



science and policy
for a healthy future

HBM4EU project

Risk communication, principles and
cases in the context of HBM
applications

Paul T.J. Scheepers PhD

3rd HBM4EU Training School 2019

- Some communication principles
- Challenges of risk communication
- Communication to participants

Case-1 PFOA

- Communications to the public

Case-2 Pesticides in children

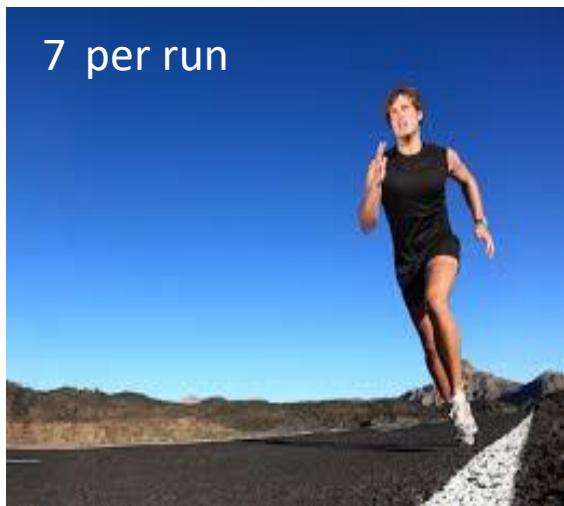
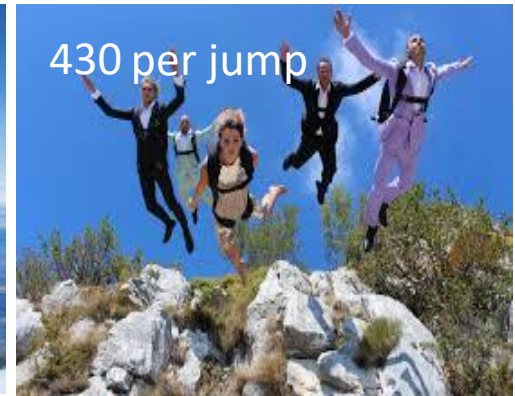
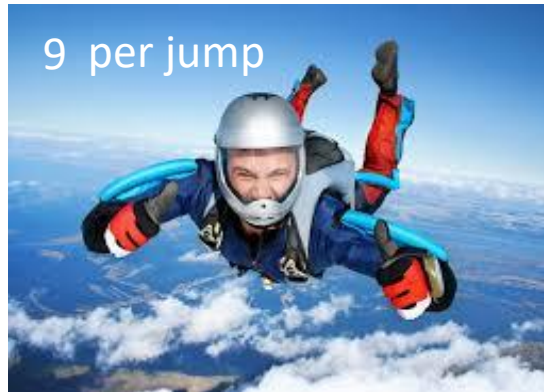
- Communication to policymakers



“There was no release of hazardous substances”

“When you hear the siren, go inside,
close doors and windows and turn
on your radio”





*Source: <https://en.wikipedia.org/wiki/Micromort>

Numbers can be very well used to make a point but often the units are the problem

Communication about the risk of traveling

WHAT'S THE SAFEST FORM OF TRANSPORT?

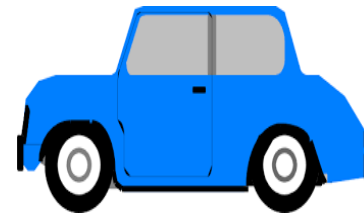
Travel distances that will raise your risk of dying by 1 in a million - short bars are bad



Communication about the risk of traveling

Deaths per billion (bn)

Type	per bn journeys	per bn hours	per bn km
Bus	4.3	11.1	0.4
Rail	20	30	0.6
Van	20	60	1.2
Car	40	130	3.1
Foot	40	220	54.2
Water	90	50	2.6
Air	117	30.8	0.05
Pedal cycle	170	550	44.6
Motorcycle	1640	4840	108.9



Net increase of
life expectancy
by 7 months

From: Hartog JJ et al. (2011) Do
the health benefits of cycling
outweigh the risks? Cien Saude
Colet. 16:4731-44

Introduction of a HBM study to potential participants:

- Explanation of the objectives
- Explanation of the intervention (what is requested)
- Benefits of the outcome for the participants
- Value of the outcome to science & society
- How will the final outcome be presented and to whom?

For every communication: who is the sender?

Communication procedure:

- Invitation by letter (+ brochure) – who is the sender?
- Additional information on a website (e.g. Q&A)
- Meeting with the researchers (individual or group)
- Opportunity to ask questions
- Signing of the informed consent
- Follow-up communications

Communication of results to the participants

- Group level and individual level
- How to explain about statistical outliers
- What if individual or group results are outside the range that is considered 'normal' background?
- How to address chance findings of clinical value

Communication of results in report with public access

- Ensure privacy
- Motivate aims
- Justify study design (and approved by ethics board)
- Declare samples lost or not analyzed
- Declare uncertainties
- Present outcome in context

Occurrence

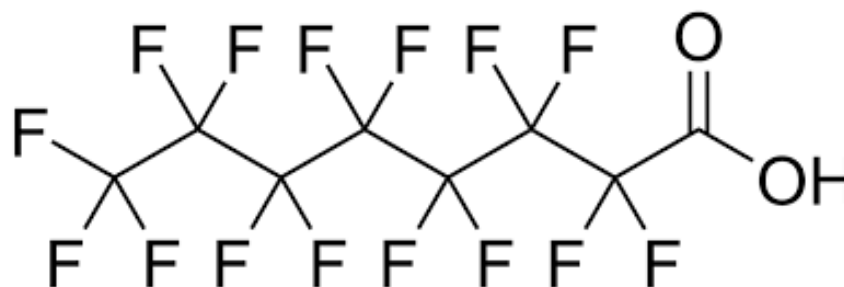
- Food packaging



- Floor and car wax



- Teflon production



Properties: water-repellent and oil repellent

Environmental fate: persists and accumulation in the food chain

Uptake: drinking water and by inhalation (primarily dust)

Toxicokinetics: elimination half-life from serum: 2-2.5 y

Dose	Effect	Evidence
<5 ug/L blood	Increase of LDL cholesterol	Consistent
	Birth weight somewhat reduced	Limited
	Changes in liver enzymes	Consistent
>5 ug/L blood	Increase of total and LDL cholesterol	Consistent
	2-3 x risk of high blood pressure during pregnancy	Limited
	2.5-3.0 x risk of normal risk of hyperuricemia (elevated uric acid)	Moderate
	Increased risk of colitis ulcerosa	Limited
	Reduced protection after flue vaccination	Consistent
> 20 µg/L blood	2 x increased risk for kidney cancer	Limited
	Reduced efficacy of all vaccinations	Limited
	Association with testis cancer	Limited



Dupont production plant in West-Virginia, US

Release in river water was related to cases of kidney cancer

Litigation in group of 3,500 local inhabitants

Total compensation of 671 Million USD



Dupont production plant in Dordrecht, NL

Used for 25 years between 1970 and 1997 and PFOA released in the air

Recently substituted by GenX which accumulates much less



Communication in Dordrecht was challenging because:

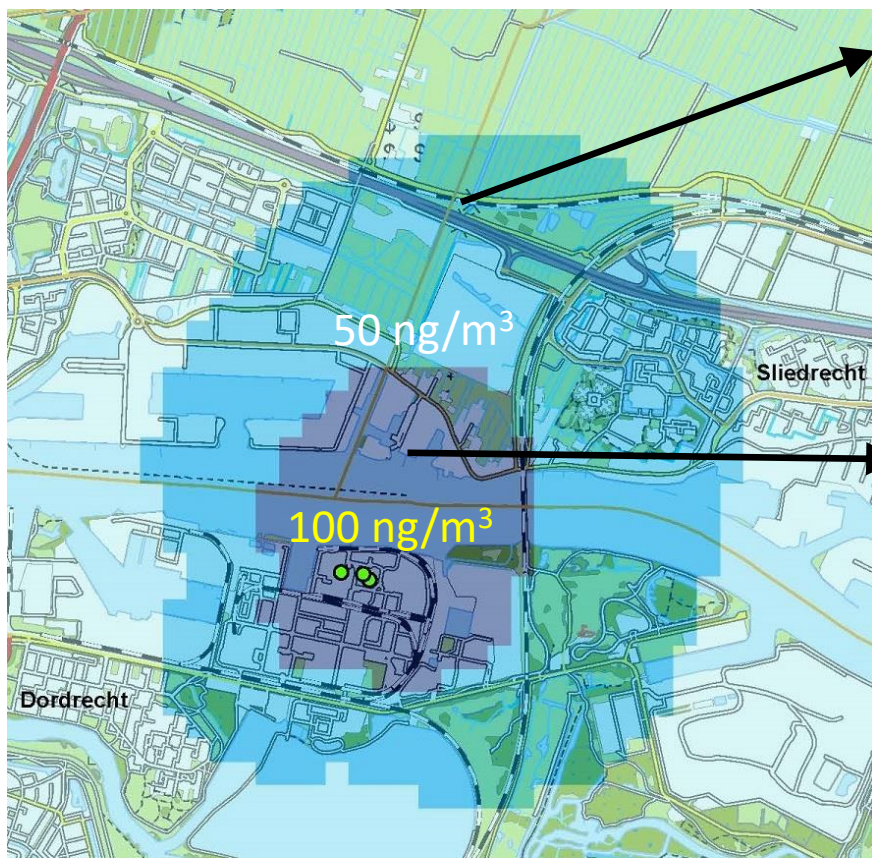
- Residents are concerned that PFOA may have caused or will cause adverse health effects
- This concern is triggered by news about litigations in US triggers
- RIVM derived their own guidance for PFOA plasma (higher than German HBM-I value)
- In the same period a commercial service for the analysis of plasma PFOA was offered for 80 €/sample
- PFOA plasma levels of individual inhabitants were in the news headlines
- Worker's exposures were also discussed in the media and in the US a confidential report with worker's plasma values became public (unintentionally).

Case-1: PFOA

Scenario-2: 5 000 kg/y (1970-1997)

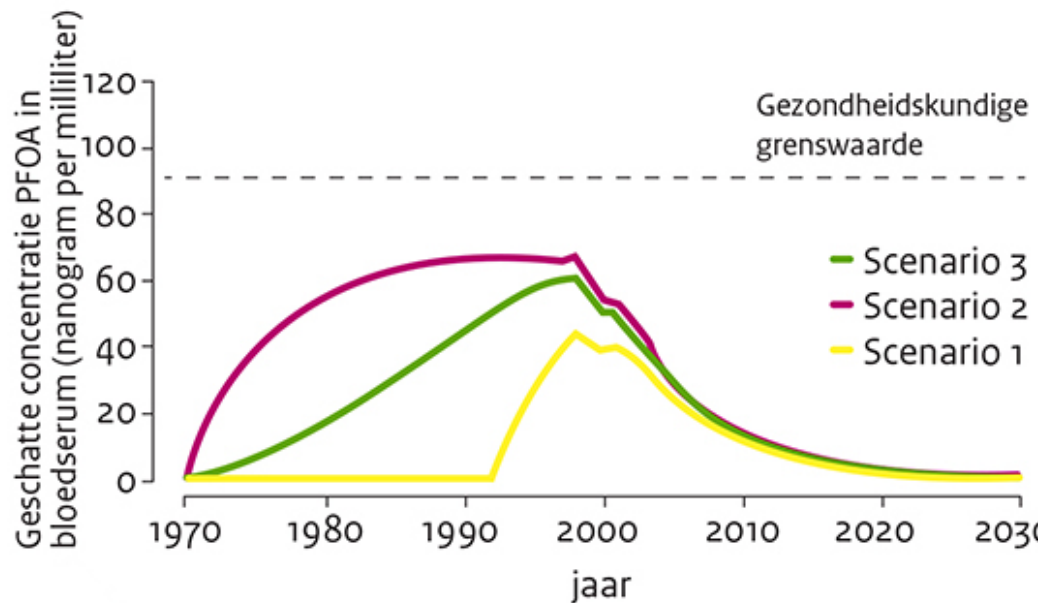
Scenario-3: 2 + gradual increase in 1970-1992

Scenario-1: 5 000 kg/y (1992-1997)

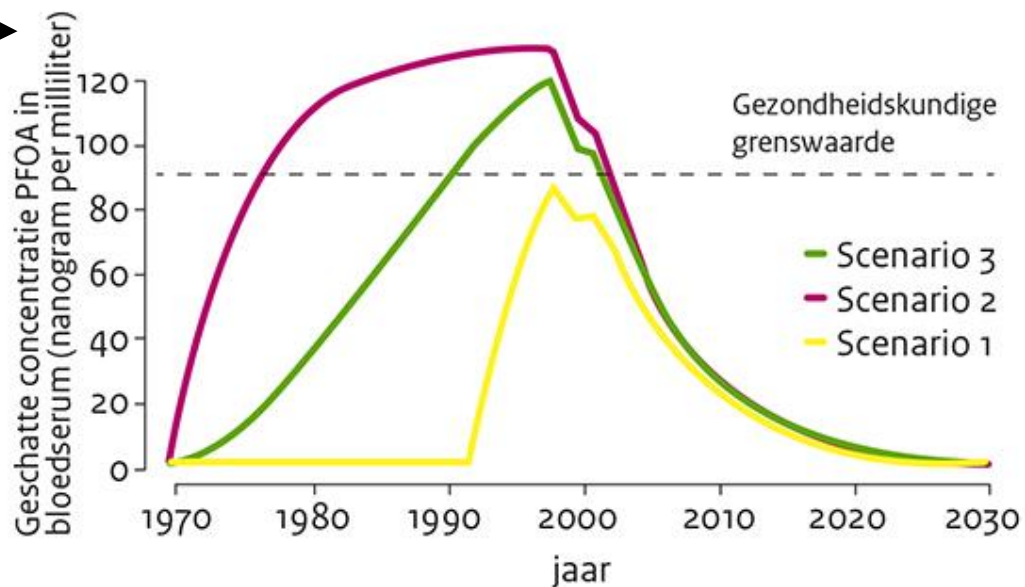


● Schoorsteen

Geschatte PFOA concentratie in bloedserum, lichtblauwe zone



Geschatte PFOA concentratie in bloedserum, donkerblauwe zone



Objective

To validate exposure model

Design

Random sample in adult population of inhabitants living close

Sample

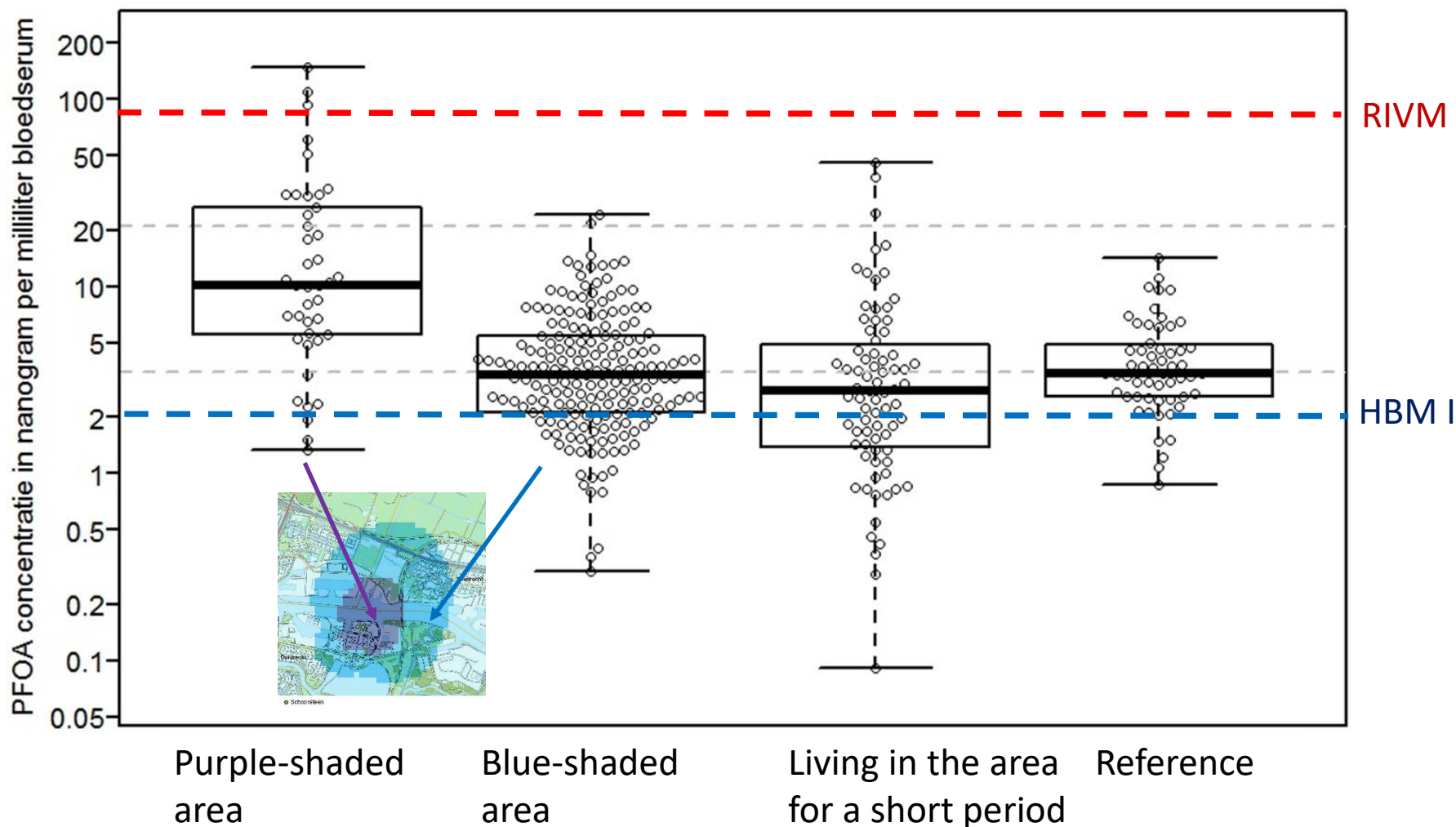
Venous blood sample by venapuncture

Ethics

Study is presented as 'exposure study' with no medical implications to be expected and the study protocol was therefore not submitted for ethics approval

Communication side effects:

- Media attention is high and follow-up news is easily triggered
- Local government decided to start a fund to support blood analysis for all
- Why was only PFOA analyzed and not other substances such as GenX?
- Follow-up questions for general practitioners were difficult to answer on a case-by-case basis
- Health complaints (even related) to PFOA cannot be treated
- Lawyers are trying to recruit inhabitants to build a legal case

Blood values of individual participants in $\mu\text{g/L}$ 

Exposure history

Long-term exposure to perfluorooctanoic acid (PFOA) in the past **may have affected the health** of people living nearby the DuPont/Chemours factory. This is partly because it is likely that the concentrations of PFOA in the blood were substantially higher in the past than have now been measured. The outcomes of the blood tests confirm previous model calculations. Residents who have lived in the vicinity of the factory for a long period of time have higher concentrations of PFOA in their blood than residents who live further away or who have lived in the vicinity for shorter periods of time.

These results are in line with an earlier risk assessment carried out by RIVM in 2016. The calculations revealed that **it is probable that the health-based threshold value for PFOA was exceeded** for a long period of time.

Source: <https://www.rivm.nl/publicaties/betekenis-resultaten-bloedonderzoek-pfoa-omwonenden-dupontchemours>

Scientific evidence

An analysis of various epidemiological studies shows that there are links between **undesirable changes in the body** and the PFOA concentration in the blood. Changes are noticeable even at relatively low PFOA blood concentrations, as occur in the general population. A link is most probable for changes in cholesterol, liver enzymes and birth weight.

Scientists are still unsure about the exact blood concentrations at which these undesirable changes occur in the body. On the basis of the available epidemiological information it is **not possible to demonstrate a causal relationship** between the undesirable changes and PFOA exposure.

Source: <https://www.rivm.nl/publicaties/betekenis-resultaten-bloedonderzoek-pfoa-omwonenden-dupontchemours>

Potential value of a health study

RIVM expects that an (individual) health study among local residents will produce **little to no health benefits** for the people in question. In some cases the undesirable changes in the body which may occur as a consequence of exposure to PFOA can already be detected by standard controls and can therefore be treated. The possible serious health effects (such as kidney cancer, testicular cancer and ulcerative colitis) occur **only on a very limited scale**.

As a result, the chance is small that a screening for these conditions will lead to the detection of any new cases. A number of the possible undesirable changes cause health effects that will be discussed in good time with GPs. **People who are concerned** about their health are advised to contact their GP.

Source: <https://www.rivm.nl/publicaties/betekenis-resultaten-bloedonderzoek-pfoa-omwonenden-dupontchemours>

Study of pesticide exposure of inhabitants who live close to agricultural land.

- Health Council of the Netherlands (2016): 'an exposure study should address exposure in young children'
- A method was developed for diaper testing
- Ethics approval was obtained to include children of all ages
- Families with young children were recruited
- Twenty+ diapers were collected
- Pesticide residues were found in a handful



Study of pesticide exposure of inhabitants who live close to agricultural land.

- Researchers themselves decided to give extra attention to the diaper findings in the concluding statements
- The letter of the minister to the parliament specifically highlighted this result
- This finding was also often used in the headlines of communications on social media.



Study of pesticide exposure of inhabitants who live close to agricultural land.

- A TV programme used as title: *'flower bulb poison in the baby diaper'*
- The topic was framed in interviews with parents with young children. One of the parents was pregnant
- A government expert was asked: can you guarantee that children will not suffer any health consequences from these pesticide exposures?



Study of pesticide exposure of inhabitants who live close to agricultural land.

Action perspective during spraying:

- Talk about your concerns
- Close doors/windows
- Remove laundry

MEMO/03/219

Bruxelles, 6 November 2003



Presence of persistent chemicals in the human body.

Results of Commissioner Wallstrom's blood test

The presence of persistent chemicals in the human body and their **potential harmful effects** is amongst the problems addressed by the European Commission's recent proposal for a new regulatory framework for chemicals (REACH - see IP/03/1477).

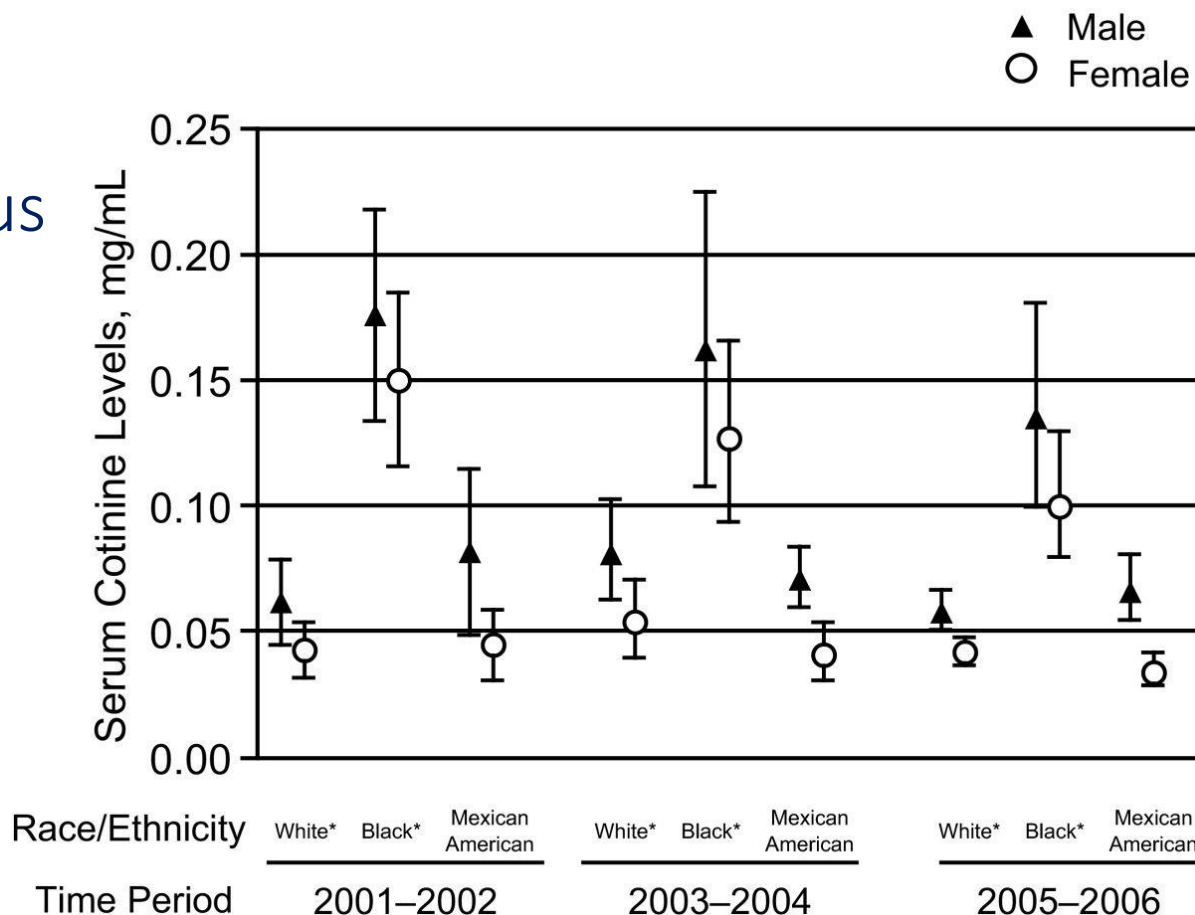
To illustrate this problem, Margot Wallström, European Commissioner for Environment, submitted a **sample of her blood** for testing. The results of these tests, which give a record of the chemicals to which Mrs Wallström has been exposed and which have **accumulated in her body**, have been published by the European Commission today

Out of the 77 chemicals analysed, the laboratory in UK **found 28 chemicals** in Mrs Wallström's blood

Source: http://europa.eu/rapid/press-release_MEMO-03-219_en.htm?locale=en

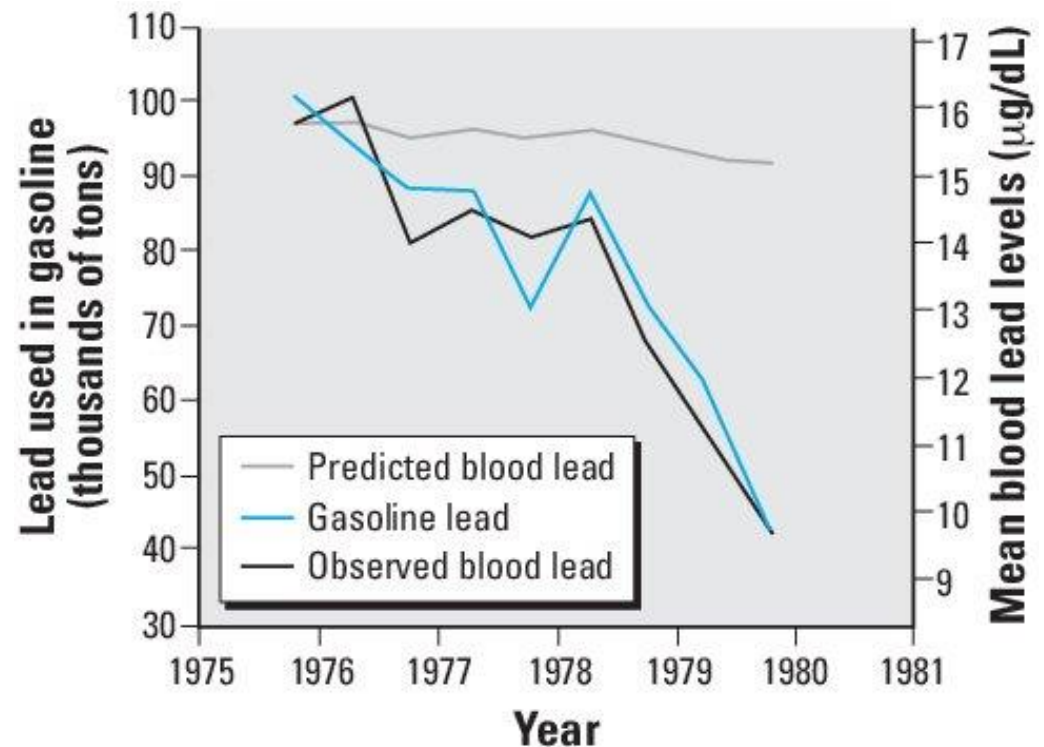
3rd HBM EU Training School, Bmo, June 17-21, 2019

“...disparities noted in previous research persist today, with the **young, non-Hispanic Blacks**, and males experiencing higher levels of exposure.”

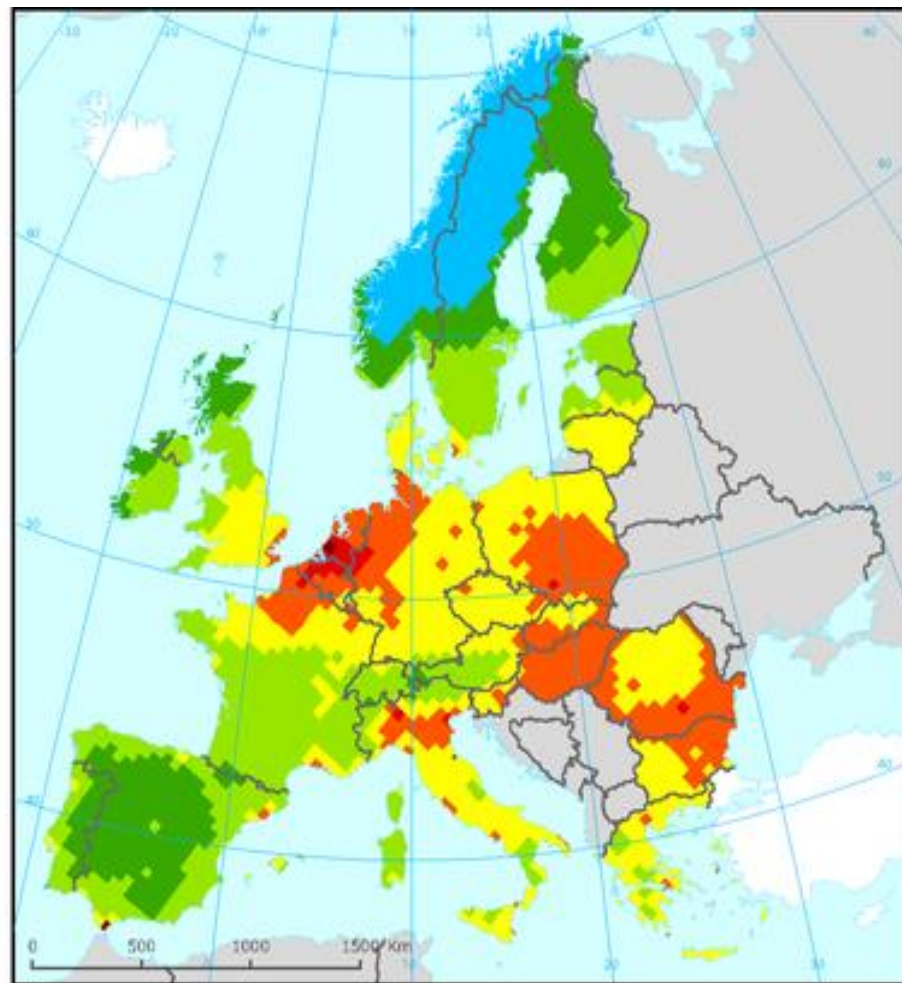
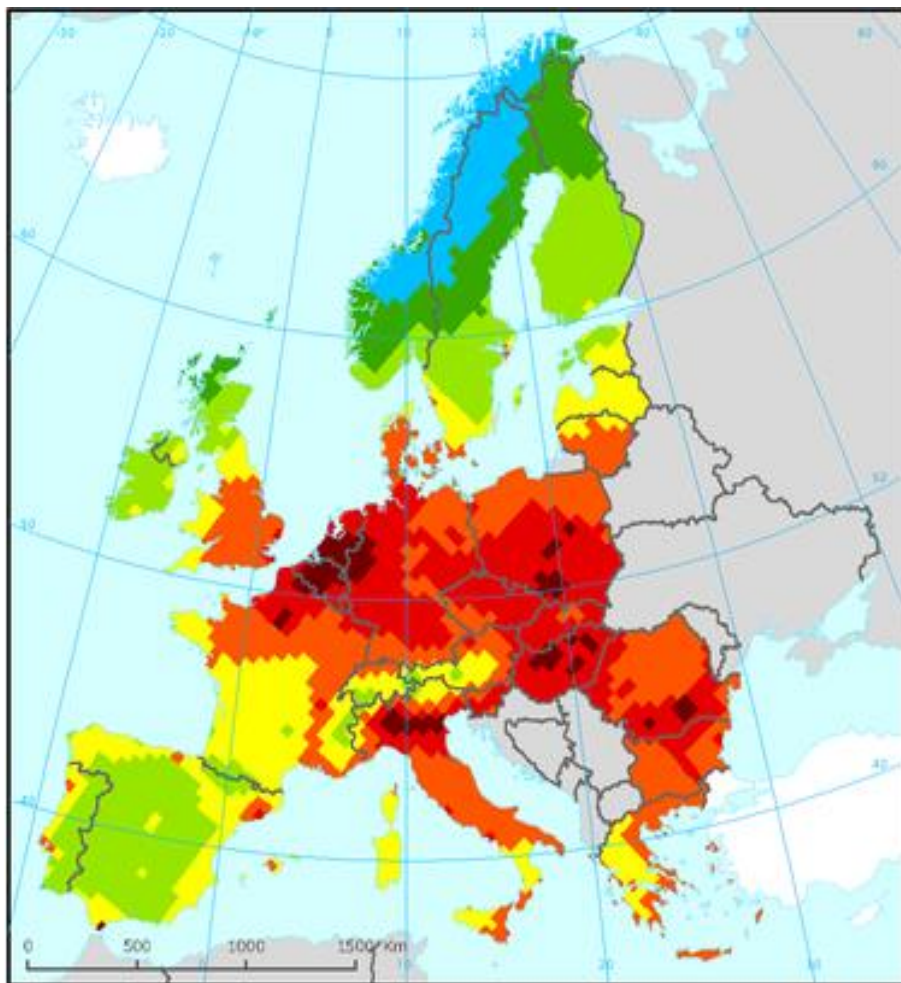


Chen *et al.* 2010 BMC Public Health 10:359

Figure 2. Sharp decline in human lead levels in the United States, as demonstrated in the NHANES III data set, compared with the levels predicted by U.S. EPA calculations (CDC 2005; Needham 2005). This decline continued for two decades.

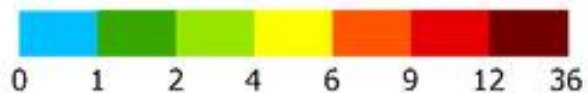


From: Paustenbach and Galbraith (2006) Environ Health Perspect. 114(8): 1143–1149.



Estimated losses in life expectancy attributable to exposure to fine particulate matter (PM_{2.5}) from anthropogenic emissions for 2000 (left) and 2020 (right)

Months



No data

Outside study area

To take home

Participants want to know the **sender** and the **funder**

Lay persons can often handle **numbers** but not **units**

Policy-makers would like to have **facts** and **figures**

Even if you manage **expectations** participants may still have other **perceptions** than expected by the researcher

The public will accept that scientists have **limited knowledge** and **understanding**

Contacts

paul.scheepers@radboudumc.nl

Speaker's information

Paul T.J. Scheepers PhD works as associate professor at the Radboudumc, Nijmegen, The Netherlands. He received training in toxicology and occupational hygiene. In HBM4EU he is responsible for training activities as task leader in WP2. He is a member of the ethics board in WP1.



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 733032.