Schweizerische Eidgenossenschaft
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Département fédéral de l'intérieur DFI
Office fédéral de la santé publique OFSP

Phase pilote de l'étude suisse sur la santé

Résultats de biosurveillance humaine (HBM)

[redacted], Natalie von Götz / OFSP

Teneurs en substances per- et polyfluoroalkylées PFAS

mesurées dans les échantillons de sérum sanguin

[redacted] Natalie von Götz / OFSP

Teneurs en PFAS

mesurées dans les échantillons de sérum sanguin

Substances avec taux de détection >50%

Concentrations sériques en PFAS [ng/mL] du collectif de SHeS phase pilote (n=778)

Substance	Acronyme (en anglais)	CAS-Nr.	Taux de détection* *[%]*	Moyenne arith. *[ng/mL]*	Médiane *[ng/mL]*	P95 *[ng/mL]*
Acide perfluoro-octanoïque	PFOA	335-67-1	100	1,5	1,3	3,2
Acide perfluoro-nonanoïque	PFNA	375-95-1	99,6	0,5	0,4	0,9
Acide perfluoro-decanoïque	PFDA	335-76-2	90,9	0,3	0,2	0,7
Acide perfluoro-undecanoïque	PFUnDA	2058-94-8	51,2	0,1	0,1	0,3
Acide perfluorohexane sulfonique	PFHxS	355-46-4	100	1,4	1,2	2,5
Acide perfluoroheptane sulfonique	PFHpS	375-92-8	87,9	0,2	0,2	0,5
Acide perfluorooctane sulfonique (linéaire + ramifié)	Somme PFOS	n.a.	100	7,8	6,1	18,8

**Limite de quantification: 0,1 ng/mL*

Pour moi. Pour tous.
Étude suisse sur la santé

Soutenu par l'Office fédéral de la santé publique (OFSP)

PFOA

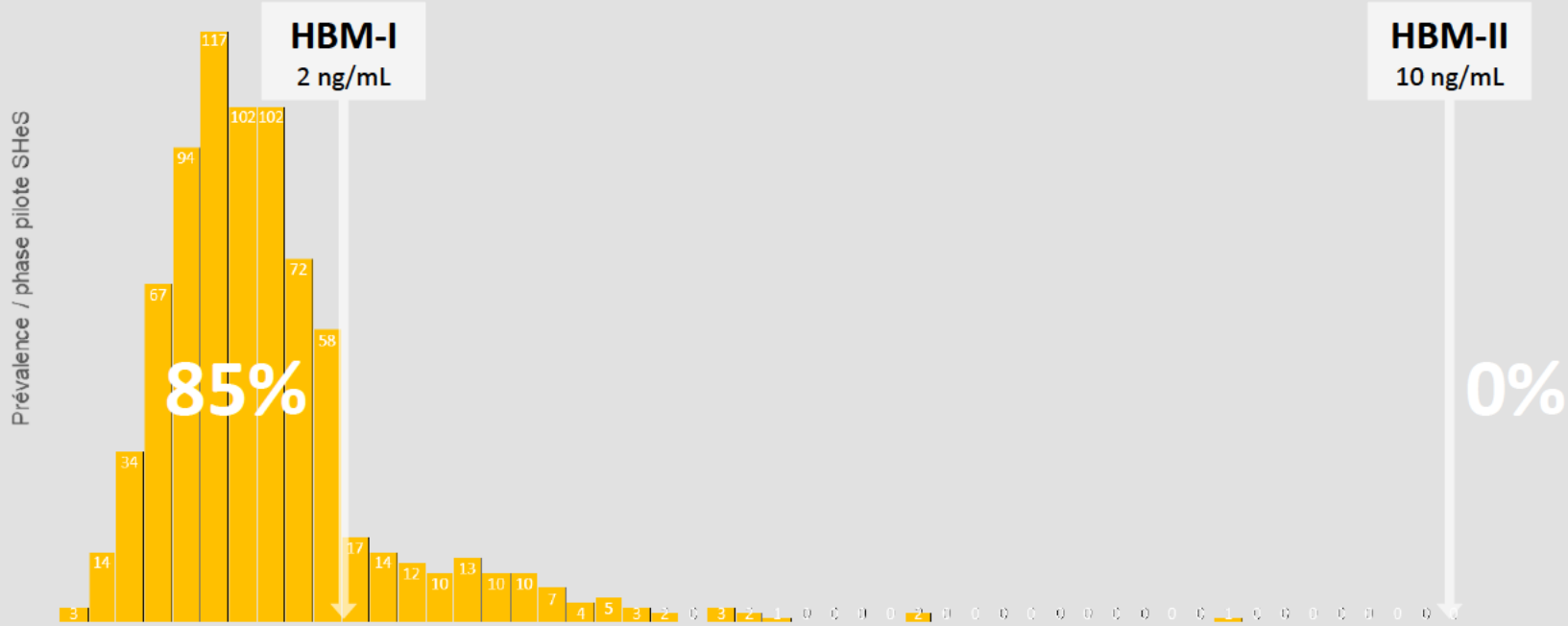
acide perfluoro-octanoïque

Concentrations sériques en PFOA [ng/mL] du collectif de SHeS phase pilote (n=778)

Comparaison aux valeurs seuils fixées par l'UBA (Umweltbundesamt DE)

HBM-I : valeur d'alerte

HBM-II : valeur seuil des effets potentiels sur la santé



PFOS

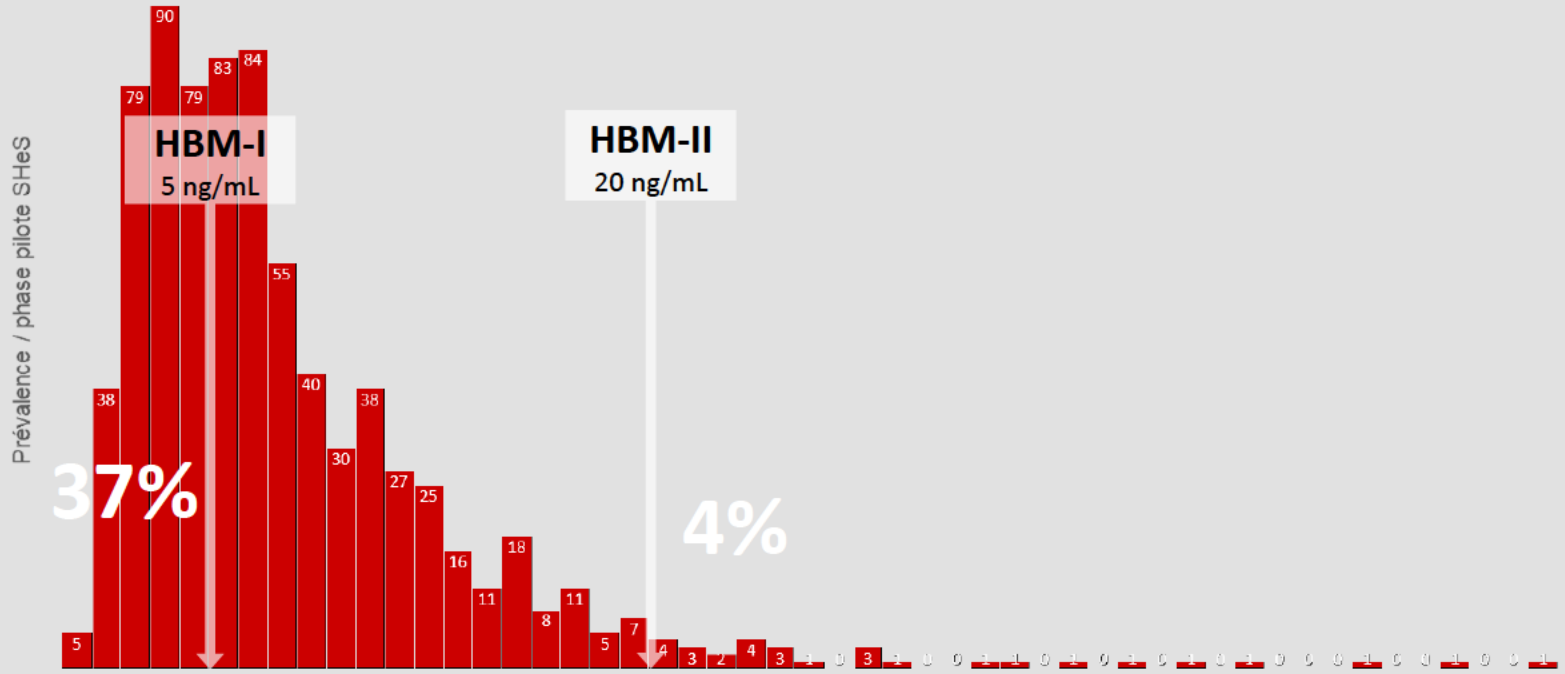
acide perfluorooctane sulfonique

Concentrations sériques en PFOS [ng/mL] du collectif de SHeS phase pilote (n=778)

Comparaison aux valeurs seuils fixées par l'UBA (Umweltbundesamt DE)

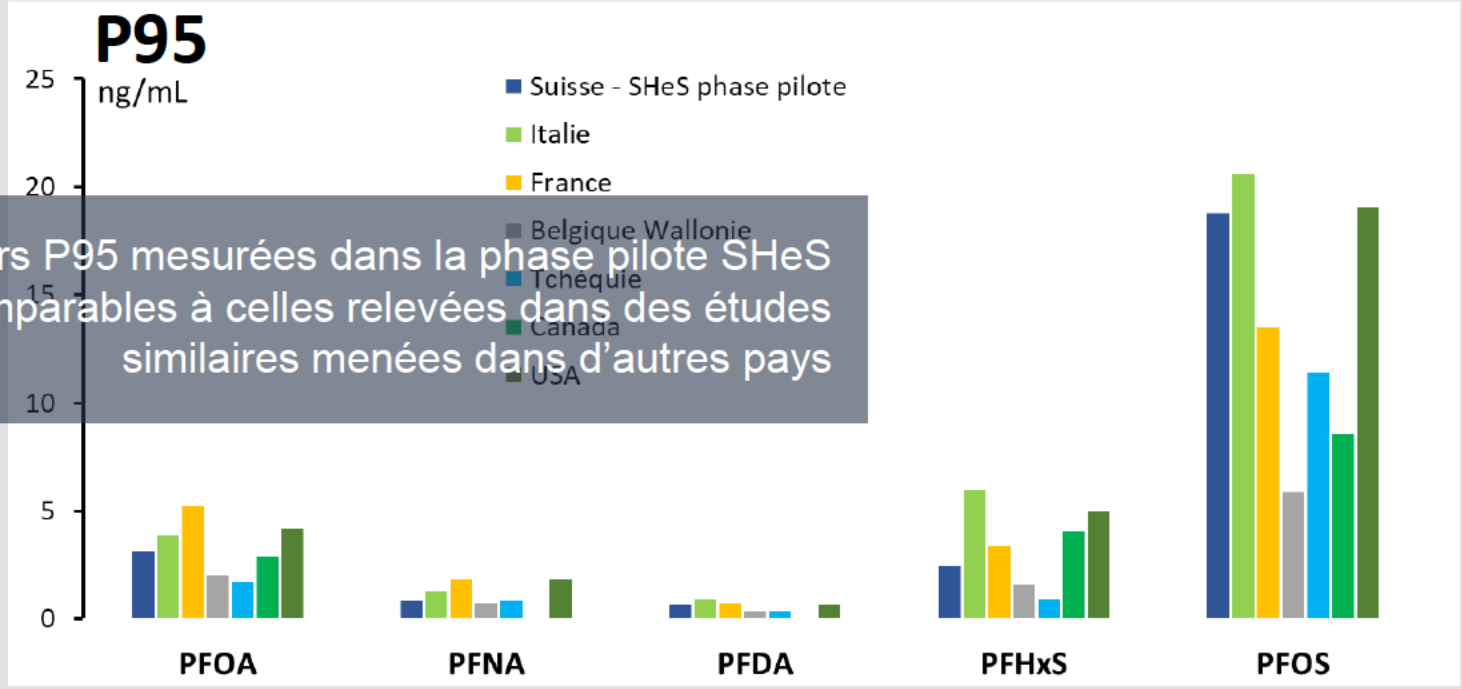
HBM-I : valeur d'alerte

HBM-II : valeur seuil des effets potentiels sur la santé



Teneurs en PFAS

valeurs des autres pays à titre de comparaison



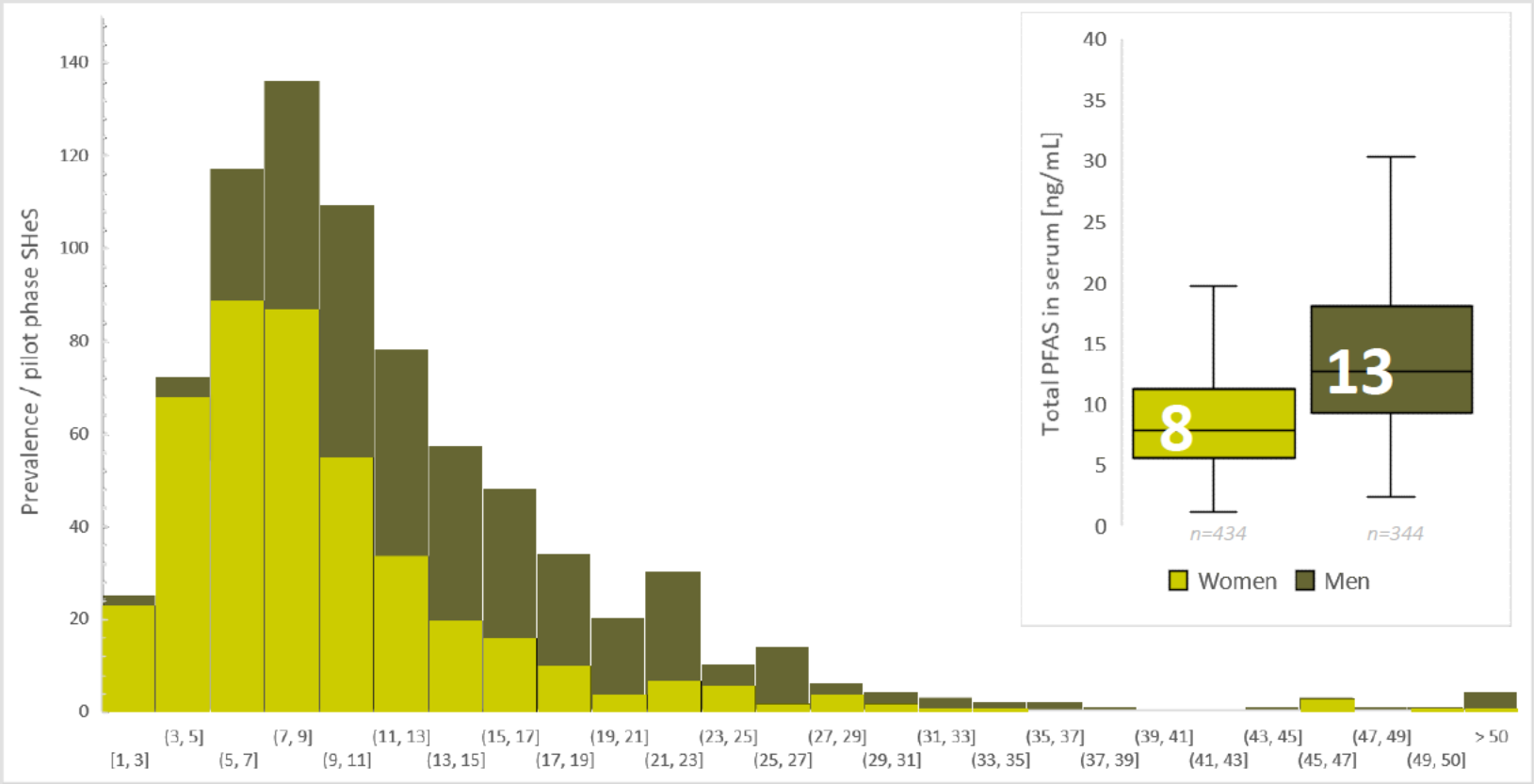
Les valeurs P95 mesurées dans la phase pilote SHeS sont comparables à celles relevées dans des études similaires menées dans d'autres pays

Le 95e percentile ou P95 indique des niveaux d'exposition élevés (seuls 5 % des échantillons analysés étant à des niveaux supérieurs)

Teneurs totales en PFAS

selon aspects démographiques

Concentrations totales en PFAS [ng/ml] mesurées auprès du collectif de la phase pilote SHeS (n=778)

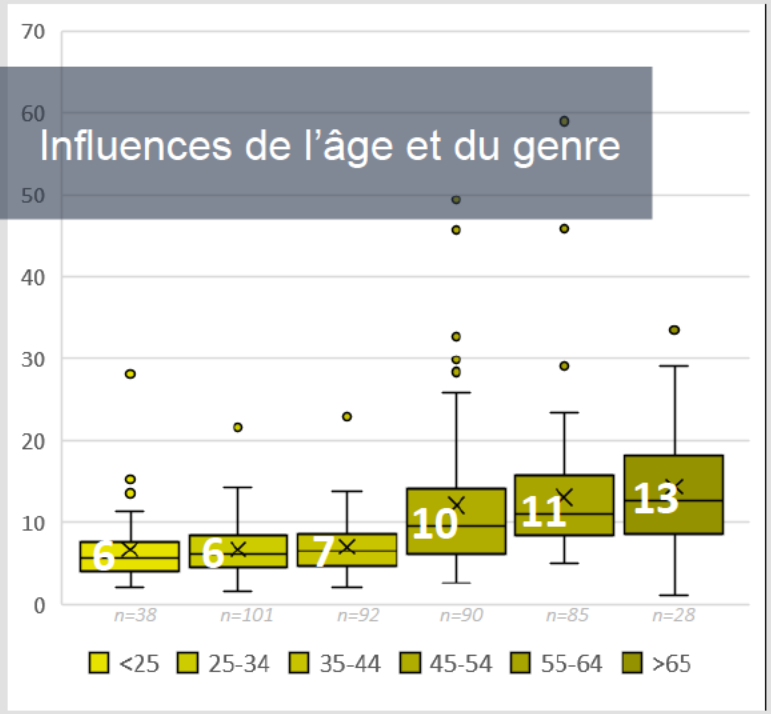


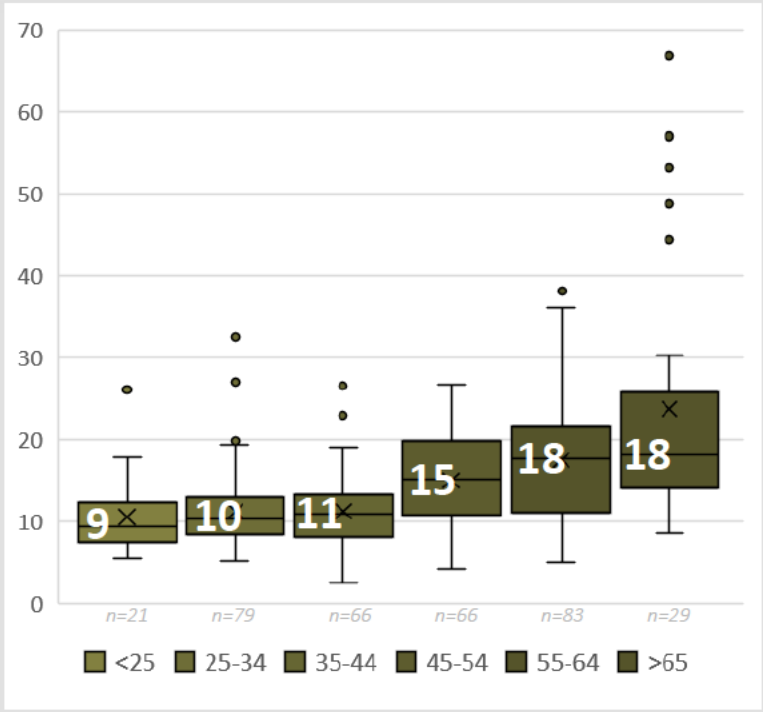
Teneurs totales en PFAS

selon aspects démographiques

Concentrations totales en PFAS [ng/ml] mesurées auprès du collectif de la phase pilote SHeS (n=778)

Influences de l'âge et du genre





Teneurs totales en PFAS

sources potentielles d'exposition

Questionnaires en ligne
Pour toute personne entre 20 et 69 ans résidant en Suisse

A quelle fréquence consommez-vous ce type d'aliment?
p. ex. œufs, poisson, fruits de mer et produits dérivés du poisson

A quelle fréquence mangez-vous des repas chauds emballés dans des emballages jetables?
p. ex. McDonalds, Migros take-away, kebab, super marché

Utilisez-vous des sprays d'imprégnation?
p. ex. pour les chaussures, les vestes

Fartez-vous vos skis ou votre snowboard vous-même?

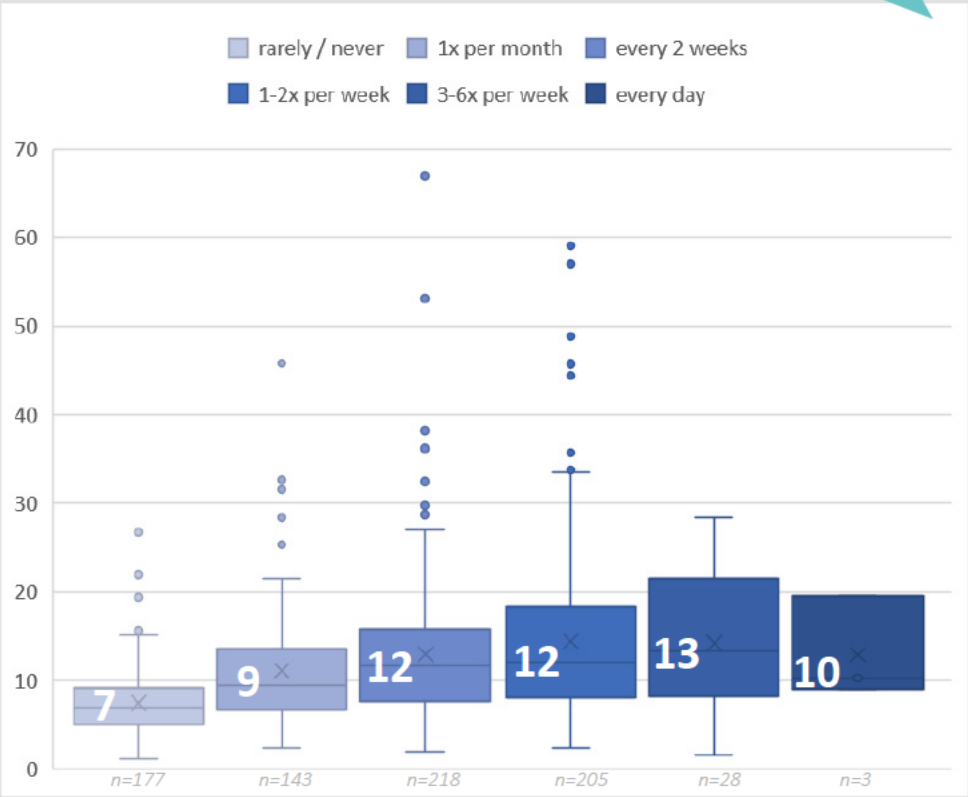
Profession actuelle et activités principales?

Teneurs totales en PFAS

sources potentielles d'exposition

A quelle fréquence consommez-vous ce type d'aliment?

Fréquence de la consommation de **poisson**, de fruits de mer et de produits dérivés du poisson

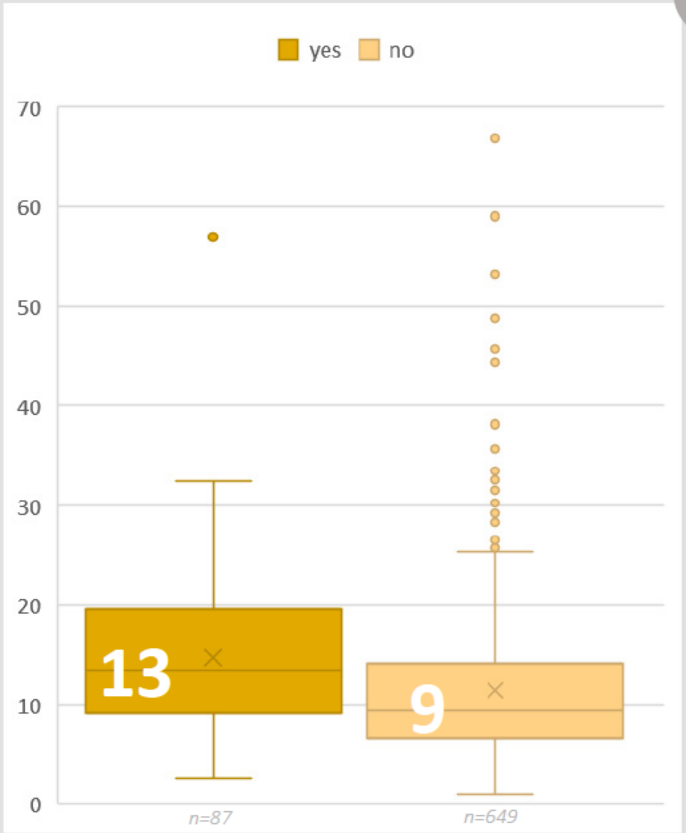


Concentrations totales en PFAS [ng/ml] mesurées auprès du collectif de la phase pilote SHeS (n=778)

Teneurs totales en PFAS

sources potentielles d'exposition

Fartez-vous vos skis ou votre snowboard vous-même?



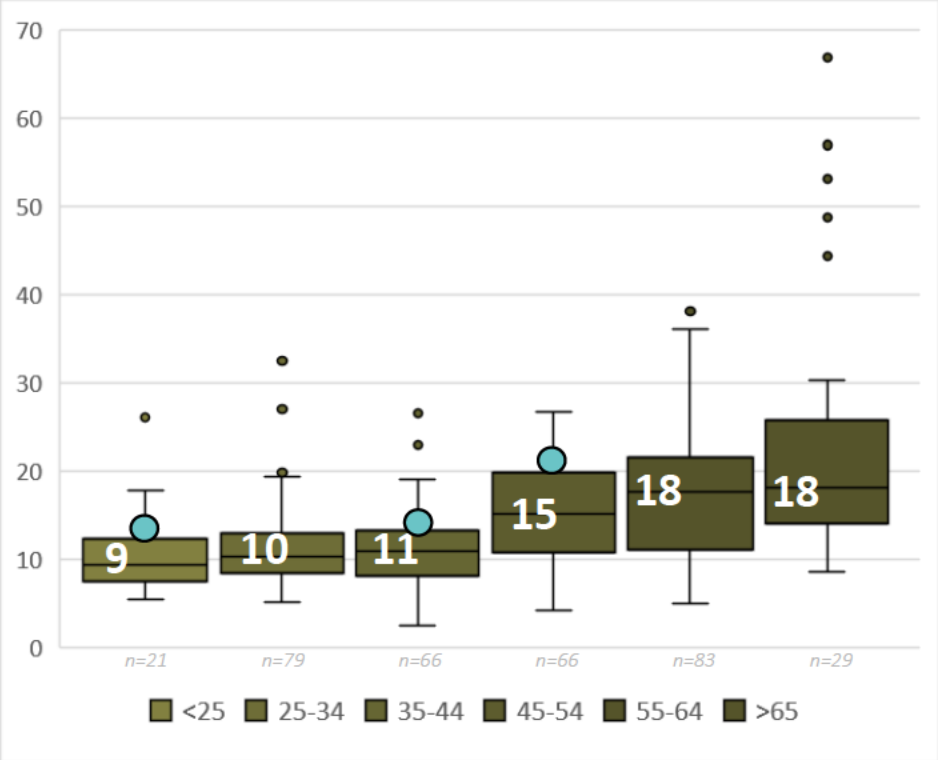
Concentrations totales en PFAS [ng/ml] mesurées auprès du collectif de la phase pilote SHeS (n=778)

Teneurs totales en PFAS

sources potentielles d'exposition

Profession actuelle et activités principales?

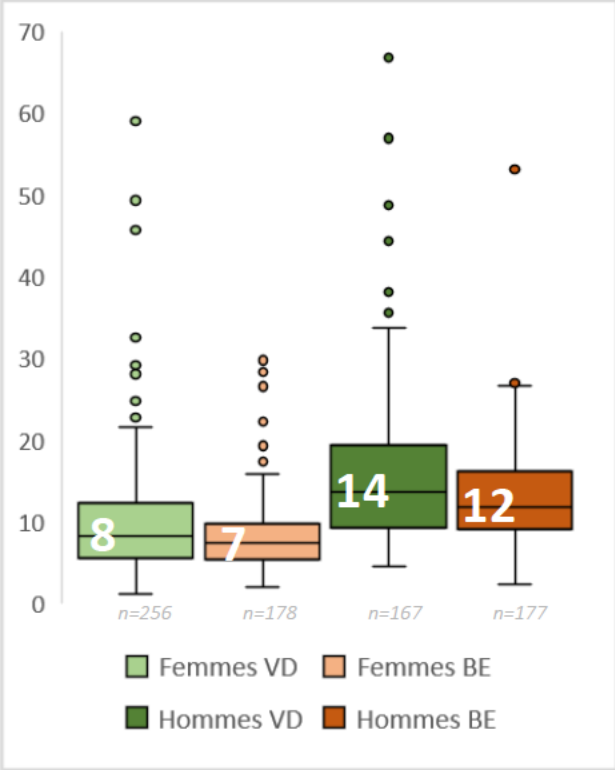
pompier / professionnel ou volontaire



Concentrations totales en PFAS [ng/ml] mesurées auprès du collectif de la phase pilote SHeS (n=778)

Teneurs totales en PFAS

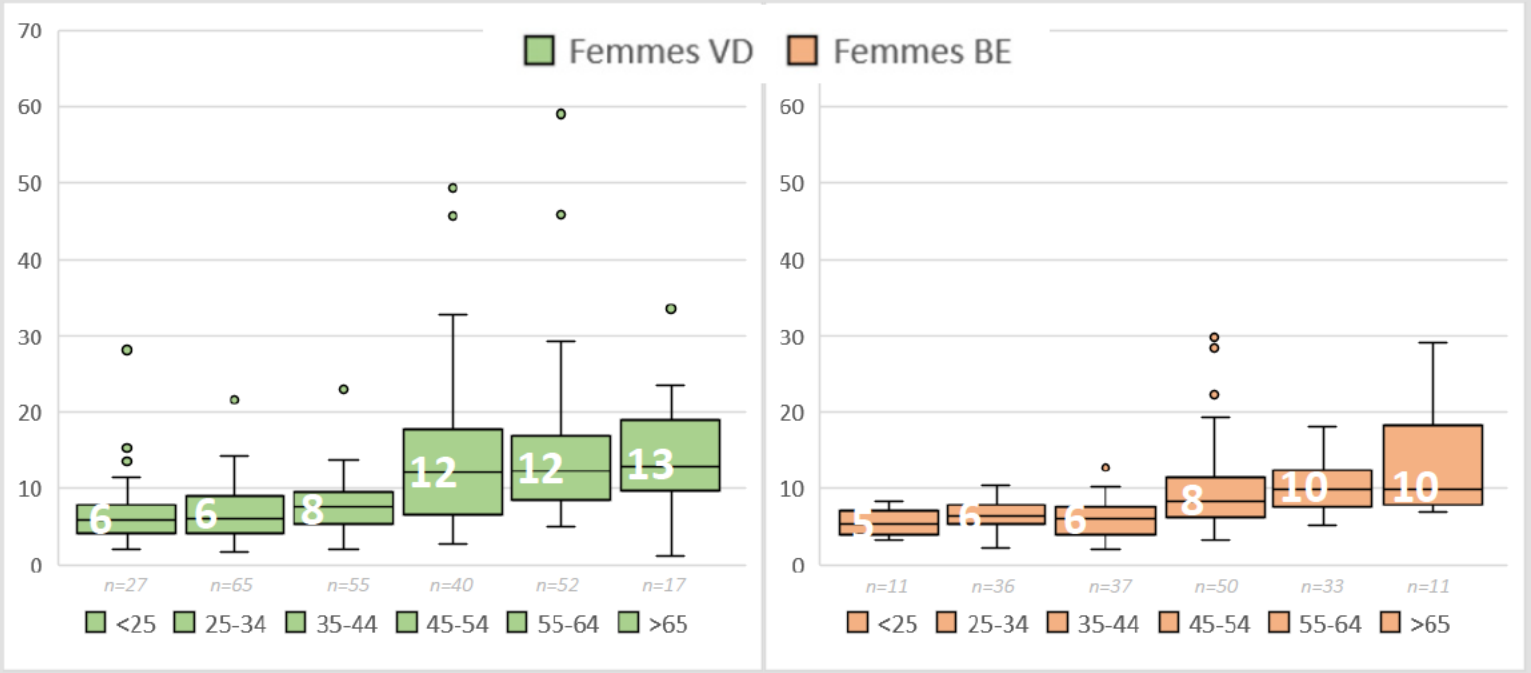
en fonction des centres de collecte et aspects démographiques



Concentrations totales en PFAS [ng/ml] mesurées auprès du collectif de la phase pilote SHeS (n=778)

Teneurs totales en PFAS

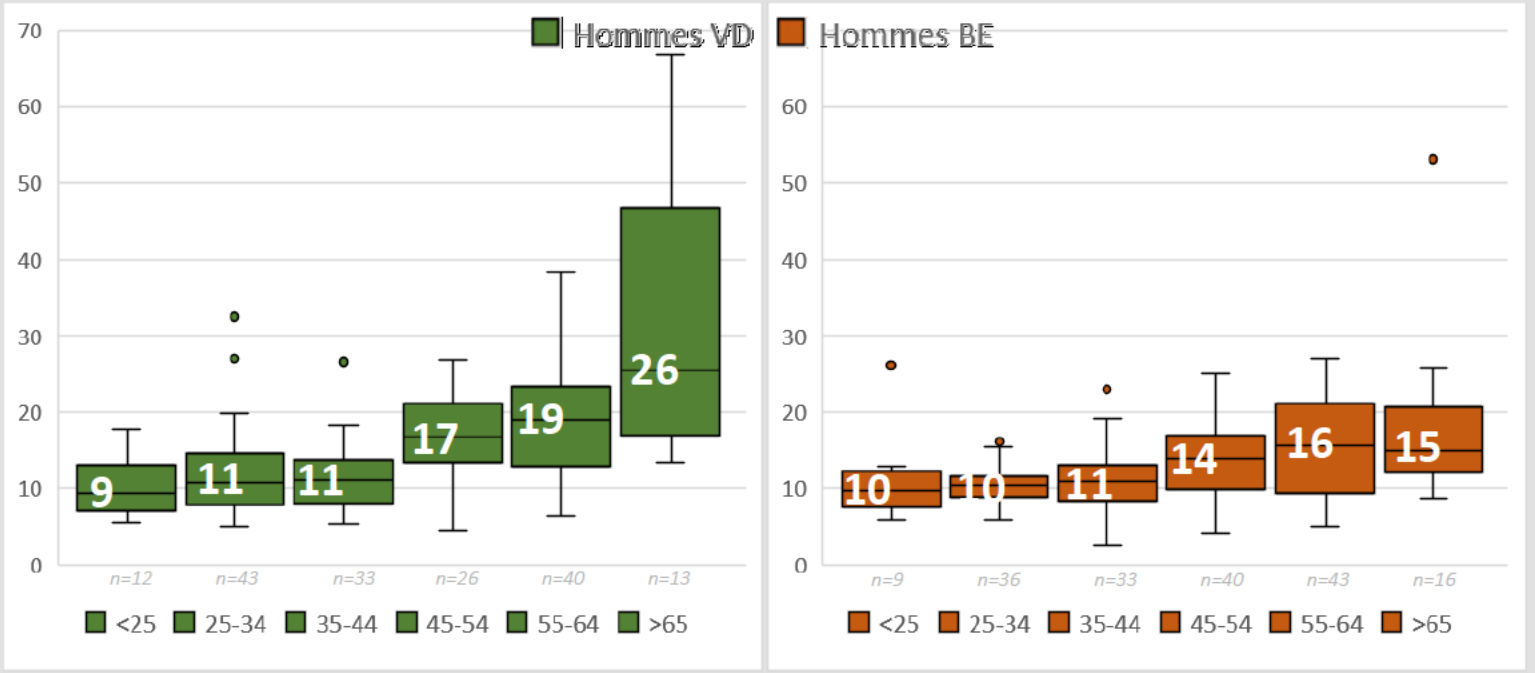
en fonction des centres de collecte et aspects démographiques



Concentrations totales en PFAS [ng/ml] mesurées auprès du collectif de la phase pilote SHeS (n=778)

Teneurs totales en PFAS

en fonction des centres de collecte et aspects démographiques

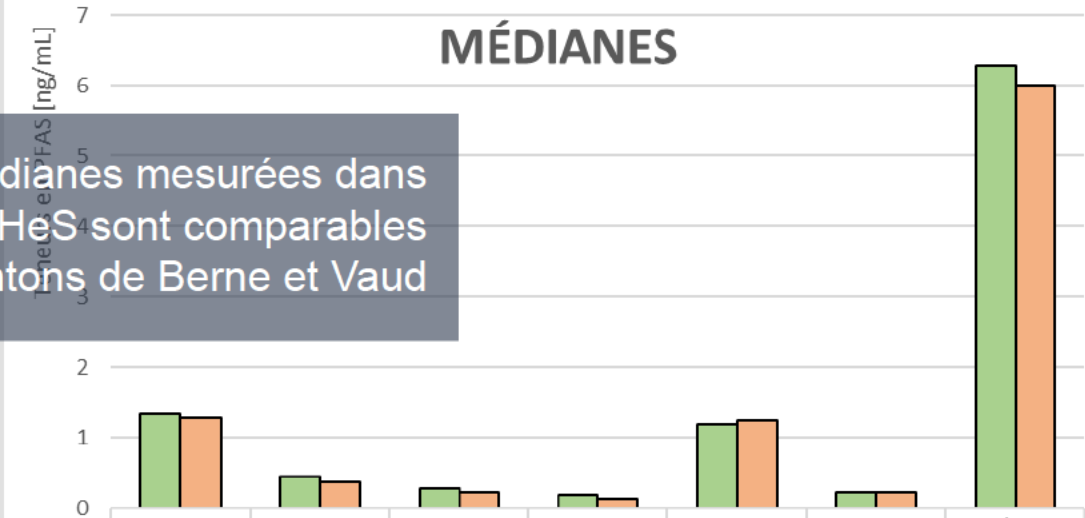


Concentrations totales en PFAS [ng/ml] mesurées auprès du collectif de la phase pilote SHeS (n=778)

Teneurs en PFAS

en fonction des centres de collecte

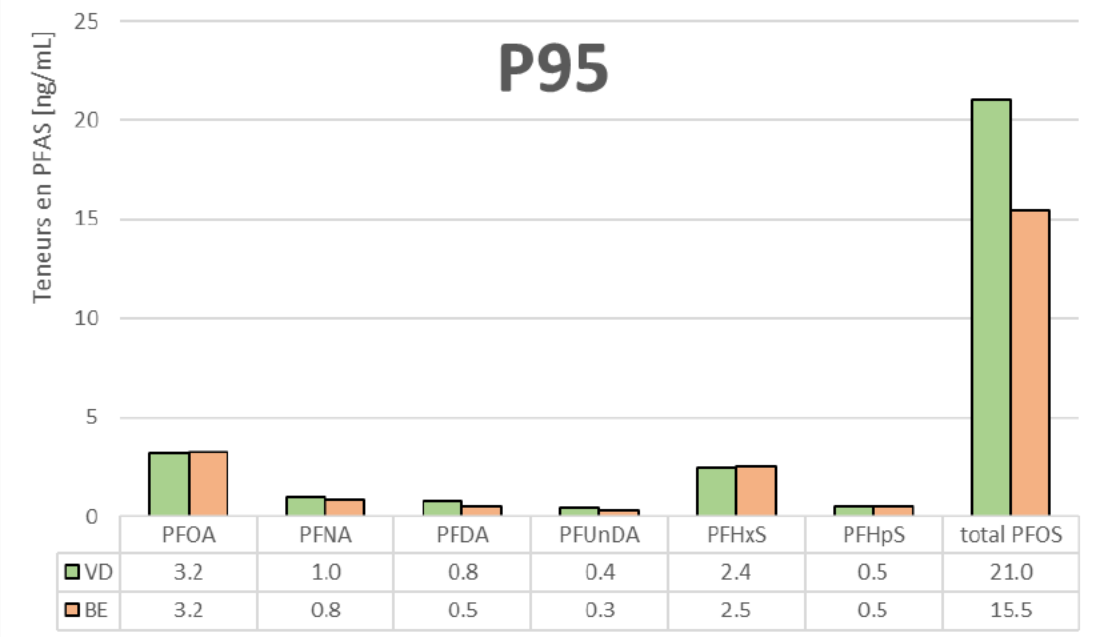
Les valeurs médianes mesurées dans la phase pilote SHeS sont comparables pour les cantons de Berne et Vaud



	PFOA	PFNA	PFDA	PFUnDA	PFHxS	PFHpS	total PFOS
VD	1.3	0.4	0.3	0.2	1.2	0.2	6.3
BE	1.3	0.4	0.2	0.1	1.2	0.2	6.0

Teneurs en PFAS

en fonction des centres de collecte



	PFOA	PFNA	PFDA	PFUnDA	PFHxS	PFHpS	total PFOS
VD	3.2	1.0	0.8	0.4	2.4	0.5	21.0
BE	3.2	0.8	0.5	0.3	2.5	0.5	15.5

Le 95e percentile ou P95 indique des niveaux d'exposition élevés (seuls 5 % des échantillons analysés étant à des niveaux supérieurs)

PFOS

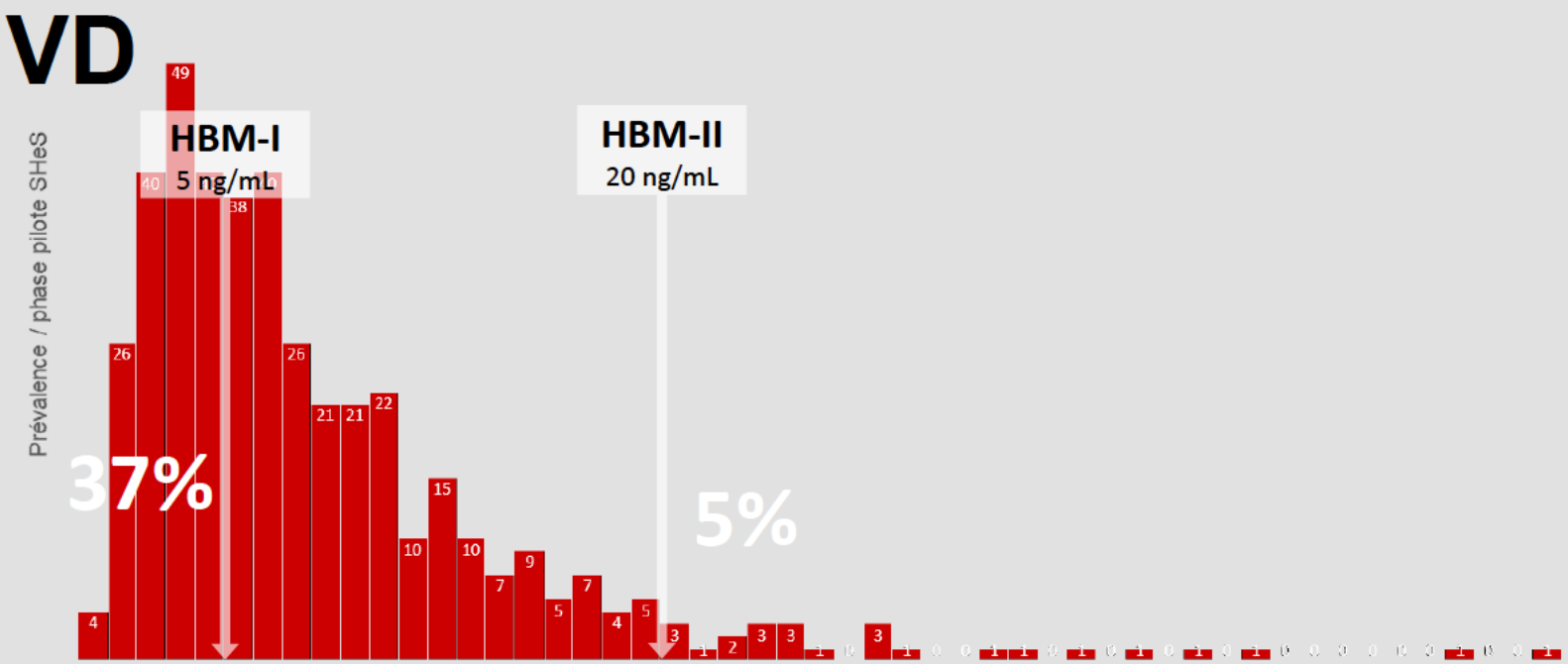
Acide perfluorooctane sulfonique

Concentrations sériques en PFOS [ng/mL] du collectif de SHeS phase pilote - VD (n=423)

Comparaison aux valeurs seuils fixées par l'UBA (Umweltbundesamt DE)

HBM-I : valeur d'alerte

HBM-II : valeur seuil des effets potentiels sur la santé



PFOS

Acide perfluorooctane sulfonique

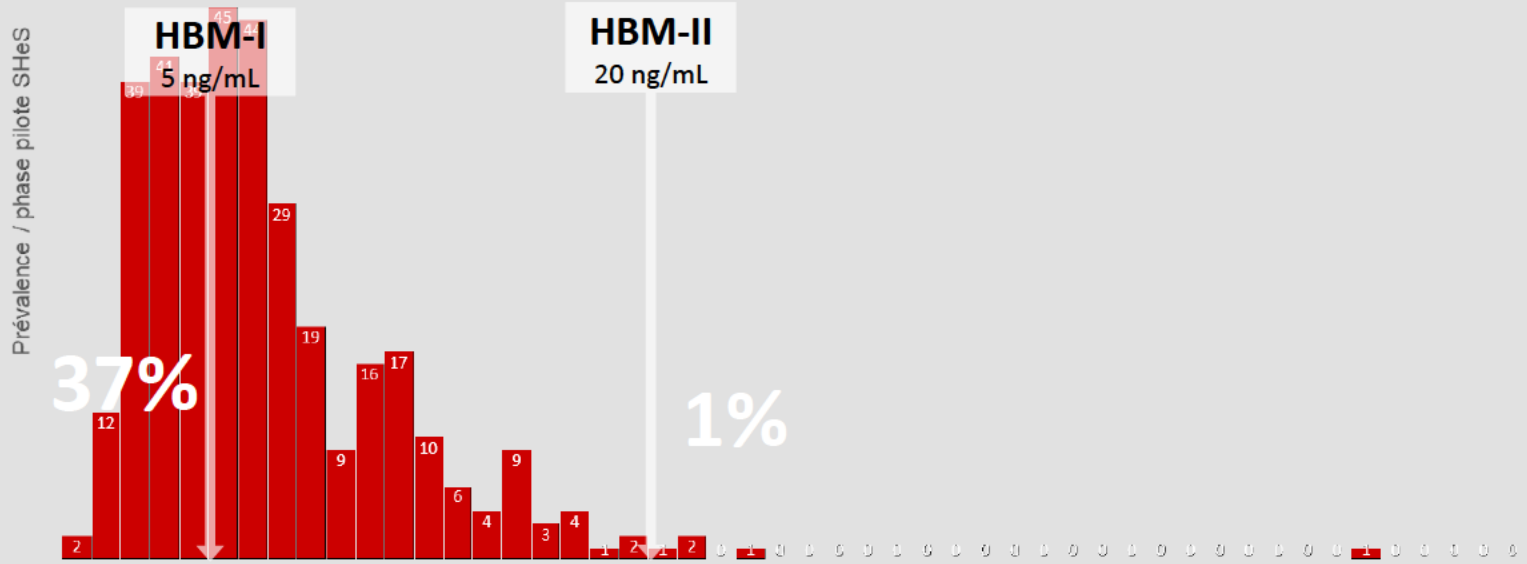
Concentrations sériques en PFOS [ng/mL] du collectif de SHeS phase pilote - BE
(n=355)

Comparaison aux valeurs seuils fixées par l'UBA (Umweltbundesamt DE)

HBM-I : valeur d'alerte

HBM-II : valeur seuil des effets potentiels sur la santé

BE



Teneurs en métaux

mesurées dans les échantillons de sang

Teneurs en métaux

mesurées dans les échantillons de sang

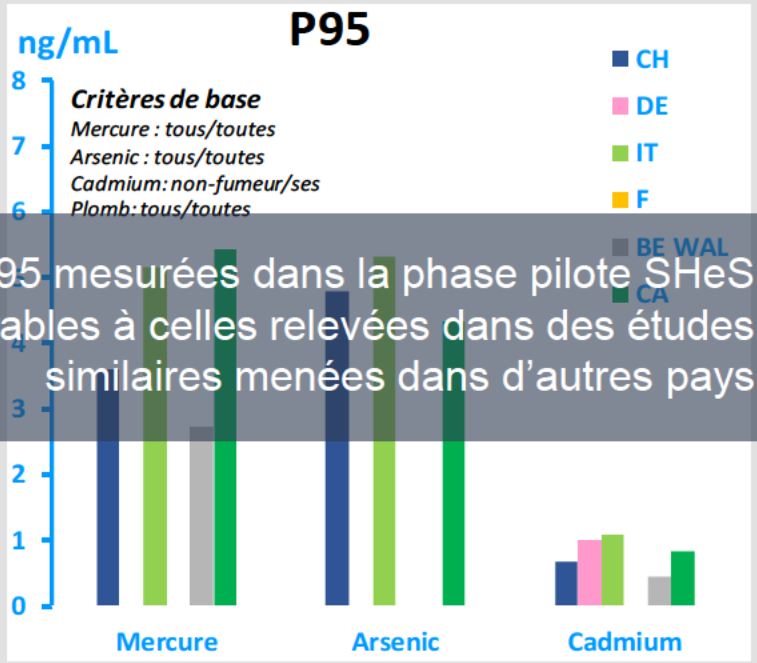
Concentrations sanguines en métaux [ng/mL] du collectif de SHeS phase pilote (n=778)

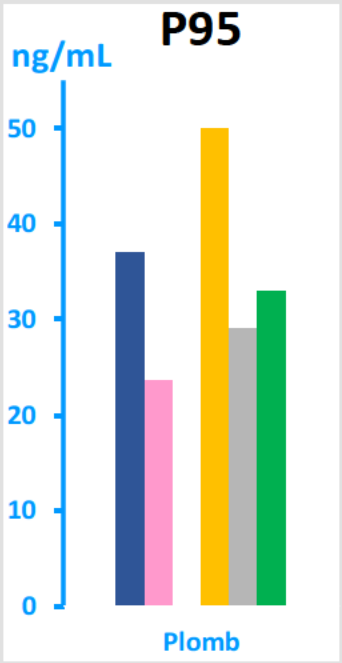
Substance	Abréviation	Taux de détection *[%]*	Moyenne arith. *[ng/mL]*	Médiane *[ng/mL]*	P95 *[ng/mL]*
Mercure	Hg	85	1,3	0,9	3,6
Arsenic	As	76	1,2	0,5	4,8
Cadmium	Cd	97	0,4	0,3	1,3
Cadmium *non-fumeurs*	Cd	97	0,3	0,3	0,7
Plomb	Pb	99	16	13	37

Source: HBM4EU

Teneurs en métaux

Valeurs des autres pays à titre de comparaison



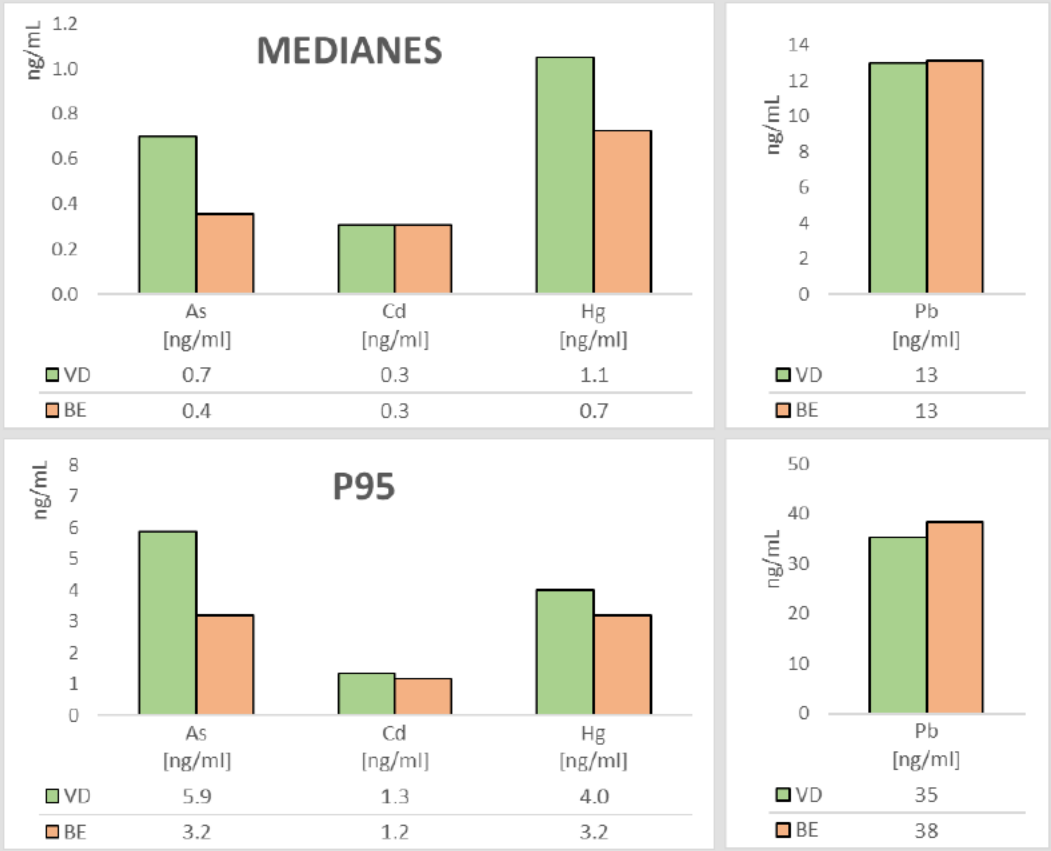


Les valeurs P95 mesurées dans la phase pilote SHeS sont comparables à celles relevées dans des études similaires menées dans d'autres pays

Le 95e percentile ou P95 indique des niveaux d'exposition élevés (seuls 5 % des échantillons analysés étant à des niveaux supérieurs)

Teneurs en métaux

en fonction des centres de collecte



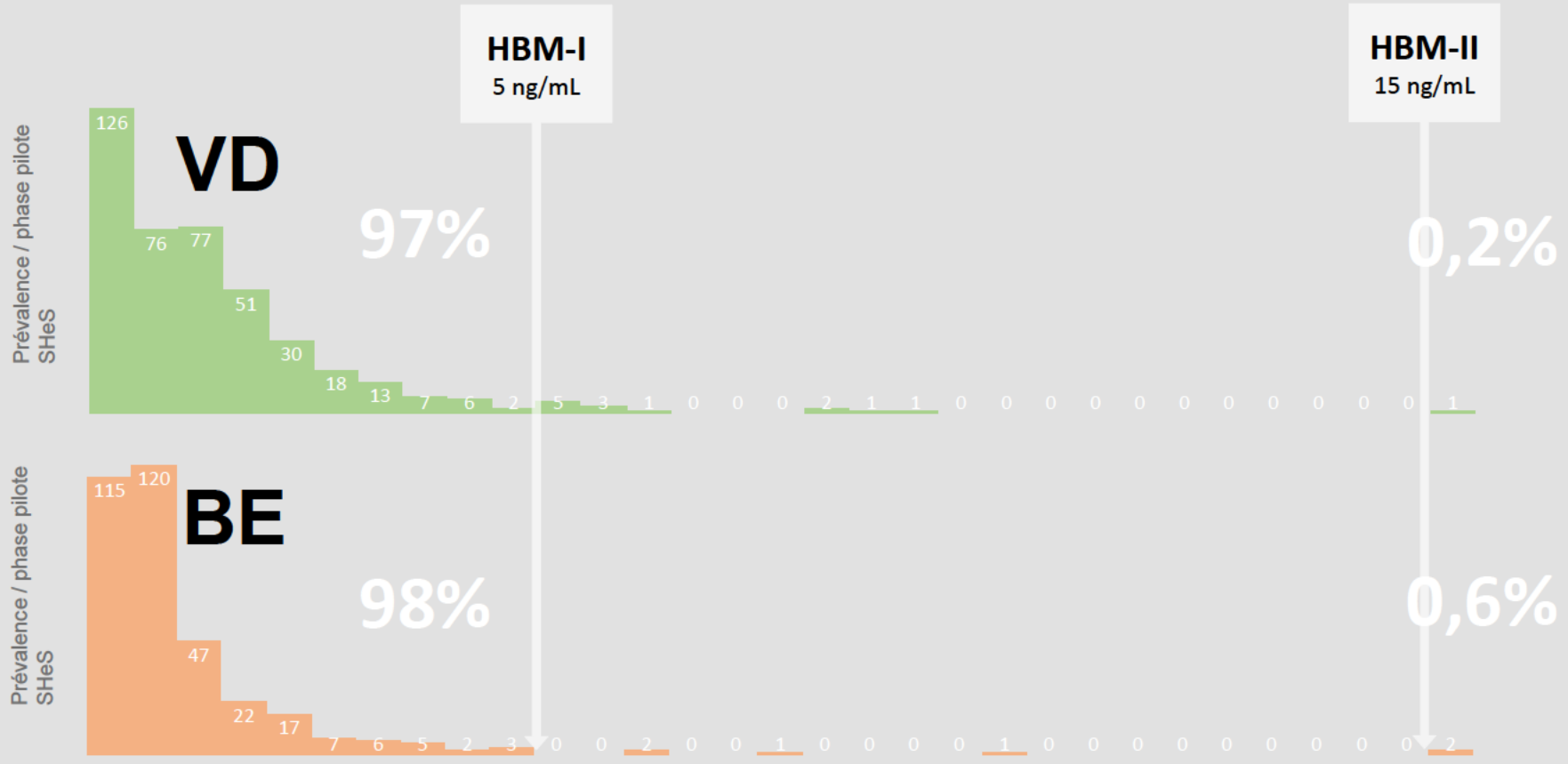
Mercure

Concentrations sanguines en Hg [ng/mL] du collectif de SHeS phase pilote
(n=778)

Comparaison aux valeurs seuils fixées par l'UBA (Umweltbundesamt DE)

HBM-I : valeur d'alerte

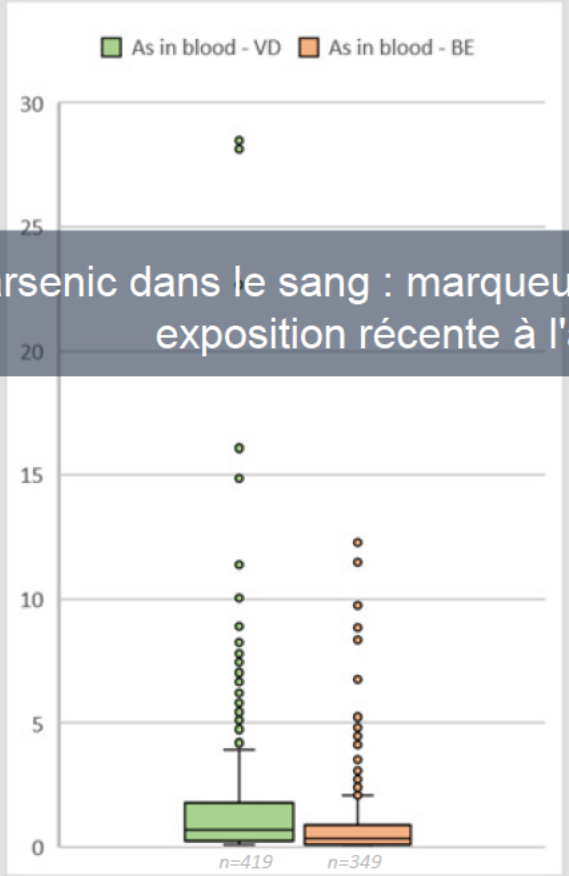
HBM-II : valeur seuil des effets potentiels sur la santé



Arsenic

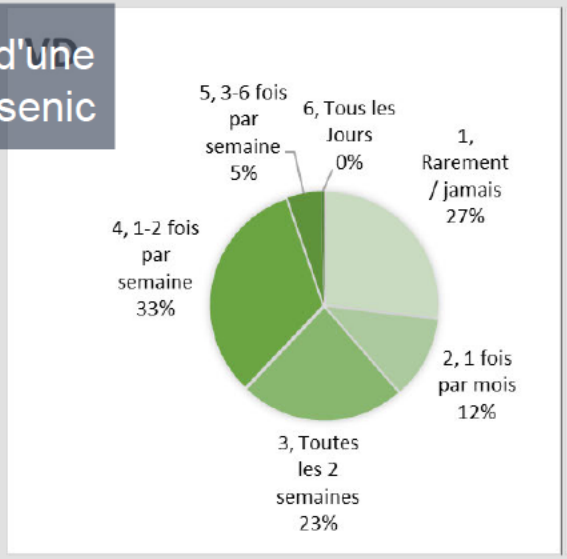
Potentielles sources

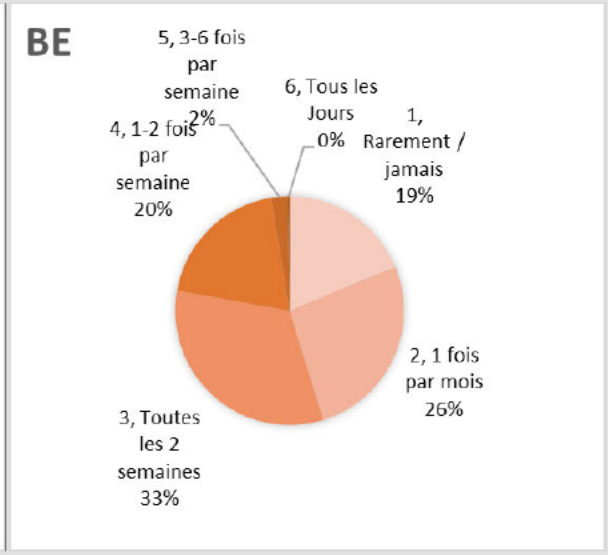
A quelle fréquence consommez-vous ce type d'aliment?



arsenic dans le sang : marqueur d'une exposition récente à l'arsenic

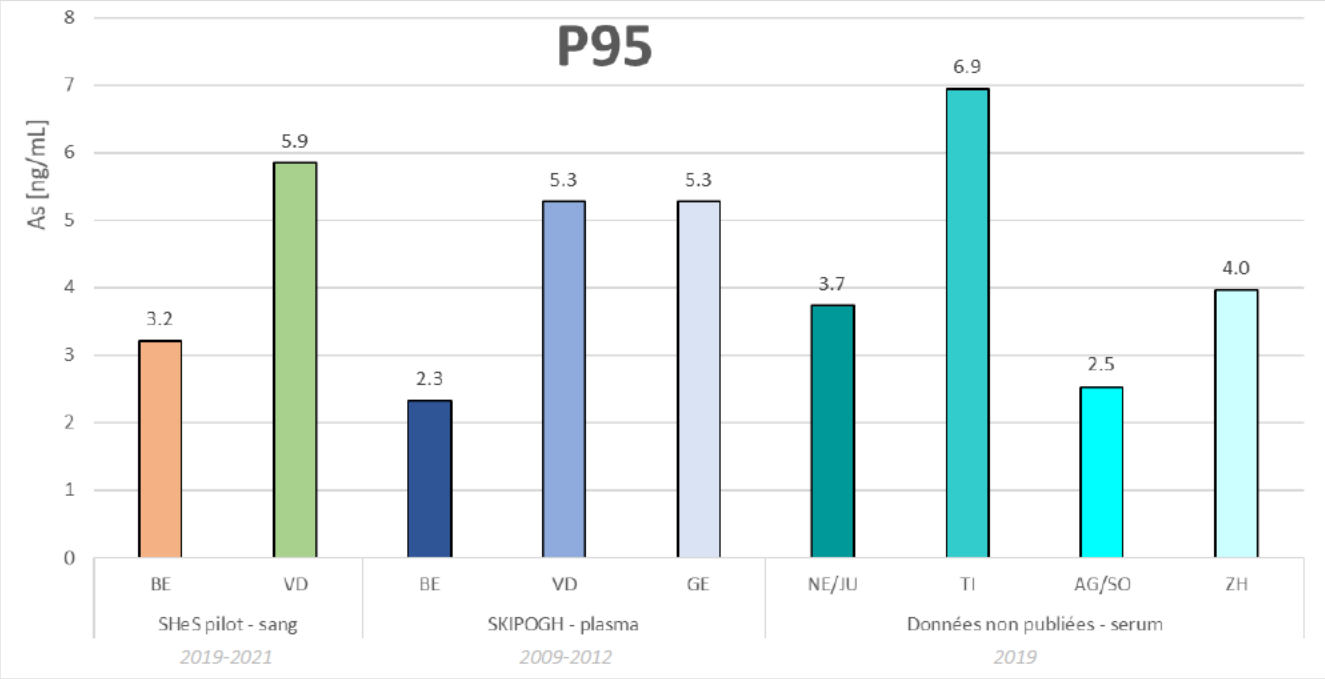
Fréquence de la consommation de **poisson**, de fruits de mer et de produits dérivés du poisson





Arsenic

Comparaison avec d'autres études réalisées en Suisse



Le 95e percentile ou P95 indique des niveaux d'exposition élevés (seuls 5 % des échantillons analysés étant à des niveaux supérieurs)

Arsenic

Comparaison avec d'autres études réalisées en Suisse

Influence des sources géogènes

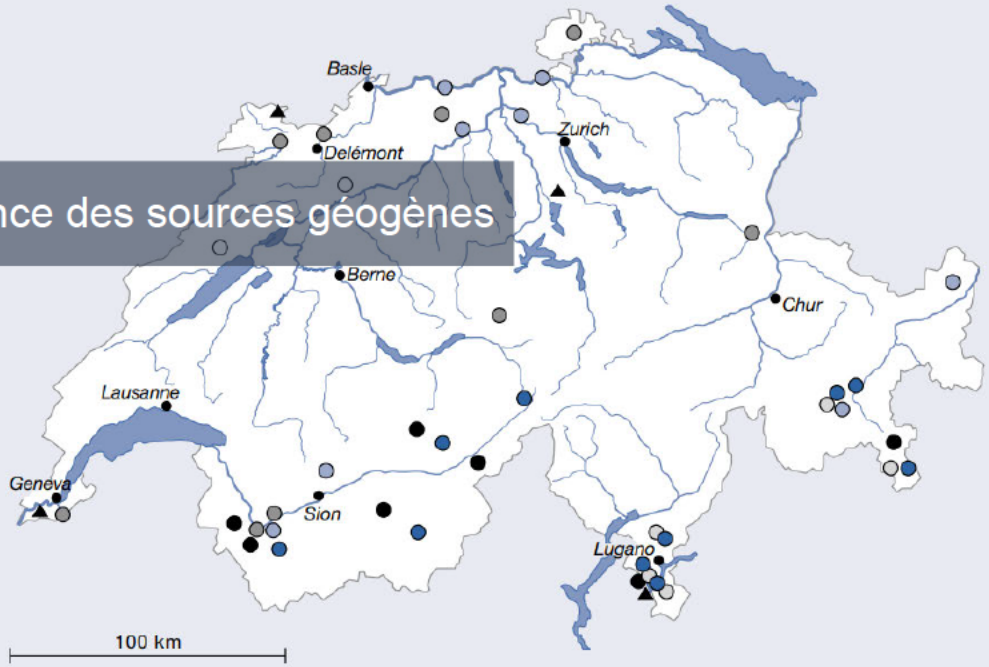


Fig. 2: Areas with elevated levels of arsenic in Switzerland. Elevated arsenic levels in ground water are found primarily in Wallis, Ticino and Grisons.

Hans-Rudolf Pfeifer and Jürg Zobrist, *De l'arsenic dans l'eau potable, la Suisse également concernée?* EAWAG news 53, p15-17

Teneurs en glyphosate & AMPA

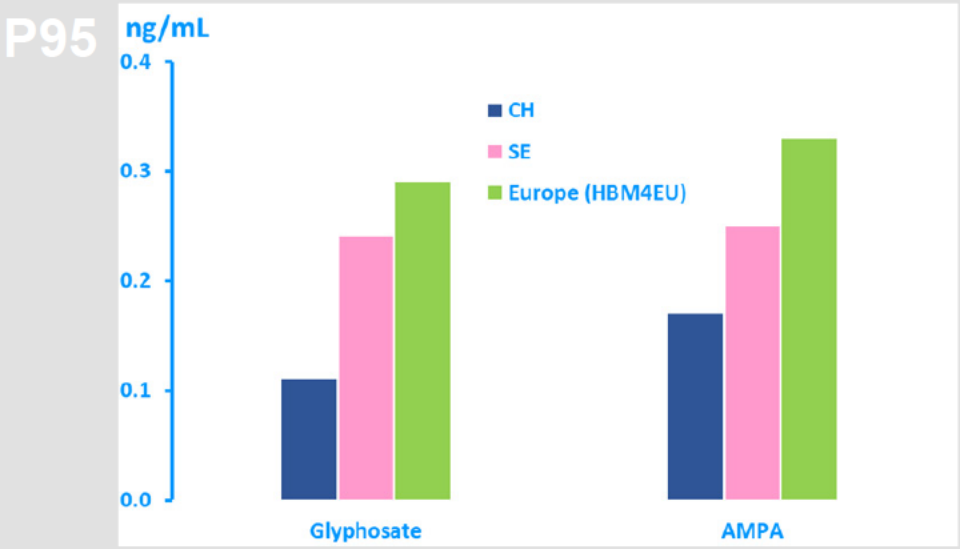
mesurées dans les échantillons d'urine

[redacted] Natalie von Götz / OFSP

Teneurs en glyphosate & AMPA

mesurées dans les échantillons d'urine (spots urinaires)

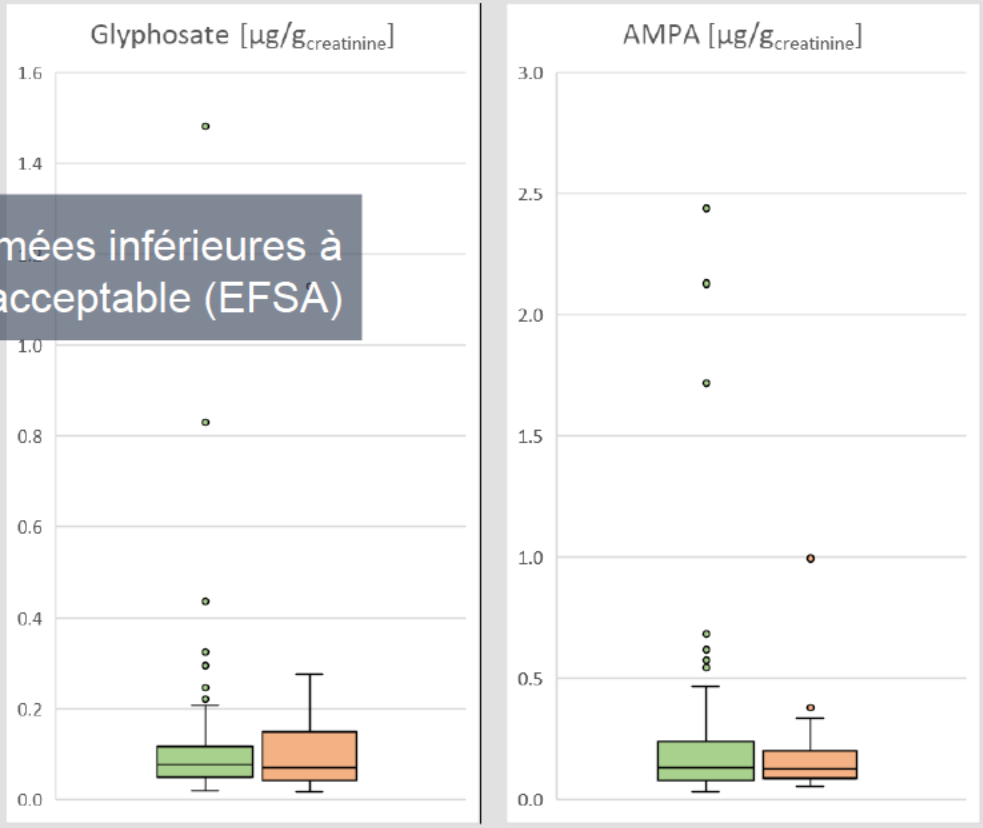
Substance	Acronyme	CAS-Nr.	Taux de détection *[%]*	Médiane *[ng/mL]*	P95 *[ng/mL]*	P95 *[ng/mg$_{crea}$]*
Glyphosate	GLY	1071-83-6	19	<0,05	0,11	0,18
Acide aminométhyl phosphonique	AMPA	1066-51-9	13	<0,1	0,2	0,35



Teneurs en glyphosate & AMPA

en fonction des centres de collecte

Doses journalières estimées inférieures à la dose journalière acceptable (EFSA)



Représentation graphique des valeurs de glyphosate et AMPA dans l'urine [µg/g creatinine], valeurs supérieures à la limite de quantification

Prochaines étapes

- Recherches des sources d'exposition aux PFAS et métaux les plus probables pour les participants les plus exposés
- Investigations approfondies sur la base des données des questionnaires
- Analyses statistiques et développement de modèles d'exposition

Pour en savoir plus,

www.etude-sur-la-sante.ch

Pour moi. Pour tous.
Étude suisse sur la santé

Soutenu par l'Office fédéral
de la santé publique (OFSP)

Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Département fédéral de l'intérieur DFI
Office fédéral de la santé publique OFSP

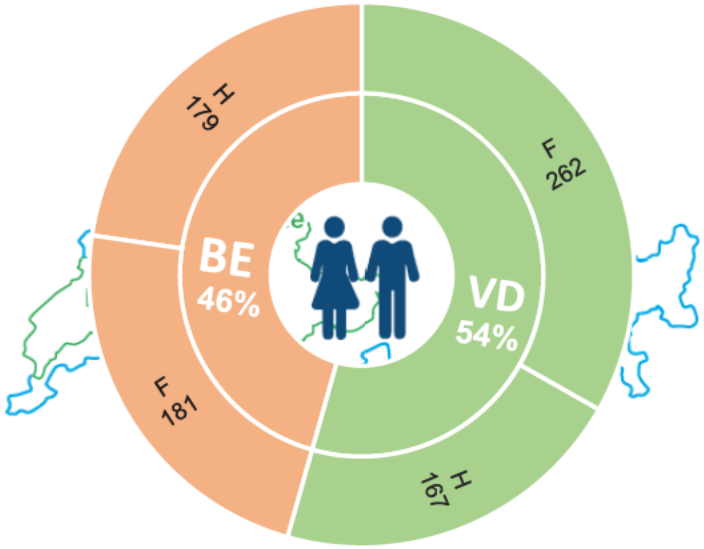
Merci pour votre attention

Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Département fédéral de l'intérieur DFI
Office fédéral de la santé publique OFSP

L'étude suisse sur la santé

Conception de la phase pilote



Questionnaires en ligne
Pour toute personne entre 20 et 69 ans résidant en Suisse

Questionnaires, examens de santé, échantillons biologiques
Jusqu'à 1000 personnes (500 par centre) sur invitation
2 centres d'étude: Lausanne et Berne

PFAS | WHAT YOU NEED TO KNOW

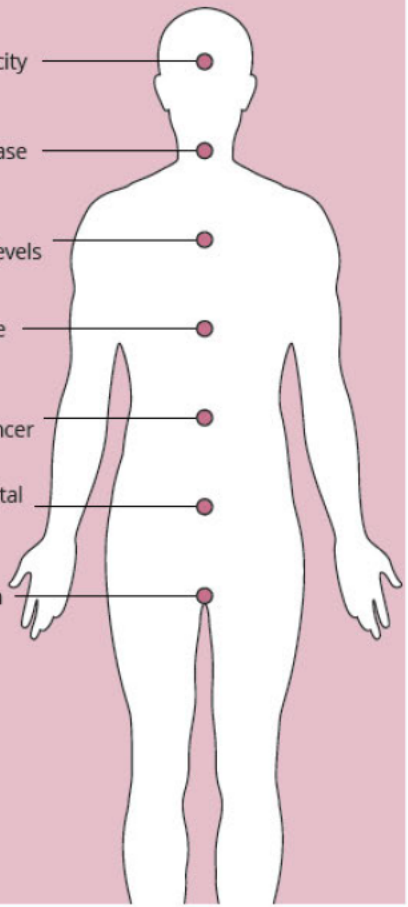
1 Possible sources of exposure

- House dust
- Occupational exposure (PFAS manufacture, firefighters, ski waxing, chromium plating...)
- Home consumer products
- Personal care products
- Breast milk
- Contaminated drinking water
- Contaminated food
- Food consumer products

2 How can PFAS enter your body?

- Via inhalation
- Via dermal absorption
- Via ingestion

3 How might PFAS affect your health?



4 How can you reduce your exposure to PFAS?

- ✗ Avoid fast-food wrapped in grease-proof papper
- ✗ Avoid fast-food sold in PFAS-containing cardboard, such as some pizza boxes
- ✗ Avoid using optional waterproofing sprays on clothing and footwear
- ✓ Ask for PFAS-free products when purchasing products that may contain PFAS. Ensure that products are free of all PFAS (and not just PFOS and PFOA)
- ✓ Check whether a particular product contains PFAS or not in online applications
- ✓ Instead of non-stick cookware, opt for ceramic, stainless steel, or cast iron

If you live in or near areas known to be contaminated with PFAS:

- ✗ **Avoid** fishing and consuming fish from these areas
- ✓ **Avoid** consuming home-grown fruits and vegetables from these areas. Ask local authorities to assess the PFAS levels to reassure yourself that it is free of PFAS
- ✓ Please **follow** the advice from authorities for water use

Where they can be possibly found?

PFAS can be found in consumer products, such as food packaging and cookware; personal care products, such as shampoo, dental floss, nail polish and eye makeup; cleaning products, upholstery, leather, and carpets as well as home improvement products such as paints, varnishes, lubricants and sealants.

It can also be found in contaminated drinking water (close to manufacturing facilities, waste treatment facilities, firefighting and military training sites and airports) or food (fish, meat, fruit and fruit products, eggs, vegetables and vegetable products due to contaminated soil).

The EU has taken action to reduce people's exposure to PFAS. For example, PFOS, its salts and derivatives as well as PFOA, its salts and PFOA-related compounds are banned under the Regulation on Persistent Organic Pollutants. The European Food Safety Authority has defined a limit for the volume of four PFAS that may be safely consumed in food in a one-week period. EU REACH restrictions are also adopted for PFHxS en C9-C14 PFAS and will be effective in the coming years for several uses. Also, the Drinking Water Directive sets limit values for PFAS in water for human consumption. Most recently, the Chemicals Strategy for Sustainability set out a range of actions to regulate PFAS as a group, including phasing out the use of PFAS in the EU, unless their use is essential.

For further information on how the European Union is protecting citizens read the **HBM4EU PFAS Factsheet**.

Pour moi. Pour tous.
Étude suisse sur la santé

Soutenu par l'Office fédéral de la santé publique (OFSP)

Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

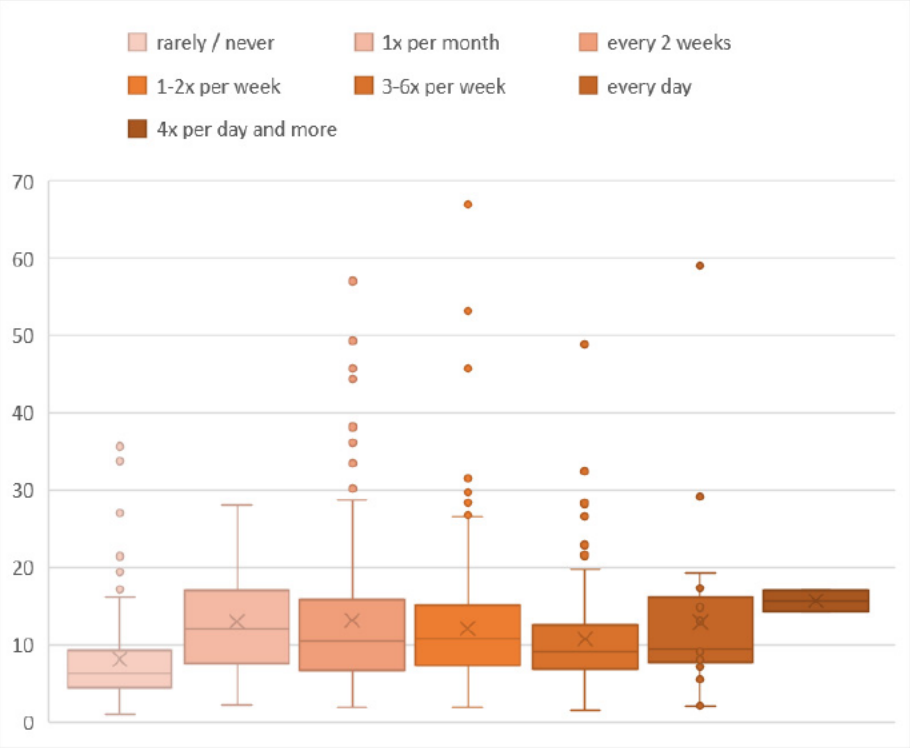
Département fédéral de l'intérieur DFI
Office fédéral de la santé publique OFSP

Teneurs totales en PFAS

Sources potentielles d'exposition

A quelle fréquence consommez-vous ce type d'aliment?

Fréquence de la consommation d'**œufs** (durs, à la coque, au plat, omelettes, etc.)



Concentrations totales en PFAS [ng/ml] mesurées auprès du collectif de la phase pilote SHeS (n=778)

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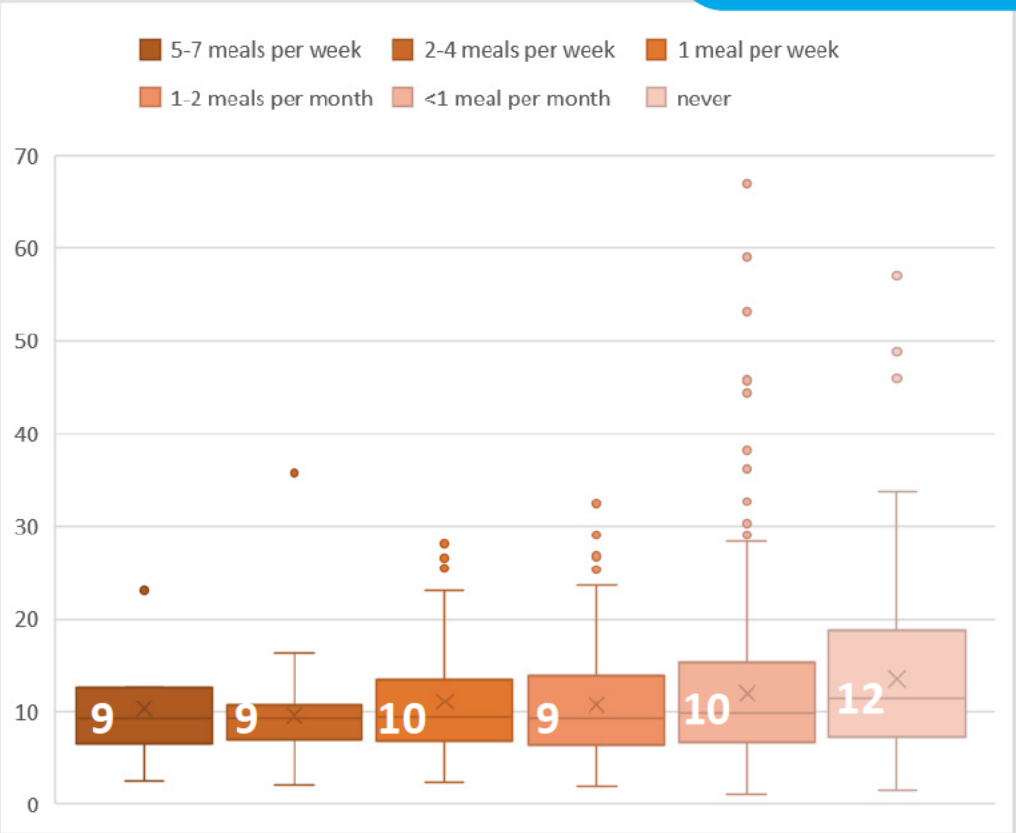
Teneurs totales en PFAS

Sources potentielles d'exposition

A quelle fréquence mangez-vous des repas chauds emballés dans des emballages jetables?

p. ex. McDonalds, Migros take-away, kebab, super marché

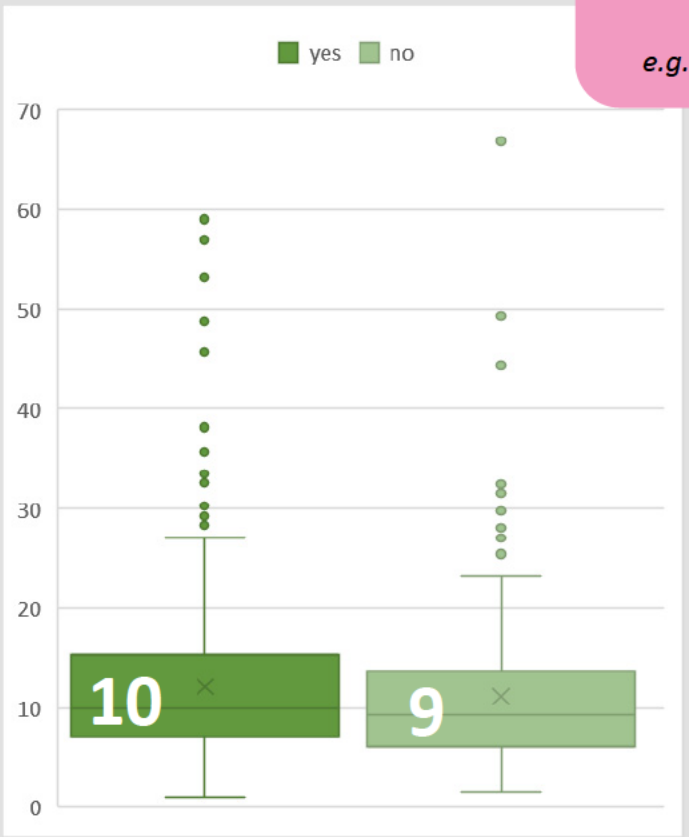


Total PFAS concentrations [ng/ml] in the SHeS pilot study group (n=778)

Teneurs totales en PFAS

Sources potentielles d'exposition

Do you use waterproofing sprays?
e.g. for shoes, jackets, etc.

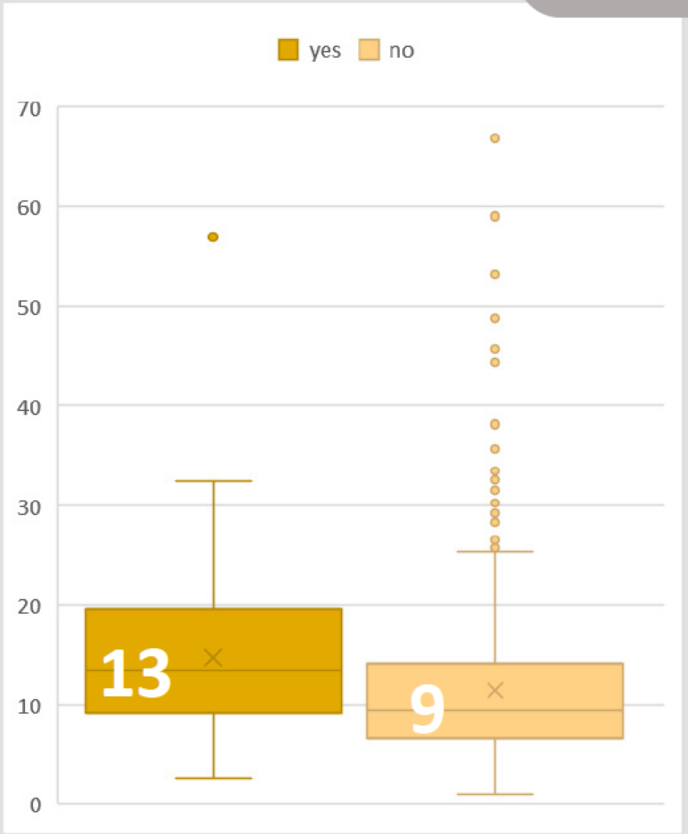


Total PFAS concentrations [ng/ml] in the SHeS pilot study group (n=778)

Teneurs totales en PFAS

Sources potentielles d'exposition

Do you wax your skis/snowboard yourself?



Total PFAS concentrations [ng/ml] in the SHeS pilot study group (n=778)

MERCURY | WHAT YOU NEED TO KNOW

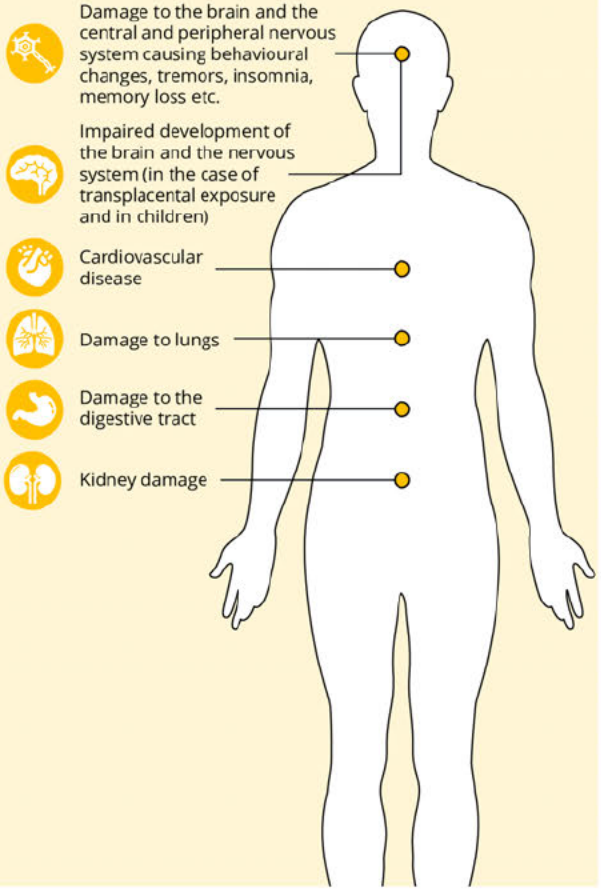
1 Possible sources of exposure

- Food (especially large predatory fish such as tuna or swordfish)
- Transplacental ingestion or via breastfeeding
- Dental amalgam fillings or damaged items containing mercury
- Occupational exposure (at fossil fuel power plants and during metal mining, non-ferrous smelting operations or cement manufacturing)
- Certain skin-lightening cosmetic products during production or long-term use

2 How can mercury enter your body?

- Via ingestion
- Via inhalation
- Via dermal absorption

3 How might mercury affect your health?



4 How can you reduce your exposure to mercury?

- ✕ **Avoid** using cosmetic products containing mercury
- ✕ **Avoid** heating alloys containing mercury
- ✓ **Reduce** the frequency of consuming large predatory fish and focus on smaller species of fish to maintain a healthy diet; be particularly prudent if pregnant or breastfeeding
- ✓ **Be careful** when handling products containing mercury (fluorescent lamps, old thermometers...) and dispose of them accordingly when damaged - wrapped in plastic and bring it to the local hazardous waste management center
- ✓ **Ask** your dentist about the alternatives for amalgam dental fillings
- ✓ **Reduce** occupational exposure by using protective gear

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There are several policies in the European Union for protecting citizens from harmful exposure to mercury such as banning its use in industrial processes, products of daily use and in cosmetics. Moreover, there are legal limits for occupational exposure, mercury presence in fish and regulating mercury use in dentistry and lighting products.

For further information on mercury, please visit the '**HBM4EU Factsheet**' section.

Where can it possibly be found?

Mercury occurs naturally in the earth's crust. It can be released into the environment via volcanic activity, the weathering of rocks or as a result of human activity at coal-fired power stations or during mining. An organic form called methylmercury is commonly found in fish, mainly large predatory types such as tuna or swordfish. Mercury is also used in certain products, such as fluorescent lightbulbs, thermometers or in dental amalgam fillings.

Source: HBM4EU

ARSENIC | WHAT YOU NEED TO KNOW

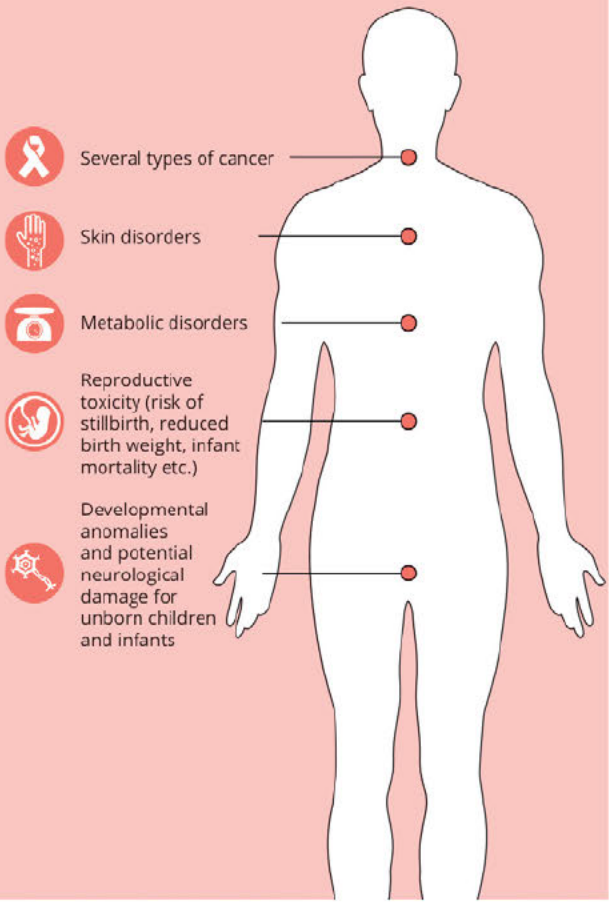
1 Possible sources of exposure

- Food (processed grain-based products)
- Contaminated drinking water (mainly from ground sources)
- Tobacco smoke
- Fumes from copper or lead smelting plants and their residues
- Residues in former agricultural lands treated with arsenic-based pesticides
- Contamined soil

2 How can arsenic enter your body?

- Via ingestion
- Via inhalation
- Via dermal absorption

3 How might arsenic affect your health?



- Several types of cancer
- Skin disorders
- Metabolic disorders
- Reproductive toxicity (risk of stillbirth, reduced birth weight, infant mortality etc.)
- Developmental anomalies and potential neurological damage for unborn children and infants

4 How can you reduce your exposure to arsenic?

- **Avoid** smoking as well as inhaling tobacco smoke passively
- **If you use** a well as a drinking water source, have it tested for arsenic
- **Eat** a well-balanced diet, alternating the consumption of rice with other grains like millet, quinoa, buckwheat, farro or bulgur. Cooking rice in excess water, which is then drained, can reduce inorganic arsenic content by 40 to 60%, although this also reduces the nutritional content (folate, iron, niacin, thiamine)
- **Check** the recommendations of your national government or paediatric associations for the nutrition of children. In some countries, young children under five are advised to avoid rice milk as a substitute for breast milk, infant formula or cow's milk
- Make sure you and your children **wash** your hands often, especially before eating

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The European Union has been taking actions to protect citizens from harmful exposures to arsenic. These include setting maximum levels for arsenic in certain foods and harmonizing requirements for arsenic in drinking water, as well as occupational safety requirements. Arsenic is regulated under EU chemicals legislation and the use of arsenic compounds is restricted under REACH (Registration, Evaluation, Authorisation and Restriction of Chemicals). Arsenic is classified as toxic and carcinogenic under CLP ("Classification, Labelling and Packaging") Regulation.

For further information on arsenic, please visit the '**HBM4EU Factsheet**' section.

Where can it possibly be found?

Arsenic (As) is a natural element that can be found in the environment, being present in rocks and soil, water, air, and in plants and animals.

There are two types of arsenic forms: inorganic and organic. *Inorganic arsenic* compounds contain arsenic combined with elements other than carbon and this form of arsenic tends to be the very toxic to humans. It may occur in drinking water and in soils, in some parts of the world where it either exists naturally or as a result of human activities in some industries. *Organic arsenic* compounds contain arsenic combined with carbon and other elements.

Source: HBM4EU

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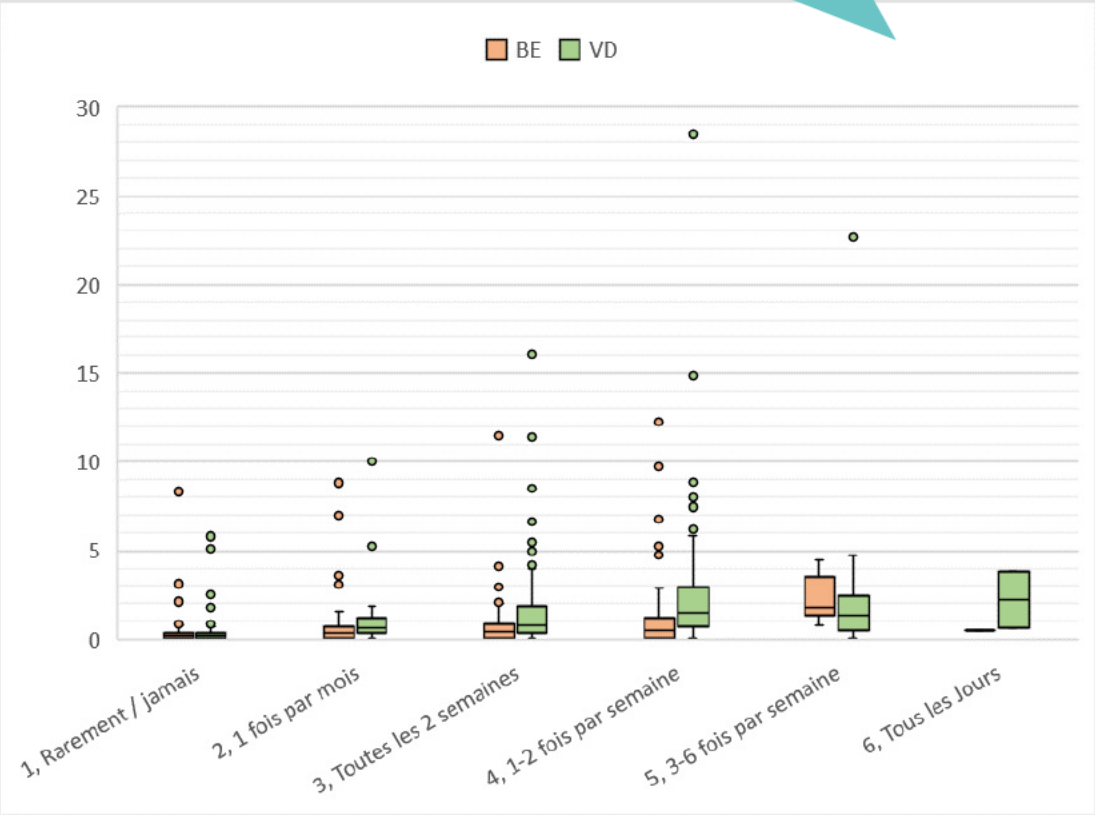
Teneurs en arsenic

en fonction des habitudes alimentaires

A quelle fréquence consommez-vous ce type d'aliment?

Fréquence de la consommation de **poisson**, de fruits de mer et de produits dérivés du poisson



PESTICIDES | WHAT YOU NEED TO KNOW

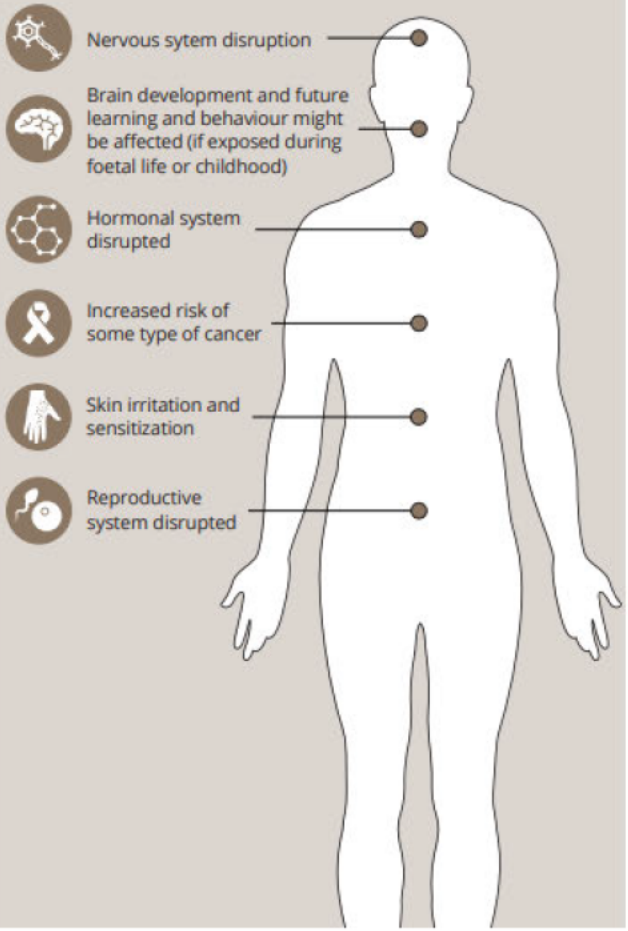
1 Possible sources of exposure

- Food
- Breast milk
- Contaminated drinking water
- Prenatal ingestion
- Occupational exposure (processing, mixing and applying pesticides in the field)
- Contaminated air and dust
- Residual air concentrations at home
- Occupational exposure (in contact with pesticides directly to the skin)
- Contaminated surfaces (residencial use of biocides)
- Handling pets (after treatment with pesticides)
- Medical product to combat head lice and scabies

2 How can pesticides enter your body?

- Via ingestion
- Via inhalation
- Via dermal absorption

3 How might pesticides affect your health?



4 How can you reduce your exposure to pesticides?

- ✕ **Never** remove labels from products
- ✓ **Consider** choosing organic food
- ✓ **Consider** consuming European commodities, as pesticide residues are often higher in products produced outside the EU and they can also contain pesticides that are not allowed for use in the EU
- ✓ **Rinse** fruits and vegetables before consuming them, remove the skin or outer leaves and wash your hands after touching unwashed fruits and vegetables
- ✓ **Use** pesticide-free methods for pest prevention in your home and garden
- ✓ **Prefer to use** a physical barrier for avoiding mosquitoes
- ✓ **To help** control fleas without pesticides, comb pets with a flea comb, regularly bath pets with pesticide-free shampoo, and wash pet bedding

If you apply pesticides:

- ✓ **Read** and **follow** the label instructions for use, storage, and disposal
- ✓ **Wear** protective clothing and equipment
- ✓ Always **keep** children and pets away
- ✓ After you are done, **wash** your hands, face, and clothing

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There are several policies in the European Union for protecting the public, workers and the environment from harmful exposures to pesticides such as restricting the use of certain pesticide active substances based on their level of toxicity. Other are related to setting maximum limits for pesticide residues in food, infant formulae, water for public consumption and in animal feed. The "Farm to Fork Strategy" sets an ambitious goal of pesticides by 50% and to reduce by at least 20% the use of fertilizers by 2030.

For further information on pesticides, please visit the 'HBM4EU Factsheet' section.

Where can they possibly be found?

Pesticides might be found in food, mainly fruit, vegetables and cereals.

Pesticides are widely used to protect plants and plant products in agriculture, forestry and horticulture from attack by fungi, insects and competing plants. They are also used to control harmful organisms to human or animal health, it can for example be disinfectants, a mosquito repellent, wood preservatives, rodenticides or antifouling paint for boats.

Source: HBM4EU