



III SIMPOSIO DE HIGIENE INDUSTRIAL

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CARCINOGENIC, MUTAGENIC AND REPROTOXIC AGENTS

RESULTS OF THE WORKERS' EXPOSURE SURVEY(WES) ON CANCER RISK FACTORS IN SIX EUROPEAN COUNTRIES

NADIA VILAHUR/ EUROPEAN AGENCY FOR SAFETY AND HEALTH AT WORK (EU-OSHA)

The WES survey in short

- **Telephone survey** including 24,402 workers in six EU Member States: Finland, France, Germany, Hungary, Ireland and Spain.
- **Based on Australian Workplace Exposure Study (AWES)**, the respondents replied to questions focusing on their daily tasks and tailored to their current job, **during the last working week**.
- **WES gathers information both on circumstances** that may lead to an exposure, and on the **presence of protective measures**. WES covers all sectors of occupation*, and includes workers often omitted from other approaches, e.g. self-employed, workers in micro enterprises.
- **Expert assessment of exposure to 24 cancer risk factors using a web-based application** to estimate occupational exposures (OccIDEAS, www.occideas.org)

* except private households, extraterritorial organisations and armed forces

Cancer risk factors covered in WES

- Including industrial chemicals, inorganic and organic dusts, metals, oils, products of combustion, solvents, and radiation

Table 1: List of cancer risk factors considered in WES

1,3-butadiene	Acrylamide	Arsenic	Asbestos	Benzene	Cadmium
Chromium VI	Cobalt	Diesel engine exhaust emissions	Diethyl/dimethyl sulphate	Epichlorohydrin	Ethylene oxide
Formaldehyde	Lead and inorganic compounds	Leather dust	Mineral oils (as mists)	Nickel	Ortho-toluidine
Ionising radiation	Artificial ultraviolet radiation (including ocular UV)	Solar ultraviolet radiation (including ocular UV)	Respirable crystalline silica	Trichloroethylene	Wood dust

Exposure assessment – how it works



OccIDEAS - an application to **assess occupational exposure** in 3 steps:

- 1. Determine worker's job category**
- 2. Asking a set of detailed questions (respondent specific)** about tasks related to the job category, including information on prevention measures
- 3. Automatic assessment of exposure** to selected risks for each respondent, the overall highest exposure to a given agent is considered

Exposure assessment – how it works (II)

- **WES estimates probability of exposure to 24 preselected cancer risk factors as:** no exposure, possible exposure and probable exposure
- **PROBABLE exposure** divided in three categories (semi-quantitative assessment)
 - Probable exposure at a high level – exposure at or around the OEL;
 - Probable exposure at a medium level – exposure between about 10% and 80% of the OEL;
 - Probable exposure at a low level – exposure that is higher than the general community, but less than about 10% of the OEL.
- When exposure to a risk factor occurs via different tasks: **the overall higher exposure level is considered for the worker**

Adaptation of the survey to the EU context

➤ New wording or exposure rules for:

- Benzene
- Lead and inorganic compounds
- Ionising radiation
- Mineral oils
- Asbestos removal
- Many others!



➤ New or adapted modules on:

- Chemical and pharmaceutical industry
- Nuclear energy and waste management
- Removal of asbestos

➤ Harmonized survey approach on preventive/ protective measures

Workplace Ventilation

How was the area where you carried out {work task} ventilated?

- By local exhaust ventilation which captured the vapour, dust, fume at the emission point.
- By on-tool extraction to remove dust and fumes away from your face.
- By a general ventilation system.
- By fans in the window or doorway.
- By open doors or windows.
- No ventilation was applied to the area.
- Other, please specify.
- Don't know.

Respiratory Protection

In the last working week, did you use respiratory protection?

- Yes.
- No.
- Don't know.

If yes: What types of respiratory protective equipment (RPE) did you use?

- Rubber face mask fitted with a particle/vapour filter or a cartridge.
- Powered Air Purifying Respirator (PAPR).
- Air-supplied respirator or SCBA (self-contained breathing apparatus).
- A filtering face piece mask or dust mask (called an FFP).
- Other, please specify.
- Don't know.

WES publications – methodology



 **OSHWiki featured articles**

Occupational cancer risk factors in Europe – methodology of the Workers' Exposure Survey

Nadia Vilahur EU-OSHA , Marine Cavet EU-OSHA , Xabier Irastorza EU-OSHA , Elke Schneider EU-OSHA
Why EU-OSHA conducted this surveyThe European Agency for Safety and Health at Work (EU-OSHA) has conducted a large worker survey, the Workers' Exposure Survey on cancer risk factors in Europe (WES), in six EU Member States: Germany, Ireland, Spain, France, Hungary and Finland.This survey is the first of its kind in Europe, and it provides information on probable exposure of workers during the last working week to several known cancer risk factors, both chemical and physical. Detailed information on the specific circumstances of exposure across jobs and the preventive and protective measures applied at work (including personal protective....

[Read full OSHwiki article](#)  

Files

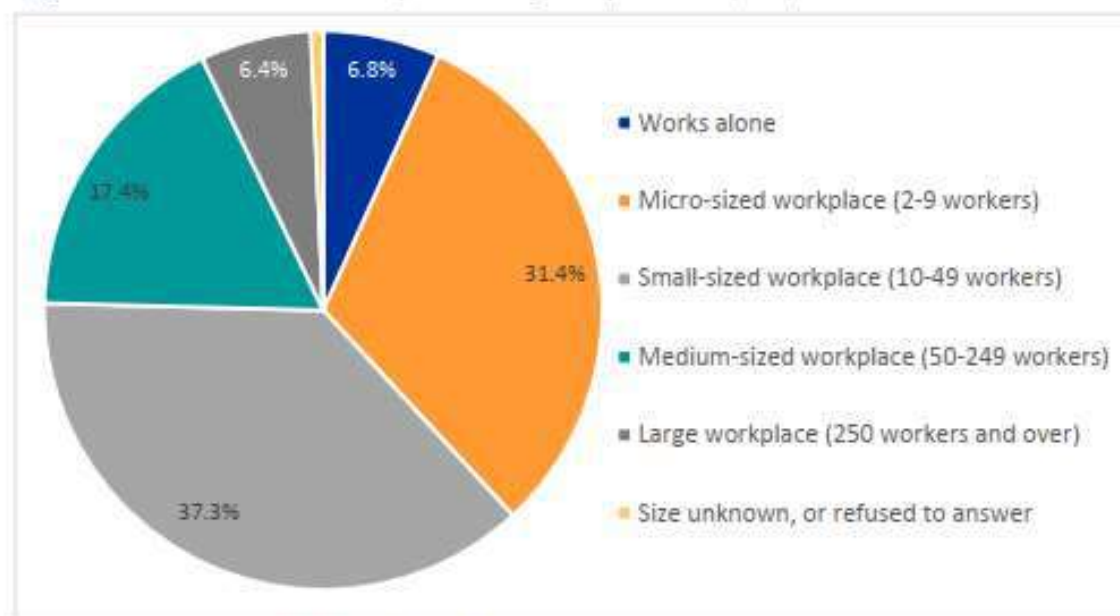
-  Criteria for the inclusion of cancer risk factors in the Workers' Exposure Survey on cancer risk factors in Europe
-  Bibliography for the Workers' Exposure Survey on cancer risk factors in Europe

Demographics – respondents' profile

Age category	Share of WES respondents
15-24 years old	4.4%
25-34 years old	21.9%
35-44 years old	29.6%
45-54 years old	28.4%
55-64 years old	14.6%
65 years old or over	1.1%
Total	100.0%

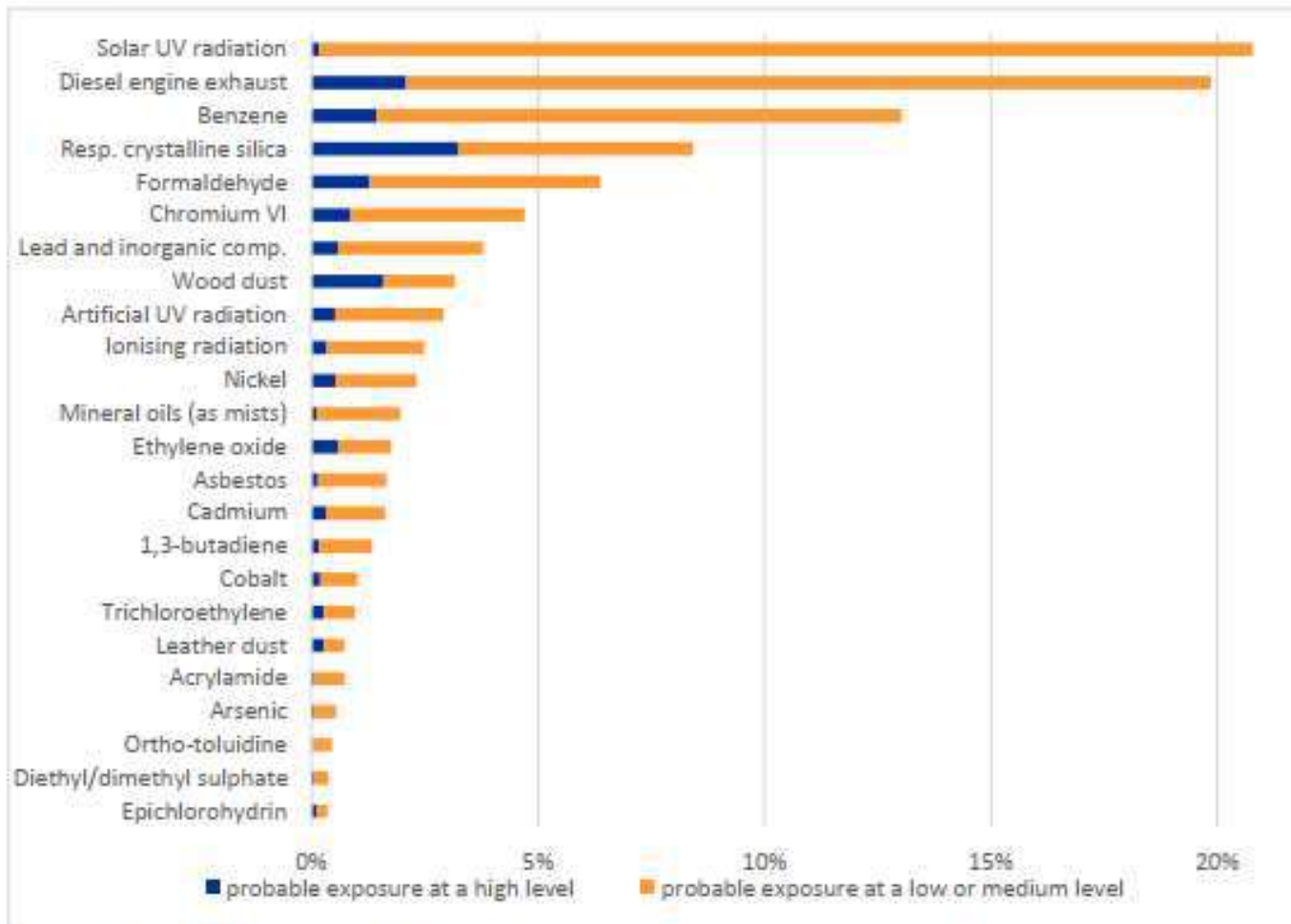
- **Gender:** male (61.7%) / female (38.1 %)
- **Also:** NACE and ISCO 3-digit, type of contract, employment status, country of birth

Figure 6: Distribution of WES respondents by workplace size (in %)



Base: all workers surveyed in the six countries, WES 2023, EU-OSHA.

Most frequent exposures



Base: all workers in the six countries, WES 2023, EU-OSHA.

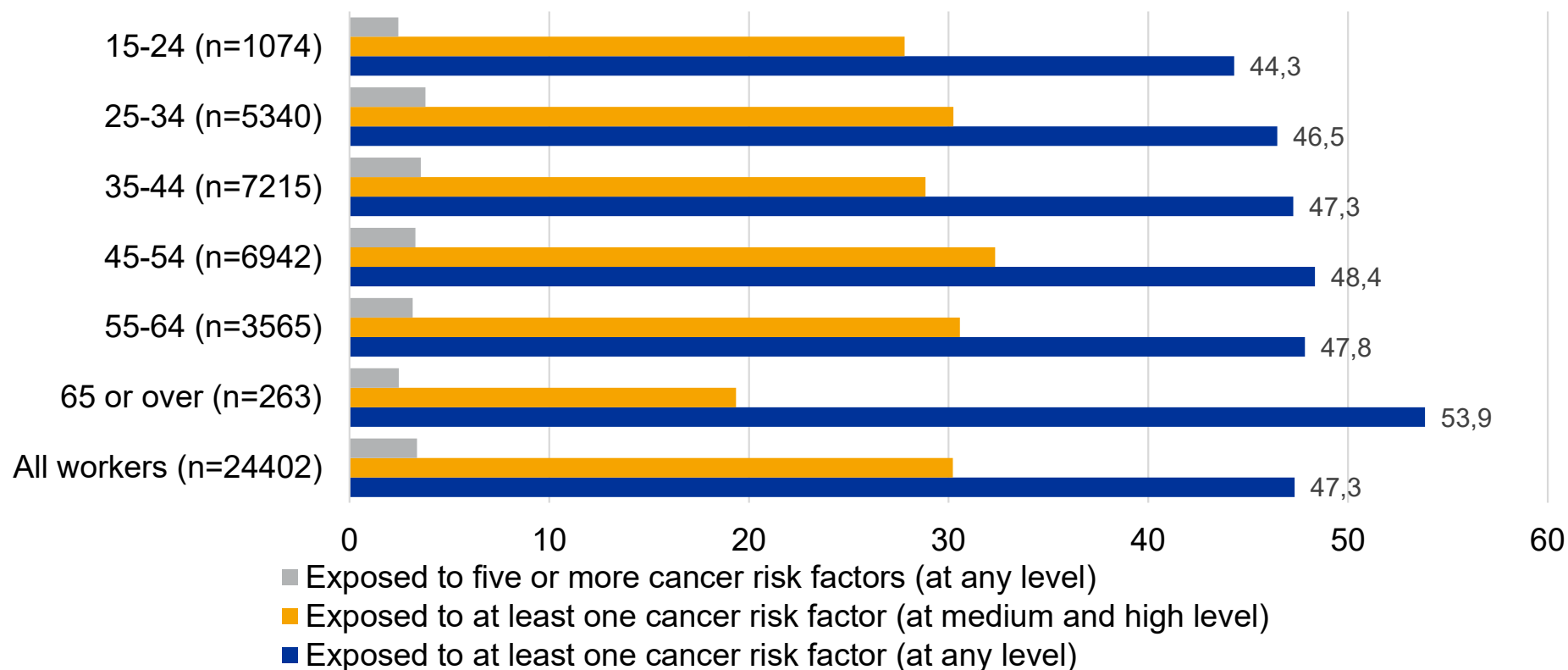
Proportion of workers exposed by gender

The 10 most common cancer risk factors at any level

	MALE (N=15068)		FEMALE (N=9298)	
	Exposure to at least one (out of 24)	56.5%	Exposure to at least one (out of 24)	36.3%
1	Solar UV radiation (including ocular exposure)	26.4%	Solar UV radiation (including ocular exposure)	13.8%
2	Diesel engine exhaust emissions	26.1%	Diesel engine exhaust emissions	12.3%
3	Benzene	15.8%	Benzene	9.0%
4	Respirable crystalline silica	12.2%	Formaldehyde	5.7%
5	Hexavalent chromium	7.1%	Respirable crystalline silica	4.0%
6	Formaldehyde	6.7%	Ionising radiation	2.5%
7	Lead and inorganic compounds	5.5%	Artificial UV radiation (including ocular exposure)	2.0%
8	Wood Dust	4.5%	Hexavalent chromium	1.9%
9	Artificial UV radiation (including ocular exposure)	3.7%	Lead and inorganic compounds	1.7%
10	Nickel	3.2%	Ethylene oxide	1.6%

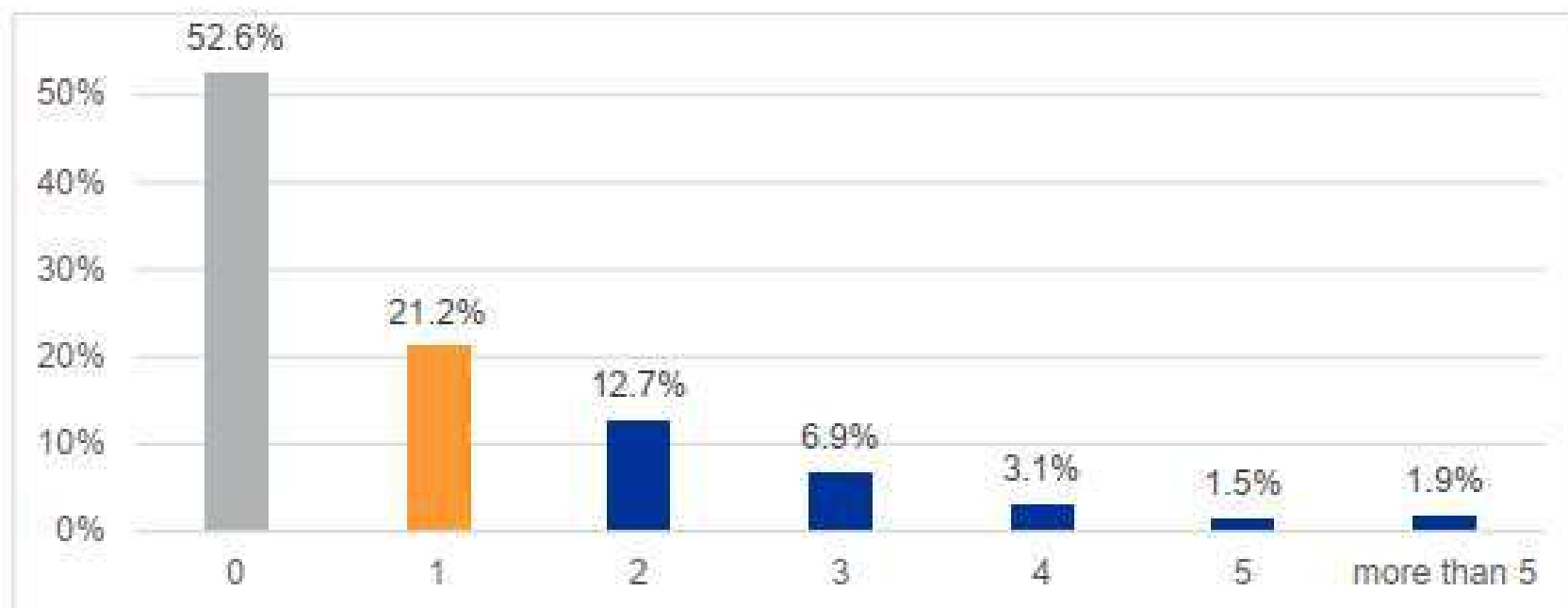
Proportion of workers exposed by age category

Occupational exposure to one or more of the 24 cancer risk factors, by age group



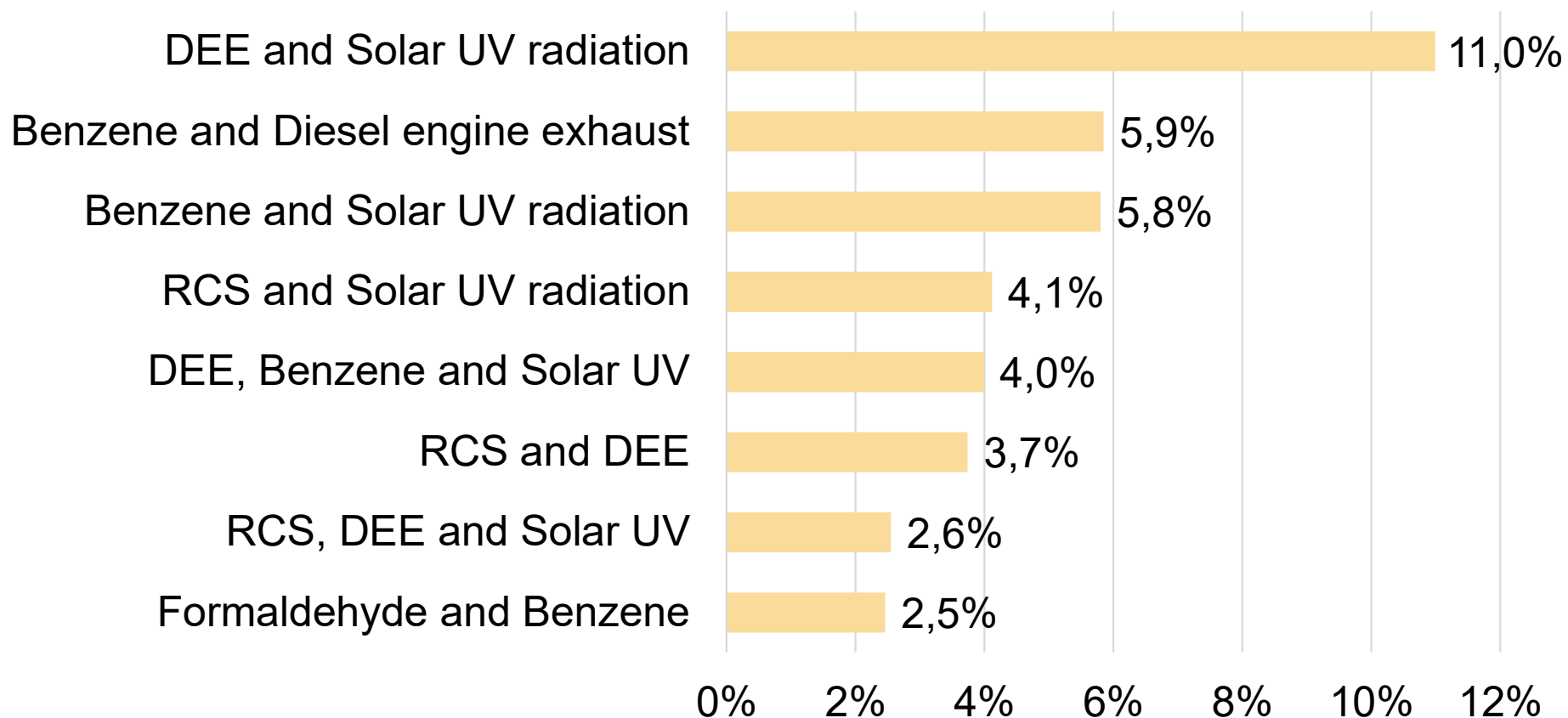
Multiple exposures in the last working week

Figure 2: Distribution of workers by number of probable exposures to the 24 selected cancer risk factors (% of all workers)

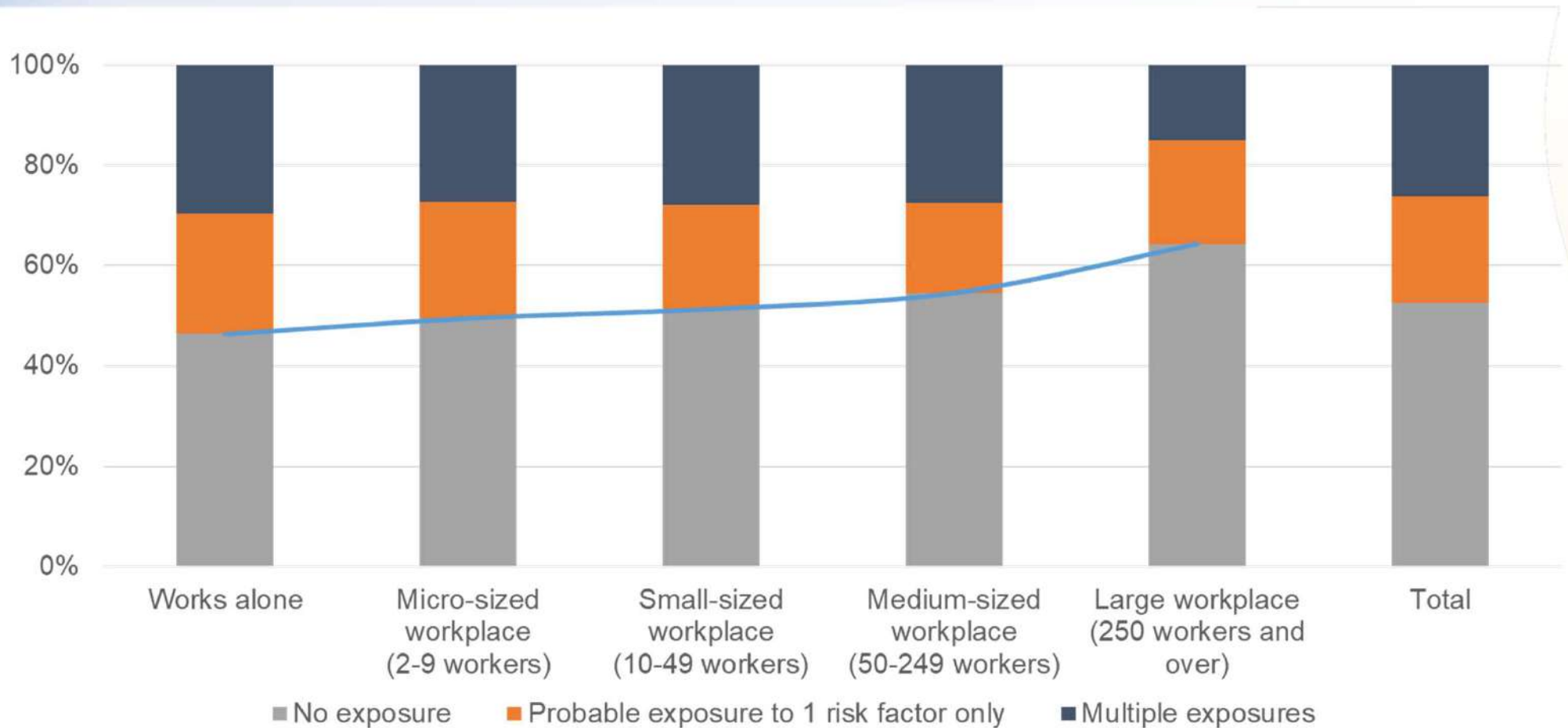


Base: all workers in the six countries, WES 2023, EU-OSHA.

The most common multiple exposures

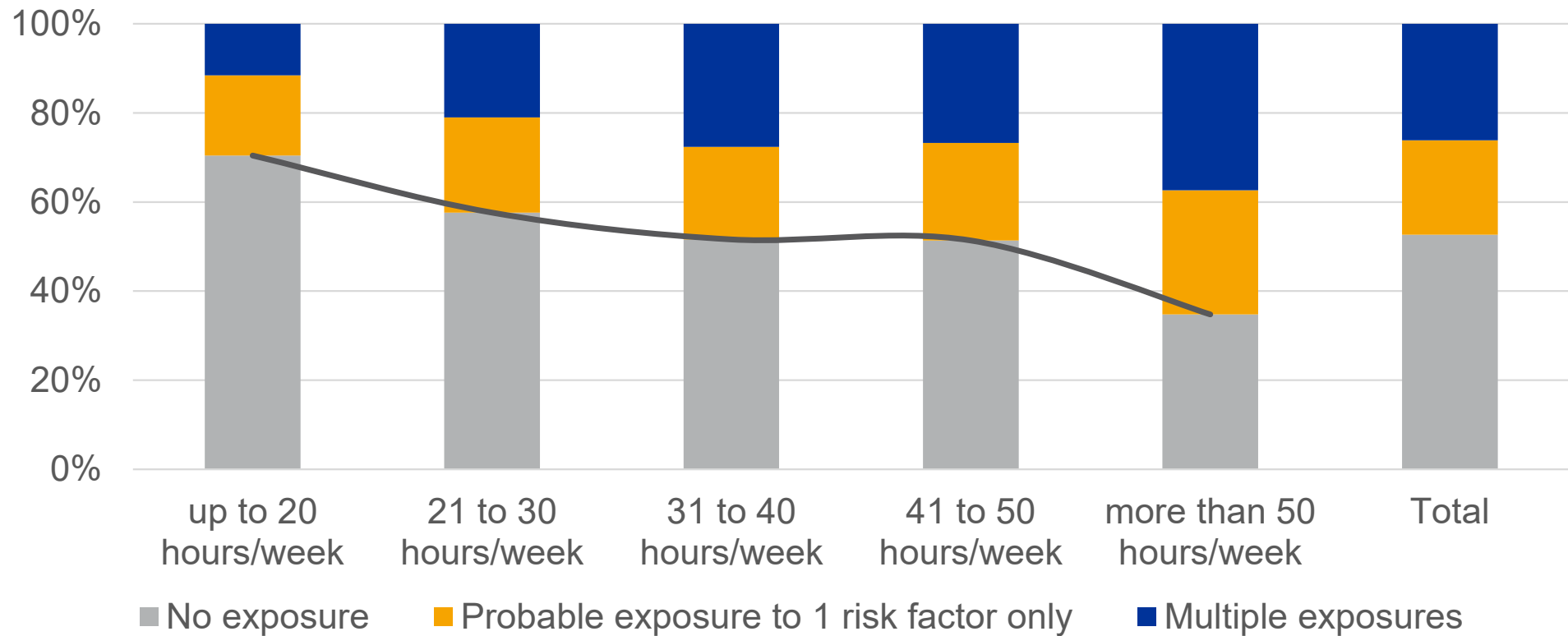


Exposure and workplace size



Base: all workers in the six countries, WES 2023, EU-OSHA.

Exposure and working conditions: weekly working hours



Base: all workers in the six countries, WES 2023, EU-OSHA.

Solar UV radiation

- Probable exposure in 20.8% of workers
- Outdoor workers
 - Construction trade workers
 - Farm workers
 - Drivers and transport workers
 - Protective service workers



Mark Stebnicki, pexels.com

Exposure circumstances*	ANY LEVEL	100%		
		LOW	MEDIUM	HIGH
Working outside during the day in the open	63.0%	16.5%	82.5%	1.1%
Working with or near reflective surfaces (sand, glass, roofing iron, water, concrete or cement, plastic, snow)	40.4%	26.6%	71.5%	1.8%
<i>Including: working with or near snow</i>	1.0%	0.0%	28.6%	71.4%
Working outside during the day under partial shade at least 1 hour/day	31.9%	31.4%	68.1%	0.5%
Working outside during the day in a vehicle with the windows down at least 1 hour/day	22.9%	32.0%	67.7%	0.3%



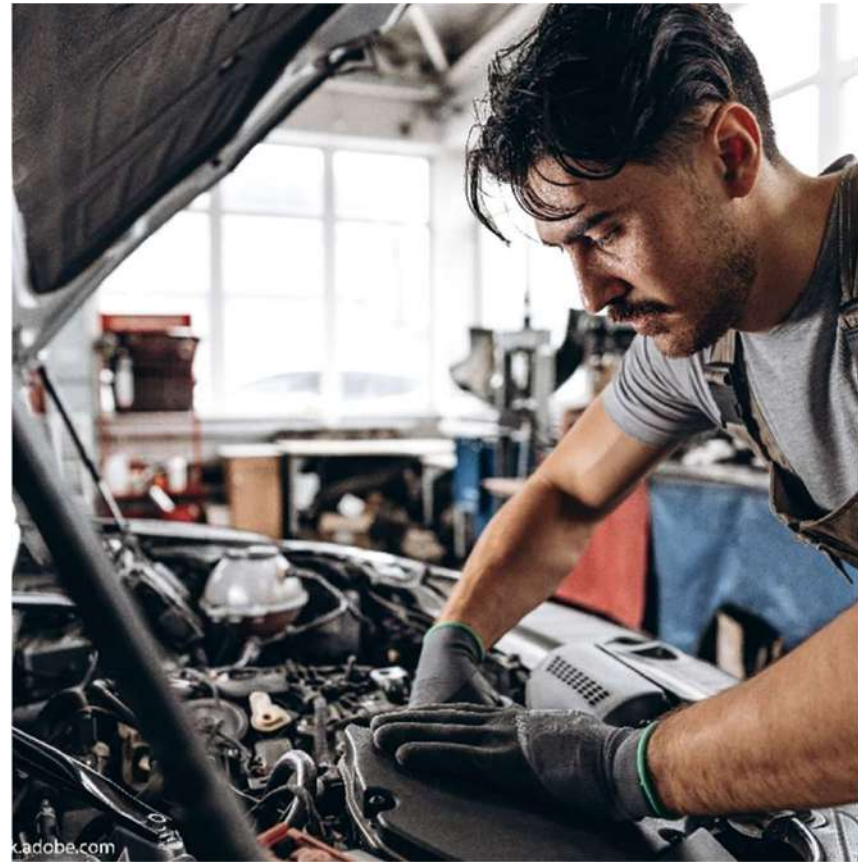
Fotofabrika, stock.adobe.com

Protection measures – exposure to solar UVR

Exposure circumstances*	Use of eye protection (wearing sunglasses)	Wearing clothing that covered most of your body (i.e., trousers and shirts or t-shirts with sleeves)	Wearing sunscreen	Wearing a hat or other sun protection head cover
Working outside during the day in the open	21.6%	86.9%	13.3%	49.4%
Working with or near reflective surfaces (sand, glass, roofing iron, water, concrete or cement, plastic, snow)	38.1%	NA	NA	NA
<i>Including: working with or near snow</i>	28.6%	NA	NA	NA
Working outside during the day under partial shade at least 1 hour/day	29.1%	88.7%	14.5%	44.2%
Working outside during the day in a vehicle with the windows down at least 1 hour/day	45.8%	88.1%	10.6%	NA

Diesel engine exhaust emissions

- **Probable exposure in 20% of workers**
- **Most of them at a low level**
- **Exposed workers**
 - Petrol and gas station workers
 - Mine and quarry workers
 - Road construction and maintenance workers
 - Drivers and transport workers
- **Exposure at a high level**
 - Driving diesel vehicles as part of the work inside a building (or in a mine)
 - Not using appropriate protection measures when maintaining a diesel vehicle



Hedgehog94, stock. adobe.com

Diesel engine exhaust emissions: circumstances

Exposure circumstances*	ANY LEVEL	LOW	MEDIUM	HIGH
Driving, maintaining or travelling in diesel-powered vehicle	70,70%	63,50%	23,50%	12,90%
<i>including:</i>				
<i>Driving inside a building a diesel-powered vehicle (as part of work)</i>	5,20%	0,00%	0,00%	100,00%
<i>Performing any maintenance work on diesel-powered vehicles</i>	11,10%	29,20%	39,50%	31,20%
<i>including: Tune ups, exhaust pipe work, or engine overhauls on diesel-powered vehicles</i>	4,30%	0,00%	37,60%	62,40%
Using or repairing any diesel-fuelled equipment	2,20%	0,00%	85,40%	14,60%
Working in an area with diesel-powered generators or other type of non-portable generator running	3,50%	40,40%	52,70%	6,90%
Working on a diesel-powered ship/boat	2,90%	73,60%	22,80%	3,60%
<i>including: Working in the engine room of a diesel-powered ship/boat</i>	0,60%	0,00%	83,80%	16,20%
Working in an area with diesel-powered vehicles running	39,80%	45,00%	44,30%	10,70%
Working in a mine or a quarry (but in offices)	1,30%	51,30%	30,30%	18,40%
<i>including: Working at the shaft or in the passageways used to transport the ore to the surface</i>	0,20%	0,00%	0,00%	100,00%
Working in a full-service petrol station (worker fills up the vehicles for the customer)	5,90%	0,00%	98,00%	2,00%
Working in a self-service petrol station (customers fill up their own vehicles)	2,70%	4,60%	94,40%	1,00%
Working around diesel-powered trains	2,80%	87,20%	9,50%	3,40%
<i>including: Working at the train repair facility indoors, around diesel-powered trains</i>	0,20%	-	-	-
Road paving and/or sealing	1,70%	0,00%	0,00%	100,00%

* workers can be exposed to diesel engine exhaust emissions through multiple tasks in the same working week.

Diesel engine exhaust emissions: protection measures

Exposure circumstances	Use of local exhaust ventilation or on-tool extraction	hose attached to the exhaust pipe of the vehicle to lead the exhaust fumes outside	Use of general ventilation system	More than 20 meters away from the generator/vehicle running	None of the protection measures listed before
Performing any maintenance work on diesel-powered vehicles	15,6%	NA	24,0%	NA	67,0%
<i>including: Tune ups, exhaust pipe work, or engine overhauls on diesel-powered vehicles</i>	18,2%	45,2%	29,1%	NA	40,6%
Using or repairing any diesel-fuelled equipment	7,9%	NA	14,0%	NA	81,1%
Working in an area with diesel-powered generators or other type of non-portable generators running	14,4%	NA	20,8%	44,8%	39,1%
Working in the engine room of a diesel-powered ship/boat	11,8%	NA	62,8%	NA	33,1%
Working in an area with diesel-powered vehicles running	6,4%	NA	9,2%	38,5%	50,5%

Benzene

- **Probable exposure in 12.8% of workers**
- **Exposed workers**
 - Petrol and gas station workers
 - Road construction and maintenance workers
 - Firefighters
- **Exposure circumstances**
 - fuelling vehicles with petrol as part of the work
 - performing maintenance work on vehicles using petrol
 - working near petrol-powered vehicles with their engine running



Maza Killah, stock.adobe.com

WES publications – first findings

A look at the survey's initial findings

The first results of WES identified **solar ultraviolet (UV) radiation, diesel engine exhaust emissions, benzene, respirable crystalline silica (RCS) and formaldehyde** as the most frequent probable occupational exposures among the 24 cancer risk factors analysed.

The survey also provides information on workers having multiple exposures during their last working week, meaning exposure to at least two cancer risk factors, which do not necessarily occur at the same time or through the same work process. The data shows that more than 60% of the workers in mining and quarrying activities and in construction activities had multiple exposures. The survey detected that workers in a micro or small-sized workplace (with fewer than 50 employees) were 1.3 times more likely to be exposed to one or more cancer risk factors than those working in medium or large companies. EU-OSHA has also analysed data on the different circumstances of exposure to each risk factor.

WES was conducted by trained local interviewers between September 2022 and February 2023 using CATI (Computer Assisted Telephone Interview). After completion of the fieldwork and quality control stages, **24,402 valid interviews** were made available for analysis. The survey population includes individuals aged 15 years or more, working in all sectors of economic activity in the six EU Member States mentioned. The study includes self-employed individuals and employees in organisations of all sizes. The questions were translated from English into the respective national languages.



Agencia Europea para la Seguridad y la Salud en el Trabajo

Factores de riesgo de cáncer en el ámbito laboral en Europa – primeras conclusiones de la Encuesta sobre la exposición de las personas trabajadoras

Európai Biztonsági és Egészségvédelmi Ügynökség



A foglalkozási eredetű rákkeltő kockázati tényezők Európában – a munkavállalók expozíciójának felmérése
Előzetes eredmények



Europäische Agentur für Sicherheit und Gesundheitsschutz am Arbeitsplatz

Arbeitsbedingte Krebsrisikofaktoren in Europa – erste Ergebnisse der Erhebung zur Exposition von Arbeitnehmern



Euroopan Työterveys- ja Yhtenäisyyshankinta

Työperäiset syövän riskitekijät Euroopassa – työntekijöiden altistumista koskevan kyselytutkimuksen ensimmäiset tulokset

Facteurs de risque de cancer professionnel en Europe: premières conclusions de l'enquête sur l'exposition des travailleurs



Conclusions and future steps

WES should contribute to:

- Increase awareness of exposure to cancer risks at the workplace
- Understand where the exposures may occur (sectors, tasks, circumstances)
- Support prevention and risk management of workplace carcinogens across the EU, inform OSH policy

Next steps:

- Detailed findings of WES results publication
- Specific focus: sectors
- Comparison with existing EU data sources
- Publish WES dataset and questionnaire (public data repository: GESIS)

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 - France: ALCIMED
 - Germany: Federal Institute for Occupational Safety and Health (BAuA)
 - Hungary: National Public Health Centre (NKK)
 - Ireland: Irish Occupational Hygiene Consultants (IOHC)
 - Spain: Barcelona Institute for Global Health (ISGlobal)
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THANK YOU!



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<https://osha.europa.eu/en/facts-and-figures/workers-exposure-survey-cancer-risk-factors-europe>