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Methodological note

European Occupational Diseases Statistics (EODS)

METHOD FOR CALCULATING THE "EU INDEX" AND THE RESULTING INDICATORS

EUROSTAT - DIRECTORATE F

UNIT F5 — EDUCATION, HEALTH, AND SOCIAL PROTECTION

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Introduction

In the context of the dissemination and publication of the EODS - European Occupational Diseases Statistics - data collected and validated for the reference years from 2013, as *Experimental Statistics*, this document is essential to describe how the main indicator, called EU INDEX, is calculated and, how its resulting indicators are defined. In terms of geographical coverage, the main indicator refers ONLY to EU (participating countries). The EU INDEX is calculated as the median of indexes and is expected to be disseminated through the 'data navigation tree' on Eurostat's dissemination database, and through the Occupational Diseases dedicated page, as part of *Experimental Statistics,* on Eurostat's website.

EU INDEX

The EU INDEX is calculated as **median of indexes.** These indexes have a fixed base, set as the year 2013, the first year in the time series considered that remains unchanged throughout the calculations. The calculation of the index is related either to the subgroups of diseases collected, classified using the ICD-10 codes[1], or for the 16 diseases (the diseases that form the short list of the EODS data collection) at 3-characters level.

EU INDEXES defined for each of the 16-diseases in the short list.

The EU INDEX is calculated by disease and year, considering that the base year is equivalent to 2013 – which will assume a value equal to 100. The first operation involved the formula (1) which concerns the calculation of the simple indexes I based on totals for a specific disease, country and year:

$$(1)\quad I_{d_i,x_j,y_k} = \left(\frac{T_{d_i,x_j,y_k}}{T_{d_i,x_j,2013}} \times 100\right) \quad where \quad i = 1,\dots,16 \qquad j = 1,\dots,n \qquad k = 2013,\dots,2016$$

T = total number of recognised cases for the i-th disease, j-th country and k-th year;

d_i = i-th disease in the short list.

x_j = j-th participating EU country carrying a value.

y_k = k-th year.

The next operation is the median of indexes calculated as (1). Considering a specific disease d_i in the short list, and a specific year y_k in the set 2013-2016, the EU INDEX is calculated as the median of countries' indexes[2], defined from the sorted distribution X of them, as follows:

$$X = (I_{d_i,x_j,y_k},\dots,I_{d_i,x_n,y_k}), \qquad where \;\; j = 1,\dots,n$$

$$(2)\quad \tilde{x}\,(X)_{d_i,y_k} = (n+1)/2, \qquad if\ n\ is\ odd$$

$$(3)\quad \tilde{x}\,(X)_{d_i,y_k} = \frac{n}{2},\left(\frac{n}{2}+1\right) \qquad if\ n\ is\ even\ (semisum\ of\ two\ terms)$$

n = the number of countries carrying an index value.

$\tilde{x}$ = the median of indexes for the i-th disease and k-th year.

The operations, illustrated above, allow the calculation of the median of indexes for each disease in the short list, thus, to obtain the evolution for each of them over the four years considered, taking into account that the reference year for comparison remains the 2013.

[1] https://icd.who.int/browse10/2010/en

[2] Switzerland (CH), Iceland (IS) are not included in the EU INDEX calculation.

Numerical example:

Table 1: Total number of cases recognised for a specific disease in the short list by year and country

C34 - Malignant neoplasm of bronchus and lung	2013	2014	2015	2016
Country 1	46	43	37	40
Country 2	139	104	80	86
Country 3	5	:	1	:
Country 4	:	:	:	1
Country 5	23	26	9	5
Country 6	49	51	60	43
Country 7	:	:	:	:
Country 8	10	8	10	6
Country 9	26	39	32	26
Country 10	1055	1013	1139	1046
Country 11	:	3	3	2
Country 12	8	15	11	11
Country 13	:	:	:	:
Country 14	306	316	259	236

Table 2: Indexes calculation, using formula (1) for the disease

C34 - Malignant neoplasm of bronchus and lung	2013	2014	2015	2016
Country 1	100	93.5	80.4	87.0
Country 2	100	74.8	57.6	61.9
Country 3	100	0.0	20.0	0.0
Country 4	100	:	:	:
Country 5	100	113.0	39.1	21.7
Country 6	100	104.1	122.4	87.8
Country 7	100	:	:	:
Country 8	100	80.0	100.0	60.0
Country 9	100	150.0	123.1	100.0
Country 10	100	96.0	108.0	99.1
Country 11	100	:	:	:
Country 12	100	187.5	137.5	137.5
Country 13	100	:	:	:
Country 14	100	103.3	84.6	77.1

Ex: $I_{C34,C1,2016} = \frac{40}{46} \times 100 = 87.0$

Table 3: The median of indexes (1) for a specific disease in the short list, using formula (3)

C34 - Malignant neoplasm of bronchus and lung	2013	2014	2015	2016
Median	100	99.6	92.3	82.0

Ex: $\tilde{x}\,(X)_{C34,2016} = (0.0, 21.7, 60.0, \ldots, 137.5)$

$\frac{n}{2} = 77.1, \left(\frac{n}{2} + 1\right) = 87$

$\tilde{x} = \frac{77.1 + 87}{2} = 82.0$

EU INDEXES defined for the groups of diseases resulting from the short list

The EU INDEX is calculated by groups of disease and year, considering that the base year is equivalent to 2013 – which will assume a value equal to 100. The first operation involved the formula (4) which concerns the calculation of the simple indexes I based on totals for a group of diseases (valid for a group of two or more diseases), country and year:

$$(4)\ I_{g_i,x_j,y_k} = \left(\frac{T_{g_i,x_j,y_k}}{T_{g_i,x_j,2013}} \times 100\right) \quad where \quad i = 1,\dots,c \quad j = 1,\dots,n \quad k = 2013,\dots,2016$$

T = total number of recognised cases for the i-th group of diseases, j-th country and k-th year;

g_i = i-th group of diseases in the short list;

x_j = j-th participating EU country carrying a value;

y_k = k-th year.

The next operation is the median of indexes calculated as (4). Considering a group of diseases g_i in the short list, and a specific year y_k in the set 2013-2016, the EU INDEX is calculated as the median of countries' indexes[3], defined from the sorted distribution X of them, as follows:

$$X = (I_{g_i,x_j,y_k}, \dots, I_{g_i,x_n,y_k}), \quad where \quad i = 1,\dots,n$$

$$(5)\ \tilde{x}\,(X)_{g_i,y_k} = (n+1)/2, \quad if\ n\ is\ odd$$

$$(6)\ \tilde{x}\,(X)_{g_i,y_k} = \frac{n}{2}, \left(\frac{n}{2}+1\right) \quad if\ n\ is\ even\ (semisum\ of\ two\ terms)$$

n = the number of countries carrying an index value;

$\tilde{x}$ = the median of indexes for a the i-th group of diseases and k-th year.

The operations, illustrated above, allow the calculation of the median of indexes for each group of diseases in the short list, thus to obtain the evolution for each of them over the four years considered, taking into account that the reference year for comparison remains the 2013.

Numerical example:

Table 1, Table 2: Total number of recognised cases for two specific diseases in the short list by year and country.

The two diseases share common characteristics related to, for example, the economic activity of the employer (NACE), the latency of the disease, and/or the exposure factor, namely the causal agent of the occupational disease.

C34 - Malignant neoplasm of bronchus and lung	2013	2014	2015	2016
Country 1	46	43	37	40
Country 2	139	104	80	86
Country 3	5	:	1	:
Country 4	:	:	:	1
Country 5	23	26	9	5
Country 6	49	51	60	43
Country 7	:	:	:	:
Country 8	10	8	10	6
Country 9	26	39	32	26
Country 10	1055	1013	1139	1046

[3] Switzerland (CH), Iceland (IS) are not included in the EU INDEX calculation.

Country 11	:	3	3	2
Country 12	8	15	11	11
Country 13	:	:	:	:
Country 14	306	316	259	236

C45 - Mesothelioma	**2013**	**2014**	**2015**	**2016**
Country 1	70	79	64	71
Country 2	285	231	238	236
Country 3	:	:	:	:
Country 4	9	17	12	20
Country 5	4	6	8	11
Country 6	105	87	104	101
Country 7	:	:	:	:
Country 8	16	15	10	8
Country 9	60	40	46	46
Country 10	405	399	393	409
Country 11	7	4	10	14
Country 12	5	5	7	:
Country 13	:	:	:	:
Country 14	600	594	591	573

Table 3: Total number of recognised cases for the two diseases considered, as a sum of the values in the Table 1 and Table 2, hypothetical group defined.

Occupational cancers (C34, C45)	**2013**	**2014**	**2015**	**2016**
Country 1	116	122	101	111
Country 2	424	335	318	322
Country 3	5	0	1	0
Country 4	9	17	12	21
Country 5	27	32	17	16
Country 6	154	138	164	144
Country 7	:	:	:	:
Country 8	26	23	20	14
Country 9	86	79	78	72
Country 10	1460	1412	1532	1455
Country 11	7	7	13	16
Country 12	13	20	18	11
Country 13	:	:	:	:
Country 14	906	910	850	809

Ex: $71 + 40 = 111$

Ex: $I_{OccCancers,C1,2016} = \frac{111}{116} \times 100 = 95.7$

Table 4: Indexes calculation, using formula (4)

Occupational cancers (C34, C45)	2013	2014	2015	2016
Country 1	100	105.2	87.1	95.7
Country 2	100	79.0	75.0	75.9
Country 3	100	0.0	20.0	0.0
Country 4	100	188.9	133.3	233.3
Country 5	100	118.5	63.0	59.3
Country 6	100	89.6	106.5	93.5
Country 7	:	:	:	:
Country 8	100	88.5	76.9	53.8
Country 9	100	91.9	90.7	83.7
Country 10	100	96.7	104.9	99.7
Country 11	100	100.0	185.7	228.6
Country 12	100	153.8	138.5	84.6
Country 13	:	:	:	:
Country 14	100	100.4	93.8	89.3

Table 5: The median of indexes (4) for a group of diseases in the short list, using formula (6)

Occupational cancers (C34, C45)	2013	2014	2015	2016
Median	100	98.4	92.3	87.0

Ex: $\tilde{x}\ (X)_{OccCancers,2016} = (0.0, 53.8, 59.3, \dots, 233.3)$

$\frac{n}{2} = 84.6, \left(\frac{n}{2} + 1\right) = 89.3 \quad \tilde{x} = \frac{84.6+89.3}{2} = 87.0$

NOTE

EU INDEX is calculated for the diseases in the EODS short list and their selected groups, by year. EU INDEX is a median of country indexes. The variations of the absolute numbers do not have a direct impact on the median values and implicitly of EU INDEX.

EUROPEAN OCCUPATIONAL DISEASES STATISTICS (EODS) –SHORT LIST

ICD-3	ICD-4	Labels
C34		**Malignant neoplasm of bronchus and lung**
	C340	Main bronchus
	C341	Upper lobe, bronchus or lung
	C342	Middle lobe, bronchus or lung
	C343	Lower lobe, bronchus or lung
	C348	Overlapping lesion of bronchus and lung
	C349	Bronchus or lung, unspecified
	C34X	Malignant neoplasm of bronchus and lung (specific usage for reporting reasons)
C45		**Mesothelioma**
	C450	Mesothelioma of pleura
	C451	Mesothelioma of peritoneum
	C452	Mesothelioma of pericardium
	C457	Mesothelioma of other sites
	C459	Mesothelioma, unspecified
	C45X	Mesothelioma (specific usage for reporting reasons)
G56		**Mononeuropathies of upper limb**
	G560	Carpal tunnel syndrome
	G561	Other lesions of median nerve
	G562	Lesion of ulnar nerve
	G563	Lesion of radial nerve
	G564	Causalgia
	G568	Other mononeuropathies of upper limb
	G569	Mononeuropathy of upper limb, unspecified
H83		**Other diseases of inner ear**
	H830	Labyrinthitis
	H833	Noise effects on inner ear
	H838	Other specified diseases of inner ear
	H839	Disease of inner ear, unspecified
I73		**Other peripheral vascular diseases**
	I730	Raynaud syndrome
	I731	Thromboangiitis obliterans [Buerger]
	I738	Other specified peripheral vascular diseases
	I739	Peripheral vascular disease, unspecified
J45		**Asthma**
	J450	Predominantly allergic asthma
	J451	Nonallergic asthma
	J458	Mixed asthma
	J459	Asthma, unspecified
	J45X	Asthma (specific usage for reporting reasons)
J61		**Pneumoconiosis due to asbestos and other mineral fibres**
	J61Z	Pneumoconiosis due to asbestos and other mineral fibres (code for reporting cases)
J62		**Pneumoconiosis due to dust containing silica**
	J620	Pneumoconiosis due to talc dust
	J628	Pneumoconiosis due to other dust containing silica
	J62X	Pneumoconiosis due to dust containing silica (specific usage for reporting reasons)
J92		**Pleural plaque**
	J920	Pleural plaque with presence of asbestos
	J929	Pleural plaque without asbestos
	J92X	Pleural plaque (specific usage for reporting reasons)
L23		**Allergic contact dermatitis**
	L230	Allergic contact dermatitis due to metals
	L231	Allergic contact dermatitis due to adhesives
	L232	Allergic contact dermatitis due to cosmetics
	L233	Allergic contact dermatitis due to drugs in contact with skin
	L234	Allergic contact dermatitis due to dyes
	L235	Allergic contact dermatitis due to other chemical products

L236	Allergic contact dermatitis due to food in contact with skin
L237	Allergic contact dermatitis due to plants, except food
L238	Allergic contact dermatitis due to other agents
L239	Allergic contact dermatitis, unspecified cause
L23X	Allergic contact dermatitis (specific usage for reporting reasons)