

Design of the French Environmental Health Biomonitoring Physical Activity and Nutrition Survey called “Esteban”

C. Fillol¹, A. Oleko¹, E. Szego², J. Contrerès¹, C. Lemoisson¹, C. Delamaire¹

1/ Environment and Health Department (DSE), French Institute for Public Health Surveillance (InVS), Saint-Maurice, France; 2/ Chronic Diseases and Injuries Department (DMCT), InVS, Saint-Maurice, France

Background

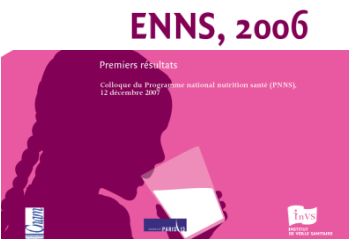


COMMISSION DES COMMUNAUTÉS EUROPÉENNES
Bruxelles, le 9.6.2004
COM(2004) 416 final

European Action Plan 2004-2010 for health and environment



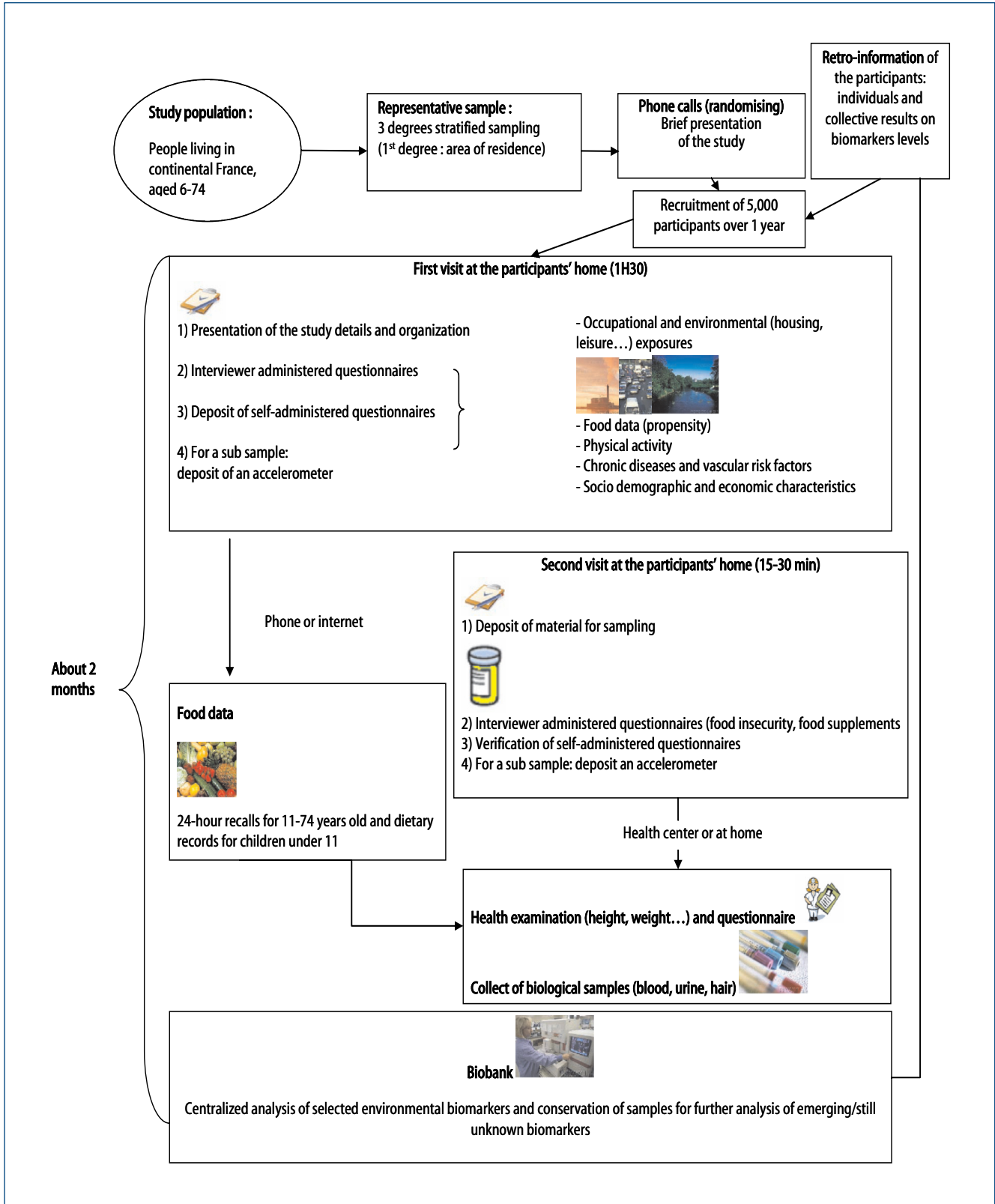
- A steering committee consisting of the French Institute for Public Health Surveillance (InVS), the Health ministry, the Environment ministry and other Public Health Agencies has decided to implement as a first step in this program a general population cross-sectional biomonitoring survey coupled with health examinations and involving a nutritional component;
- The nutrition surveillance component answers to the national nutrition and health Plan 3 (2011-2015) and the obesity plan 2011-2013;
- Pre-existing study in the French general population: ENNS 2006.



Objectives

- Describe levels of impregnation and some of their determinants, in order to establish reference values;
- Describe food consumption and physical activity;
- Estimate the prevalence of chronic diseases (diabetes, chronic kidney disease, COPD, asthma) and vascular risk factors (hypertension, dyslipidemia) and the part of undiagnosed diseases;
- Estimate the prevalence of atopy, asthma and allergic diseases in children.

Study design



Biomarkers selection

An iterative consensus process (adapted from Delphi) among experts was used to obtain a prioritized list of biomarkers' families. It was followed by stakeholders consultation.

Each Biomarker family was finally ranked in order of priority A (high priority) or B.

N°	Biomarker family	Priority	Biomarkers	Matrix
1	PCB-Dioxins-Furans	A		Serum
2	Metals	A	Lead	Blood
		A	Cadmium, Mercury, total Arsenic, Aluminium, Antimony, Nickel, Cobalt	Urine
		A	Mercury	Hair
		A	Arsenic and metabolites	Urine
		B	Other : Barium, Beryllium, Boron, Copper, Gold, Iridium, Iron, Lithium, Manganese, Palladium, Thallium, Tin, Tungsten, Uranium, Zinc	Urine
		B	Chrome, Cesium, Molybdenum, Platinum, Selenium, Vanadium	Urine
3	Benzene	A	Benzene	Urine/blood
4	Cotinine	A		Urine
5	Phthalates	A	Metabolites of di-2-ethylhexyl phthalates (DEHP)	Urine
		A	Metabolites of dibutyl phthalate (DBP)	Urine
		A	Other phthalates metabolites: Mono-methyl phthalate MMP (metabolite of dimethylphthalate DMP), Mono-ethyl phthalate MEP (metabolite of diethylphthalate DEP), Mono-benzyl phthalate MBzP (metabolite of benzylbutylphthalates BzBP), Mono-cyclohexyl phthalate MCHP (metabolite of dicyclohexylphthalate DCHP), Mono-n-octyl phthalate MOP (metabolite of di-n-octylphthalates DOP), Mono-(3-carboxypropyl) phthalate MCPP (metabolite of di-n-octyl phthalates DOP), Mono-isononyl phthalate MINP (metabolite of di-isononyl phthalate DINP)	Urine
6	Bisphenol A (free and total)	A		Urine
7	Perfluorochemicals	A	Perfluorooctanoic acid (PFOA)	Serum
		A	Perfluorooctane sulfonic acid (PFOS)	Serum
		B	Other: Perfluorohexane sulfonic acid (PFHxS), 2-(N-Ethyl-perfluorooctane sulfonamido) acetic acid (Et-PFOSA-AcOH), 2-(N-Methyl-perfluorooctane sulfonamido) acetic acid (Me-PFOSA-AcOH), Perfluorodecanoic acid (PFDeA), Perfluorobutane sulfonic acid (PFBSu), Perfluoroheptanoic acid (PFHpA), Perfluorononanoic acid (PFNA), Perfluorooctane sulfonamide (PFOSA), Perfluoroundecanoic acid (PFUnA), Perfluorododecanoic acid (PFDoA), Perfluorobutanoic acid (PFBA), Perfluoropentanoic acid (PFPA), Perfluorohexanoic acid (PFHxA), Perfluoroheptane sulfonic acid (PFHpS), Perfluorodecane sulfonic acid (PFDS)	Serum
8	VOCs	A	Trihalogenomethanes (Chloroform, bromoform, bromodichloromethane, dibromochloromethane)	Serum
		A	1,5- Dichlorophenol (metabolite of 1,4-dichlorobenzene)	Urine
		A	Tetrachloroethylene, Trichloroethylene	Serum
		B	1,2-Dichlorobenzene, 1,3-Dichlorobenzene	Serum
		B	1,1,1-Trichloroethane (methylChloroform), 1,1,2,2-Tetrachloroethane, 1,1,2-Trichloroethane, 1,1-Dichloroethane, 1,2-Dichloroethane, Hexachloroethane, 1,1-Dichloroethylene, cis-1,2-Dichloroethylene, trans-1,2-Dichloroethylene, 1,2-dibromo-3-chloropropane, 1,2-Dichloropropane, Carbone tetrachloride, Dibromomethane, methylene chloride, Methyl-tert-butyl ether (MTBE)	Serum
		B	Chlorobenzene, Ethylbenzene, Nitrobenzene	Serum
		B	m-/p-Xylene, o-Xylene, Styrene, Toluene	Serum
9	PCB non dioxin like	A		Serum
10	Polybrominated compounds	A	BDE 15, BDE 17, BDE 25, BDE 28, BDE 33, BDE 47, BDE 66, BDE 85, BDE 99, BDE 100, BDE 153, BDE 154, BDE 183, HBCD, BB153	Serum
		A	Deca-BDE 209	Serum
11	Pesticides	A	Chlorophenols : 4-MCP, 2,4-DCP, 2,5-DCP, 2,6-DCP, 2,3,4-TCP, 2,4,5-TCP, 2,4,6-TCP, PCP, 2,3,4,6-TeCP	Urine
		A	Organophosphorus Insecticides: Dialkyl Phosphate Metabolites : DMP, DMTP, DMDTP, DEP, DETP, DEDTP	Urine
		A	Pyrethroid pesticides: F-BPA, Br2CA, Cis-Cl2CA, Trans-Cl2CA, 3-PBA, CDCA chrysanthemum dicarboxylic acid	Urine
		A	Organochlorine pesticides: aldrin, HCB, DDT/DDE, alachlor...	Blood
		B	Other herbicides: atrazine and metabolites, glufosinate...	Urine
		B	Organophosphorus Insecticides: Specific Metabolites: Diazinon, chlorpyrifos...	Urine + Serum
		B	Carbamate insecticides metabolites: propoxur...	Urine
		B	Other pesticides: linuron, fipronil...	Urine + Serum
12	PAH	A	1-Hydroxypyrene	Urine
		A	3-Hydroxybenzo[a]pyrene (benzo[a]pyrene)	Urine
		A	1naphtol, 2naphto	Urine
		B	Other PAH metabolites	Urine
13	Glycol ethers	B	MAA (methoxyacetic, metabolite of ethylene glycol methyl ether); EAA (ethoxyacetic acid, metabolite of ethylene glycol ethyl ether); BAA (butoxyacetic acid, metabolite of ethylene glycol butyl ether); PhAA (phenoxyacetic acid, metabolite of phenoxyethanol); PAA (propoxyacetic acid, metabolite of ethylene glycol n-propyl ether); MPA (methoxypropionic acid, metabolite of the beta isomer of propylene glycol methyl ether); MEAA (methoxyethoxyacetic acid, metabolite of diethylene glycol methyl ether); EEAA (ethoxyethoxyacetic acid, metabolite of diethylene glycol ethyl ether)	Urine
14	Organotins	B	Monobutyltin (MBT), dibutyltin (DBT), tributyltin (TBT), monophenyltin (MPHT) diphenyltin (DPHT), triphenyltin (TPHT) monooctyltins (MOT), dioctyl (DOT), trioctyltin (TOT)	Urine
15	Parabens	B		Urine
16	Mycotoxins	B	Ochratoxin A and aflatoxins	Urine/Blood

Conclusion/ Perspectives

Inclusions are scheduled to begin in March 2014 until the 3rd trimester of 2015. This survey will offer a unique opportunity to assess the levels of impregnation of the French population by many chemicals. It will then allow comparison across time, and will be complementary to other national initiatives (e.g. biomonitoring in children as part of the Elfe cohort). The results will be compared with surveys conducted abroad (in other European biomonitoring programs).