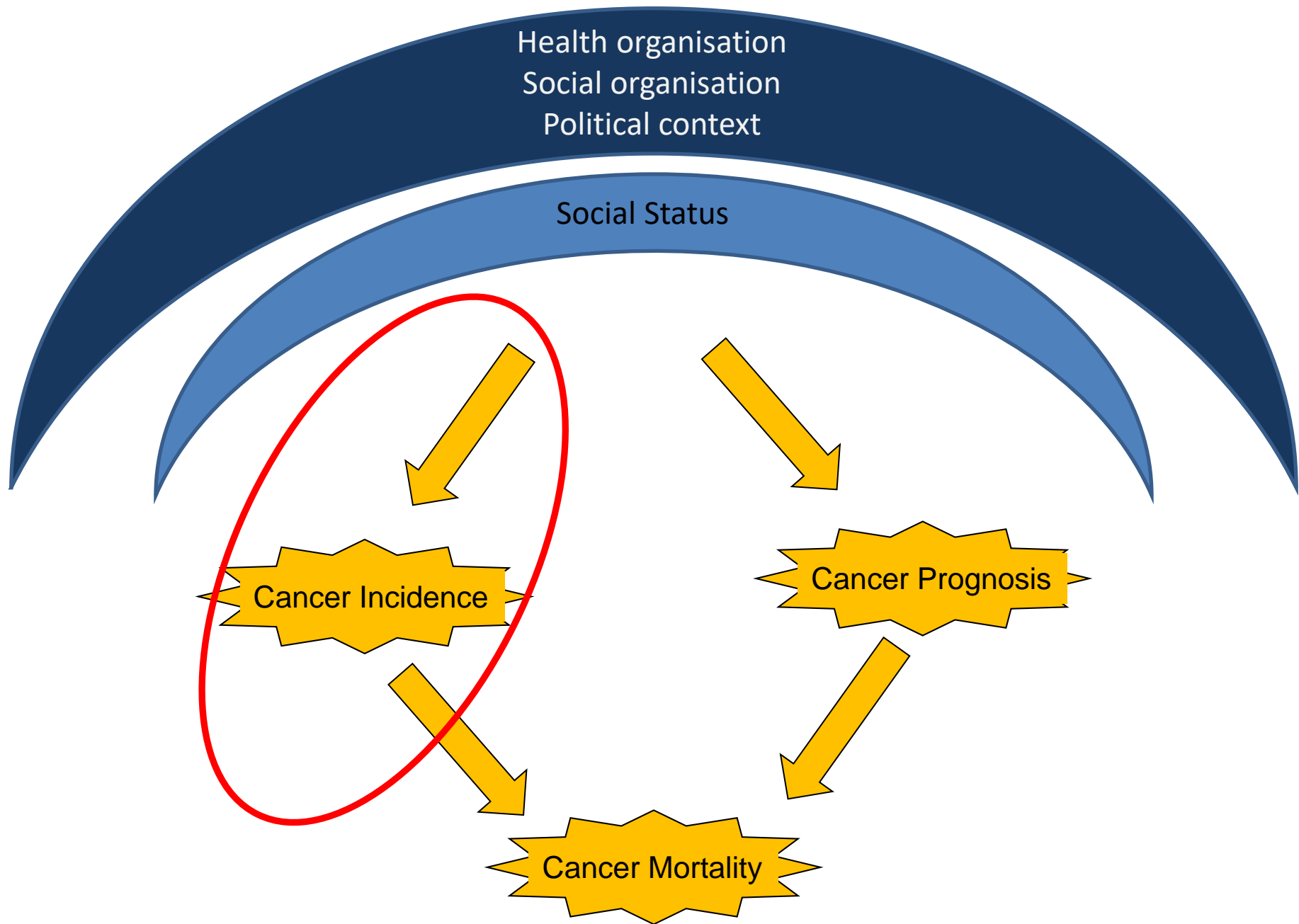


N > 500 000

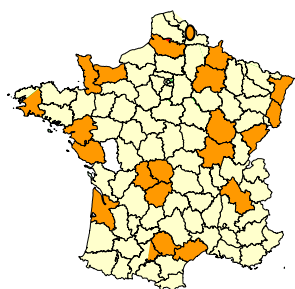
Géolocalisation (x,y)



Social determination of incidence and prognosis of cancer



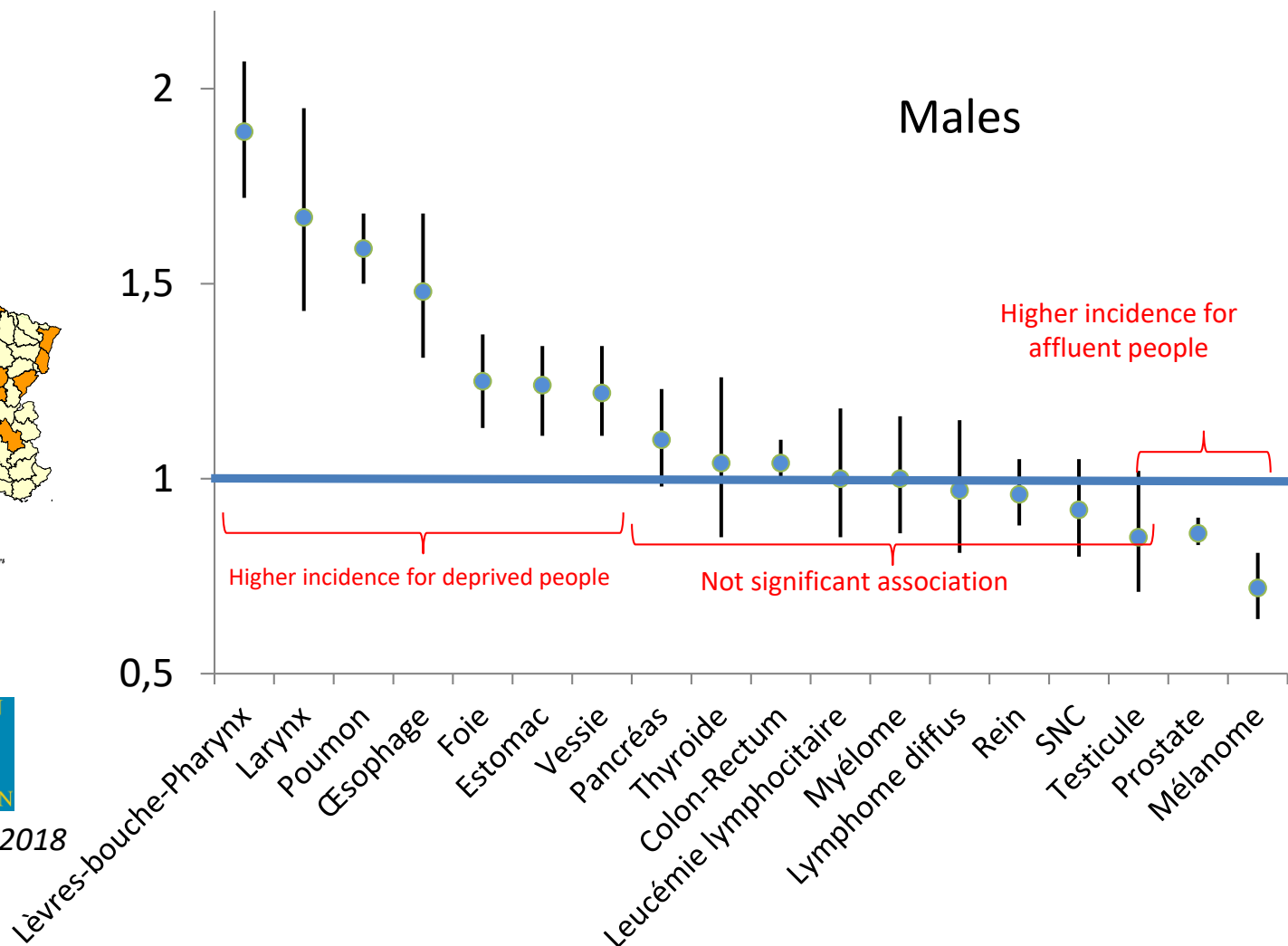
Deprivation level and cancer incidence in France



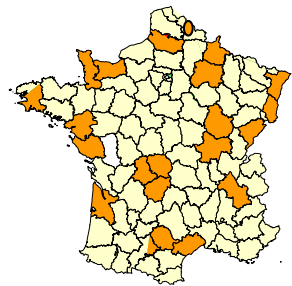
Registres des cancers
FRANCIM

EUROPEAN
JOURNAL
OF
CANCER
PREVENTION

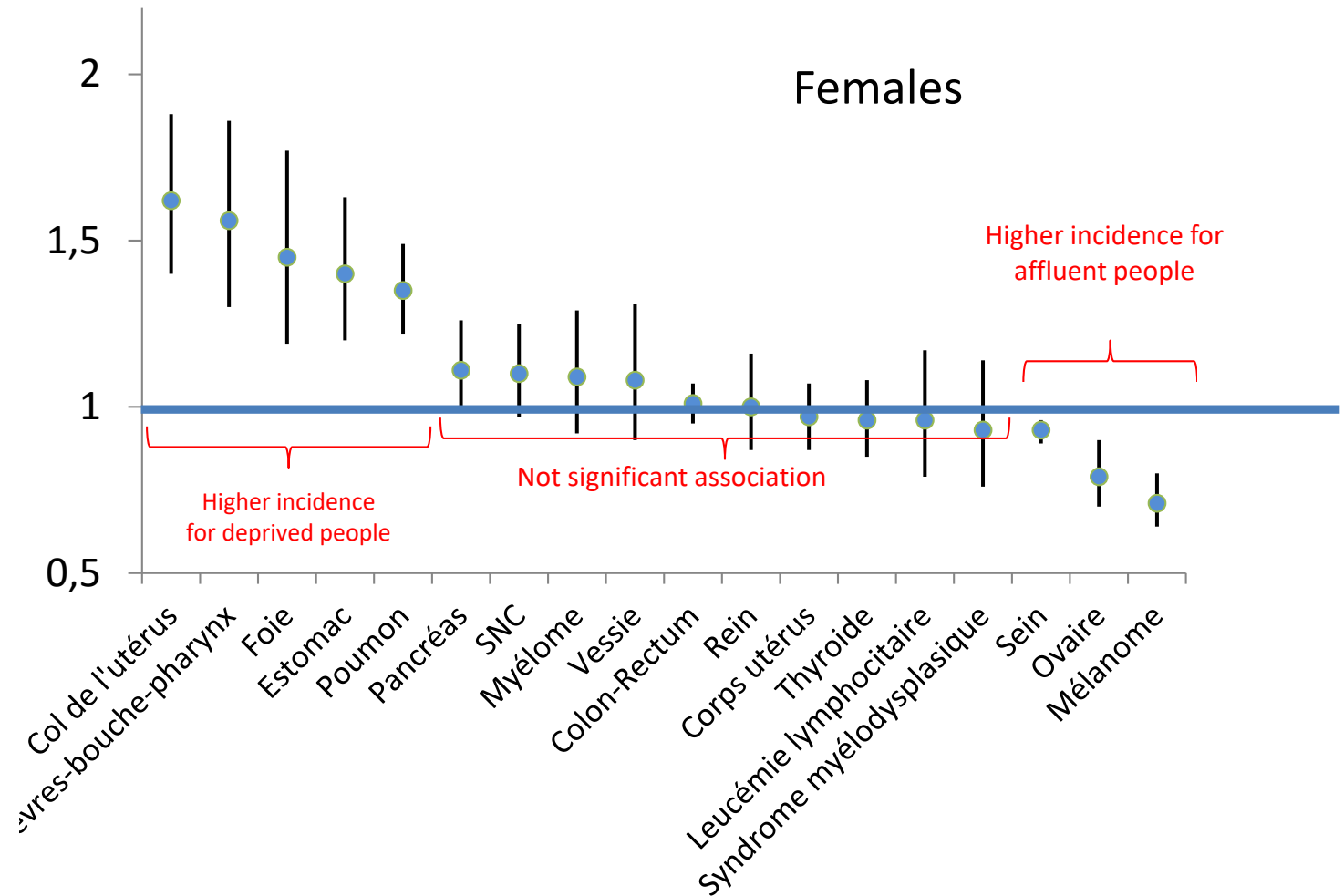
Bryere et al, 2018



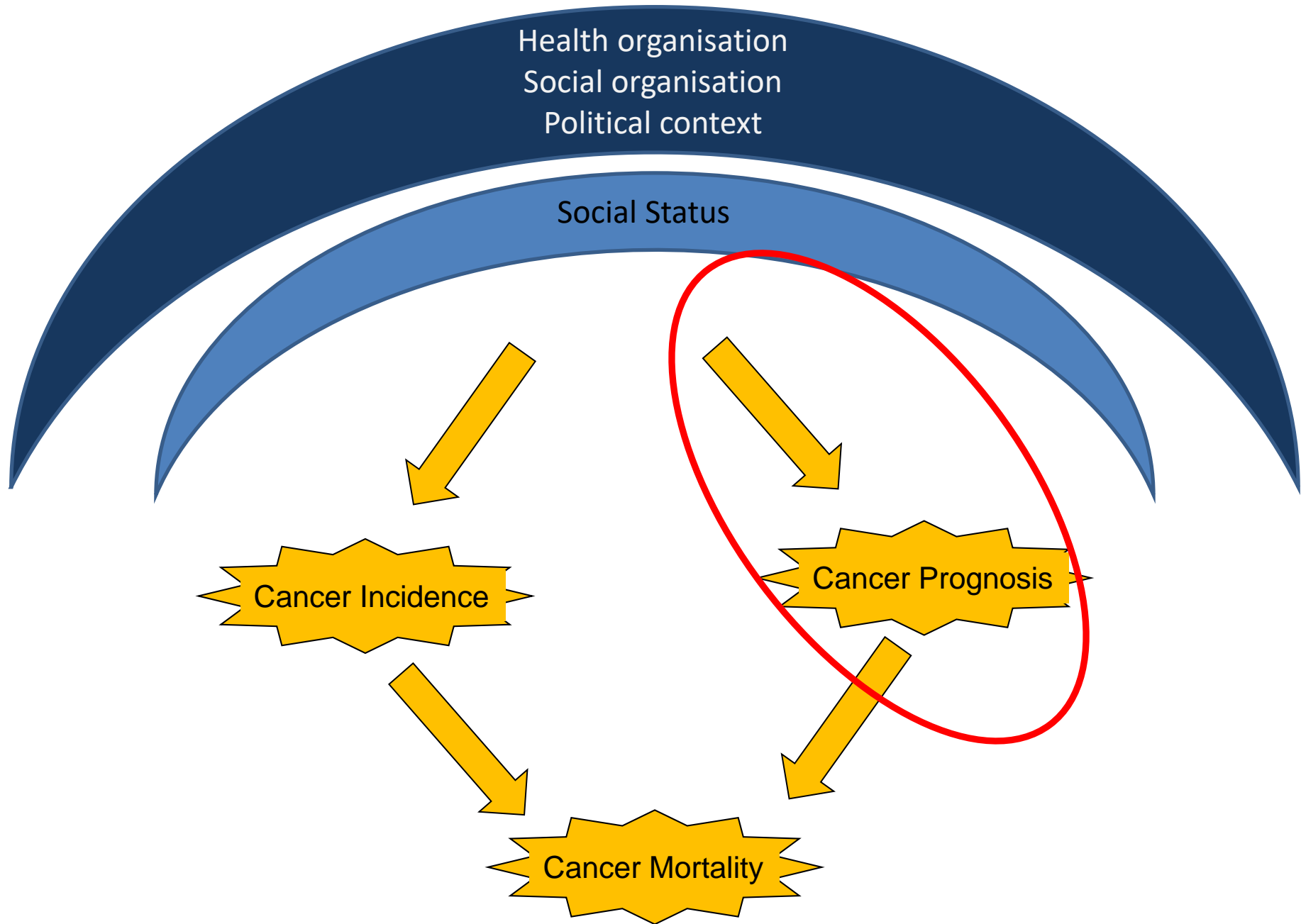
Deprivation level and cancer incidence in France



Bryere et al, 2018

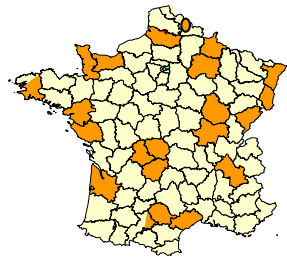


Social determination of incidence and prognosis of cancer



Deprivation level and cancer prognosis in France

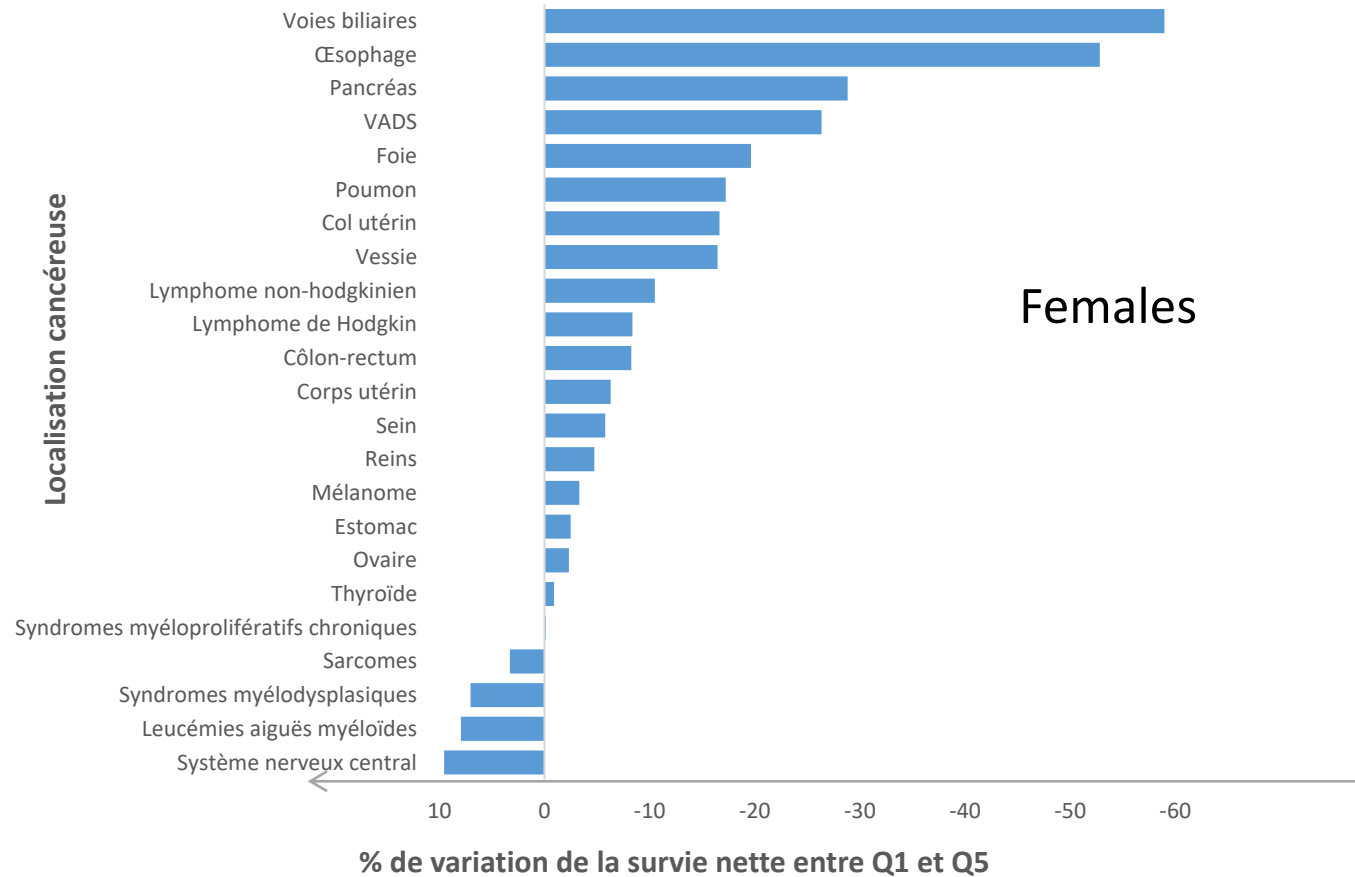
Variation of net survival (5years) between the less deprived (EDI - Q1) and the most deprived (EDI Q5)



Niveaux Français des Registres de Cancer
FRANCIM

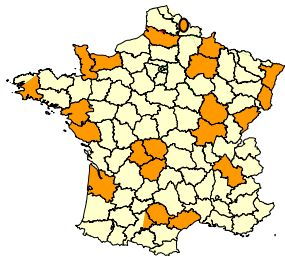


Tron et al. 2019



Deprivation level and cancer prognosis in France

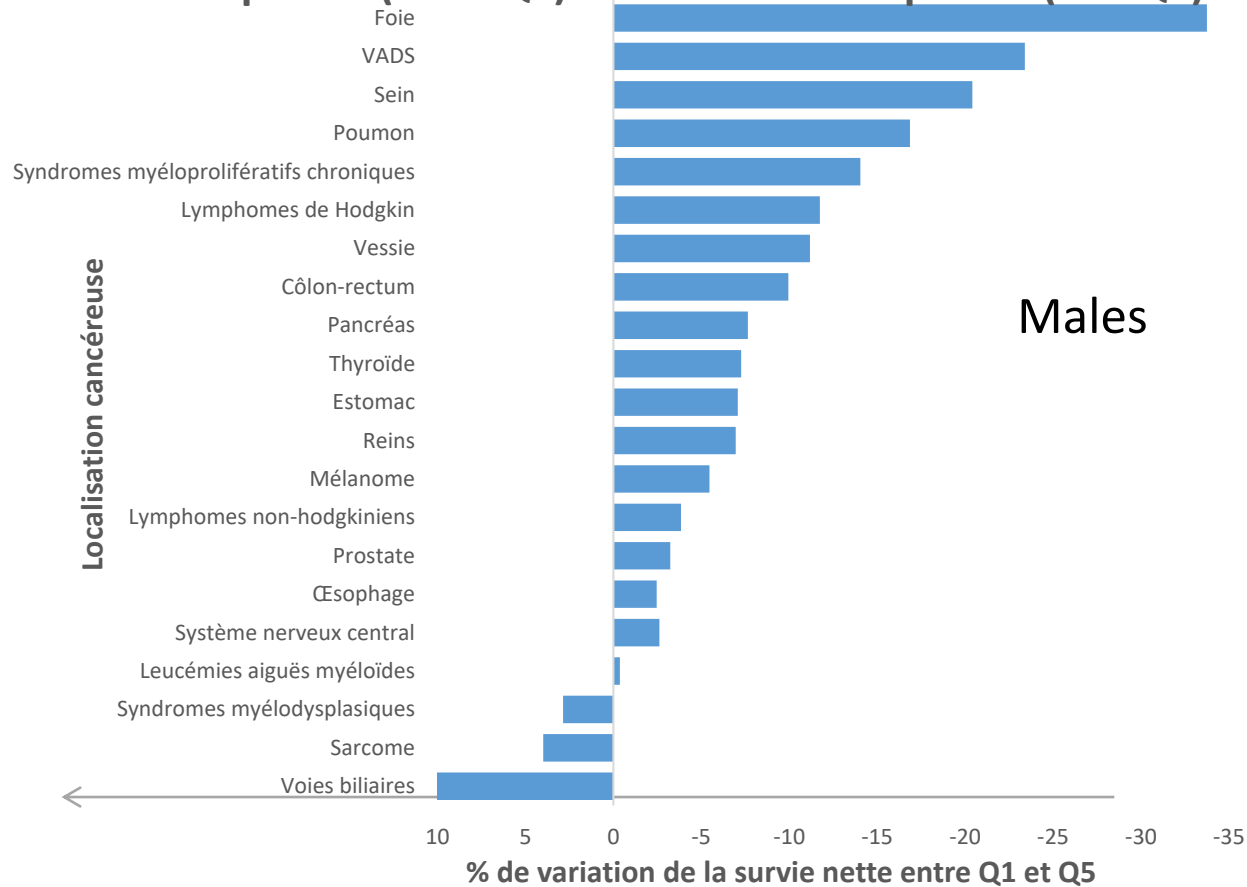
Variation of net survival (5 years) between the less deprived (EDI - Q1) and the most deprived (EDI Q5)



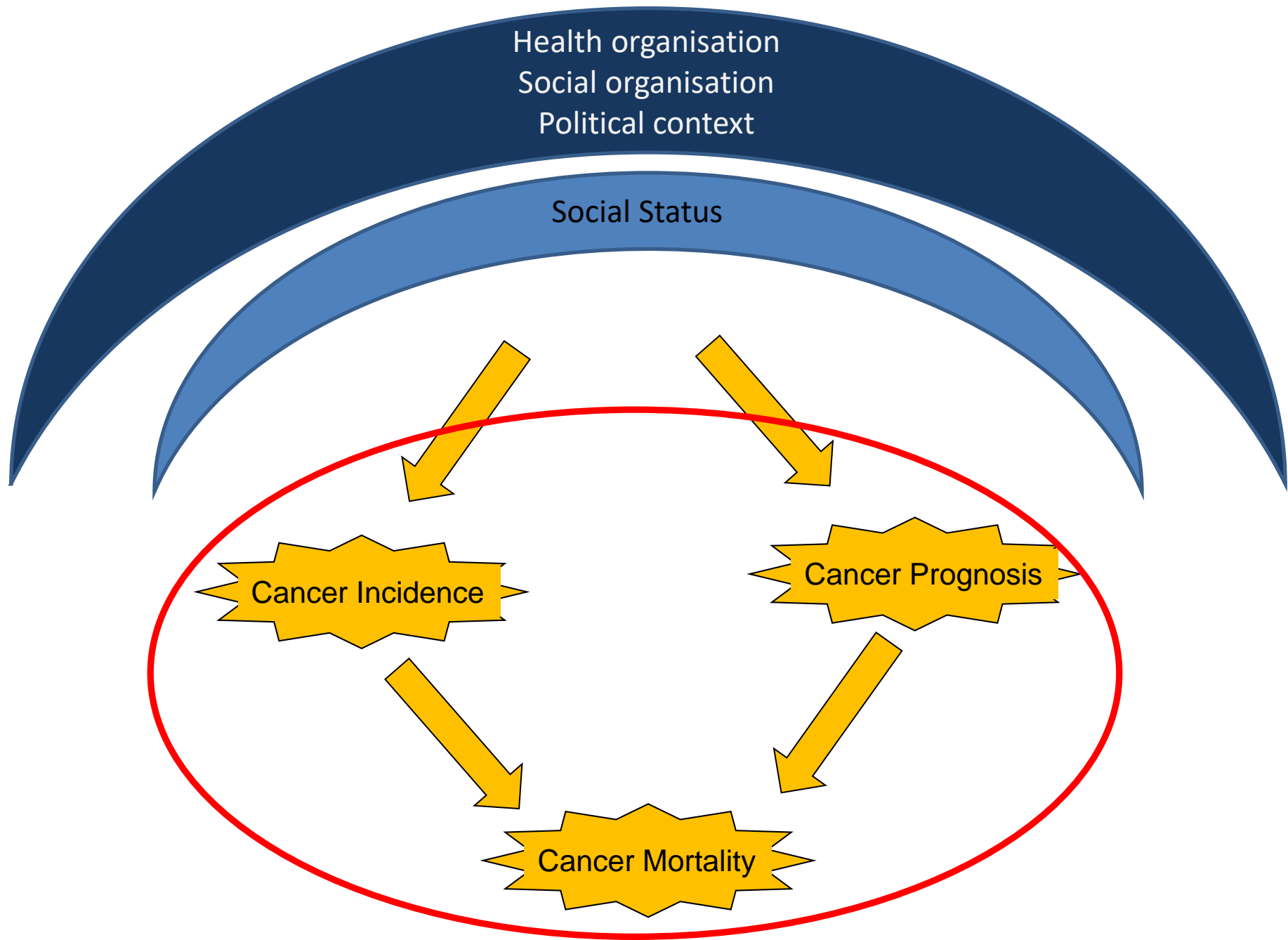
Néonax Français des Registres de Cancer
FRANCIM



Tron et al. 2019



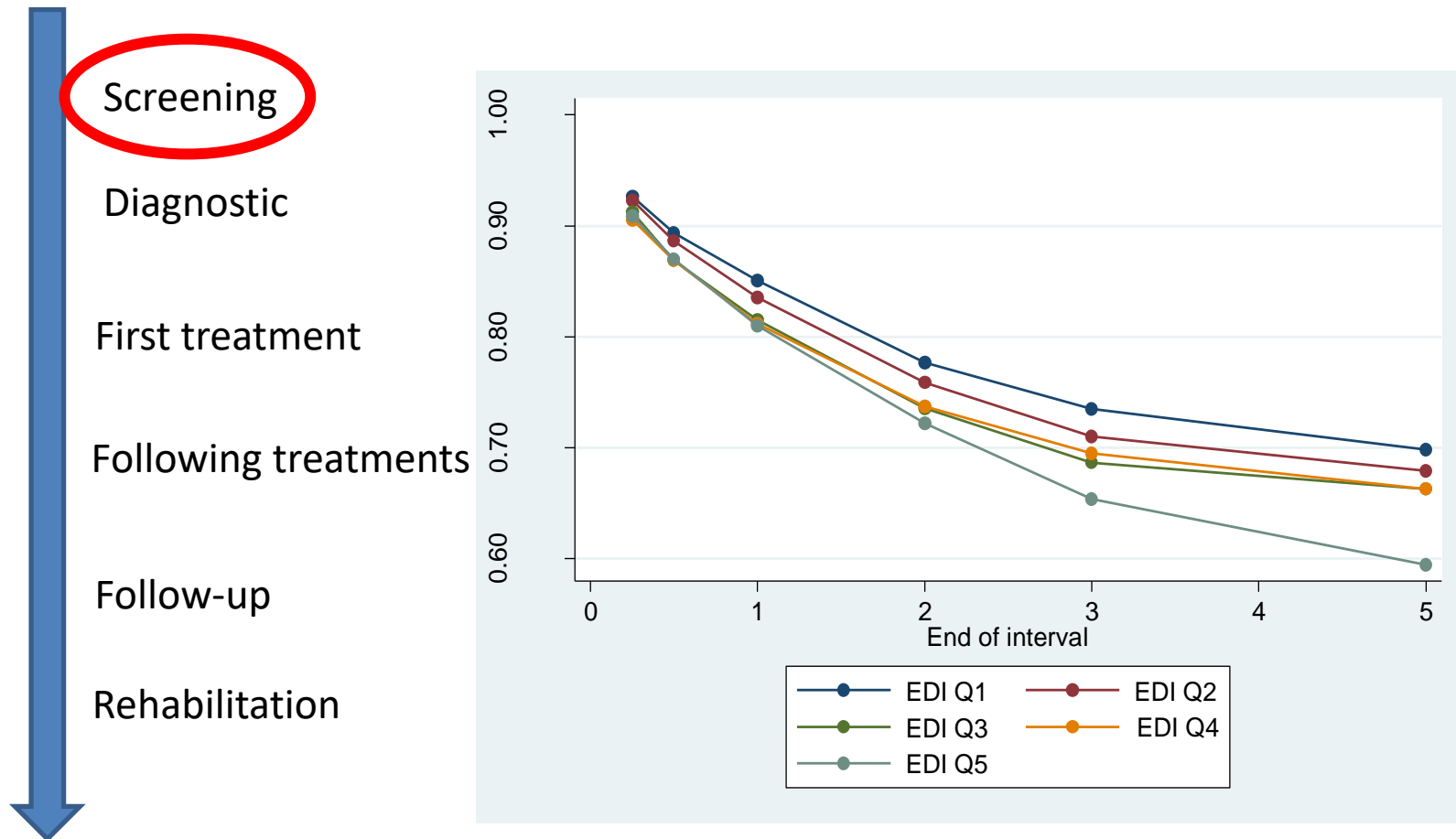
Social determination of incidence and prognosis of cancer



The respective parts of incidence and lethality in socioeconomic differences in cancer mortality



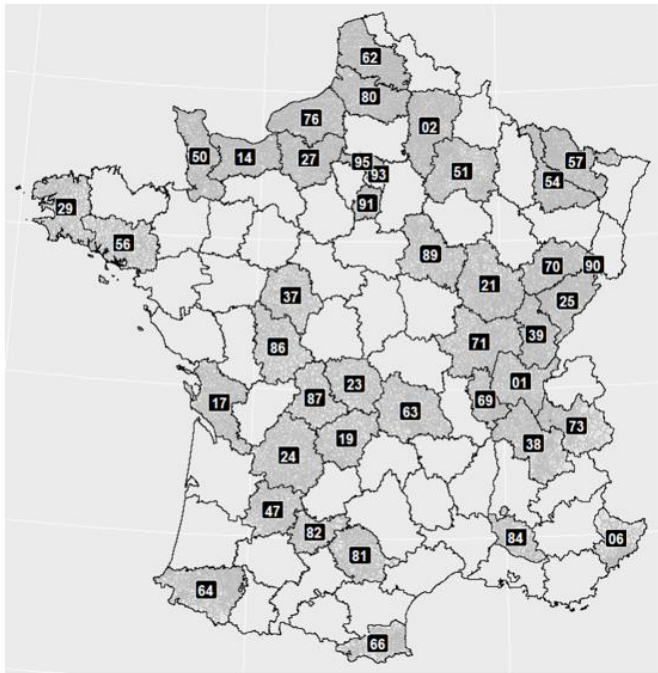
Form of social inequalities in survival for cancer patients



Social inequalities can be built up at any point in the history of the disease

Screening, crucial moment in social inequalities construction

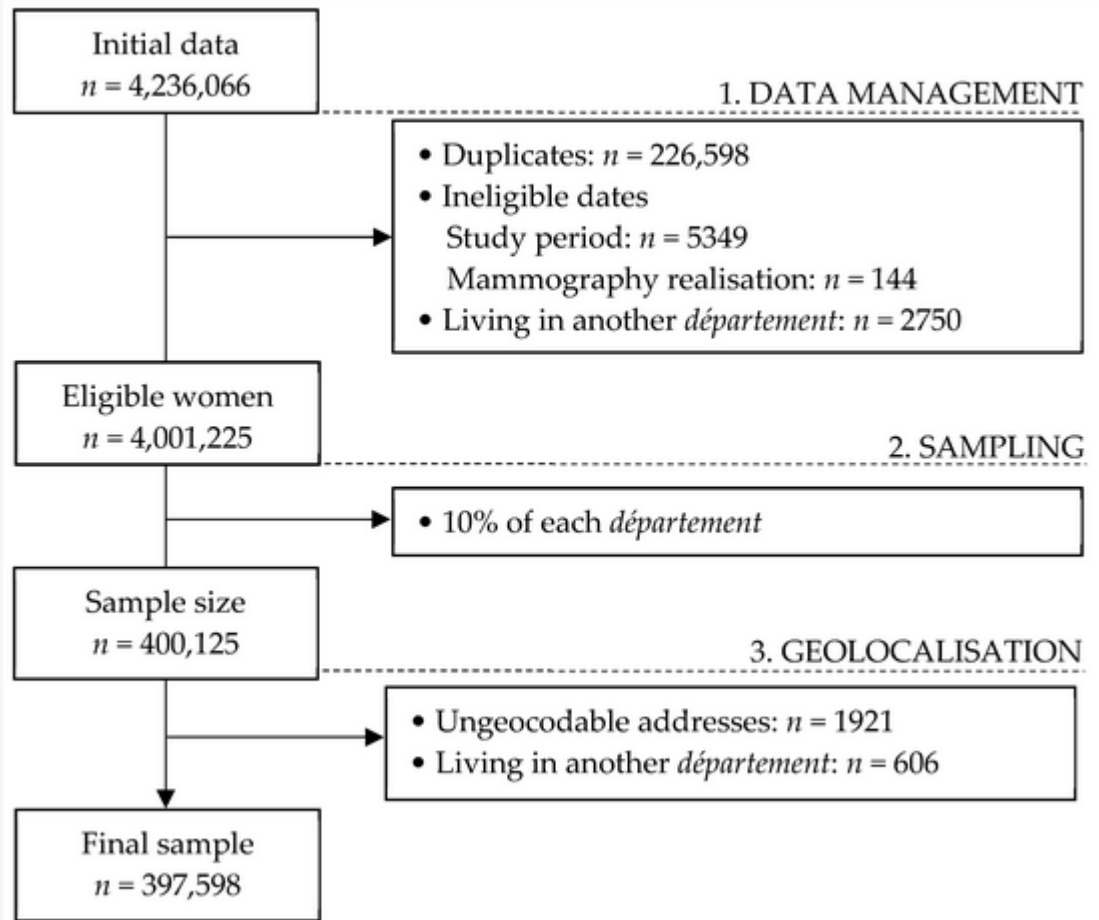
SISTER Study



Géolocalisation (x,y)

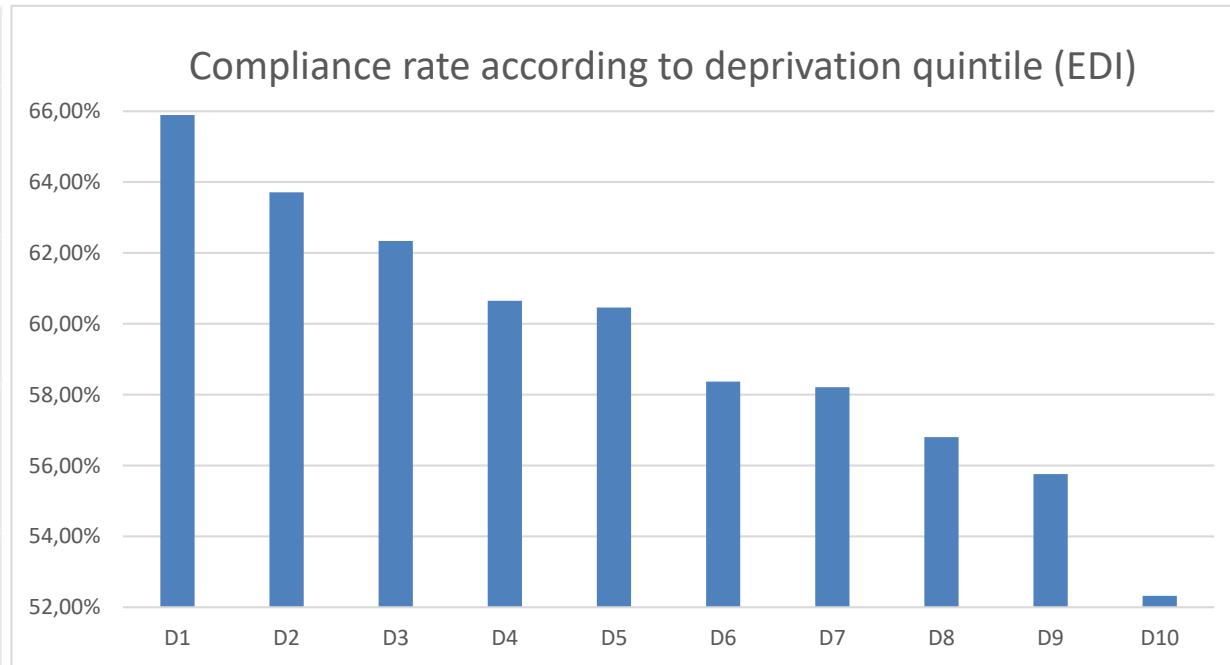
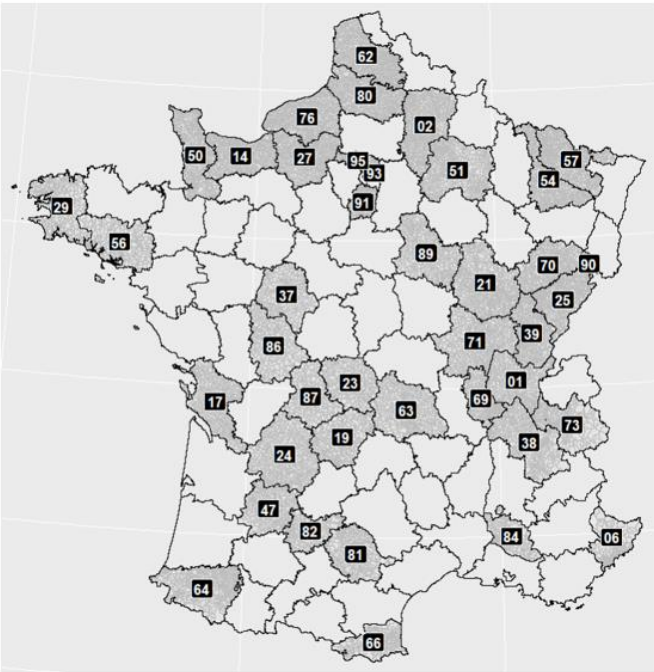


Figure 1. Flow chart of the population.



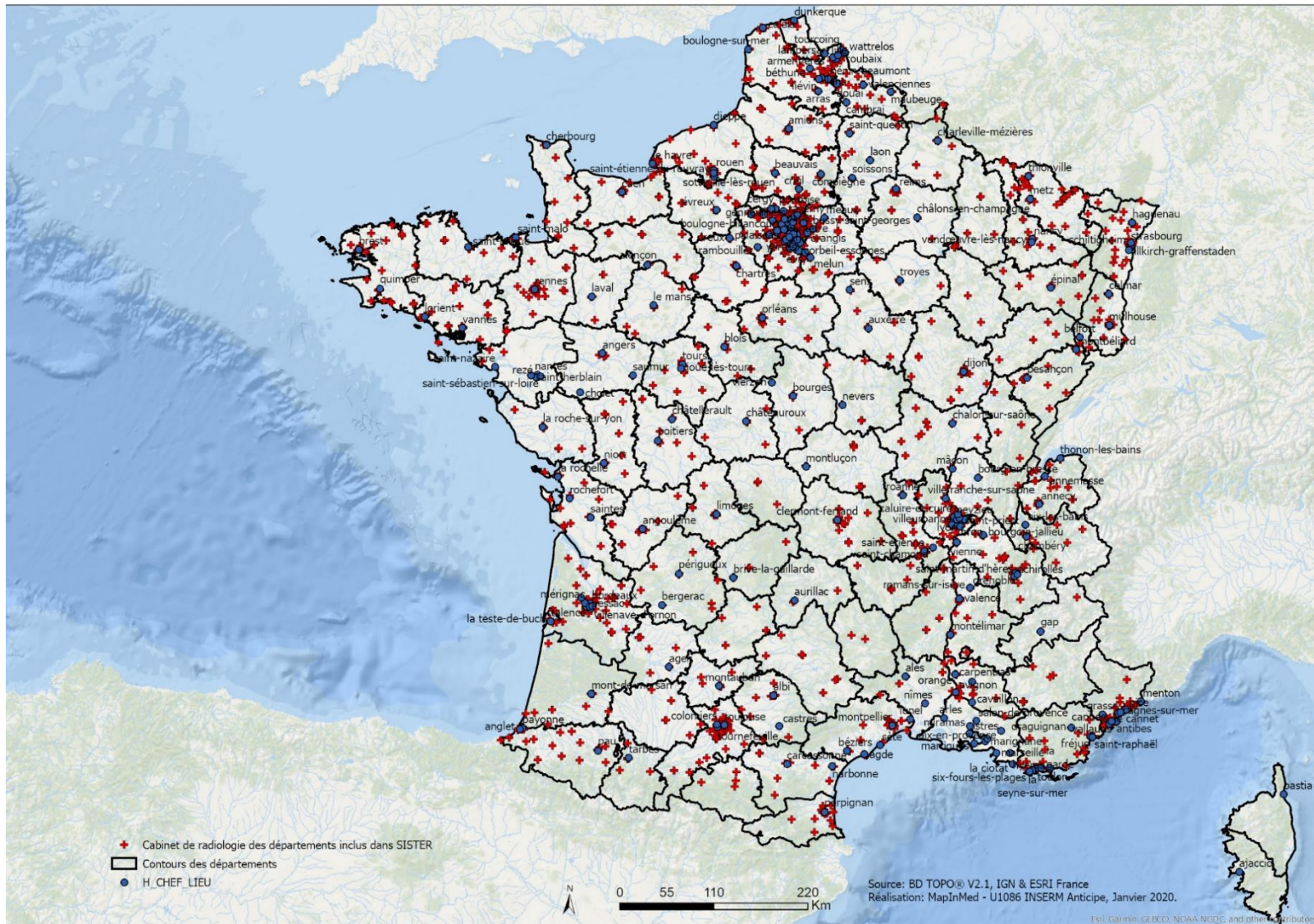
Screening, crucial moment in social inequalities construction

SISTER Study



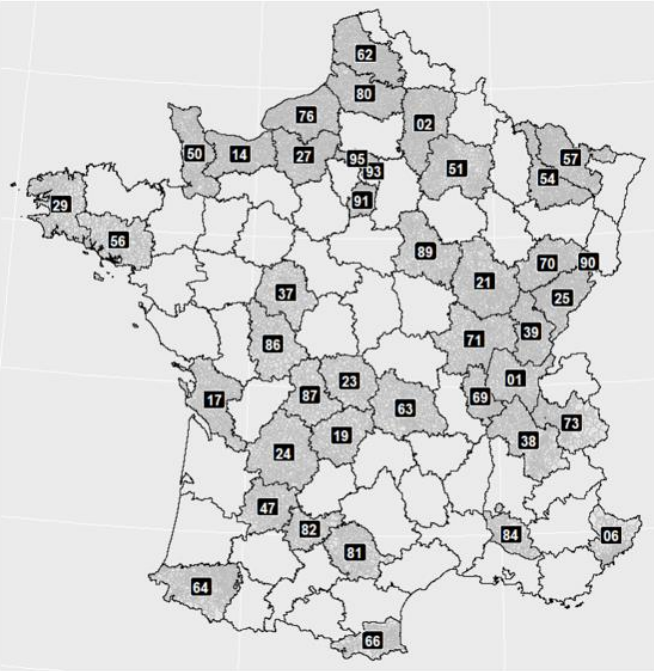
Participation rate in breast cancer screening in France according to deprivation

SISTER study – Geolocalisation of radiology centres in France

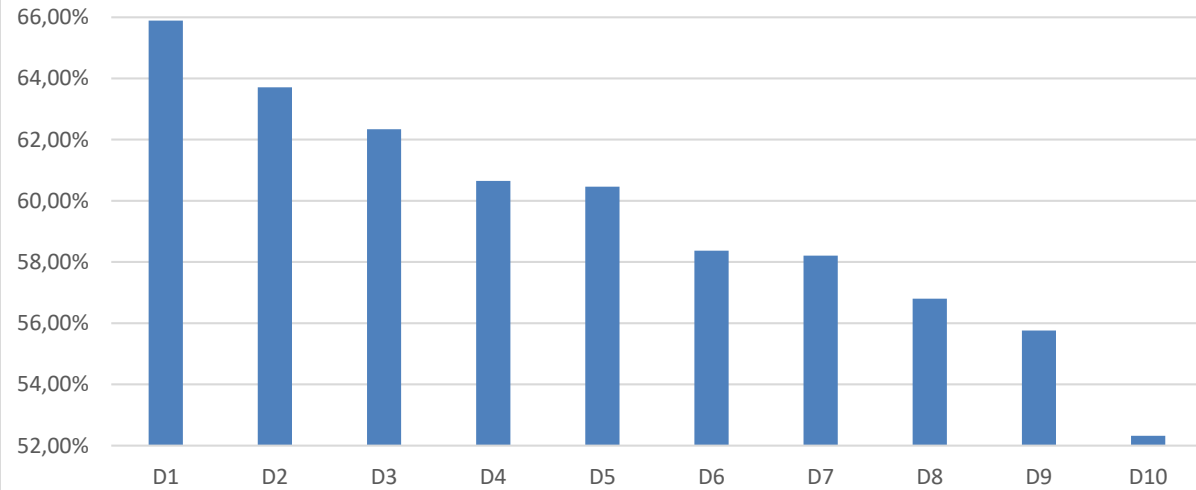


Screening, crucial moment in social inequalities construction

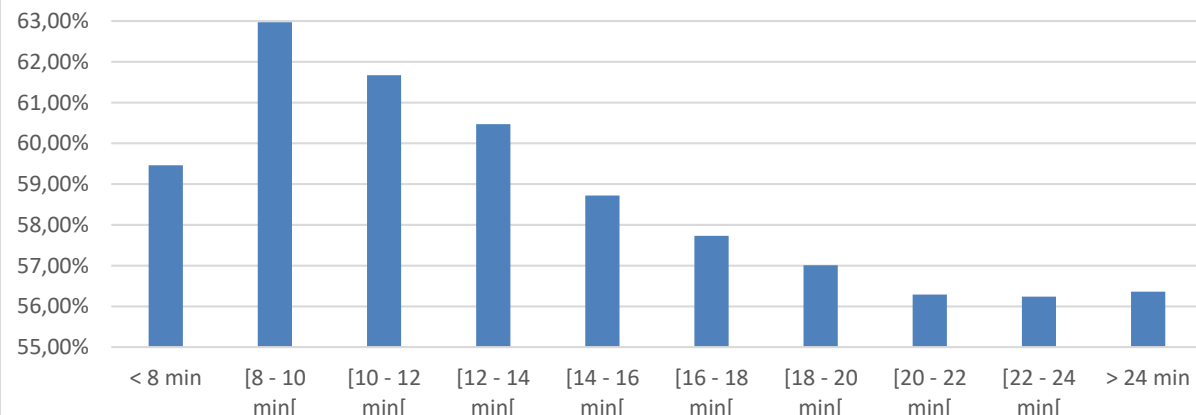
SISTER Study



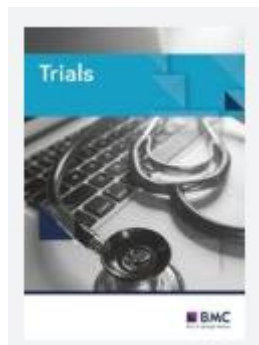
Compliance rate according to deprivation quintile (EDI)



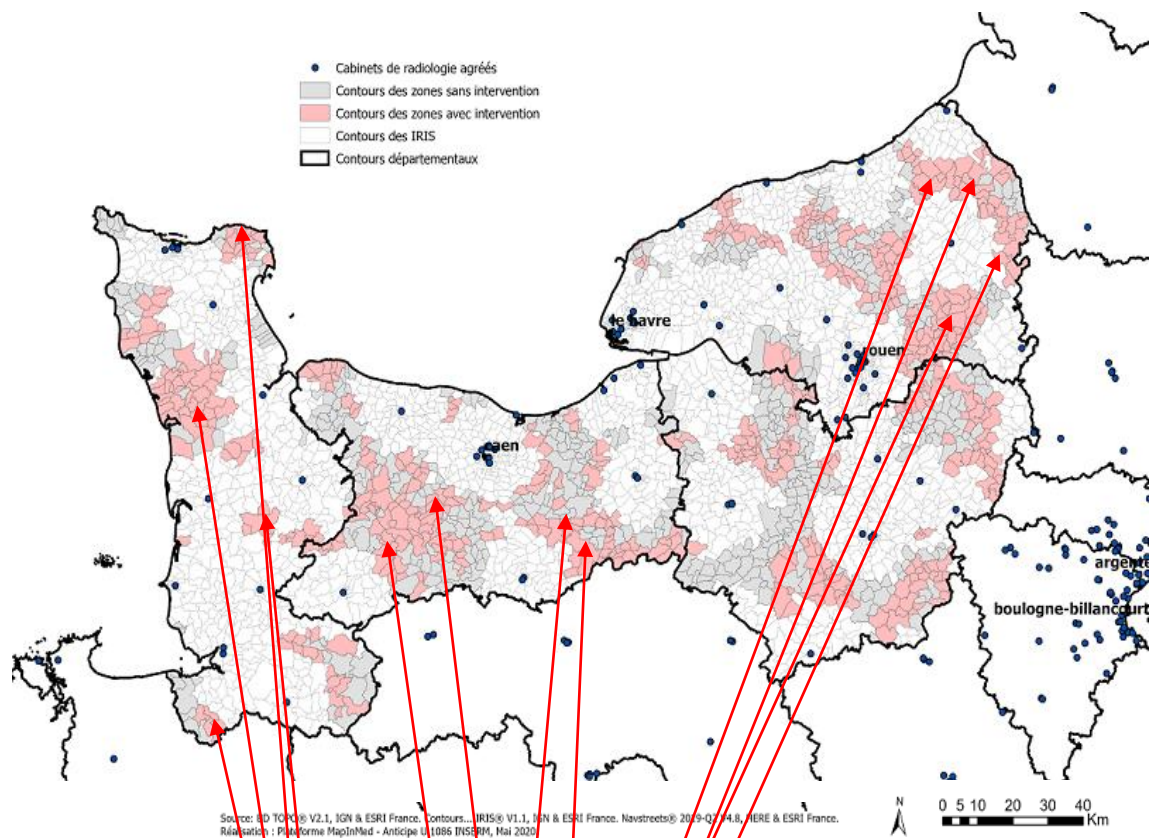
Compliance rate according to distance to radiology centre



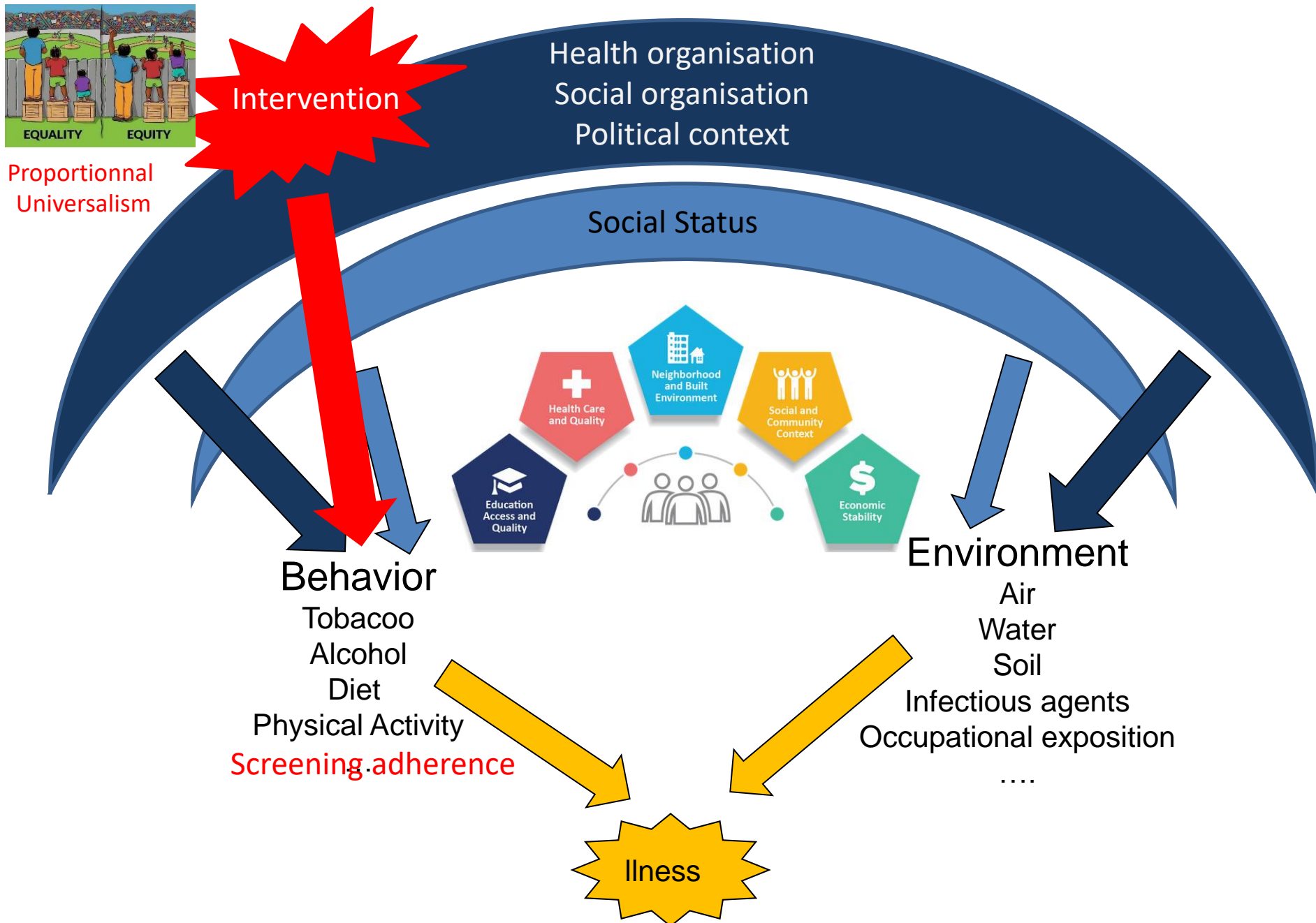
Rollet et al. 2022



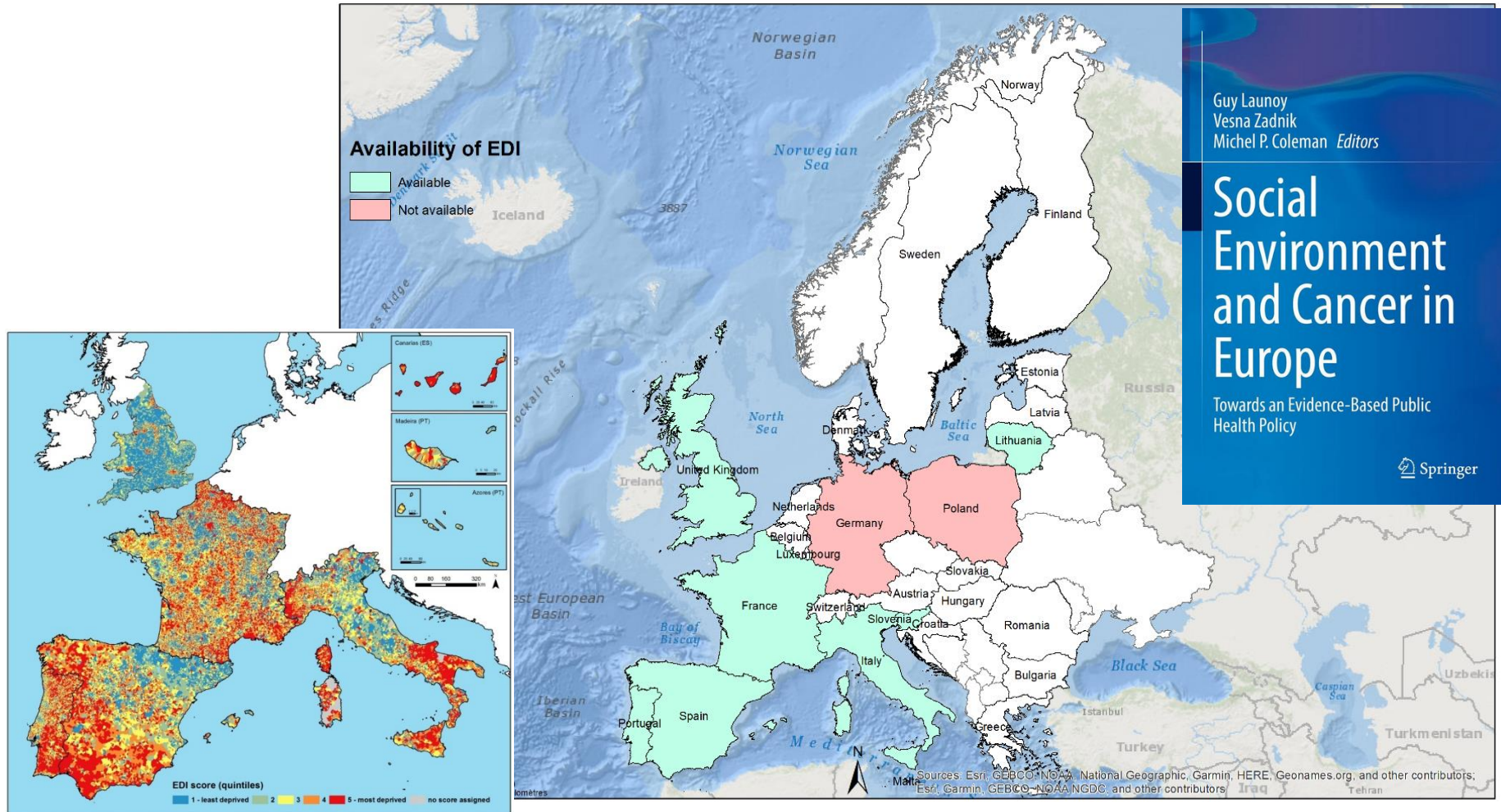
Guillaume et al.
2022



General model of social determination of health



Europe, the ideal level for understanding and tackling social inequalities in health



The progressive extension of the European Deprivation Index