

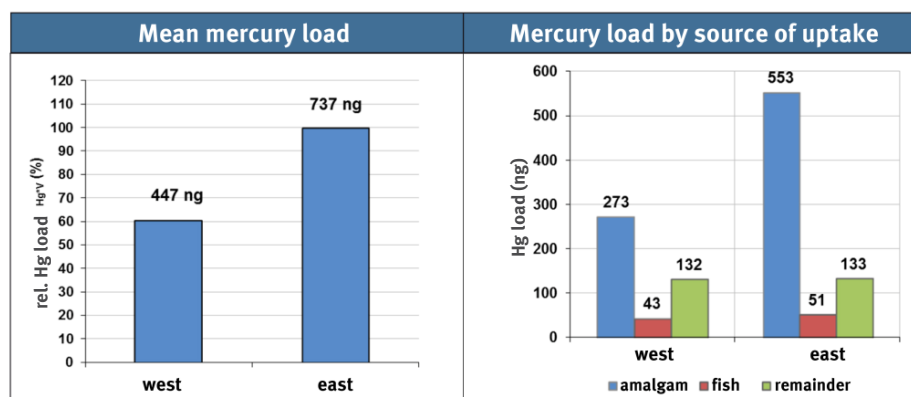
Young adults in Germany: Mercury body burdens on the decline – but vary by region

A research project recently completed shows that mercury exposure of young adults in Germany is constantly declining. The study analysed data on urine samples archived by the German Environmental Specimen Bank (ESB) in the period 1995 to 2013 and collected at four locations, i.e. Münster/Westphalia and Ulm (in western Germany) and Halle/Saale and Greifswald (in eastern Germany). The data evaluated came from 7,804 students 20 to 29 years of age and included total mercury levels in urine, number of dental amalgam fillings, various clinical, anatomical and physiological parameters (e.g. creatinine concentration, urine volume per day, body mass index), conditions at place of residence, and eating, drinking and smoking habits. For the evaluation, a basic model was developed which considers the main exposure routes and refers to mercury loads (ng Hg per day).

The project was carried out by Fraunhofer ITEM in cooperation with Fraunhofer IME and QuoData GmbH as part of the research accompanying the ESB.

Results of the study

Analysis of the entire group revealed that the mean mercury load in students born in eastern Germany is about 40 percent higher than that of students from western Germany. Further evaluation showed that this east/west difference is largely attributable to the

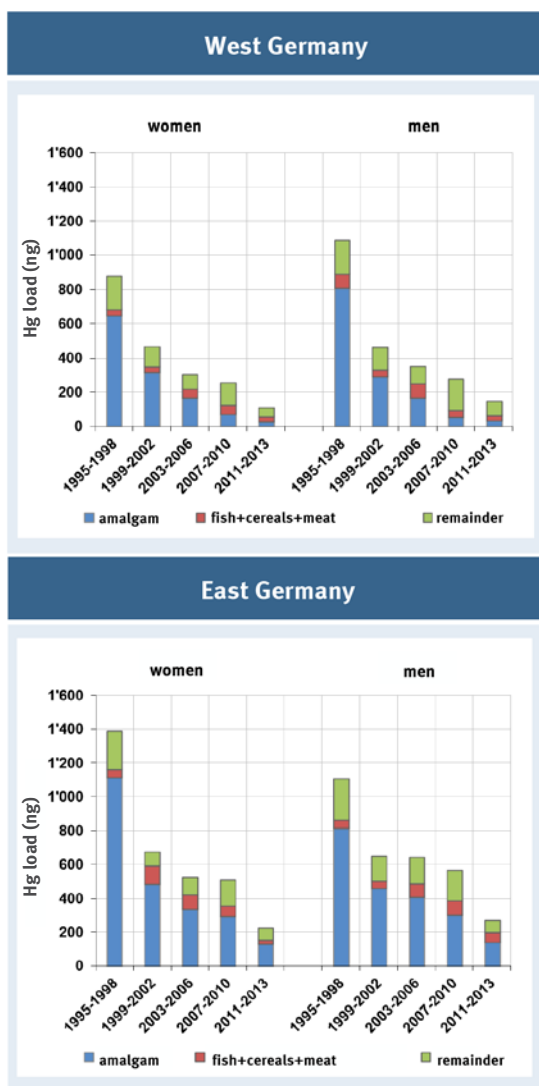


exposure source 'amalgam': students from eastern Germany have more dental amalgam fillings than students from western Germany.

In contrast, the fraction of the mercury load that is attributable to fish consumption is almost identical in the two groups. The inclusion of cereal and meat consumption slightly improved the model. Other potential sources of mercury intake (e.g. beverages, tobacco smoke) could not be shown to make a significant contribution to the total mercury load. This left a non-modelled contribution ('remainder') which does not differ between eastern German and western German students.

Marked decline in exposure since 1995

To study trends over time, the dataset was divided into 4-year intervals. In addition, the east/west cohorts were separated by gender in order to detect possible gender-specific differences in mercury loads.



Overall, a marked decline in the mercury load over time was observed, with subjects from eastern Germany mostly exhibiting higher loads. Exposure via amalgam fell quickly and continually in students from western Germany.

This decline was slower in students from eastern Germany, so that at the end of the observation period amalgam accounts for a significantly higher share of their total loads by comparison. The contribution made by the consumption of fish, cereals and meat is similar both in men and women and in students from western and eastern Germany, and did not change significantly over time. Uptake from non-modelled sources fell over time, but also shows distinct variations between 4-year intervals.

It should also be noted that amalgam's contribution to the mercury load in young adults has become less dominant in recent years whilst the contribution due to eating habits shows an upward tendency. From 2007 onwards, non-modelled sources accounted for over 50 per cent of the total mercury load in students from western Germany, and this contribution is assumed to largely reflect mercury exposure from the environment. It was not, however, possible in the project to model this uptake with environmental data from the Environmental Specimen Bank, as relevant exposures seemed too low to be statistically measurable alongside the comparatively high exposure via amalgam and food consumption.

The German Environmental Specimen Bank (ESB)

Established in the early 1980s, the ESB regularly collects specimens from ecosystems throughout Germany – from coastal areas to agglomerations to mountain regions. In addition to typical representatives of different trophic levels such as alga, mussel, fish and seagull, it also collects human samples (blood and urine) from students at four locations in Germany. Specimen collection and processing is carried out on the basis of standardized guidelines. The specimens are analysed for a defined spectrum of pollutants and then frozen and stored.

This wealth of data accumulated over many years is used increasingly for cross-cutting analyses, where available results from the analysis of human and environmental specimens are evaluated jointly to uncover links between exposures.

- **Report “Integrierte Bewertung von Quecksilber anhand der Erhebungen der Umweltprobenbank des Bundes (UPB)” (in German language with English abstract)** [short link: <http://bit.ly/1LKBxnB>]
- **Information on the Environmental Specimen Bank** [short link: <http://bit.ly/1LbVSRn>]

Imprint

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