WASABY

WASABY

WAter and Soil contamination and Awareness on Breast cancer risk in Young women

D5.1 Deprivation index available data

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Co-funded by the Health Programme of the European Union

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Wasaby report D5.1 on deprivation index available data

1. Introduction

The Wasaby project focuses on the geographical analysis of population-based cancer incidence data in connection with environmental factors, using breast cancer and water/soil contamination, as an example. In this project, the WP5 have to provide a national version of European Deprivation Index (or of other Deprivation Index) for all countries participating in the study, i.e., France, Germany, Italy, Lithuania, Poland, Portugal, Slovenia, Spain and Northern Ireland. In order to minimize the unavoidable ecological bias, the smallest area for which census data were available must be identified to include deprivation (assessed at aggregated level) as confounder in statistical modeling for breast cancer.

The main aim is to identify those participating countries for which a national version of the European Deprivation Index (EDI) is not available. For these countries, we have to collect information on census data availability, according to the data level, in order to estimate the possibility of a deprivation index construction. If EDI is not estimable, other deprivation indexes should be identified and collected. The present report focuses on the data available for estimating deprivation indexes in the various participating countries , and concludes on the feasibility of the European Deprivation Index construction in each country.

2. Background

2.1 Concept of deprivation

According to P. Townsend, deprivation refers to unmet needs caused by a general lack of resources, rather than financial needs alone, and needs vary between societies and periods. Since the single socioeconomic data are often absent or poorly collected in routine health databases, individual social status is regularly assessed through the socioeconomic characteristics of the place of residence, mainly at the small-area level of census blocks. Moreover, the aggregated-level index allows to consider for contextual factors not accounted by individual-level index. The purpose of the European Deprivation Index is to measure ecological deprivation at a small-area-level in a comparable manner across countries, despite the social and cultural specificities of the different countries, and the availability of census variables. The ecological deprivation indices are built according to shared methodological principles, by selecting fundamental needs associated with both objective and subjective poverty; they use the same theoretical concept of relative deprivation, through a European survey on relative deprivation (EU-SILC) that is regularly conducted on national samples across the EU. The concept of relative deprivation makes it possible to measure comparable social status using variables that may differ in each country.

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2.2 European deprivation index

The method for computing national versions of the European Deprivation Index (EDI) is described in different papers [Pornet C, JECH 2012 PMID: 22544918; Guillaume E, JECH, 2016 PMID: 26659762] and national versions of EDI are already available for 5 European countries (Italy, Portugal, Spain, England and France). This index is based on:

- the European survey on deprivation European Union Statistics on Income and Living Conditions (EU-SILC). EU-SILC is a cross-sectional and longitudinal sample survey providing data on income, poverty, social exclusion and living conditions in the European Union. From these data, the statistical office of the European Union (Eurostat—http://ec.europa.eu/eurostat/web/main) produces a European standardized questionnaire that is specifically designed to study deprivation. It consists of nine questions, common for all European Union members, aimed to evaluating needs that directly or indirectly induce financial inability. For each European Union member, the sum of weights for the sample design and the response rate to a national questionnaire were tailored on the basis of the national population size. All analyses were weighted for non-response and adjusted for sample design, so as to ensure the representativeness of the results for each member.
- The ecological data of the national population censuses Ecological data came from the last exhaustive national population censuses conducted in 2001 for Italy (Italian National Institute of Statistics: ISTAT), Portugal (National Institute of Statistics: INE), Spain (National Institute of Statistics: INE) and England (Office for National Statistics: ONS), and, in 1999, for France (National Institute for Statistics and Economic Studies: INSEE).

The method of EDI construction is based on three steps. The **first step** aims to construct an individual indicator for deprivation thanks to the identification of fundamental needs associated to objective and subjective poverty. The **second step** aims to identify variables available both at individual (EU-SILC survey) and aggregate levels (census) in each country. The **third step** is dedicated to the construction of ecological deprivation index. In this step, individual indicator of deprivation is explained in a logistic regression by variables identified in the previous step. The regression coefficients became the weights of the variables measured at aggregated level. The final index is the sum of these weighted variables.

3. Why and how will the deprivation index be applied in the WASABY Project

Since this study includes different European countries, the measurement of socioeconomic deprivation must be comparable or at least transferable between them despite the socio-cultural differences, so to improve comparability and reproducibility of the concept of relative deprivation. The European deprivation index is the only index with these characteristics.

EDI will be use in analyses of incidence and as a covariable to investigate the link between environmental pollutants and breast cancer incidence.

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4. National and European Deprivation Index in the participating countries

4.1 EDI estimation

While EDI 2001 is already available in the aforementioned countries, the construction of EDI 2011 is in progress for all countries involved in WASABY. Table 1 here below describes the different steps of the construction progress in the Project.

Table 1: State of the art of EDI 2011 estimation for WASABY (at 31st March 2019)

	Year of Census	Status		
		Step 1	**Step 2**	**Step 3**
France	2011	X	X	X
Germany	2011	X		
Italy	2011	X	In progress	
Lithuania	2011	X		
Poland	2011	X		
Portugal	2011	X	X	X
Slovenia	2011	X	X	X
Spain	2011	X	In progress	
Northern Ireland	2011			

The French, Portuguese and Slovenian EDI-2011 were concluded. In a few weeks, Step 2 should be reached for Italy, and the same process will take place for Spain. At a later stage, Northern Ireland's EDI will be constructed, and so will the Polish and Lithuanian ones.

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4.2 National indices

For each country, the list of national available indices is not exhaustive, as it only concerns widely used indices.

- **France**

The most frequently used index are the European Deprivation Index (EDI) and the French index of social deprivation (FDep). FDep is constructed by principal component analysis including four variables that are the percentage of: blue collars among active people, persons over 15 years of age with baccalaureate (upper secondary education degree), unemployed persons among active people, median income per household[1]. FDep was initially constructed at municipality level but is now available at census block level.

- **Germany**

According to scientific literature, the German deprivation index was built after the model of the British IMD.; most articles, however, are in German hence an accurate synthesis on the subject was not possible.

From an abstract in English, we know that a small-area, multidimensional Index of Multiple Deprivation (IMD) was developed for Germany, based on an established British method. Official sociodemographic, socioeconomic and environmental data was used to create a Bavarian Index of Multiple Deprivation (BIMD) (PMID: 22020751)

The German IMDs consist of seven deprivation domains representing single aspects of deprivation (income, employment and educational deprivation, municipal revenue deprivation, social capital deprivation, environment and security deprivation). Specific indicators were generated from data of official statistics, and assigned to the deprivation domains. The weighted single domains were finally combined to an overall index. The German IMDs are available at a municipal level and at a district level. (PMID: 29119206)

A version of the German Index of Multiple Deprivation GIMD based on data from 2007 to 2010 for all 412 rural and urban districts in Germany was then developed and mentioned in PMID: 25706042.

- **Italy**

A nationwide deprivation index at municipality and census block level on Census data, from 2001 was developed and published in Italian. From the 280 variables defined at census block level (2001 General Census of Population and Housing) the following five traits that operationally combine to represent the multidimensionality of the social and material deprivation concept were selected: low level of education, unemployment, home non-ownership, single parent family and overcrowding. The index is calculated by summing standardized indicators. (PMID 21224518)

- **Lithuania**

An index is not available neither at local nor at national level. Socioeconomic inequalities are studied using single indicators such as education (PMID 29408192, PMID 24227051), income, absolute material deprivation, assessed by the question "how often do you not have enough money for food" (PMID 24227051) , and relative deprivation defined by the number of household amenities (PMID 24227051).

[1]REY G., RICAN S., JOUGLA E. (2011). Mesure des inégalités de mortalité par cause de décès - Approche écologique à l'aide d'un indice de désavantage social. BEH n°8-9 : pp 87-90

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- **Poland**

There are two local indices: the Poviat index[2] of deprivation and the local index of deprivation[3] constructed at municipality level. These indices take into account population's income, unemployment, living conditions (flats with bathroom), education (results of lower-secondary school final exam) and access to goods and services (number of person per flat and percentage of children covered by the preschool education). These variables were summed up after normalization and divided by the number of variables included in the indices.

- **Portugal**

In Portugal, no standard ecological deprivation index exists, contrasting with other countries. The Portuguese version of a transnational deprivation index, European Deprivation Index, was described in PMID: 28501033

- **Slovenia**

No local deprivation measure is available. The Slovenian version of EDI was described in PMID: 29651315. EDI was recently developed at individual level (PMID: 30678244).

- **Spain**

A few local indices are described (PMID: 25631857, PMID: 22846597) and no national index other than the EDI was constructed with 2001 census (PMID: 26659762). It is available at census tract level and must be updated with 2011 census.

- **Northern Ireland (UK)**

The most common index are the Townsend and Carstairs indices and more recently the Index of Multiple Deprivation. The latter includes several dimension of deprivation such as income, employment, education, health, crime, access to housing services and living environment. For each one, variables that best reflect each dimension were taken into account[4]. All dimensions were then combined to obtain a measure of deprivation. An Index is available at small geographical unit-level (LSOA).

5. Availability of census data

A survey (cf Annex) was sent to each contact to establish the availability of data and the best geographical unit for the construction of EDI. Only one country did not answer to it (Lithuania). At the same time, national census institutes were contacted when more detail were considered to be useful.

A synthesis of the responses is presented in the table below describing the geographical units for which census data is available, and the number of inhabitants for all of them. Units are presented from the smallest geographical units (level 1) to the largest ones (table 2).

[2]http://www.euroreg.uw.edu.pl/dane/web_euroreg_publications_files/6547/poviats_threatened_by_deprivation_2015.pdf
[3]http://www.euroreg.uw.edu.pl/dane/web_euroreg_publications_files/6543/local_concentration_of_deprivation_in_poland_2016.pdf
[4]https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/464485/English_Indices_of_Deprivation_2015_-_Technical-Report.pdf

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Table 2: Geographical units for each country involved in WASABY

	Smallest units (level 1)			Units just higher than the smallest (level 2)			Units level 3			Units level 4			Census
	Name	**Number of unit**	**Average population (min-max)**	**Name**	**Number of unit**	**Average population (min-max)**	**Name**	**Number of unit**	**Average Population (min-max)**	**Name**	**Number of unit**	**Average population (min-max)**	
France	IRIS	50,867	1,277 (0-11,159)	Municipality	36,664	1,443 (0-1,926,595)	Department			Region			
Germany	Municipality	11,054	1,719 (9-3,469,849)										
Italy	Census section	366,863	165 (0-7,647)	Municipality	8,092	7,492 (30-2,617,000)	Province	110	551,149 (57,657-4,094,659)	Region	21	2,886,973 (127,425-9,809,298)	Exhaustive, Traditional, 10 years
Lithuania	Census block	71	Not yet available	Seniunijos	546	Not yet available	Municipalities	60	Not yet available	Apskritis	10	Not yet available	
Poland	Municipality (Gmina)	2,478	15,510 (1,302-1,764,615)	Poviat	380	101,141 (20,270-1,764,615)	Subregion	73	526,487 (189,469-1,764,615)	Voivodeship	16	2,402,097 (990,069-5,384,617)	Sample-based survey
Portugal	Census block	265,955	40 (0-1,742)	Census block group	18,074	584 (0-2,152)	Parish	4,260	2,479 (31-66,250)	Municipality	308	34,293 (1,430-547,733)	Exhaustive, Traditional, 10 years
Slovenia	Settlements	5,972	338 (1-259,896)	Polling stations for National Assembly elections	3,104	660 (30-4,516)	Municipalities	210	9,762 (316-280,140)	Administrative units	58	35,348 (8,416-347,147)	Exhaustive, Registered-based census, 3 to 4 years
Spain	Census tracts	525	3,384 (85-95,675)	Municipalities	221	3,384 (95-95,675)							
Nothern Ireland	Census Output Area	5,022	350 (100-2,100)	Small Areas	4,537	400 (98-3,072)	Super Output Areas	890	2,000 (900-4,200)	Electoral Wards	582	3,000 (700-9,500)	Exhaustive, Traditional, 10 years

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For countries like France, Portugal, Spain (even if the largest population is higher in this country), Italy, Northern Ireland and Slovenia, geographical units are in accordance with studying social inequalities. This unit must be the smallest available so as to limit ecological fallacy (Woods et al, 2006). For these countries, average population for each spatial unit are equal to 40 for Portugal, 165 for Italy, 350 for Northern Ireland, 1,277 for France and 3,384 for Spain.

For countries like Poland, the only geographical units available are those at municipality-level. Average number of inhabitants is equal to 101,141 for Poland. We expect the socioeconomic inhabitant composition in such units to be very heterogeneous but there is no alternative if census data at a smallest unit- level is missing.

For Germany, the number of inhabitants in the different municipalities is highly inhomogeneous from one federal state to another. Moreover, socioeconomic data will be obtained through different sources and may not be available for all federal states. For this reason, the construction of EDI does not seem to be relevant for this country (table 2), hence the use of a national index is recommended.
The geographical unit level used for the development of EDI is described in table 3, below. This also ensures that we proceed in line with the population data collected within WASABY WP4.

Table 3: Geographical units for EDI construction

Country	Census block	Parish level	Municipality level
France	*		
Germany		NOT RELEVANT	
Italy	*		*
Lithuania			*
Poland			*
Portugal		*	*
Slovenia	*		
Spain	*		*
Northern Ireland			*

The contact names for the development of EDI in each country are entered below:

Country	Contact	Institute
France	Ludivine Launay	Caen University
	Elodie Guillaume	Caen University
Germany	Ron Pritzkuleit	Lübeck University
Italy	Roberto Lillini	Instituto Nazionale Tumori (INT)
Lithuania	Ieva Vincerzevskiene	Lithuanian Cancer Registry
Poland	Krzysztof Czaderny	Centrum Onkologii – Instytut im. Marii Skłodowskiej-Curie
Portugal	Ana Isabel Correia Ribeiro	EPIUnit - Public Health Institute University Porto
Slovenia	Vesna Zadnik	Oncology institute in Ljubljana
Spain	Marc Saez	Girona University
	Marc Mari Dell'Olmo	Agència de Salut Pública de Barcelona
Northern Ireland	Bruna Pucci	Ulster University
	Adrian Moore	Ulster University

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6. Conclusions

Except for Lithuania for which we need a further contact to progress in our work, we have compiled the information concerning the census level data and we have identified a country for which EDI cannot be developed (Germany).

We have the information on the different level for which census data exists but we must remain vigilant about the actual availability of census data. We want to distinguish the fact that we have information about census level but we are not sure to have the access of these data for all countries. For example, in Slovenia, census data were only available on the census institute laptop.

Our work shows that in some countries (Germany, Poland) municipalities are the census data smallest unit. In such cases, we could technically develop an index at this level but we prefer to be careful about the relevance of using EDI on this level for this project. Indeed making the assumption that all individuals living in the same geographical units have the same socioeconomic level is a very high assumption. According to the ecological fallacy, it is all the more true that the unit is large (as the municipality). Moreover, heterogeneity within a unit such as the municipality is even more important in rural areas than in urban areas.

At this stage, the indicators for estimating the European Deprivation index in WASABY are:

- Number of countries for which we are sure about the EDI 2011 estimation: 5 (France, Spain, Italy, Portugal, Slovenia)
- Number of countries for which we envisage the EDI 2011 estimation: 3 (Lithuania, Poland, Northern Ireland)
- Number of countries for which we will not be able to do EDI estimation : 1 (Germany)
- Number of countries estimating EDI for the first time: 3 (Lithuania, Poland, Northern Ireland)

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Annex

WASABY - Description report on geographical area in the country

Country: _____

Contact name: _____

As you know, your country is involved in WASABY Project which aim to identify areas with higher cancer rates, so to study whether pollutant contamination may be a cause for increased cancer risk. As part of Work Package 5 (construction of the European Deprivation Index, EDI), we need some information to determine the best geographical unit to compute EDI for your country. Indeed, to limit ecological bias, EDI have to be computed at the smallest geographical area for which census data are available. This area will determine the geocoding level for registries data for each country. That is why we sent you this survey in addition to the one sent by WP4. Do not hesitate to contact people who can answer to these questions in your country or to indicate the more pertinent contact to obtain these informations.

About geographical area

For some countries, socioeconomic data could be not available in national census data but available in regional statistics as in Germany. So we need to investigate the availability in census of such information for the different geographical unit.

Can you cite the different geographical area (administrative and non-administrative) in your country (for example, district, municipality, census block…). Cite them by the smallest to the largest scale. For all of them, precise if census data are available. Provide a little description if some area are not disposable for all units (for example in Germany, administrative region does not divide all Bundesländer). If some geographical area are dependent of the number of population (or another variable), please precise it in description (for example in France, IRIS concerned only all the municipalities with more than 10,000 people, a part of the municipalities with more than 5,000 inhabitants and less than 10,000; municipalities with less than 5,000 inhabitants are not divided and are an IRIS by themselves).

For example, in France:

Geographical area	Description	Number of units	Mean	min	max	Corresponding NUTS	Availability of the census
Region						2	Yes
Department						3	Yes
Municipality		36,664	1,443	0	1, 926,595	LAU	Yes
IRIS	All municipalities with more than 10,000 inhabitants, a part of municipalities with more than 5,000 inhabitant and less than10,000; municipalities with less than 5,000 inhabitants are not divided and are an IRIS by themselves	50,867	1,277	0	11,159		Yes
Grid							Little information

1

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WASABY - Description report on geographical area in the country

			Population					
Geographical area	Description (if necessary)	Number of units (if available)	Mean (if available)	Min (if available)	Max (if available)	Corresponding NUTS* (if available)	Availability of the census	Socioeconomic indicator available

*The NUTS classification (Nomenclature of territorial units for statistics) is a hierarchical system for dividing up the economic territory of the EU: NUTS 1=major socio-economic regions, NUTS 2 = basic regions for the application of regional policies, NUTS 3: small regions for specific diagnoses. To meet the demand for statistics at a local level, Eurostat maintains a system of Local Administrative Units (LAUs) compatible with NUTS. These LAUs are the building blocks of the NUTS, and comprise the municipalities and communes of the European Union. (http://ec.europa.eu/eurostat/web/nuts/background; http://ec.europa.eu/eurostat/web/nuts/local-administrative-units).

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About census

What is the name of the institute in charge of it: _____

What is its website: _____

Is the census exhaustive?

- □ Yes
- □ No, Precise the size of the survey sample: _____

What is the type of census?

- □ Traditional
- □ Rolling
- □ Sample based administrative data based
- □ Sample-based
- □ Other (Precise:_____)

Is it conducted annually?

- □ Yes
- □ No. Please provide the specific timing:_____

Does it include socioeconomic data?

- □ Yes
- □ No. Precise, if these data are available by another mean and how: _____

Reference

If there is some reference that can complete these information, please, write it:

1. _____
2. _____
3. _____
4. _____

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