

Before HBM4LV: the historical background of human biomonitoring in Latvia and key activities of the project



Linda Matisāne
Ivars Vanadziņš

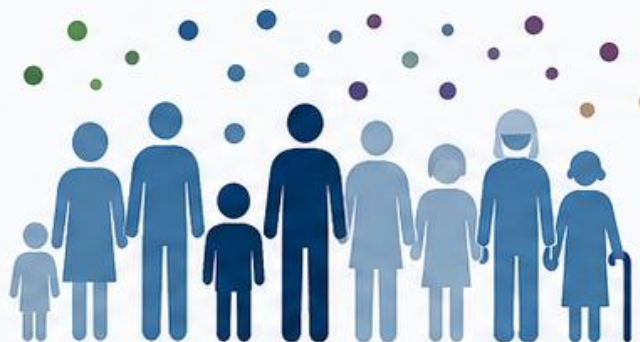
Date
29.05.2026.

HUMAN BIOMONITORING (HBM) IN LATVIA – CURRENT SITUATION



So far, only a few sporadic HBM studies have been conducted in Latvia.

The available data from these studies are **not comprehensive enough** to provide a detailed evaluation of chemical exposure across the population.



The previous attempts to carry out HBM studies were primarily **project-based** and, therefore, focused on a **narrow area**, for example, the exposure to **persistent organic pollutants** in breast milk.

PREVIOUS ATTEMPTS – LIMITED IN SCOPE



Project-based studies with a narrow focus

For example, exposure to persistent organic pollutants in breast milk.



Research by non-governmental organizations

Exposure to plastics.



House dust studies

House dust samples, unfortunately lacking a properly elaborated methodology.

SPECIMEn PROJECT IN LATVIA – STUDY DESIGN AND METHODS

DATA SOURCE

Data on Latvian residents were obtained from the dataset that covered persons who participated in the SPECIMEn study as part of the European biomonitoring initiative HBM4EU.

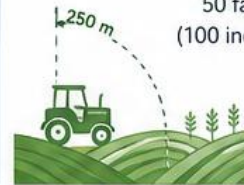


STUDY POPULATION

Participants were assigned to either a control or an **exposed group**. (Individuals were defined as those living within 250 m of agricultural land where pesticides are used in crop cultivation).

EXPOSED GROUP

50 families
(100 individuals)



CONTROL GROUP

51 families
(102 individuals)



Two participants from each household were included: one adult and one child aged 6 to 11 years.



Adults
n = 101



Children (6–11 years)
n = 101

STUDY TIMELINE AND SAMPLE COLLECTION

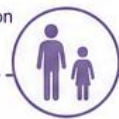
Urine samples were collected from each participant at two time points to assess the seasonal impact on pesticide and/or metabolite levels.



WINTER SEASON
February / March 2020



Urine sample collection



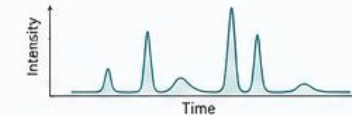
SUMMER SEASON
June 2020

Urine sample collection



ANALYTICAL METHODS

To detect pesticides and their metabolites in urine samples, a screening approach based on liquid chromatography coupled to high-resolution mass spectrometry (LC-HRMS) was used.



POSSIBILITIES FOR SECONDARY DATA ANALYSIS

Consumption of fruit and vegetables



Dietary data collected through questionnaires allow for analysis of the relationship between fruit and vegetable consumption and pesticide/metabolite levels.



Geospatial area analysis



Geospatial data enable analysis of environmental and land-use factors, such as proximity to agricultural land, land cover, and other spatial determinants of exposure.



Establishment of the Latvian Human Biomonitoring Programme – HBM4LV

Project/Contract No.: VPP-VM-Sabiedrības_Veselība-2023/4-0001



THE FIRST SYSTEMATIC HBM STUDY IN LATVIA

The study “Establishment of the Latvian Human Biomonitoring Programme – HBM4LV” is the first systematic study in the field of human biomonitoring in Latvia.

Within a unified methodological framework, representative data on residents' exposure to several priority chemical groups were obtained – pesticides, metals, persistent organic pollutants and other substances.



IDENTIFICATION OF PRIORITY SUBSTANCES



Potential substances for the HBM (CBM) program were identified



Substances were evaluated according to a defined methodology



The Latvian Human Biomonitoring Council approved a list of



30

high-priority chemical substances

These substances were included in the HBM4LV programme and analyzed within the pilot project.



PILOT PROJECT – BIOLOGICAL SAMPLES AND ANALYSES

During the pilot project, biological samples (blood and urine) from selected Latvian residents were analyzed to detect pesticides, phthalates, per- and polyfluoroalkyl substances (PFAS), as well as metals, reflecting the impact of daily environmental, dietary and other exposure pathways.



Biological samples:
blood and urine

Analyzed substance groups



Pesticides



Phthalates



PFAS



Metals

... and other substances

KEY FINDINGS



Some substances were detected widespread.



In some cases, elevated concentration levels or exceedances of reference and biomonitoring guideline values were observed, indicating potentially increased exposure situations.



Pilot results confirmed that HBM is an effective tool for assessing real exposure, as it integrates the total impact of all exposure pathways, regardless of the origin of individual sources.



The importance of individual habits and choices in chemical exposure was also highlighted, emphasizing the need to complement regulatory measures with targeted public information and education activities.

LIMITATIONS AND INFRASTRUCTURE ACHIEVED



The main limitation of the pilot project is the relatively small number of participants, which limits the possibility to draw conclusions that characterize the entire population of Latvia.

At the same time, the project demonstrated the institutional capacity and practical feasibility of implementing the HBM approach in Latvia.



BIOBANK ESTABLISHED

A biobank (collection of biological samples) was created.



SAMPLE CODING AND STORAGE

Blood and urine samples were coded and stored under appropriate long-term conditions.



DOCUMENTATION AND SYSTEM

Documentation and a record-keeping system were developed to ensure efficient use of samples for future analyses.



STRONG FOUNDATION FOR THE FUTURE

This infrastructure provides a solid basis for future research, expanding the range of analytes, applying new analytical methods and ensuring data comparability over time.



These studies serve as an important benchmark for future research, as HBM becomes a key instrument that influences and drives the development of health policies.

WHY AN ONGOING NATIONAL HBM PROGRAMME IS NEEDED



The results clearly show the need to establish a sustainable national HBM programme in Latvia that will ensure regular and representative monitoring of residents' exposure, support evidence-based public health policy planning and contribute to the timely identification and reduction of chemical risks, ultimately improving public health.

HOW HBM SUPPORTS HEALTH POLICY AND PUBLIC HEALTH



REAL EXPOSURE ASSESSMENT

HBM measures what actually enters the human body, unlike traditional approaches based on environmental or food contamination assessments.



IDENTIFICATION OF RISKS

Allows identification of public health risks, high-risk groups, areas with higher pollution burden and priority chemical substances.



EVALUATION OF POLICY EFFECTIVENESS

Provides a basis for evaluating the effectiveness of policies and regulations by assessing whether exposure truly decreases after restrictions are introduced.



EVIDENCE FOR INVESTMENT PLANNING

Provides evidence-based justification for investment and supports decisions on public health programmes, environmental and occupational safety improvements, and

Enhances public awareness and ownership of environmental improvements, and early interventions.



PUBLIC TRUST AND TRANSPARENCY

Enhances public trust by providing clear, evidence-based information on risks and on actions taken by authorities.



INFLUENCING AND SHAPING POLICY

HBM becomes a powerful tool that informs and drives the development of health policies.

Before HBM4LV: the historical background of human biomonitoring in Latvia and key activities of the project

