Group 1 National Hub Template (HBM data for Awareness)

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Introduction:	
• Background information on the evolution and status of HBM in your country e.g COPHES/DEMOCOPHES and EU programs.	The Norwegian Institute of Public Health (NIPH) has been involved in human biomonitoring (HBM) since the 1980s and has at present a state-of-the-art HBM-platform. The last decades the focus has been on developing high throughput methods using low sample volumes, to be used in cohort studies. Both persistent and non-persistent environmental pollutants are covered. NIPH has also established the "Norwegian Environmental Biobank" where biological samples are collected together with questionnaire data. The information can be linked to other health registries. NIPH has performed HBM in several EU-funded projects, the most recent ones being A-TEAM, Euromix, Helix and Athlete in addition to HBM4EU. The HBM data are used for surveillance of the population's exposure to environmental pollutants, as input for risk assessments and in research projects to study associations with different health outcomes.
Main text - Results and Discussion ENSURE YOUR NARRATIVES ARE REFERENCED AS FAR AS POSSIBLE	
• Description of issue(s) which have resulted in the raising of awareness. • Include brief description of sample population, substances of concern and whether local/regional/national. • Give example of cases and specific studies	Through the years different situations have resulted in awareness of HBM; eg. the WHO breast milk monitoring program and contamination of the fjords, which led to several biomonitoring projects. In the 1990s high levels of flame retardants were measured in trout caught in the largest lake of Norway – a lake popular for hobby anglers. A biomonitoring study was performed to assess the exposure of the anglers and dietary recommendations were issued. Another more recent example which is of specific relevance for the Nordic countries, is the use of PFAS in skiwax. HBM studies revealed elevated PFAS levels in both amateur and professional ski waxers.
• Description of HBM programme if it exists e.g. implementation of a HBM module into HES or relevant other activities funded by the government.	A Human Environmental Biomonitoring program that use the Norwegian Mother, Father and Child Cohort Study (MoBa) as a basis for recruitment, has been established at NIPH. MoBa is an ongoing prospective pregnancy cohort which includes 114 500 children, 95 200 mothers and 75 200 fathers (Magnus et al. 2016). Part 1 of our biomonitoring program includes analyses of elements and nutrients in 3 000 blood and urine samples that were collected from women during mid-pregnancy. In Part 2 of the program, new biological samples (blood and urine) were collected in 2016/2017 from a subset of children and

	their parents from Part 1 and from additional MoBa participants. This collection is referred to as the "Norwegian Environmental Biobank" (NEB) and constitutes samples from about 1800 individuals, *i.e*. around 600 families. All data from NEB can be linked to numerous questionnaires already collected in MoBa, as well as to national health registries. We are presently working on Part 3 of the program, where samples /questionnaires are to be collected in 2022. In Part 1, a range of biomarkers have been measured, including nutrients, essential elements, heavy metals, and biomarkers of health status. In samples from the children in Part 2, a number of environmental pollutants have been determined (*e.g.* PFASs, plasticizers, parabens and bisphenols, acrylamide, flame retardants, PCBs and pesticides), as well as different biomarkers relevant for health as part of the aligned study in HBM4EU. The NEB is a future resource of stored human specimens, as well as a continuously growing database of measured levels of nutrients, biomarkers of exposure and biomarkers of effect. This will be an important tool for national and international health risk assessments and efforts to reduce exposure to environmental pollutants, as well as a basis for research projects.
• Describe which ministries (Environment, Health etc.)/policy makers and stakeholders involved/steering/financing the HBM programme. • Give examples - specific chemicals or outcomes.	NIPH is placed under the Ministry of Health and Care Services. The steering committee of NEB consists at present only of NIPH.
• Steps/processes needed or used to get the attention of policy makers.	Several authorities and institutes are involved in the national hub and we find this a fruitful way to interact, discuss and bring attention forward to policy makers through respective channels. Further, NIPH provides science based knowledge and advices both to the environmental and health authorities. A close collaboration is needed and results in attention of the policy makers as well.
• Describe barriers e.g funding; challenges e.g. participant recruitment; opportunities e.g. enhancing cross government working and linking of env data with	Long-term funding framework for collection of samples and HBM is needed; the infrastructure is available and up and running. I think this has been well addressed in HBM4EU through the annual NH questionnaires.

exposure measurements currently at play in your country with regards to HBM. • Have any of these barriers been addressed by HBM4EU? If yes - describe.	
• Other players who would be beneficial in raising awareness and working together to promote HBM	
Future plans - • Are there plans to use HBM data in the future for policy or awareness - give clear examples. Will the data from HBM4EU be used?	The Ministry of Health in Norway presented an opinion to the Parliament in 2019 describing their visions for Public Health. Here it is stated (amongst a wide range of other topics) that the government wants to continue the collaboration with other European countries to survey the general population's exposure to environmental pollutants, and to enlarge the knowledge base on these exposures' potential impact on health. This is further mentioned in the chapter on "Green Health" in their International Strategy (2021-2025), as well as in the action plan for "a toxic free everyday life", just launched by the Ministry Climate and Environment. The NIPH has funded a second collection of samples for NEB to take place in 2022, that we plan to involve in PARC and develop further, to have a sustainable surveillance of the populations' exposure to hazardous chemicals and changes in diet, as well as to generate a rich data source of exposures that can be linked to health information/registries to be used in future risk assessments and research projects at European level.