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Adapted general guidelines for study design and selection of the participants, recruitment and sampling, quality control measures concerning field work and adapt questionnaire to be the basic module for MS questionnaires

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COPHES
European coordination action on human biomonitoring

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D 2.2 Adapted general guidelines for study design and selection of the participants, recruitment and sampling, quality control measures concerning field work and adapt questionnaire to be the basic module for MS questionnaires

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Abbreviations

AM	Arithmetic mean
CAPI	Computer-Assisted Personalized Interview
EHMS	Environmental Health Monitoring System of the Czech Republic
ENNS	French Nutrition and Health Survey
ESBIO	Expert team to Support BIOmonitoring in Europe
ETS	Environmental Tobacco Smoke
GerES	German Environment Survey
GM	Geometric mean
GSD	Geometric standard deviation
HBM	Human biomonitoring
IG	Implementation Group
IFCC	International Federation of Clinical Chemnistry
IUPAC	International Union of Pure and Applied Chemistry
LOQ	Limit of Quantification
MS	Participating country of the EU-HBM Study
NUTS	Nomenclature of Units for Territorial Statistics
SD	Standard deviation

Preface

This deliverable 2.2 is a central document concerning the study design and field work of the Pilot Study DEMOCOPHES. It will explain the background of these issues and general guidelines are given, that might also be considered for a future representative monitoring on the European scale. This includes a short overview on the objectives of a future European-wide study on human biomonitoring, a description of the basic options for study design and field work, fundamentals for the use of questionnaires and final conclusions.

Several aspects that are recommended for the DEMOCOPHES Pilot Study will also be valid for the future representative monitoring on a future European-wide study on human biomonitoring. Alternative solutions are shown; recommendations given and issues to be discussed are highlighted.

Experiences made within the running of DEMOCOPHES have not yet been considered for the recommendations but will be reviewed after DEOMCOPHES has been conducted (Deliverable 2.3 Lessons learned and 2.4 Summary report).

Several decisions on study design and field work have already been discussed and prepared in previous European scientific groups like the Implementation Group (IG)[1] or ESBIO[2]. Preparatory talks were conducted about following issues:

- kind of epidemiologic study design to choose
- population segment, representativity
- sample size
- region
- inclusion/ exclusion criteria
- occupational exposure
- field work (recruitment, options to increase response rate; organization of field work, e.g. time frame, home visit or examination centre; specimen sampling (pooled or individual)
- questionnaires (way of questioning, which modules)
- quality assurance (Fieldwork Manual; internal and external quality control)

All these issues have been further discussed within COPHES – mainly to prepare DEMOCOPHES. Lessons learned from DEMOCOPHES will be addressed in the final reports (Deliverable 2.3/2.4). This deliverable will highlight which decisions were made, elucidate the reasons and prepare thereby further decisions necessary for the EU-HBM approach. In the annex SOPs for the conduct of DEMOCOPHES are given, which will have to be adapted to the differences in registration, governance, culture and ethics of the individual participating countries. They can serve as a basis for the development of SOPs for a future European-wide HBM approach.

[1] http://www.eu-humanbiomonitoring.org/sub/implgroup.htm
[2] http://www.eu-humanbiomonitoring.org/sub/esbio.htm

1 Rationale and objectives

The design of any scientific study depends on its objectives and the underlying hypotheses. The primary goal of a European HBM approach will be to get information about exposure of the general population to certain pollutants in different countries. Based on these data reference values for these pollutants should be defined for each country separately and for the whole of Europe. Another goal is to get information about the proportion and characteristics of population groups at risk. The optimum design is a cross-sectional study of a population representative sample from a clearly defined population. An optimal population sample should then give a picture of the total population of a country – or at least of a selected population group.

1.1 Objectives of the Pilot Study

With respect to the sampling strategy and field work the objective of the Pilot Study DEMOCOPHES is to test the feasibility of a European wide approach which means to test the instruments that shall be used and the participation rate that can be achieved. To get information about these issues it is not necessary to perform a population based cross-sectional study for a country. This means that only a limited number of participants is necessary and no fully representative picture of each participating country is to be given.

An additional objective is to get preliminary reference values for the analysed target population groups, which has consequences for the design of the Pilot Study especially for the sample size and the exclusion criteria. This will be discussed in the study design section.

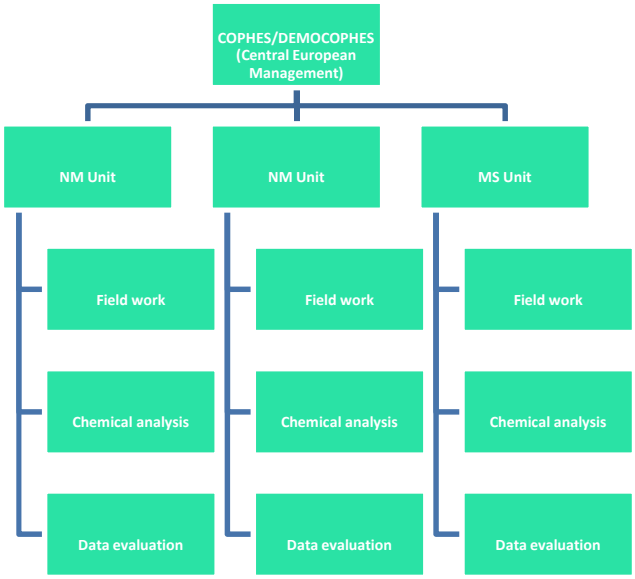
1.2 Investigation programme

The basic investigation programme comprises the components human biomonitoring and a questioning. For the human biomonitoring in DEMOCOPHES it is planned to analyse cadmium, cotinine and metabolites of phthalates in morning urine as well as mercury in scalp hair according to the recommendations of the Implementation Group. Analytes and matrices for the future EU-HBM survey will have to be defined. Questionnaires will be used to get all information necessary to learn about the participants, their socio-economic status, their environmental and exposure relevant living conditions and behaviour and the sampling conditions for the specimen sampling.

1.3 Investigation structure

The general structure of the Pilot Study is that each MS performs all steps of recruitment, field work and data analysis on its own responsibility but in an EU-wide harmonized way. To make this clear the following **Figure 1** shows the general organisation structure.

Figure 1: Organisation structure



In each MS a national management unit (NMU) is established who holds the responsibility for field work, chemical analysis and data evaluation. Field work, chemical analysis and data evaluation can be performed by this NMU itself or may be subcontracted. In case of subcontracting the national management units have to make sure that the subcontractors perform the work according to the guidelines provided by the central European management.

This organizational structure might also work for a future European HBM survey.

The Pilot Study will lead to a comparable experience in conducting a population based cross-sectional study in the participating MS. To give the MS a background on the decisions made for recruitment and sampling options this deliverable was prepared. In the following sections the central element is always a table in which the different options are shown together with statements on the advantages and disadvantages of each option. Based on this overview a recommendation is given and the rationale explained on how to perform the Pilot Study DEMOCOPHES. These recommendations are the results of the discussions within COPHES and will be part of the study protocol that is to be developed for the Pilot study. Probably they will have to be changed after experiences with DEMOCOPHES have been evaluated to be valid for a future EU-HBM study.

2 Study design

The following chapter addresses all sampling design issues, including the population segment that has to be chosen, the sample size, the choice of the sampling units, inclusion and exclusion criteria as well as occupational exposure.

For epidemiologic studies several study designs exist. For DEMOCOPHES a cross-sectional study design was selected.

Cross-sectional studies provide a snapshot of the health experience of a population at a specified time (Kleinbaum et al., 1982). They are a necessary prerequisite for any longitudinal or prospective study (WHO, 1983).

Several countries have experiences with cross-sectional surveys. E. g. in Germany, HBM-surveys have been conducted since 1985 in a cross-sectional design, repeated at irregular intervals (Schulz et al., 2007). In the Czech Republic cross-sectional surveys are repeated since 1994 annually and biannually (Cerna et al., 2007). Also in France (ENNS, 2010) and in Belgium (Hond et al., 2009) cross-sectional surveys were conducted to generate reference values for the targeted population groups.

These examples vote for a cross-sectional study design not only to be used for DEMOCOPHES but also for a future EU-wide HBM study.

2.1 Population segment

An optimal population sample should give a picture of the total population of a country. That means that an ideal sample should be as representative of the population as possible. However, when trying to achieve this, one is facing several restrictions. In most cases the size of the population sample has to be limited due to resources or circumstances.

In an early stage of planning the Pilot Study it was decided that the target population will be children aged 6 to 11 years and their respective mothers up to 45 years (Implementation Group 2005, 2006). However, in the following also the rationales for these decisions are shown to have a complete picture of all options that had been considered.

Decisions that have to be made on an age range and a population group are listed in **Table 1,** where also practical advantages and disadvantages of the options are mentioned.

Children, especially unborn, newborn and small children are a special vulnerable group. Depending on the pollutant the critical window of susceptibility is different. Children like adults may be exposed to chemicals through the different environment media. They have additional unique routes of exposure like the trans-placental exposure or the ingestion of breast-milk (WHO 2006).

Experiences with children have been collected in several surveys: In GerES IV in Germany children aged 3-14 years were involved (Becker et al., 2004), in the French ENNS 3-17 year old children and adults were the study participants (ENNS, 2010) and since 1994 in the Czech Republic the blood, urine and scalp hair has been sampled and analysed of children aged 8-10 years (Cerna et al., 2007).

Table 1: Options for a population segment for the Pilot Study and an EU-HBM survey

Topic	Alternatives	Advantages	Disadvantages
Age	All age groups	Full picture	Higher costs, sample size
	Children, specific age groups	Sample size can be reduced according to age groups	Blood not easy to sample, urine sampling difficult under the age of three; ethical considerations
	Children and adolescents	Full picture of childhood, youth and adulthood.	Children's blood not easy to sample, low response rate for adolescents
	Adults	Blood easy to sample; fewer ethical considera-tions.	Adults are no especially vulnerable group.
Vulnerable group	Newborns	Vulnerable phases	Small sample volume, sample collection difficult; ethical considerations
	Babies		
	Toddlers		
	Preschool children	Easy to sample	Small sample volume; ethical questions
	Schoolchildren	Easy to sample	Small sample volume; ethical questions
	Mothers, pregnant women	Transplacental exposure	Recruitment of pregnant women difficult
	Women in childbearing age	Potential pathway mother/child	
	Seniors	Accumulating and persistent pollutants	Not a group of primary interest right now

The recommendation from the Implementation Group (2005) for HBM in Europe was to analyse children and their mothers because the EU Environment and Health Action Strategy (SCALE) focused on children. In this regard, children could represent the prime target group not only for DEMOCOPHES but also for the future EU-HBM survey. Because of their unique physiology and behaviour exposure of children in all ages may be higher than those of adults in the same environments. However, starting from school age sampling of children in field studies becomes much easier in every sense (sampling via schools possible, ethics, blood sampling). Therefore for the Pilot Study it was decided to sample children in school age but before puberty – this could also be valid for a future EU-HBM survey.

In order to arouse public interest, to gain access to and acceptability for future surveys on children and to cope with the preference of several European Member States for a wider view and an approach addressing the whole population, it was recommended to include their respective mothers into the scope of the Pilot Study. The children should be aged from 6 to 11 years. The women should be in childbearing age, that means up to 45 years.

It should be noted that mothers may serve as indicators of the exposure of foetuses and infants, in particular for the youngest children. This is an additional reason why the respective mothers of the children will be examined in the Pilot Study. The analyses of mothers coming from the same household might in addition lead to additional insights in exposure sources and pathways.

Sampling women of childbearing age in addition to their children thus serves three purposes:

(1) measuring biomarker levels in women and by this determining exposure of the developing child (Selevan et al., 2000; EEA, 2002),
(2) getting insight in biomarker levels of a population group in which prevention may be very efficient, and
(3) awareness raising for potential exposures in young households.

Recommendation 2.1 for the Pilot Study and a future EU-HBM survey: Population segment

In the Pilot Study and a future EU-HBM survey children aged 6 to 11 years and their respective mothers (or forster or step mothers) aged up to 45 years should be studied.

2.2 Sample size

As mentioned above an optimal population sample should give a picture of the total population of a country. That means that an ideal sample should be as representative of the population as possible. To achieve this representativeness a sufficiently large probability sample of the target population covering many different parts of the country must be drawn. Calculations on the necessary number of participants have to take into account the variability of the pollutants under study, the effect size of the exposure sources to be analysed, and the intended precision of the reference values. In case of the Pilot Study it is not necessary to achieve a full representativity because the overall objective of the EU Pilot Project is to test the feasibility of a coordinated HBM approach, for which the number of participants could be quite limited.

Therefore a reduced sample as recommended by the EU Implementation Group (IG 2006) could be chosen. In this recommendation the IG stated that to get an insight in the exposure situation the number of participants should be sufficiently large to allow (minimal) statistical evaluations. In this context the IG cited the International Federation of Clinical Chemistry (IFCC), endorsed by IUPAC/Clinical Chemistry Division, which recommends measuring the values of at least 120 individuals per group for the determination of 95^{th} reference percentiles and their 95% confidence intervals (Poulsen et al, 1997). For the EU Pilot Study this translates to a number of 240 samples (120 mother and 120 child samples) per MS.

A sample size of 120 children can also be assumed to be large enough to prove large effects of exposure factors at a significance level of α = 5% with a sufficient statistical power (80%), but this will not be possible for exposure factors with smaller effects. In general, the smaller the group sampled and the larger the variation in values because of interindividual differences and laboratory variation, the more uncertain the results will be. The relationship is illustrated for several central hypotheses of the Pilot Study.

Example 1: ETS exposure of children and smoking status of their mothers

In DEMOCOPHES cotinine in urine will be measured as an indicator of ETS exposure in children. As no other relevant sources are known, all children with cotinine concentrations above LOQ are defined as ETS exposed. GerES IV showed that 75 % of the children with smoking mothers were ETS exposed, whereas only 35% of the children whose mothers did not smoke were ETS exposed. The difference of proportions of 40% is significant at alpha=5% with a power of 80% for a sample of at least 38 children[3]. In a sample of 120 children a minimum difference of 23% (i.e. 58% ETS-exposed children with smoking mothers) will be significant with sufficient power. These calculations show that it will be possible to prove the relationship with the DEMOCOPHES data of one MS.

Example 2: Smoking status and cadmium in urine of women

GerES III and other studies showed a significant difference of cadmium in urine (Cd-U) concentrations between female adult smokers and non-smokers. In GerES III, the GM of female smokers was almost 36% higher than the geometric mean (GM) of non-smokers. A difference of GMs of 36% gets significant with sufficient power, if a minimum of 171 women are analysed[4]. The difference of GM has to be at least 45%, if the sample consists only of 120 women. Therefore it is possible that the effect of smoking status on cadmium in urine may be proven with the Pilot Study data of one MS.

Example 3: Fish consumption and mercury in hair

Several studies (e.g. ENNS, NHANES) have shown that the Hg concentrations are about twice as high or higher in frequent fish consumers' hair compared to people who consume fish seldom. In NHANES (McDowell et al. 2004) 90% higher Hg concentrations in women's hair were observed. One would expect that the large difference leads to significant results with

[3] Data for calculations: children aged 6 to 11 years from GerES IV (unpublished data); N = 850; cotinine > LOQ = no ETS exposure; 30% of the mothers are smokers; one-sided test.

[4] Data for calculations: women aged 18 to 45 years from GerES III (unpublished data); N=1307; non-smokers: GM 0.176 µg/l (0.166-0.186); smokers: GM 0.240 µg/l (0.224 – 0.256); proportion of smokers 40%; one-sided test.

sufficient power even for small samples. But power calculations with the NHANES data[5] showed that a minimum sample size of about 500 is necessary. This is due to the large variance of the Hg concentrations in each fish consumption group. The relationship between fish consumption and mercury in hair can probably not be proven with the Pilot Study sample of one MS.

The above calculations lead to the following conclusions:

A combined evaluation of data from several countries results in a larger sample size and enables the detection of exposure factors with smaller effects.

The necessary sample size depends most strongly on the variation of the pollutant concentrations. But in most MS the variations are not yet known for the examined population groups. Evaluation of the DEMOCOPHES data will yield the information necessary to calculate the sample size for the EU-wide HBM study.

Recommendation 2.2 for the Pilot Study: Sample size

In the Pilot Study 120 children aged 6 to 11 years and their respective mothers aged up to 45 years should be studied.

Recommendation for a future European HBM survey: Sample size

For a future European HBM survey the sample size has to be discussed.

For DEMOCOPHES it was decided to take a fixed number of participants in each participating country. If a European survey is planned, reference values valid for the whole of Europe can only be generated if the selected sample is representative for all participating countries. Therefore the number of inhabitants of each country in relation to the sum of inhabitants of the participating countries has to be considered when fixing the sample size. Another important aspect for the sample size is the variability of the specific pollutants under study, the effect size of the exposure sources to be analysed, and the intended precision of the reference values.

[5] Data for calculations: NHANES 1999-2000 (McDowell et al. 2004), US females aged 16-49 years; seldom fish consumption (1 or 2 times in past 30 days): n = 573, GM = 0.20 (0.16 – 0.25); frequent fish consumption (fish consumption ≥3 times in past 30 days): n = 447, GM = 0.38 (0.28-0.48); one-sided test.

2.3 Region

As a primary aim of DEMOCOPHES is to test the feasibility of an EU-HBM approach it is not necessary to choose a population sample on a strictly representative basis in each MS. However, preliminary reference values for the groups chosen shall be generated and therefore some kind of standardised strategy regarding the selected sampling location is essential. **Table 3** shows the options for choosing a region.

Table 3: Options for the regional segments in the Pilot Study

TOPIC	Alternatives	Advantages	Disadvantages
REGION	▶ Only the capital city	Easy access for the participants	No comparison between regions
	▶ Rural and urban	Chance to detect lifestyle differences, not the most convenient way	Medium effort
	▶ Rural, urban, industrial	Useful to define measures for reduction of exposure.	Definition of industrial? (different for different biomarkers).

The convenience sample would certainly be the one sampled only in one city (option 1). But this advantage of convenience might not give a comprehensive picture of the population of a country. Especially in some of the countries with a predominantly low population density living-conditions and exposure might be different in urban and rural areas. This might be relevant for example with regard to exposure to heavy metals: families in rural areas might consume self-grown fruits and vegetables in higher amounts than families in urban areas. Children from rural areas might also have higher exposure to pesticides. The degree of urbanisation and socio-economic status which certainly influences life-style and consumption patterns might also correlate in some countries.

Although in some countries these differences might meanwhile be marginal it would also be useful to test not only an easy and convenient way to meet the participants but also one in which longer travel times, higher logistical endeavour and more efforts to convince people to take part have to be undertaken. This will certainly be valuable for a future more complicated EU approach.

The greatest differences in exposure in a country might be expected if in addition to urban and rural areas also industrial areas or hot-spots are taken into account. It is obvious that exposure and awareness of exposure might have an additional influence on participation rate. However, a definition for an “industrial” area that is valid and relevant for the whole spectrum of the pollutants that will be analysed in the Pilot Study and for all MS is impossible to give.

Taking this into account it is recommended to recruit the children for the Pilot Study from one community from an urban area and from one community from a rural area (if necessary combined with neighbouring communities). The border for the upper and lower limit for the selection of the two sampling locations (“rural” and “urban”) has to be determined by each

participating country itself because it is not possible to find a common definition for the degree of urbanisation valid for the whole of Europe. Therefore the participating countries will define and report their own criteria for degree of urbanisation according to the respective situation of population density or community size. The only requirements to fulfil are that the two sampling locations chosen should represent the two extremes of degree of urbanization, all socio-economic status groups should be present, no industrial hot-spot should be included and they should be independent, which means that the "rural" area should for example not be a commuter area of a big city. More information on the selection process is given in the respective SOP (**Annex 8.2.1**) where examples for Germany can be found.

Recommendation 2.3 for the Pilot Study: Region

For the Pilot Study two sampling locations in each country should be chosen, one from lower degree of urbanisation and one from the upper degree of urbanisation.

Recommendation for a future European HBM survey: Region

For a future European HBM survey definitely more than two sampling locations per participating country are necessary to achieve a representative sample. How the sampling locations are chosen within the participating countries has to be discussed.

In Annex IV.3 "A stepwise approach to data analysis and interpretation" of the DEMOCOPHES EU-Study protocol information on the NUTS classification system can be found, which could be used to detect sampling locations for a future EU-HBM survey.

2.4 Inclusion and exclusion criteria

When planning the recruitment of the children and their mothers it has to be decided on inclusion and exclusion criteria. Criteria that should be applied to the Pilot Study and which could also be valid for a future EU-HBM survey are shown in **Table 4**.

Table 4: Options for inclusion/exclusion criteria in an HBM study

Topic	Alternatives	Advantages	Disadvantages
Exclusion criteria	Healthy subjects: no chronic illnesses of the digestive system (inter alia, liver, kidneys)	Exclusion of participants with metabolic disturbances or abnormal urine excretion	Question must be asked in the recruitment questionnaire
	Exclusion of subjects with insufficient language ability	Less expensive, no language barrier	No complete picture of the population of a country.
	Exclusion of children or mothers living in hospitals, institutions, homeless	Less expensive (homeless very difficult to access, more non-responders)	No complete picture of the general population
	Mothers with a minimum duration of living at the place	No imported exposure	No complete picture of the general population.
	Only one child per mother	No loss of information	--

Inclusion criteria are the age of mother and child. Mothers should be in childbearing age and up to 45 years old, children between 6 and 11 years old. Both, mother and child have to be living together at least for the majority of time (> 16 days per month) and should be living in that sample location for at least five years so that they are adapted to the general exposures of this area.

Recommendation 2.4 for the Pilot Study and a future EU-HBM survey*:*
Inclusion/exclusion criteria:

It is recommended to take a population sample that is as much representative for a population in a MS as possible. However, for practical reasons

a) only healthy subjects (no metabolic disturbances)
b) not living in hospitals, institutions or being homeless
c) with a sufficient knowledge of the MS language

should be sampled.

The families should be living for at least 5 years at the sampling location and only one child per mother should be sampled.

If insufficient knowledge of the language should be an exclusion criterion in a future EU-HBM survey has to be discussed.

In the German Health Interview and Examination Survey in which all GerES IV participants took part, the questionnaires were translated into 6 other languages, resulting in a participation rate of immigrants close to that of Germans (Kamtsiuris P et al., 2007) but this was associated with high efforts, which couldn't be afforded in the DEMOCOPHES Pilot Study. For example in France the description of ethnical differences is not allowed so they were not described in the French Nutrition and Health survey and the language ability decided about participation (ENNS, 2010).

2.5 Occupational exposure

To achieve one of the objectives of the Pilot Study or the future EU-HBM study, that is to derive (preliminary) reference values for the agents under study, it is necessary to base them upon a representative reference population sample. Whether potential participants with a considerable occupational exposure are part of such a reference population or not might be discussed. The prevalence of the contact to agents of interest in the occupational surrounding is typically between 1% and 20% (Siemiatycki, 1996). A potentially high occupational exposure has an influence on the distribution of data and the higher percentiles and finally reference values will be influenced. Therefore a decision on how to consider occupational exposure and how to deal with this issue is necessary.

Table 5 summarizes the options, advantages and disadvantages to consider occupational exposure. In **Annex 8.1** two recommendations for assessing occupational exposure are given. For DEMOCOPHES it was decided to assess occupational exposure in the course of the study and to only exclude participants after expert assessment of questionnaire data. Option 2 of **Table 5** offers this chance. Option 2 might bear the risk of misclassification, but misclassification is less possible than in option 1. However option 2 is the alternative with the most efforts and costs.

The realistic options for the Pilot Study and a future European approach are 1) Occupational exposure is seen as part of the general exposure of the population, and 2) Occupational exposure should be assessed as exact as possible by expert judgement on the basis of questionnaire data.

Table 5: Options to consider occupational exposure in population based studies

Topic	Alternatives	Advantages	Disadvantages
Occupational exposure	Sampling with occupational exposure as an exclusion criterion	Medium effort to get information, selection can be managed without a special assessment	Information might be wrong or incomplete. Population sample is less representative.
	Sampling without exclusion, exclusion only after expert assessment of questionnaire data	Best chance to get as close to realistic reference values as possible. Exclusion for each pollutant analysed separately.	High efforts and costs: longer questionnaire, involvement of experts, more complicated evaluation. Classification might be difficult, but misclassification is less possible.
	Sampling and evaluation without consideration of occupational exposure	Reduced time, costs and efforts.	Resulting reference values are influenced by occupational exposure to an unknown extend.

Recommendation 2.5 for the Pilot Study and a future EU-HBM survey:
Assessing occupational exposure

1) Occupational exposure is seen as a part of the general exposure and is no exclusion criterion per se.

2) Occupational exposure should be recorded as good as possible within the questionnaire and be assessed by expert judgement

The evaluation of the DEMOCOPHES data will show if changes of this recommendation are necessary for the EU-HBM approach.

More information on occupational exposure and more possible sophisticated solutions for a European HBM approach can be found in **Annex 8.1** of this deliverable.

3 Field Work

A well designed and implemented fieldwork programme is essential to finally get high quality data. It is also essential to improve practicability and an optimal use of financial resources. In this section options for the instruments and procedures that might be used for field work are presented and discussed. In detail this is the recruitment strategy, the organization of field work and the instruments used.

3.1 Recruitment

Basis for the recruitment are the recommendations for the study design given in the previous chapter. Children aged 6 to 11 years will be recruited in an area of lower and in one of upper degree of urbanisation and the children and their respective mothers will be invited to participate. The options to get access to the children are shown in **Table 6**. With the view on a future EU-wide HBM-approach which should be performed on a strictly representative basis, the ideal option is to address the child via population registries.

***Table* 6: Recruitment options**

Topic	Alternatives	Advantages	Disadvantages
General considerations	Sample of volunteers, self-selecting sample	Motivated participants	Selection bias; possibly people with higher exposure
	Random Sample (and equivalent types of sample)	Less selection bias	Higher rate of non responders
Choice within population data bases	Inhabitant registries	Easy to sample, almost complete database of all citizens	Cooperation of the offices is needed; data protection; confidentiality
	Schools, vocational schools	Generally good response as pupils like unusual experiences	Support of the school needed. School/region must be considered: social and educational bias
Choice within medical system	Physicians, pediatricians	Additional information on health status can be gathered, doctors might be good motivators	Support of the physician is needed, only participants visiting a doctor
	Screening test when entering school	Many participants at one place, doctor might be a good motivator	Support of the health authorities is needed, only one age group (5-7 years of age), might not be possible in all MS
	Preventing medical check-ups	Doctor might be a good motivator	Only for children of specific age. Social bias, disease bias. Data protection? Offered in all MS? Cooperation of doctor is needed
Choice within specific groups	Members of a research institute	Easy to sample, motivation, interest in results	No representative picture, not even suitable for the Pilot Study
	Churches		Not a relevant institution in all MS

Recommendation 3.1 for the Pilot Study and a future EU-HBM survey: Recruitment

It is recommended to recruit the participating children via inhabitant registries.

To select children on the basis of the lists of inhabitant registries has the advantage to get a strictly random population sample.

If this approach is not feasible in a MS the second priority should be given to sampling via schools. The schools should be situated in areas with a mixed population regarding socio-economical structure.

The recommendation is based on experiences gained so far. Experiences made within DEMOCOPES may alter this recommendation.

Different approaches have been used in some European cross-sectional surveys. In Germany the children were selected with support of the registration offices, in France different telephone lists were used and in the Czech Republic and in Belgium/Flanders the children were selected via the school or paediatricians.

Anyway the crucial point for recruiting is the response rate. An estimate of the response rate is necessary to calculate the number of children that has to be chosen and asked to participate. The response rate might be very different in the different MS. This means reaching valid estimates is difficult. Therefore recruitment will be performed in a step-by-step procedure which is described in the annex of this guideline (SOP Recruitment and Field Work.

In general several measures can be deployed to increase the response rate. The most important options are shown in **Table 7**.

Table 7: Options to increase response rate

Topic	Alternatives	Advantages	Disadvantages
Information strategy	Complete information about the survey and about the individual results	Higher participation rate	Higher costs
Effort spend	Number of trials to contact participants	Higher participation rate	Higher costs
Compensation for time/money spent	Financial incentives or gifts	Higher participation rate	Higher costs, ethical considerations (suitable amount, social bias).

Recommendation 3.1.2 for the Pilot Study and a future EU-HBM survey: Response rate

The whole spectrum of measures to increase response rate shall be applied: providing all information about the study, its goals and principles as well as all individual results to the participants. The number of trials to contact the potential participants should be sufficient large enough, financial incentives and gifts should be provided as far as an ethical committee agrees and it fits to the habits in the country.

The procedures for reporting personal results to the participants as well as the use of study incentives (compensation for time and inconvenience) will have particular attention in order to enhance the benefits for study participants and to raise response and commitment in return.

In the Flanders human biomonitoring survey a communication plan was utilised to guarantee a precise timing of communication and several scientists were occupied with the right time to give the results to the participants and the politics (Hond et al., 2009). In Germany different strategies for handing out incentives for different age groups were proved in the pilot study to GerES IV (Voigt et al., 2004).

3.2 Organization of field work

For a successful field work it is essential to define the duties of all team members involved. This is especially important while establishing a survey office for field work. This office plays a central role and has a long list of duties to fulfil (see annex SOP Recruitment and Field Work and SOP Quality Assurance Methods). It has the responsibility to plan and prepare field work properly including the field plan, the preparation of the Fieldwork Manual and the assignment of experienced or well educated personnel.

In a first step the basic decisions have to be made by the survey office. These are exact start and duration of field work (in the frame of the EU-guidelines). In a second step it must be planned which sampling location will be visited at what time and this must be fixed in a route plan. All this information has to be part of the Fieldwork Manual (see SOP Quality Assurance Methods).

For example, in the French ENNS 73 health centres participated and in the German GerES IV 150 sample locations were picked out. This demonstrates the enormous organisational effort associated with population based surveys.

Furthermore it has to be decided whether the mothers and the children are visited at home or if they are invited to an examination centre. In **Table 8** the advantages and disadvantages of a home visit are discussed. Inviting the mothers to an examination centre is certainly

easier to organize, but doesn't offer the possibility to collect environmental samples of the residence and to validate the answers concerning the home environment.

Table 8: Place of examination

Topic	Alternatives	Advantages	Disadvantages
Place of examination and interview	Visit at an examination centre	All equipment at one place, no transport needed	Inconvenience for the participants
	Visits at home	Validation of answers possible, ambient monitoring possible	Blood sampling not suitable, privacy touched.

<u>Recommendation 3.2 for the Pilot Study and a future EU-HBM survey: Field work</u>*:*

It is recommended to visit the mothers and their children at their homes. Only in case the mothers refuse to be visited at home an invitation to the examination centre should be offered.

Some additional basic recommendations concerning the organization of field work are listed in **Table 9**.

Table 9: Basic recommendations concerning field work

Topic	Action	Justification	Note
Personnel	Trained interviewers	Essential for quality of data and communication with participants	Consider time for training
Avoiding seasonal bias	Sampling in the same season in all MS	Exclusion of seasonal effects	
Duration of examination	Duration of interview: 0,5 - 1,0 h	Better chance to get fully completed questionnaires	
Invitation	Written invitation	Concurrent with written information and written consent	
Definition of duties	Definition of duties of all team members involved	Essential to organize work in a harmonized way	
Fieldwork Manual	Preparation of a Fieldwork Manual in each MS	Essential to organize work in a harmonized way, for training and quality control	
Preparations of SOPs	Preparation of SOPs in each MS	Essential to organize work in a harmonized way, for training and quality control	Adaptations to country specifics
Creation of a website	Onset of a website/link in each MS	Essential for transparency and communication with participants	Link to EU-website necessary

To avoid seasonal bias, sampling during all seasons is recommended. If this is for whatever reason not feasible sampling during one and the same season in all MS is recommended.

Individuals meeting the selection criteria should receive a written invitation to participate. This invitation shall include comprehensive information on background, aim and procedures of the study. The installation of a plain website (including an email address) and a competent telephone-hotline are recommendable accompanying measures at national level. The importance of a survey specific website or digital newsletter was successfully demonstrated in the Flanders and German survey.

A written consent of participants is a must for being eligible for participation. Regarding children, such consent has to be obtained from the parent in any case, and may be accompanied additionally by the written consent of the child. The consent can be withdrawn any time, and care should be taken to observe possible -even cryptical - resistance of the child during the course of the study.

The survey office will be responsible for getting the permission by the ethics committee to conduct the survey.

3.3 Sampling of specimen

The analysis of pooled samples is naturally far less expensive than the analysis of individual samples. A comparison is shown in **Table 10**. An important argument to achieve a high response rate is that the participants will get their individual results. This is only possible if the specimen samples are sampled and analysed individually. Anyway, the population sample fixed for the Pilot Study is sufficient small to facilitate individual sampling and measurement with regard to the resulting costs.

Table 10: Analysis of individual or pooled samples

Topic	Alternatives	Advantages	Disadvantages
Individual vs. pooled samples	Individual samples only	Individual results, range of exposure, reliable statistical comparison over time	Analyses that are expensive will not be performed
	Pooled samples	Less expensive, more volume, more substances can be analysed and detected	No individual results, no range of exposure, no reliable statistical comparison over time. Summary of questionnaires is needed, minor motivation for participants to take part
	Individual and pooled samples	Special (expensive) analyses with the pooled sample possible	

Recommendation 3.3 for the Pilot Study and a future EU-HBM survey:
Sampling of specimen:

For the Pilot Study and a future EU HBM survey it is recommended to sample human specimens on an individual basis.

4 Questionnaires

Biomarker studies should collect detailed information on exposure relevant factors as well as on cofactors to facilitate interpreting the data (NRC, 2006). In population based HBM-studies questionnaires are an essential instrument to get information on the participants, their personal characteristics, their lifestyle and behaviour, about potential exposure pathways, about occupational exposure, smoking behaviour and other relevant information. Questionnaires are also important to document the inclusion/exclusion criteria, and the sampling of the specimens. Non-responder questionnaires are also helpful to assess selection bias.

The general considerations undertaken when developing the questionnaires for DEMOCOPHES are explained in **Annex 8.2.4** of this guideline. In **Annex 8** all questionnaires used within DEMOCOPHES are given. Additionally to the basic questionnaire (**Annex 8.3.2**) a version which contains background information, references and explanations for the interviewers can be found in **Annex 8.3.3**. Examples of the questionnaires used in the German environmental surveys can be found under (in German):
http://www.umweltbundesamt.de/gesundheit/survey/frage/index.htm#fb.

All questionnaires are delivered in English; a precise (one-to-one) translation into the language(s) of participating MS has to be carried out by the MS; lastly a transfer of questionnaire data into an English database is required. The questionnaires and its translations shall be tested before being made operational. That means that a small-scale validation exercise prior to the pilot project is recommended for each MS.

4.1 Way of questioning

The options for the way how to use the questionnaire in the field are shown in **Table 11**. In general the questionnaires may be filled in by the participant (on paper or in the internet), the participants may undergo a face to face interview or they may be interviewed during a telephone call.

Table 11: Option to perform the questioning of the participants

Topic	Alternatives	Advantages	Disadvantages
Way of questioning	Questionnaire filled in by the mother (self-administered)	Less expensive	Only easily understandable questions possible. Check when returning the questionnaire is essential.
	Face to face interview	Interviewer can give additional explanations: better data	Higher costs, longer duration of the interview, social desirability bias
	Interview by telephone	Reduced time, costs and efforts.	Additional appointment necessary
	Web-based questionnaire		Not all participants have access to the internet

The personal interview is the most common method. By using this method a tendency to under-report exposure (for example smoking) and socially undesirable behaviours can be observed, the so called social desirability bias (Armstrong et al., 1994). On the other hand interviews have the advantage that misunderstandings can be reduced thus optimizing data quality.

The best way of questioning can vary depending on the age of the participant. In the French ENNS children aged 3-14 were personally interviewed at their homes, the adolescents form 15 years on had to fill out self-administered questionnaires. In the German GerES IV survey most questions were asked the parents with interview-guided questionnaires, additional questions were asked the children of age 8-10 and different questions had to be answered by the 11-14 year olds and questions belonging to indoor air quality were asked by means of a self-administered questionnaire.

In a self-administered questionnaire the questions have to be comparably less complex and usually the questionnaire has to be shorter. The advantage on the other hand is that costs are reduced and an interviewer bias does not have to be considered.

A special way to perform the face to face interview is the use of CAPI (computer-assisted personalized interview). For the Pilot Study the use of CAPI is still under discussion, the costs (e. g. for the necessary laptops or the software) have to be balanced against the advantages of CAPI (e.g. automatic validity check, no separate data entry necessary). For the future HBM survey CAPI probably has more advantages than disadvantages and should be considered.

Recommendation 4.1 for the Pilot Study and a future EU-HBM survey: Way of questioning*:*

It is recommended to perform face-to-face interviews - with paper and pencil or with CAPI.

4.2 Modules of the basic questionnaire

To appropriately characterize the study population and to be able to identify environmental factors but also life style factors which may influence the biomarker levels the participants will be asked to provide information based on questionnaire data.

The basic questionnaire will be used to interview the mother of the participating child at the time of the sampling by skilled personnel. The time mothers have to afford to fill in the questionnaire might be a crucial point and the willingness to spend much time on this might be different in different MS. In GerES for example it was possible to occupy the participating

family members for 90 minutes. In the EHMS of the Czech Republic it took just 10 minutes to answer the short questionnaire, whereas the participants of the French ENNS had to calculate round about 2 hours, not including the examination with another 30 minutes.

For the Pilot Study or the future EU-HBM survey it is recommended that the time needed to fill in the questionnaire should not exceed 60 minutes.

The basic questionnaire should consist of modules that are easy to identify. An overview of the different modules recommended is shown in **Table 12**. Taking into account that the questionnaire must be relatively short only mayor pathways of exposure can be considered.

Table 12: Modules of the basic questionnaire

Topic	Modules	Examples	Reason
Modules	Residential environment and residence (Major/known non-food, non-tobacco, non-occupational related exposure pathways for substances under study)	Hobbies, products in the home, use of cosmetics etc.	To learn more about the relevance of these pathways for mother-child-pairs
	Nutrition (Food frequencies for exposure relevant food items)	Consumption of fish, game, convenient food, organic-products, etc.	To learn more about the relevance of these pathways for mother-child-pairs
	Smoking behaviour	Current smoking, former smoking, ETS exposure	Essential, important confounder, exposure pathway of several elements
	Occupation of the mother	Profession, occupation, exposure	Essential to get information about occupational exposure
	Socio-demographic information	Gender, age, date of birth, education, profession, occupational status, household income, household members, sibling, immigrants.	Essential to assess socio-economic status

Recommendation for the Pilot Study and a future EU-HBM survey 4.2 Modules of the basic questionnaire:

The questionnaire for the Pilot Study and the future EU-HBM survey should consist of different easy to identify modules.

The modules that have to be included are: 1) Exposure pathways (non-food), 2) Exposure pathways through nutrition 3) Smoking behaviour, 4) Occupation of the mother 5) socio-demographic information

The basic questionnaire for DEMOCOPHES developed in the framework of this deliverable can be found in A**nnex 8.3.2.** In **Annex 8.3.3** another version with the underlying hypothesis for each question is given, which serves for training purposes.

4.3 Additional questionnaires

In the Pilot Study the so called "Basic questionnaire" consisting of several modules will be the main source of information. Smaller questionnaires that deal with the sampling of the specimens and a non-responder questionnaire will also be used (see **Table 13**). The questionnaires are:

(1) Questionnaire on inclusion/exclusion criteria (recruitment questionnaire)
(2) Questionnaire on urine sampling
(3) Questionnaire on hair sampling
(4) Non-responder questionnaire

The first questionnaire (1) will address the criteria for eligibility of the participant (see *inclusion/exclusion-criteria*), also the potential candidates' interest to participate or the reasons for non-participation. Questionnaire (2) and (3) will be used to get information on sampling conditions of the specimens and are further explained by WP3. A non-responder questionnaire (4) is essential to assess a potential selection bias.

Table 13: Questionnaires for the Pilot Study

Topic	Alternatives	Advantages	Disadvantages
Necessary questionnaires	Questionnaire on inclusion/exclusion criteria	Documentation of the criteria	Additional effort but necessary
	Non-responder questionnaire	Check on bias	Additional effort, important to assess selection bias
	Basic questionnaire	Essential	--
	Questionnaires about specimen sampling	Essential to document sampling conditions	--

Recommendation for the Pilot Study and a future EU-HBM survey 4.3:
Additional questionnaires

It is recommended to use additional and separate questionnaires beside the basic questionnaire. These questionnaires are: a recruitment questionnaire on inclusion/exclusion criteria, a non-responder questionnaire and questionnaires for each specimen that is sampled.

Questionnaires for non-responders are important to get some basic information on exposure-related behaviour from these who refuse to participate. It enables to calculate a potential selection bias. To gather information about the sampling conditions of the different specimens sampled separately from the basic questionnaire has practical reasons.

5 Quality control measures

Quality control procedures implemented on each stage of a study play an important part in increasing the quality and comparability of results. Central element of quality control measures is the already mentioned Fieldwork Manual. In this manual all steps of field work are described and SOPs for the essential steps are provided. At the same time the Fieldwork Manual serves as the basic material to train the interviewers. Internal and external field visits are also important quality control measures (see Annex 8.2.3 and **Table 14**).

5.1 Fieldwork Manual and training of the interviewers

Each study that requires the collection of data by examinations and personal interviews should have a Fieldwork Manual. On the one hand this manual can serve as the basis for the training of the interviewers and on the other hand it is a reference book that can be used in the field if questions occur. The Fieldwork Manual should be based on a loose leaf system so that pages can be changed or added.

The training of interviewers has been shown empirically to improve their performance, particularly in increasing response rate and reducing under-reporting of information or item non-response. A carefully planned and structured programme of training of interviewers is essential for the success of epidemiological studies (Armstrong et al., 1994).

For the German GerES IV interviewers were intensively trained before the survey started and again during field work, they were immediately informed if the external or internal quality assurance were aware of abnormalities. Another example is the annually training of the field staff at the beginning of the survey for the regular interval of the Czech EHMS.

***Recommendation 5.1 for the Pilot Study and a future EU-HBM survey: Fieldwork Manual*:**

The basic instruments of quality control of field work that should be implemented in each MS are a Fieldwork Manual and the training of the interviewers.

Both instruments are essential for a successful field work. Each MS will have its own Fieldwork Manual in the MS language(s). The content of the Fieldwork Manual will be comparable between MS and follow this guideline.

5.2 Additional internal and external quality control measures

It should be the interest of all partners involved that field work is controlled and checked. Systematic or unsystematic errors might slip in over time and be covered by routine-blindness. The simplest way to avoid errors is the use of check-lists including all important steps of the procedures (**Table 14**). These lists might be developed for the field personnel to

perform the quality control in their own responsibility. Another option is to perform field visits by supervisors not involved in field work but belonging to the institution that is responsible for field work (internal quality control). The third option is to have field visits by an external subcontractor especially hired for this purpose.

Table 14: Additional internal and external quality control measures

Topic	Alternatives	Advantages	Disadvantages
Quality control measures	Internal check lists	Essential	--
	Internal quality control	Essential, less expensive	--
	External quality control	Desirable for Pilot Study Essential for EU-HBM survey	Extra costs
	Fieldwork Manual	Essential	Extra preparation
	Training of the interviewers	Essential	Extra costs and effort

Recommendation for the Pilot Study and a future EU-HBM survey 5.2:
Additional quality measures

To check the quality of field work it is recommended to use internal check-lists and to perform internal and external quality control organized by the institution responsible for field work.

External quality control handled by an organization not involved in the survey is recommendabed for a future EU-HBM survey.

6 Final remarks

The general guidelines presented in this deliverable cover issues of study design, field work, questionnaires and quality control measures. They have been generated through a long lasting discussion process within European scientific groups. With the onset of the COPHES consortium in December 2009 and the beginning of the DEMOCOPHES Pilot Study in September 2010 this process has once more been accelerated. The procedures undertaken and experiences made during the running of DEMOCOPHES will lead to more sophisticated guidelines resulting in recommendations which will be described in the final deliverables (Deliverable 2.3 Lessons learned and Deliverable 2.4 Summary report) for an EU-wide HBM survey.

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8 Annex

8.1 Assessment of occupational exposure in population-based HBM studies

8.2 Standard Operating Procedures

8.2.1 SOP 1: Selection of Participants

8.2.2 SOP 2: Recruitment and Field Work

8.2.3 SOP3: Quality Assurance Methods

8.2.4 SOP 4: Questionnaires and Interview Conduct

8.3 Questionnaires

8.3.1 Recruitment interview

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8.3.3 Basic questionnaire: Background, references and interviewer briefing

8.3.4 Non-responder questionnaire

Annex 8.1

Assessment of Occupational Exposure in Population-Based HBM-Studies

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Contents

1 Introduction

In population based HBM studies one of the objectives might be to get the data basis to derive reference values for the pollutants/agents under study. Whether potential participants with a considerable occupational exposure are part of such a reference population or not is a questions that is not solved. The prevalence of the contact to agents of interest in the occupational surrounding is typically between 1% and 20% (Siemiatycki, 1996). A potential high occupational exposure has an influence on the distribution of data and the higher percentiles and finally reference values will be influenced. Therefore a decision on how to consider occupational exposure and how to deal with this issue is necessary.

2 Occupational exposure as an recruitment exclusion criteria

The German Human Biomonitoring Commission has identified the problem and taken the following position which was published in its basic paper that described the definition and use of reference values based on population-based studies (HBMK 1996):

"An immanent problem when selecting a reference population is the development of exclusion criteria for potential participants that are exposed to one of the agents that is to be analysed. Whether exclusion is done before or after sampling will be dependent on the general conditions of the study. The more stringent the exclusion criteria are the more difficult it will occur to get a sufficient large reference population. In addition a priori exclusion criteria can only be defined from exposure pathways that are already known during the planning of a study. Therefore the commission recommends starting a study with an as much as possible representative probability sample. However, information on all relevant confounding factors should be collected. If meaningful, resulting data might then be divided for different strata (for example smoker/non-smoker) or adjusted by regression analyses."

Taking this recommendation into account exclusion criteria should not be defined before sampling, but occupational exposure has to be assessed in the course of the study.

3 Assessing occupational exposure

Assessing occupational exposure, particularly within population-based studies is, however, a substantial challenge. Several methods to assess exposure have been employed – exposure measurements, self reports, job exposure matrices, followed by an expert assessment (Armstrong et al., 1994; Siemiatycki, 1996; Fritschi et al., 2009; McGuire et al., 1998; Teschke et al., 2002).

In large studies it is not feasible to make contact to the employers of the participants to conduct measurements or to get recent or historical information about exposure in the specific job. Concerning self reports it is generally concluded that the subject's ability to report exposures accurately varies with the agent of interest, and is generally low (Fritschi et al. 1996, Fritschi et al. 2009) and that there is a tendency of over-reporting (Blatter et al. 1997). In addition employees have difficulties in assessing the extent or level of exposure because they only know the situation at their own working place and cannot compare with other working places.

The best option to assess occupational exposure by an expert might be a job exposure matrix (Teschke et al., 2002, van Tongeren et al., 2002). The more comprehensive the matrix the better the expert assessment might be. Therefore the job has to be divided in specific job categories and specific questions have to be asked. This procedure might take a considerable part of resources of the questionnaire and the later assessment of the exposure by an occupational expert is extremely time-consuming and costly. However, validity of exposure assessment depends on the resources allocated to its realization, not only at the exposure assessment phase of a study but also earlier in the collection of the basic data that are used for exposure assessment (Siemiatycki, 1996). On the other hand the procedure is not free from the risk of misclassification (Mannetje et al., 2003). Several publications have shown that an essential prerequisite for such an assessment is that personal interviews have to be performed because postal questionnaires increase the risk of misclassifications (Blatter et al., 1997)

However, a job exposure matrix that is assessed by an expert is currently regarded as the best option to assess occupational exposure in population-based studies. This was also stated by the German Human Biomonitoring Commission while publishing their basic papers describing the definition and use of reference values which (HBMK 1996).

To ask about the class of business or the industrial sector and about exposure at the workplace in a standardized way is sufficient to assess occupational exposure. A better option is to ask about an as good as possible description of the individual task and the main product of the specific company or institution (what is produced in your company?). In a further step a occupational health practitioner should assess and categorise individual exposure.

Meanwhile some new developments have occured. Fritschi et al. (2009) recently published a paper about OccIDEAS (Occupational Integrated Database Exposure Assessment System) which is a web-based software application to assess occupational exposure in epidemiological studies. This software package combines all steps of the assessment. It allows automatic removal of questions from an interview if an agent is not interesting for the study. OccIDEAS is open source software and a demonstration is available at http://www.occideas.org/. However, the list of agents considered is not yet completed but COPHES should observe the development carefully.

Another example for an improvement in the assessment of occupational exposure was provided by Perez-Saldivar et al. (2008). They created an occupational exposure index (OEI) in which they included the type of economic activity, type of specific position, use of personal protective equipment, exposure to the agent of interest, daily exposure frequency, exposure intensity. The data for each factor included were provided by experts according to the occupation reported (International Standard Classification of Occupations, ILO 2009).

4 Experiences from population-based studies

Regarding the existing relevant population based studies leads to the conclusion that the philosophy about the definition on “the general population” in connection with occupational exposure can be completely different. In GerES II (Seifert et al., 2000) a high effort was laid on the assessment of occupational exposure which included extensive questionnaires and

expert judgement. In GerES III (Becker et al., 2002) in adults the funding and the time frame for developing a concept was short and therefore occupational exposure was considered only in an extremely short version (job title only). Also in NHANES, the US study occupational exposure is not especially surveyed thus regarding occupational exposure as a part of general exposure (Needham, 2010).

4.1 GerES

The assessment of exposure was a topic in **GerES IIb (1991/92),** which was conducted in Germany in the former German Democratic Republic after reunification. The concept for assessing occupational exposure was developed by the Federal Health Agency, which was conducting the study at that time, in cooperation with the Federal Institute for Occupational Safety and Health (BAuA). Sampling was performed without occupational exclusion criteria but a special questionnaire was used that can be downloaded from the internet pages of GerES (UBA 2009)[6].

Tab. 1: Questionnaire data for a detailed job description from GerES II

Question	Explanation	Example
Job title	title	nurse
Work task	what is produced / the service?	nursing old patients
Main task	task that occupies most of the time	basic personal care, to place dressings
Work equipment	materials and tools	dressing material, disinfectants
Product	product you are working on	(humans)
Health threat	materials that might cause exposures	Frequent use of disinfectants

Tab. 2: General questions to describe occupational exposure (GerES II)

	Question	Categories
1	Where are you working / did you work last?	free text (company, town)
2	To which branch does the company belong?	free text
3	Since when have you been working there?	month/year
4	Since when are you fulfilling your main task	month/year
5	How many employees has the company/institution? Is a physician employed?	Yes/no
6	Did you have a preventive occupational health check up in the last two years? Because of what agent?	Yes/no, agent (free text)
7	Occupational whereabouts?	office, workshop, outdoors, etc.

[6] http://www.umweltbundesamt.de/gesundheit/survey/frage/index.htm#fb (in German)

Table 1 shows the questions asked to describe the current or latest job, explanations and examples. In addition to these questions that had to be answered all in free text a general part encompassed the questions listed in **Table 2**. In an additional part the frequency of working conditions and the use of special working materials was asked (very often/often/sometimes/ never). The conditions and materials asked for are mentioned in **Table 3**.

Tab. 3: Frequency of working conditions and use of materials (GerES II)

Working conditions	working seated, standing, walking
Working conditions, general exposures	dust in the air, dust on the floor, dust on materials, dust on clothes, smells, bad air, fume, gases, oils, pharmaceutics, paints, solvents, other chemicals, metals, iron/steal
Use of materials (that are measured in HBM)	copper, chromium, arsenic, lead, cadmium, mercury, manganese, zinc

The information collected with the first part of the questionnaire (**Tab. 1**) was used by the experts for occupational exposure to assess exposure to the target pollutants (metals). The comparison with the data provided by the participants themselves (**Tab. 3**) revealed that the latter was not very reliable, a lot of false negative and false positive results were observed. It was concluded that direct exposure questions are not recommended for exposure assessment, in particular because of the high proportion of wrong answers and that an exposure assessment procedure should include educated judgement by experts (Ahrens 1999).

Another lesson learned was that it is not a good solution to ask only for the current or latest job because this caused difficulties if participants had changed the job shortly before the survey. It would be better to ask about occupational exposures in a certain time frame for example the recent 5 years before the year of the survey

4.2 NHANES

In **NHANES** no exclusion criteria referring to occupational exposure had been applied while sampling the participants (Needham 2010). The questionnaire used in NHANES (CDC 2009) comprises some questions on occupational exposure. These questions and categories are described in the following **Table 4**.

Although the NHANES participants were asked about their exposure the resulting reference values are based on the total sample. This means that occupational exposure is seen as part of the general exposure in a population. It does not mean that occupational exposure might not be considered in the detailed evaluations and multivariate analyses to describe the relevance of exposure pathways.

Tab. 4: Questions to assess occupational exposure (NHANES)

	Question	Categories
1	Working status in the last week? How many hours?	working, looking for work, on vacation
2	Usual work hours? Reasons for not working last week?	less or more than 35 hours, retired, school, health reasons, etc.
3	Name of employer? Kind of business? How long?	free text
4	Kind of work (profession)? Most important activities?	free text
5	Professional status and shift work	employee, self employed, etc.
6	How often do you smell smoke (cigarettes)	hours
7	Longest job ever? Business? Task? How long?	Free text
8	Ever exposed to dust from rock, sand, concrete, coal, asbestos, silica or soil? How many years?	yes/no, years
9	Ever exposed to dust from baking flours, grains, wood, cotton, plants, animals? How many years?	yes/no, years
10	Ever exposed to fumes? How many years?	yes/no, years
11	Ever exposed to any other gases, vapours or fumes? How many years?	yes/no, years

5 Summary and recommendation

Table 5 summarizes the options, advantages and disadvantages. Option 2 offers the best chance to finally get the "true" reference values. However, also this option bears the risk of misclassification (but less than option 1) and it is also the option that needs the most efforts and costs.

Table 5: Options to consider occupational exposure in population based studies

Topic	Alternatives	Advantages	Disadvantages
Occupational exposure	▶ Sampling with occupational exposure as an **exclusion criteria**	Medium effort to get information, selection can be managed without a special assessment	Information might be wrong or incomplete. Population sample is less representative.
	▶ Sampling without exclusion, exclusion only after **expert assessment** of questionnaire data	Best chance to get as close to realistic reference values as possible. Exclusion for each pollutant analysed separately.	High efforts and costs: longer questionnaire, involvement of experts, more complicated evaluation. Classification might be difficult, but misclassification is less possible.
	▶ Sampling **and** evaluation **without** consideration of occupational exposure	Reduced time, costs and efforts.	Resulting reference values are influenced by occupational exposure to an unknown extent.

Two recommendations for assessing occupational exposure are possible:

Recommendation A:

In a European HBM approach occupational exposure is seen as part of the general exposure of the population.

Therefore reference values are generated including the persons that have an occupational contact to the pollutant in question. It has to be accepted that the reference values are influenced by occupational exposure to some extent. However, also in case of an expert assessment on the basis of the participant's questionnaire data misclassification of exposure in both directions which is under- or overestimation cannot be ruled out. For some pollutants (phthalates) it seems nearly impossible to assess occupational exposure. Anyway questions related to workplace exposure should be included in the exposure assessment questionnaire to get an insight in the exposure pathway in general.

Recommendation B:

In a European HBM approach occupational exposure should be assessed as good as possible by expert judgement on the basis of questionnaire data.

Based on the current state of the art the assessment should be performed by taking the following steps:

1) Job title, a description of the tasks and the potential exposure to the pollutants of choice should be asked of the participants in a questionnaire

2) Expert assessment of the probability of exposure to the pollutants under study.

3) Exclusion of participants with a high probability prior to the calculation of reference data.

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Annex 8.2 Standard Operating Procedures

8.2.1 SOP 1: Selection of Participants

8.2.2 SOP 2: Recruitment and Field Work

8.2.3 SOP 3: Quality Assurance Methods

8.2.4 SOP 4: Questionnaires and Interview Conduct

Annex 8.2 Standard Operating Procedures

8.2.1 SOP 1: Selection of Participants

DEMOCOPHES

SOP 1

Selection of Participants

WP 2

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Contents

1 Introduction

This guideline is intended to be used in the framework of the Pilot Study DEMOCOPHES. DEMOCOPHES has the aim to test the feasibility of a European human biomonitoring (HBM) approach, to test the procedures and instruments and to get information about the participation rate that might be achieved. DEMOCOPHES does not have the objective to give a full picture on exposure of population groups in Europe. As financial means are restricted, only a small sample of participants in each participating country will be addressed. To test generating comparable data a strictly representative sample selection is not necessary, but every participating country is obliged to try best as possible to follow this SOP to achieve comparable data on an as much as possible harmonized way.

2 Study design

The study design for the Pilot Study might be described as cross-sectional for different communities. The target population are children aged 6 to 11 years. To get information about the exposure of the family and about exposure of women in childbearing age their mothers (aged up to 45 years) will also be recruited.

Each participating country will have to collect information about 120 children and 120 respective mothers. However, the number of children and mothers who have to be selected in the selection process through inhabitant registries or through schools must be larger due to the unknown response rates that might be achieved (**Table 2.1**).

1) In each participating country children and mothers will be recruited from two different sampling locations, according to the degree of urbanisation (see “3 Selection of sampling locations”), using the highest and lowest category of urbanisation (downtown of big city vs. rural) not including hot-spots. In each sampling location participants of various socio-economic status groups should be present. This can be safeguarded by considering secondary statistical data or by asking local administrative or political representatives.

The 120 children and mothers of each participating country will therefore be divided into a sample which consists of 60 children from a location of the highest category of urbanisation and another sample which consists of 60 children from a location of the lowest category of urbanisation, i.e. each of the two selected urbanisation areas involve 10 children per age group (6 age groups: 6, 7, 8, 9, 10, and 11 years).

2) Recruitment will be done on the basis of inhabitant registries as the preferred option, or via schools.

Since it is difficult to predict response rate in the different participating countries and it is only possible to ask inhabitant registries once for selection, it is suggested to select 210 children aged 6 to 11 years from the inhabitant registry of each of the two sampling locations, assuming a minimum participation rate of about 30 %. This leads

to 35 children who have to be selected per age group and per area. This procedure warrants a sample large enough for the enrolment of the 10 children per age group finally needed.

The procedures explained under (1) and (2) for the recruitment via inhabitant registries are shown in the overview presented by **Table 2.1**.

Table 2.1 Overview of the number of children and mothers who have to be selected in each participating country via inhabitant registries

Recommendations and Assumptions	Consequences for the number of children to be selected via inhabitant registries
Sample size per participating country	120 children and 120 respective mothers
Division of the sample into two sampling locations, one with the highest degree of urbanisation (downtown big city), and one with the lowest degree of urbanisation (rural)	60 children and 60 respective mothers in each sampling location (which is 10 children per age group per area)
Response rate minimum about 30 percent	210 children and 210 respective mothers in each sampling location (which is 35 children per age group) have to be selected (Summed up to 420 children and 420 mothers per MS)

If recruitment is not performed via inhabitant registries but through selected schools, all pupils of the selected class levels and between 6 and 11 years old should be asked for participation.

Not every child is eligible. Among the exclusion criteria are: children living in institutions such as hospitals or children's homes, living for less than 5 years in the sampling location, or having health problems leading to liver and renal failure. Children from immigrant families will be considered according to their mothers' language ability. Only one child from each family will be considered (see Annex 8.3.1 Recruitment interview).

3 Selection of sampling locations

The selection of the participants will follow a two step procedure. **First step** is the selection of the sampling locations and the **second step** is the selection of the children (together with the respective mothers) within the sampling locations, stratified by age group and gender. As mentioned before, two different sampling locations have to be selected in each participating country.

Table 3.1 describes the procedure to choose these sampling locations.

Table 3.1 Selection of the sampling locations

Stages	Procedure	Criteria
1	Selection of a region (e.g. Federal State, province)	The defined categories of urbanisation are present (highest and lowest category) both in the region to reduce travel costs for the field team
2	Selection of one sampling location with lowest degree of urbanisation ("rural")	a) following the definition of each participating country b) no commuter area c) all socio-economic status groups present
3	Selection of one sampling location with highest degree of urbanisation ("big city")	a) following the definition of each MS b) city centre c) all socio-economic status groups present

Each participating country has to determine the border for the upper and lower limit for the selection of the two sampling locations ("rural" and "downtown big city") itself because it is not possible to find a common definition for the degree of urbanisation valid for the whole of Europe. Therefore the participating countries will define and report their own criteria for degree of urbanisation according to the respective situation of population density or community size. The only requirements to fulfil are that the two sampling locations chosen should represent the two extremes of degree of urbanization and be independent, which means that the "rural" area should for example not be a commuter area of the "big city" area.

To observe regulations regarding data protection the size of the "rural" sampling location has to be chosen large enough that the recommended 210 children (35 children of each age group) of different sex and socio-economic background can be selected without the possibility to identify participating children or mothers, i.e. the sampling location must have at least 300 children in the age cohort from 6 to 11 (born 2000 to 2005). To warrant this it may be necessary to select more than one small village and combine the results of two or more inhabitant registries. But on the other hand, to safeguard the feasibility of interviewing many families at home or the centre within a reasonable time frame, the "rural" sampling location must not cover an area too large.

Table 3.2 shows an example of the German approach, using **community size** as the selection criteria.

Table 3.2: Categories of community sizes in Germany

Inhabitants	Definition used for
< 2.000	"rural" < 5.000
2.000 - < 5.000	
5.000 - < 10.000 10.000 - < 20.000 20.000 - < 50.000 50.000 - < 100.000 100.000 - < 500.000	*No child selected*
=/> 500.000	"big city" > 500.000

For the Pilot Study one Federal State of Germany will be selected where the two extremes (“rural” and “big city”) are present. Children will only be selected living either in one of the “rural” sampling locations (if necessary with neighbouring villages) or one of the “big city” sampling locations. It has to be kept in mind that various “middle” degrees of urbanisation are not covered in this small Pilot Study sample.

Another example to determine the degree of urbanisation could be the **population density**.

If using the selection criterion “population density” it has to be considered that:

1 population density depends on the borders set to calculate the density, e. g. Hamburg with its harbour and large fields and water has a much lower population density than Munich with narrow city borders. Within one country the highest density is in the cities.

2 Cities with lots of single households have a lower population density than cities with families living in the dwellings. Also within one city the density can vary a lot.

Table 3.3. shows examples of the population density of German cities, parts of cities and Federal States and demonstrates that the selection criterion “population density” needs careful analysis of population density data before selection of the two study areas.

Table 3.3 Population density of German cities, parts of cities and Federal States

Examples[7]	**Inhabitants per km^2**
Munich	4.300
Schwabing-West (Part of Munich)	14.217
Region Munich (City and surrounding counties)[8]	482
Federal State Bavaria	177
Berlin	3.861
Kreuzberg (Part of Berlin)	14.184
Hamburg	2.350
Hoheluft-West (Part of Hamburg)	18.214
North Rhine-Westphalia	529
Mecklenburg-Western Pomerania	73

Following the criterion “population density”, one could choose a part of a large town in the Federal State of Bavaria: Schwabing-West. This is an electorial district with the highest population density of Munich and could be chosen for the sampling location “big city”.

[7] http://de.wikipedia.org/wiki/Bev%C3%B6lkerungsdichte

[8] http://www.regierung.oberbayern.bayern.de/oberbayern/zahlen/02762/index.php

To achieve logistic and monetary advantages it is recommendable that in this example the “rural” sampling location should also be near Munich. Here one could choose a small village in the surrounding counties, as shown in the map (**Figure 3.1**): for example a small village in the east part of the county/province Erding (German synonym for province is Lkr.) could be chosen for the “rural” area, which has a population density of 174 inhabitants per square kilometre and is no commuter area of Munich[9,10].

Figure: 3.1 Map of surrounding counties of Munich, Germany (part of Federal State of Bavaria)

4 Selection of participants

It can be anticipated that in a future European-wide HBM selection of the children via inhabitant registries will be the option of choice. Therefore one of the goals of the Pilot Study is to get experience with the respective procedures involved. If access to inhabitant registries is restricted it should be checked whether it is nevertheless possible for a European approach in the frame of the EU Environment and Health Action Plan. Each participating country should carefully take this option into account and try to put as much effort into it as possible. Only if a selection via inhabitant registries is not at all feasible selection via schools is the alternative way to select the children.

For the correct selection of 6 to 11 year old children, participants are often asked their age on a key-date, e.g. the age on the 31st October (here: middle of the sampling period for DEMOCOPHES). This is practical for inhabitant registries but

[9] http://www.airfolgsregion.de/2103--~de~Wirtschaften_und_Forschen~Standortfaktoren~Zahlen_und_Faktoren~Zahlen_und_Fakten.html

[10] http://www.regierung.oberbayern.bayern.de/imperia/md/images/regob/internet/bereich2/raumordnung/lkr_in_r14.gif

seems too complicated for the selection in the schools, because there the teacher would have to manage the selection. **Therefore we recommend using the year of birth as selection criteria: children born in the years 2000 to 2005 should be included in the selection process.**

4.1 Selection of children via inhabitant registries

Table 4.1 summarizes the procedures that have to be followed when choosing the children via inhabitant registries. These procedures will be explained in a separate letter to the inhabitant registries (see Appendix of this SOP) which should be asked to strictly follow these procedures. This letter for the inhabitant registries should also contain the information that children living in children's homes, orphanages or similar institutions should be excluded and that per family only one child should randomly be selected. To inform the inhabitant registries about DEMOCOPHES it is suggested to send them the information leaflet (flyer) (see WP 5) together with the letter.

As mentioned above (see **2**) it is difficult to predict the response rate in the different participating countries. Assuming a minimum response rate of about 30%, it is suggested to select **420** children in one country (aged 6 to 11 years), divided into **210** children from a "rural" and **210** children from a "big city" sampling location. This results in **35** children who have to be selected per age group and per area (6 age groups: 6, 7, 8, 9, 10, and 11 years).

Tab. 4.1: Random selection of the children via inhabitant registries, stratified by age group and gender

	Procedure	Note
1	Definition of age groups	Exact definition of age groups according to year of birth (year 2000 – 2005)
2	List for each age group	Creation of a random list of all children of the age group and placement of an at least 8-digit random number to each child
3	Sorting each list	Sort the numbers in ascending order according to the digit number
4	Selection of children	Selection of the first 35 children in the list per age group
5	List of children selected	First name/s Last name Street Street number Postal code Date of birth Gender Nationality Random number Legal representative

If some inhabitant registries are not able to perform the described selection procedure or in case they want unreasonable fees they should be asked to send the list of addresses (if possible connected with information on date of birth, gender and nationality) of all children aged between 6 and 11 to the survey office.
In case that the number of children is not sufficient to select 35 children per age group the inhabitant registry should send a list with all the children available per age

group. In this case the survey office will contact another inhabitant registry of a neighbouring district, combine the lists and perform the above described selection procedure.
The selection procedure should be performed close to the start of field work to minimize quality-neutral drop outs (removals, child stays most of the other time in another place, hospital, care centre). As a result of this selection process the survey office should get a list with addresses of 35 children per age group (born 2000 to 2005), stratified by sex. Each child will be assigned with a random number; the sorted random numbers will serve as the basis for the selection of the children who will receive the first invitation letters.

4.2 Selection of mothers via inhabitant registries

If the inhabitant registries of a participating country do not contain children, but only adults, mothers less or equal to 45 years (born year 1966 or later) are to be drawn. In this case COPHES (WP 2, UBA) will support the country with the selection process.

4.3 Selection via schools

If an approach via inhabitant registries is not at all feasible in a participating country the third priority should be given to sampling via schools. Selection of the schools will follow in the two selected areas “big city” and “rural”. Within both areas the schools should be situated in districts with a mixed population regarding socio-economical structure. Different school-types (private school, governmental school, etc.) may attract parents/children with different socio-economic background which could lead to social bias and should be avoided.

It has to be clarified first which institutions have to give their permission for contacting pupils in schools (agency for cultural affairs, superintendent of the school district, or other)[11]. With the help of these authorities a list of all schools in the two selected areas (highest and lowest degree of urbanisation) can be compiled. Of all schools for 6-to-11-year olds only schools that are attended by all SES are eligible. One is to be selected at random. If that is not possibly, one school mainly attended by lower SES children and one school mainly attended by higher SES children has to be selected randomly in each area.
After selection of the schools the school principal has to be asked to give his permission (**Figure 4.3.1**). He is the one to ask the teachers for their interest.
After the dialogue with the principal there should be a meeting of a representative of the survey office with the teachers of the eligible classes to explain the survey. He will explain the survey and the tasks of the pupils and their mothers to the teachers and he will hand out the invitation letters, the information leaflets and the reply cards which cover the same options as the ones used for the approach via inhabitant registries (see Annex 8.2.2 SOP 2 Recruitment and Field Work). The teachers will be

[11] As for the other options, all steps have to be preceded by a procedure through the ethical committees and after notification to the data protection authorities (see under ethics and data protection)

informed that every pupil who brings back the reply card will, in any case, receive a small incentive (pencil, rubber, ruler, etc.), regardless if the pupil will take part or not. Soon after this meeting the teacher should explain the survey to his class and hand out the survey material to children born in the years 2000 to 2005. Older or younger children have to be excluded because they don't meet the inclusion criteria. The teacher informs the children about the collection of the reply cards in the next two or three days. The reply cards (hidden in envelopes) are collected from the teacher who will change them with the promised incentives; he will send the collected reply cards in a prepared envelope to the survey office soon after collection or a member of the field staff will visit the teacher to collect them.
The survey office will evaluate the reply cards and will call the potential participants (see also Annex 8.2.2 SOP 2 Recruitment and Field Work)[12].

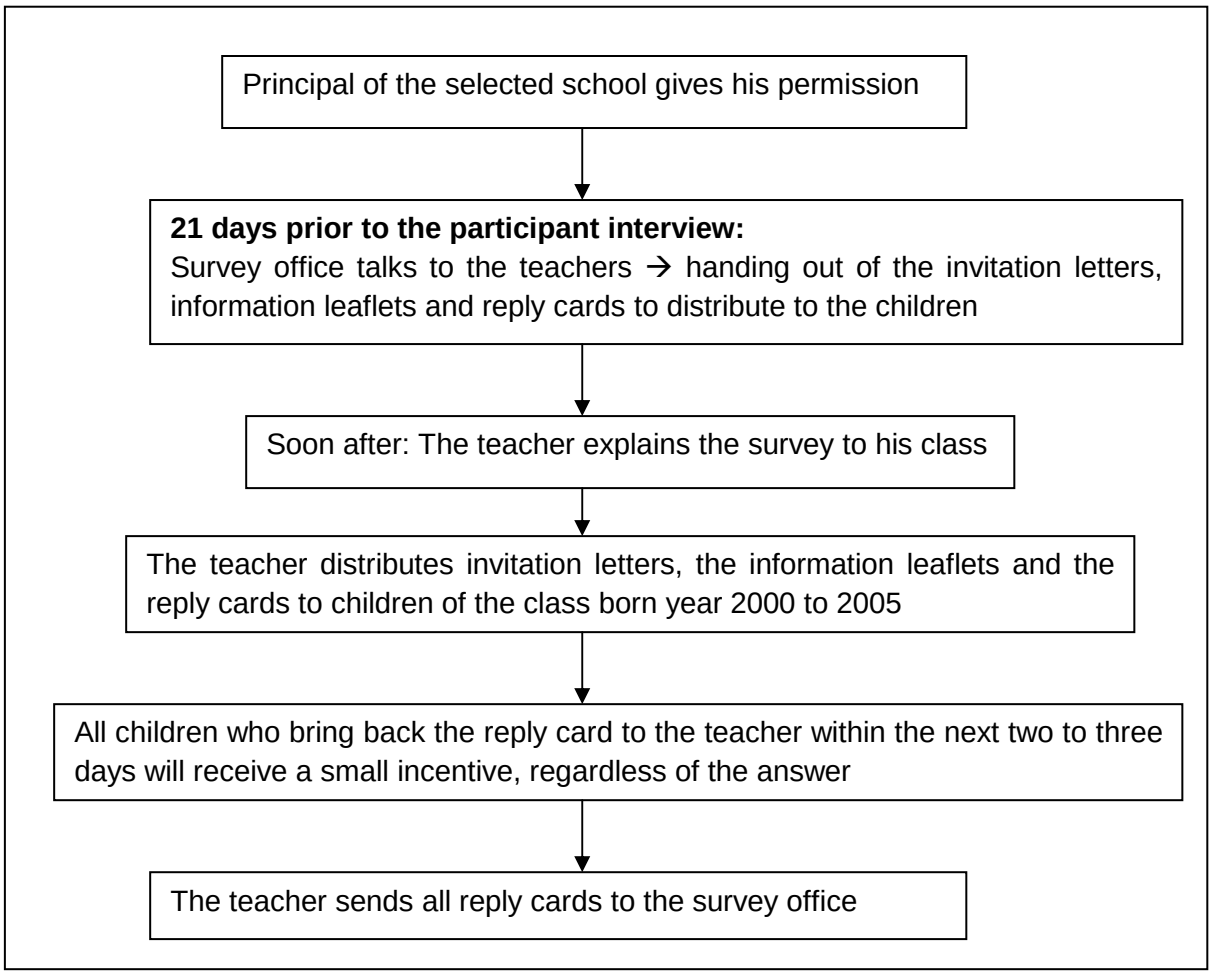

Figure 4.3.1 Recruitment via schools

As a result of the selection procedure via schools, the survey office gets an envelope with all the reply cards collected in the school.

[12] In the case of this Pilot Study it is not necessary to convince all pupils of the classes, because only 10 pupils of each age group are necessary as participants. Therefore low input to convince potential participants may be sufficient; this is the reason why the survey staff can afford not to visit in the respective classes.

The alternative way to select Participants at schools would be as follows: If in one MS it is possible to get the list of addresses of the pupils from the school secretariat this list should be used to send invitation letters, information leaflets and the reply cards to the parents of the children. This has the advantage that not the complete class has to be informed but just the number of parents needed.

Appendix

Letter to the inhabitant registries

DEMOCOPHES (Logo)

(DEMOnstrationStudy to COordinate and Perform Human biomonitoring on a European Scale)

Address/Name of institution performing this inquiry

Address of registry

Aim: Obtaining addresses from the residency register (inhabitant registry) for an international human biomonitoring study

Dear Sir or Madam;

[Name of the country] takes part in the Pilot Study DEMOCOPHES, which finds its origin in Action 3 of the European Environment and Health Action Plan. All background information on this action Plan can be found at:

http://europa.eu/legislation_summaries/public_health/health_determinants_environment/l28145_en.htm.

In the frame of this Action Plan the overall objective of the Pilot Project is to *"test the hypothesis that human biomonitoring in the field of environment and health (hereafter abbreviated as HBM) can be performed in a coherent and harmonised approach throughout Europe by means of commonly developed protocols, strategies and scientific tools ensuring reliable and comparable data, whilst also leading to a more effective use of resources*"

The xxx Institute intends to conduct the national part of this EU-wide survey on children between 6 and 11 years and their respective mothers. This survey encompasses an interviewer-guided questionnaire and the collection of urine and scalp hair samples. The study shall be carried out at 2 selected locations of which one is located in your jurisdiction [area of responsibility].

The results of this Pilot Study shall build the basis for HBM on the European level and first information about the situation of harmful substances in children and mothers in childbearing age in our country in comparison to other European countries.

Targeted precautionary measures and health policy decisions, which will benefit inhabitants of our country, are the ultimate aim of human biomonitoring surveys. A European coordinated approach is expected to generate more meaningful results and lead to a more effective use of resources.

The demands of this survey can best be met through gathering random samples from the registers of the residential registration offices. The feasibility of the study essentially depends on the required addresses being available.

We therefore cordially request your support in this undertaking, which is important to health and environmental policy, specifically through initiating the acquisition of these addresses as soon as possible and in accordance with the procedure described in the enclosure. Please send the addresses identified to us by the <Date>.

As a federal agency of the Federal Ministry for …./ working at the demand of the federal agency of the Federal ministry for, we request uncompensated release of the data in the framework of official cooperation.

The number of the required addresses, the sampling process and other information can be found in the enclosed acquisition instructions.

We are, of course, at your disposal to deal with any problems or unclear points. Just contact xxx.

Sampling Instructions

Gathering a sample of addresses from registration records for the research project DEMOCOPHES, [Name of the country]-Part

Target population

Included in the target population are all children aged 6-11 in the municipality of the main residence who were born in the following 6 time intervals:

Interval No.	From	To
1	01.01.2000	31.12.2000
2	01.01.2001	31.12.2001
3	01.01.2002	31.12.2002
4	01.01.2003	31.12.2003
5	01.01.2004	31.12.2004
6	01.01.2005	31.12.2005

We need 35 addresses from <city/village > for each time interval, divided nearly equally between both sexes, a total of 6 age cohort intervals X 35 addresses = 210 addresses (105 boys and 105 girls).

Attention:

If there are in total fewer than 50 addresses in the village in the affected age cohorts, then send us all of these addresses. Children who are homeless, live in children's homes or in institutions have to be excluded. Only one child per family can be selected.

If it is impossible for you to select addresses following the described sampling procedure, please send us all addresses for the age cohorts indicated.

Otherwise please select the data from your registration records in accordance with the procedure described in the following pages.

If possible, please send us the addresses by <Date> with the following properties:

-First name
-Family name
-Street and Number
-Postal code
-City
-Date of birth (DD.MM.YYYY)
-Sex
-Nationality
-Random number (see below)
-Legal guardian/representative

and as far as it is possible without additional effort, certifiable regional identification such as district/city borough.

If there are delays in identifying the addresses, we would be grateful if you would inform us immediately.

Please note:

If selection is done via computer, we ask that the addresses be transferred on data storage devices instead of [paper] address lists, if this does not require any additional effort (ASCII, EXCEL, ACCESS-file, etc.). They can also be returned via e-mail (e-mail address).

Procedure

Unrestricted Random Sample

Determine the size of the target population for each birth year cohort, i.e., the number of children in the aforementioned birth year cohorts registered with their primary residence in the community <city/village>. You have 6 subpopulations. In order to obtain the desired random sample of 35 that we want for each birth year cohort, repeat the following procedure for each of the 6 subpopulations.

Arrange the children in the subpopulation in a random order. Generate a random number for each person in the target population – very often there is a special function for this in a program such as random number () or rand () – and write this random number in a column next to the personal identification number. Now, sort the subpopulation according to the random numbers and select the first 35 children from the subpopulation sorted in this way as a sample. If possible, send us the addresses with the assigned random numbers.

The following example shall illustrate the procedure. From a population of 10 persons, 3 shall be selected unrestrictedly at random:

Unsorted Population	
Personal Number	**Random Number**
1	0.24124007
2	0.04246308
3	0.27632941
4	0.18420375
5	0.99205507
6	0.49371558
7	0.61239002
8	0.11153661
9	0.54799921
10	0.60231511

Population Sorted by Random Numbers	
Personal Number	**Random Number**
2	0.04246308
8	0.11153661
4	0.18420375
**********	**********
1	0.24124007
3	0.27632941
6	0.49371558
9	0.54799921
10	0.60231511
7	0.61239002
5	0.99205507

The sample would contain children with the personal numbers 2, 8 and 4.

If you don’t have the information and an unrestricted random selection is not possible or is too expensive, please contact us.

For additional evaluations, we **also** need a table of the population (see **below**), i.e., the number of all boys and girls of the birth age cohorts in <city/village>, which provides the basis for the random sample that you selected.

Table of the target population

Interval No.	**From**	**To**	**boys (number)**	**girls (number)**
1	01.01.2000	31.12.2000		
2	01.01.2001	31.12.2001		
3	01.01.2002	31.12.2002		
4	01.01.2003	31.12.2003		
5	01.01.2004	31.12.2004		
6	01.01.2005	31.12.2005		

Annex 8.2 Standard Operating Procedures

8.2.2 SOP 2 Recruitment and Field Work

DEMOCOPHES

SOP 2

Recruitment and Field Work

WP 2

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Contents

1 Introduction

This standard operating procedure for recruitment and field work is intended to be used in the framework of the DEMOCOPHES Pilot Study. The procedures described below follow the selection procedures performed via inhabitant registries or schools (see Annex 8.2.1). These procedures include the recruitment of participants from the number of preselected ones and the conduct of the interviews and specimen sampling during home visits or performed in the examination centres.

2 Basic decisions

Before designing recruitment and field work some basic decisions have to be laid down. The basics relevant for the EU Pilot Study DEMOCOPHES are described below.

2.1 Start and duration of field work

The research project that goes along with the Pilot Study for the EU-wide HBM started in September 2010 with a preparatory phase. Field work will start, depending on the exact schedule of the respective participating countries, **September 2011** and will be finished by **December 2011**. At each of the two sampling locations the field teams will operate for 1.5 months or the field work can run in parallel. Thus it can be ensured that all participating countries collect exposure information by questionnaires as well as urine and hair specimen in the same season.

2.2 Establishment of a survey office

Each participating country has to establish a **survey office**. Depending on the structure, this survey office might be located in the unit responsible for the Pilot Study (NMU National Management Unit) or in the institution responsible for field work (in case field work is performed by a subcontractor). The office is the **central unit** for conducting field work and responsible for the management of participants' sampling and recruitment.

The essential tasks are:

Organisation

- to develop a concept to safeguard data protection
- to apply for ethical permission to conduct the study
- to notify the study to the privacy authorities (data protection)
- to prepare the Fieldwork Manual
- to translate the questionnaires in the language(s) of the country and to retranslate this into English for control purposes
- to validate the translated questionnaires (10 – 15 test-interviews)
- to find qualified interviewers

- to organise and perform the training of the interviewers
- to design the schedule for visiting the sampling locations (two areas)
- to acquire rooms that can serve as examination centres
- to organise necessary material (for urine and hair sampling, little books etc. as incentives for children)

Selection

- to ask population registries for performing the selection procedure
- to contact the necessary school authorities if selection will be via schools
- to check incoming selection lists from the population registries
- to check whether exclusion criteria are met or not (perform recruitment interview)
- in case a registration office was not able to choose: prepare the address lists of the selected children
- in case of recruitment via schools: check the reply cards form the parents and organise little incentives for the pupils
- to create a database with the addresses adding the ID-Numbers (child and mother)

Recruitment

- to prepare and send all written material (letter of invitation, information leaflet, reminder letters, reply card, confirmation letter, informed consent, letter of thanks for mother/child who didn't meet the inclusion criteria, instructions on urine sampling)
- to prepare the protocol sheet as soon as the letter of invitation is sent including the respective ID-number (see below)
- to provide a help-desk phone number for the interviewers and the participants
- to organise recruitment visits at home in case families cannot be reached by telephone
- to create a data base and a list in which all attempts to reach and fix a date with the participants have to be quoted and where all received samples are documented (protocol sheet)
- to perform the non-responder interview
- to fix dates for the examination/sampling

Field work

- to supervise the field work, to give help and advice if necessary
- to supervise the careful sending of the urine and hair samples to the laboratory
- to perform internal quality control of field work

- o to safeguard data protection
- o to manage the creation of a data base from the questionnaire data
- o to provide this data base to the unit that performs data evaluation
- o to report about experiences and lessons learned to the responsible NMU

For field work organisation it has to be kept in mind that two sampling locations (big city and rural area) were selected, so that some of the items mentioned above have to be organised in both locations separately.

2.3 Instruments to be used

One instrument in the EU-Pilot Study is **human biomonitoring** (HBM) using morning urine and scalp hair samples. This is accompanied by **questionnaires** intended to be used by interviewers. The basic questionnaire, which is answered by the mother, is about socio-demographic information and information about exposure pathways (nutrition, other behaviours, occupation and residence) of mother and child. Additional questionnaires will collect information about sampling conditions of all four samples (mother: morning urine and scalp hair; child: morning urine and scalp hair).

Everything necessary to use these instruments and to collect and send the samples to the laboratories has to be prepared in advance by the survey office. As mentioned above this includes adaptation and translation of all questionnaires, the providing of the sample vessels and plastic bags and it also includes the scissors, gloves, plastic bags and tape necessary to take the hair samples.

2.4 Case definition

The mother and child pair only counts as a case, if they gave informed consent, met the inclusion criteria, urine and hair samples from mother and child have been collected and in addition, about 80 % of the questions of the basic questionnaire have been answered. Furthermore, some of the questions of the basic questionnaire are mandatory for possibly deriving reference values. These must definitely be answered so that the family can count as a case (further details see Annex 8.2.4).

3 Recruitment

Recruitment is performed by the survey office. The office manages the written invitations and confirmations, the dating and all necessary telephone calls. Recruitment starts with the sending of invitation letters and finishes when an appointment was fixed for interview and specimen sampling.

An important instrument for the documentation of the recruitment and field work process is the **protocol sheet;** it has to be set up for every invited family**.** It contains the address and phone number(s) of the selected child and mother and the respective ID-numbers (see below) that will be added to the sheets when sending the

letter of invitation. With this information of address and ID-number data protection has to be safeguarded. Therefore all protocol sheets have to be kept separately from other documents and need to be stored securely if not needed. Access has to be limited and in accordance with the confidentiality and data protection rules established. The protocol sheet contains the information if the family has agreed to be contacted or not and, if yes, compiles an overview of all contacts to the selected participants. It documents all attempts necessary to make an appointment with the mother and her child (phone calls or home visit), to obtain the informed consent and it contains a table for documenting the reception of urine and hair samples from mother and child and for documenting the conducting all interviews.

Coding of ID numbers of mothers and children

Each mother and child gets a unique ID-number.
Length: 7 characters
Type: string

Position	Contents
1, 2	two-letter abbreviation of country according to EUROSTAT (examples: DE for Germany; LU for Luxemburg, UK for United Kingdom)
3	one letter for sampling location (R= rural; U=urban)
4, 5, 6	three-digit number of family within sampling location/country (single-digit numbers and two-digit numbers have to be filled with leading 0)
7	one letter for family member (M=mother; C=child)

Examples:

- Mother 47 from the urban sampling location in the Netherlands gets ID no. NLU047M
- Child of family 8 in the rural sampling location in Slovakia gets ID no. SKR008C

For the recruitment procedure, following the preselection of the participants, several essential materials are necessary and listed below. All those materials have to be part of the Fieldwork Manual (see Annex 8.2.3 SOP Quality Assurance Methods).

Materials necessary for the recruitment procedure:
(see WP 5 Communication, if not other Annexes or Appendices are indicated)

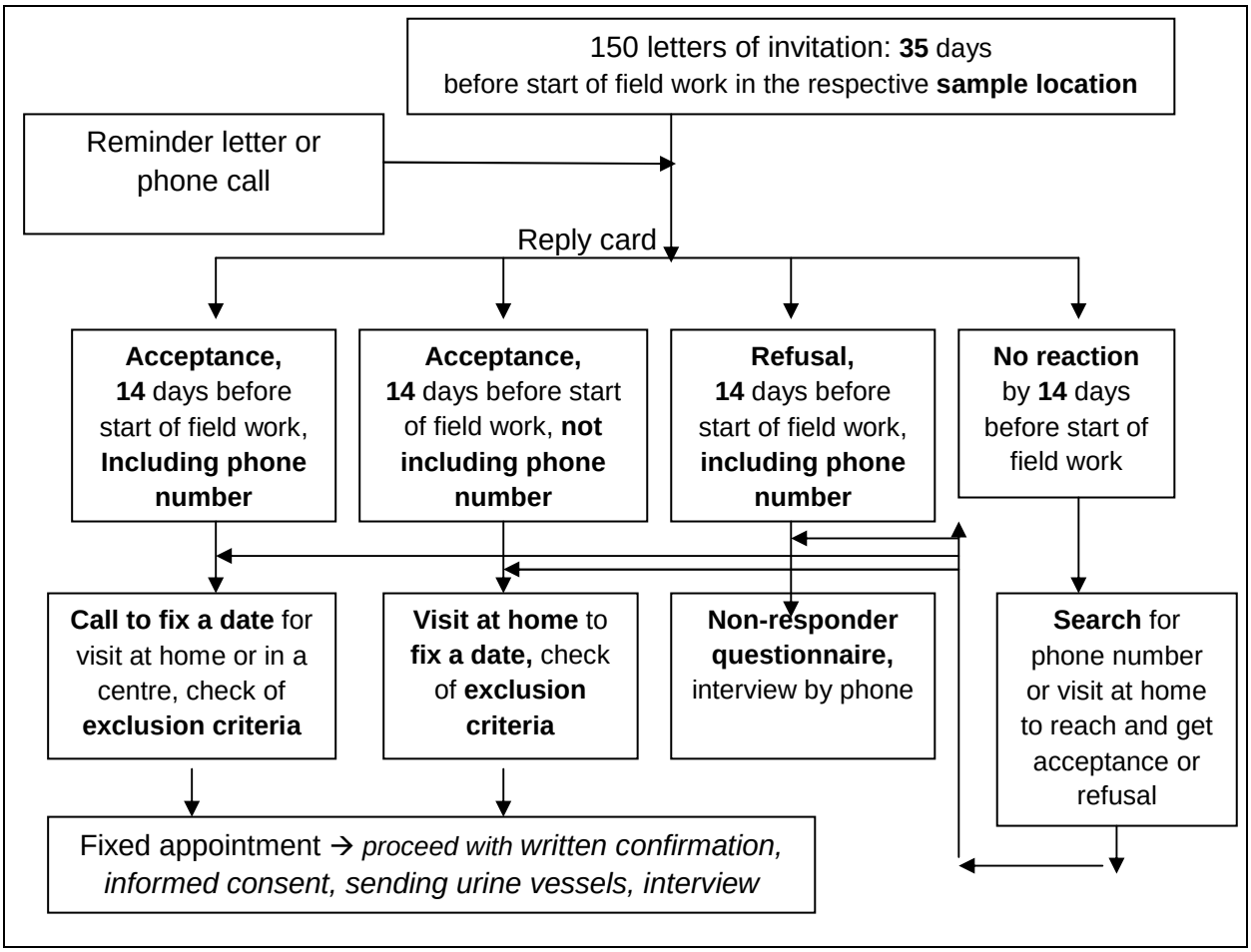
1) The letter of invitation on behalf of (signed by) a renowned authority addressed to the family of the child or the mother if her address was selected
2) A flyer (information leaflet) about the survey and its objectives
3) A reply card: already post-paid (see Appendix II 3.1 to Annex 8.2.2)
4) A reminder letter
5) A recruitment questionnaire (see Annex 8.3.1)
6) The written confirmation of the time and date
7) A written informed consent form (will be send together with 6)
8) A reminder letter to request sending the informed consent (will be send together with 11+ 13)
9) A letter of thanks – for participants who did not meet inclusion criteria
10) A non-responder questionnaire (see Annex 8.3.4)
11) The sampling vessels for the urine sample
12) The written instruction to take the urine sample (see WP 3)
13) The protocol sheet to collect all individual information (see Appendix II 3.2 to Annex 8.2.2)

3.1 Recruitment on the basis of inhabitant registries

As mentioned in Annex 8.2.1 (SOP 1 Selection of Participants) the inhabitant registries are asked to select 210 children in each sample location, divided into 35 children per age group (both sexes ca. equally distributed). Anticipating a higher participation rate than 30 % and to reduce the work load, only 150 potential participants per sampling location have to be sent an invitation letter in a first round, i.e. 25 per age group (12 boys and 13 girls; or 13 boys and 12 girls). The inhabitant registries will send all addresses stratified by age group and sex and in a random order (each child with a random number, random numbers sorted in an ascending order), so that 25 children will be randomly selected out of 35 addresses if the first 12, respectively 13 addresses in each sex (boys respectively girls) and age group are selected. Incoming reply cards should also be sorted according to age, sex and random number to facilitate later access.

Figure 3.1 shows the recruitment procedure when the address of selected children or mothers was derived from inhabitant registries.

Figure 3.1: Recruitment procedure in a sample location and following procedures



For all of these 150 invited families a protocol sheet has to be set up and a database has to be prepared by the survey office. Already known information about the potential participants has to be laid down in both, in the protocol sheet and database.

The survey office sends the 150 **letters of invitation** 5 weeks before the start of the field work in the respective sampling location. The letters will be addressed to the family of the child, using the address provided by the inhabitant registry, or the address of the mother if she was selected from the registries. Along with the letter of invitation **a brief description** of the survey **(information leaflet)** and its objectives and a **reply card** are provided.

The reply card contains the following response options:

- o I am interested to take part in the survey, please contact me at (phone number)
- o I am interested to take part in the survey, but I can't be reached by phone. I agree to be visited at home preferably at ….. day and….hour
- o I am not interested to take part, but I agree to answer some questions. My phone number is ……

An email address of the survey office should be given, to offer the possibility to answer via email. With this reply card families can declare their willingness or

unwillingness to participate and are kindly asked to provide a contact telephone number and a convenient time when they can be reached. Addressees will be asked to send the card to the survey office at least two weeks before starting the field work at the sampling location. If within ten days the family has not reacted, a **reminder letter** will be sent to the family or the family can be called by phone if the phone number is available through internet or telephone lists (see **Figure 3.1**).

Two alternative procedures can follow, according to the number of incoming reply cards (attention: one could send the reply by e-mail or call the survey office!):

1) If nearly all children per age group send back the reply card: they will be called according to the random number. In this call the exclusion criteria are checked and appointment times are arranged. If it happens that more appointments can be fixed than the 5 boys and 5 girls necessary per age group, all families should be considered, because there could be drop-outs later in the process (appointment cannot be kept, urine specimen is not provided or analysis shows abnormalities, etc.) and it would be very impolite to reject families.

2) If less than 20 children send back a reply card (10 boys and 10 girls) in one age group, invitation letters have to be send to the remaining 10 addresses, left over from the 35 addresses derived from the inhabitant registries.

After the reply card arrived at the survey office (or the family has written an email), the potential participant is called:

1) If mother and child want to take part, this call gives the opportunity to ask remaining questions, to check the inclusion criteria (age, language ability, place of residence and health status) and to fix a date for the home visit, provided inclusion criteria are met. To check the inclusion criteria the families shall be asked whether the child currently is living most of the time (more than 16 days per month) with the biological, foster mother or stepmother at the address (and not in hospital or somewhere else, etc.) and whether both of them have been living in the sampling location for the last 5 years and the child meets the inclusion criteria for age (between 6 and 11 years old, i.e. born between year 2000 until 2005) and the mother is not older than 45 years. Also the health status is asked, i.e. mother and child should not have diseases that lead to renal failure or liver damage. While talking to the mother the interviewer can check the language ability. The place of the upcoming interview and sampling is preferably at the home of the family. Only if the family refuses this, sampling and interviewing can be performed at the examination centre. All the data collected in this call have to be noted in the protocol sheet.

2) In case the reply card indicates interest but the participant cannot be called by telephone the survey office has to take care that the family is visited at home in advance to fix a date and to hand over all material necessary.

3) In case the reply card indicates no interest in participating but provides a phone number for non-responder questionnaire, the call is used to ask the non-responder questionnaire.

4) In case the families do not reply at all the survey office will try to find out the telephone number in phone books or in the internet. Five attempts to reach the families by phone should be performed. If no phone number can be found, the

families will be visited at home and asked either to participate or to respond to the non-responder questionnaire. Three attempts to reach the family personally at home should be performed.

5) In case a definite refusal is given on the reply card – even if there is no tick box for this reply, it could be written on the card – the family must not be contacted.

If mother and child want to take part and meet the inclusion criteria, the mother has to give their informed consent for the survey. The form for the informed consent is posted to the family in a letter together with the confirmation of the fixed date which will be sent after the phone call when the appointment was fixed. The appointments should consider scheduling wishes of the families and should avoid to conflict with school or working hours. It has to be written down in the protocol sheet that the informed consent was given, otherwise the family should be reminded. This reminder can be sent together with the urine vessels and accompanying explanations for their use a few days before the fixed date of the home visit. If the informed consent is still not sent to the survey office it can be accepted during the home visit but without informed consent, no interview can start.

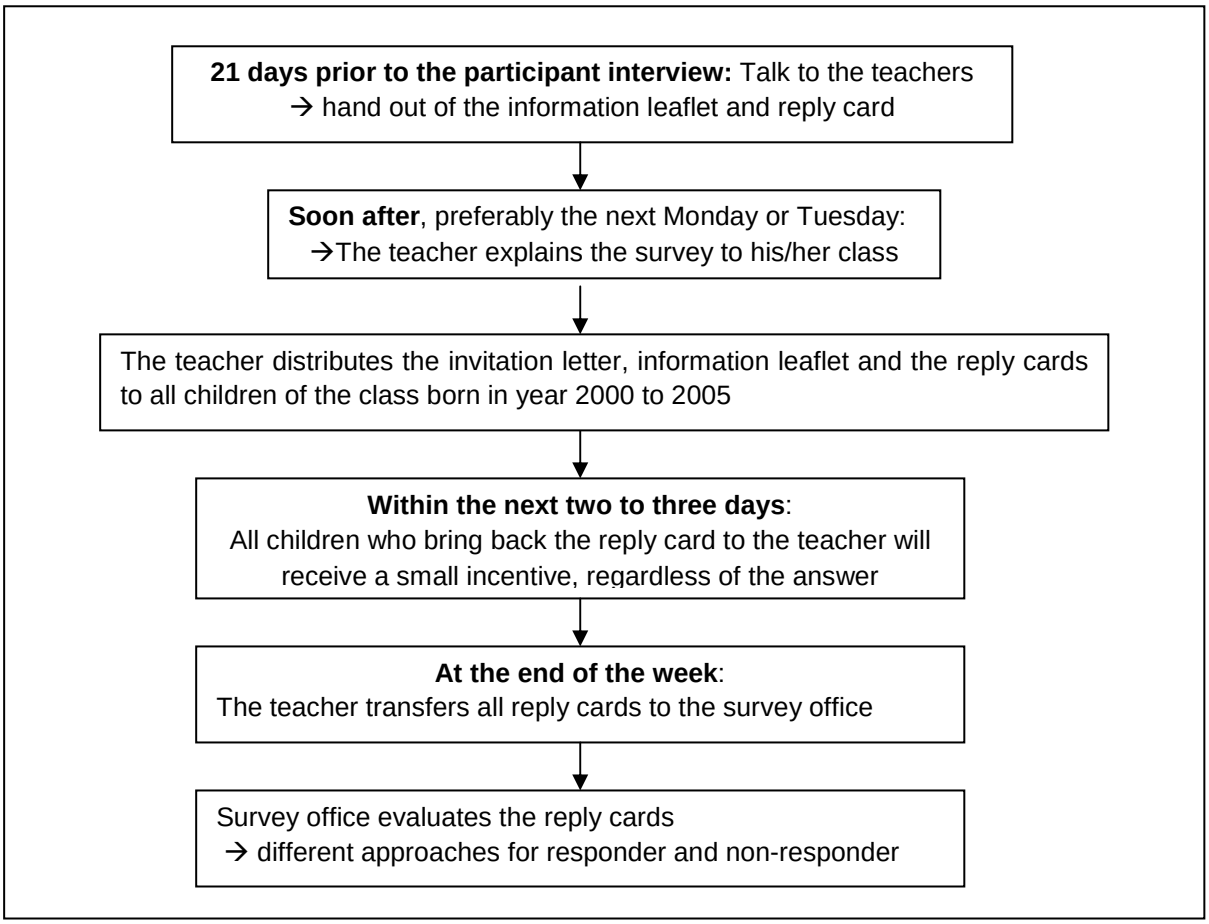
If mother or child do not meet one or more of the inclusion criteria, they must be excluded from the survey. Mother and child have to be thanked in a very polite way if one of them does not meet the inclusion criteria. This has to happen first during the first phone call and later on in a **letter of thanks**, explaining the reasons for exclusion and thanking them for their interest in the study.

3.2 Recruitment via schools

If recruitment on the basis of inhabitant registries is not at all possible (neither children nor mothers) in one participating country, the recruitment via schools is the next option. The field work is foreseen from September until December 2011 with 6 weeks per selected sampling location. This timetable is not easy to keep with regard to the summer (and autumn?) vacation, therefore careful planning of the different steps is necessary. As already mentioned in Annex 8.2.1 (SOP 1 Selection of Participants) several education authorities are involved in the school hierarchy which have to be contacted and asked for permission before schools are selected and school principals can be contacted.

If in one participating country it is possible to get a list of addresses of the pupils from the school secretary this list should be used to send invitation letters, information leaflets and the reply cards to the parents of the children without taking to the teacher of the respective classes. This has the advantage that the complete class does not need to be informed but just the number of parents needed. Otherwise the procedure described in Annex 8.2.1 (SOP 1 Selection of Participants) and in **Figure 3.2** below has to be followed. It starts with the appointment of the representative of the survey office with the teacher, which should take place about 21 days prior to the start of the field work. This meeting should be on a Monday or Tuesday enabling the teacher to collect the reply cards before the weekend.

Figure 3.2 Recruitment via schools



The teacher will put the information about the survey into the class soon after a meeting with the survey office (preferably the next school day, Monday or Tuesday) and he/she distributes the invitation letters, the information leaflets and the reply cards (enclosed in an envelope) to the children, born in the years 2000 to 2005. Older or younger children have to be excluded because they don't meet the inclusion criteria. All children who receive the invitation letter have to be assigned a random number by the survey office (e.g. generated with a computer programme). When the children bring back the reply cards (enclosed in an envelope) within the next two to three days, the teacher will exchange it with the promised incentives. If insufficient reply cards are returned, the teacher should remind the class to bring them back to school straight after the weekend. If only reply cards from the first responders are used, this could lead to a selection bias which has to be considered for data evaluation. Because of the stringent time table, emphasis should be made on requesting a quick response. The reply cards have to be transferred back to the survey office as soon as possible (e.g. send by post in a provided envelope, or a member of the field staff will collect them). The survey office will handle the reply cards in the same way as the ones from the participants selected through the inhabitant registries, i. e. sort them according to age group and gender and start calling the families according to the random number. Each pupil who got an invitation has to be noted in a protocol sheet together with the information given on the reply card (further procedure see 2.1).

4 Home visit

After all possible appointments are fixed and databases are created, an overview has to be compiled which shows how many appointments are missing and have to be fixed during field work. 5 days before field work starts in a sample location, the survey office transfers the recruitment database and protocol sheets with all information already gathered, address lists from the inhabitant registries or self created and all necessary materials, to the field team. This is the start of the field work; including the move of the responsibility to the field work team.

The survey office should have already fixed all appointments for the home visits two weeks in advance of the start of the field work in one sample location. Nevertheless, the field team has to take into account that some appointments might not be fixed yet or changed at short notice.

Urine and scalp hair samples as well as questionnaires will be sampled from all participating mothers and children. Major efforts should be spent to maximize the number of participants with complete records. If one participant forgot to collect the morning urine he has the possibility to do this the next morning, the member of the field staff will collect it. The mother and child pair counts as a case only if they gave informed consent, met the inclusion criteria, each of them gave the urine sample, the hair sample and the basic questionnaire was performed (further detail see 2.4. and Annex 8.2.4). If there are any doubts whether participants will count as cases the survey office should be asked for advice.

4.1 Field personnel

The program which each mother and child pair has to follow in the Pilot Study is not very extensive. Therefore, one skilled interviewer might be sufficient to do a home visit. The number of interviewers one country has to employ, depends on the organisation of the field work (number of parallel running of home visits). If, e.g. the field team consists of two skilled persons one should be responsible for the whole process. However, both persons (and more, if the team is larger) should be educated and trained for all occurring procedures.

4.1.1 Education of the field team members

All persons involved in field work have to be trained. The training should consist of a theoretical part in which the survey objectives, the pollutants analysed and other theoretical background information will be provided. Training should also have a practical module in which the sampling of the urine and scalp hair samples will be practiced as well as to fill out the questionnaires and to perform the interview in a polite way and to deal with difficulties during the home visit. Information on cultural aspects, especially if interviewing immigrant families, have to be considered (see Annex 8.2.4 SOP 4 Questionnaires and Interview Conduct).

The basis for the education is the Fieldwork Manual which must be ready and harmonized between all involved partners in one participating country and between participating countries before training starts. The education procedure

should be accompanied by the persons who are in charge of internal quality control (see Annex 8.2.3 SOP 3 Quality Assurance Methods).

Field teams should be supervised during the whole field work period. They should have a permanent adviser in the survey office taking care of them and trying to find answers to all occurring questions. The advisor must easily be reached by phone during working hours in the field. Changes of appointments will come in at short notice ("my child has fallen ill"): the field team must be informed and new appointments with this family have to be fixed. In case a field team member office falls ill, the advisors of the survey office must be prepared to substitute her or him.

4.2 Procedure

The home visit or the visit in the examination centre has to follow a strict procedure, which is demonstrated in **Figure 4.1.**

All information relevant for this process has to be included in the Fieldwork Manual, which is described in Annex 8.2.3.

If single participating countries want to ad particular examinations to the official DEMOCOPHES procedure this is only possible after the interview of the basic questionnaire has been finished.

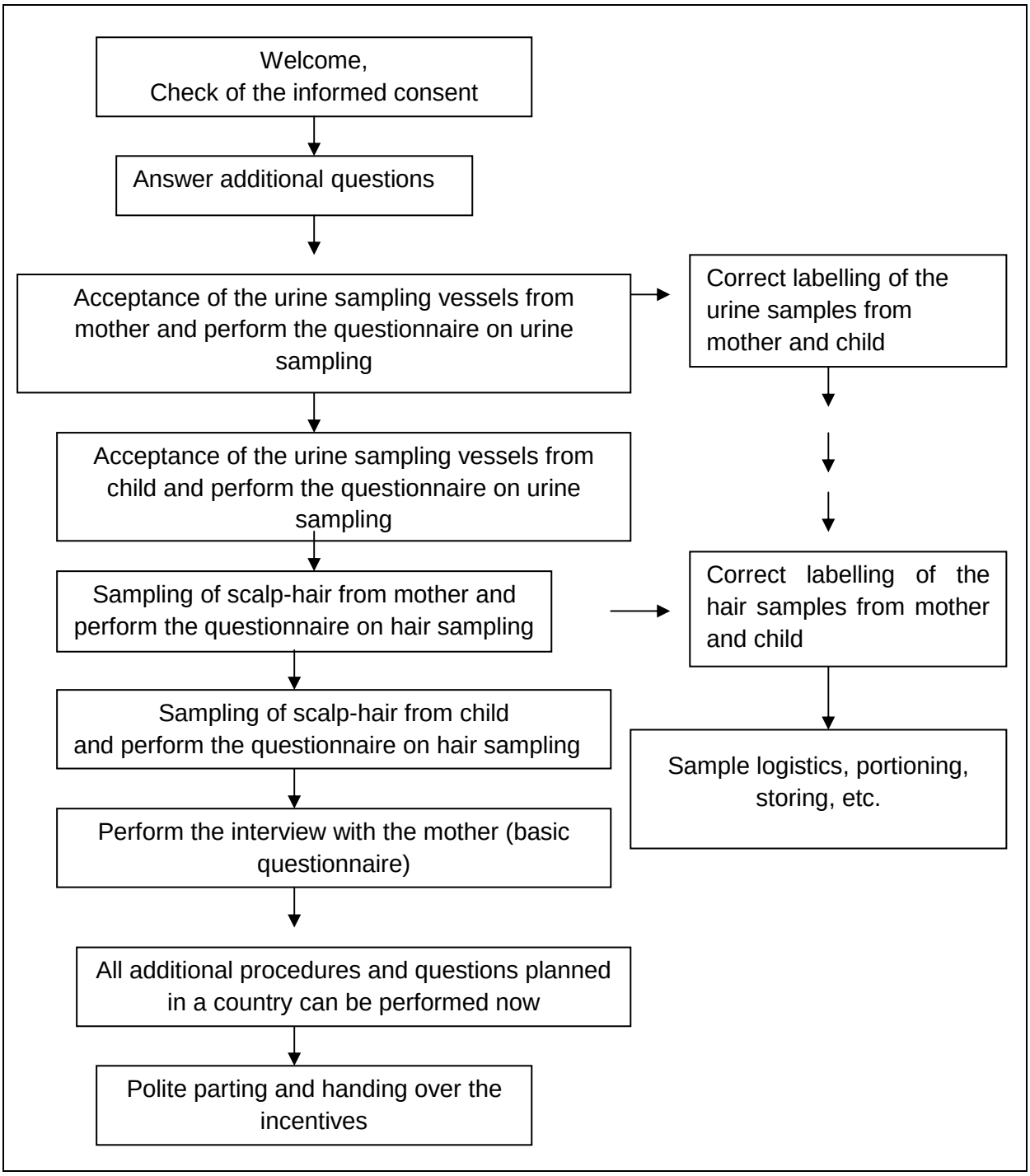
4.3 Interview

The procedure of sample taking is already accompanied with interview conduct because, the questionnaires regarding urine and hair sampling concern the sampling procedure and therefore will be performed close to the acceptance of the sample, e.g. when the urine vessel from the mother is accepted she will be asked the related questionnaire and if the urine vessel is accepted from the child the questionnaire belonging to the sampling of the child's urine is asked (see **Figure 4.1**). A mix-up of the two urine vessels and hair samples must be avoided.

The basic questionnaire is another essential part of the study. This questionnaire will be performed as an interviewer-guided questionnaire with the mothers at the time of sampling (home visit)[13]. To perform interviews in a competent and polite way is also part of the education mentioned above (for details see Annex 8.2.4 SOP 4 Questionnaires and Interview Conduct).

[13] The use of CAPI is under consideration

Figure 4.1: Procedure at the home visit or in the examination centre



5 Examination centre

Only if a family refuses a home visit, can the interview and specimen sampling be performed in the examination centre installed at the sampling location. For example, these can be rooms of the community or paediatricians or schools.

The examination centre should easily be reached by public transport. It should have at least two rooms. One should be equipped with a reception desk and should have a waiting zone (with material to entertain the children). The other one should be used for taking, handling and storage of the urine and hair samples and all materials. One of the two rooms should also be used to conduct the interviews and hair sampling with participants who refuse a home visit. Sanitary equipment is necessary including a wash basin in the sampling room. Wet cleaning of the floors should be possible and the rooms should have heating. Ventilation must be possible. The rooms should be presentable. A detailed list of all the equipment that has to be present is part of the Fieldwork Manual (Annex 8.2.3 SOP 3 Quality Assurance Methods).

6 Quality control

To safeguard quality and comparability all steps of recruitment and field work have to be explained in detail in the Fieldwork Manual that has to be prepared by the survey office. Internal quality assurance has to be organised (Annex 8.2.3 SOP 3 Quality Assurance Methods). The personnel involved have to be well trained so that they are able to respond to all questions the participants might have and also be able to create a relaxed environment (see Annex 8.2.4 SOP 4 Questionnaires and Interview Conduct).

Appendix

II.3.1 Reply card *(see below)*

Sender:
<Family>
<Street and Number>
<Postal code>< City>

Recipient will pay

Reply Card
DEMOCOPHES

<Survey office>
<Street and Number>
<Postal code> < City>

<EMAIL-address of the survey office institution>

Logo DEMOCOPHES Logo survey office institution

Please mark/ fill in all that apply.

☐ I am interested to take part in the European DEMOCOPHES Study with my child and request a call-back to arrange an appointment
The best way to reach me by phone is:

Home: Tel.:_____Time:_____
Mobile: Tel.:_____Time:_____
Work: Tel.: _____Time:_____
Email:_____

☐ I am interested to take part in the European DEMOCOPHES Study with my child. As I cannot be reached by phone, I request a visit to arrange an appointment. The best day and time to reach meat home is:
day_____,Time_____

☐ I am not interested to take part in the European DEMOCOPHES Study with my child, but I will answer a few short questions on family and environment.
The best way to reach me by phone is:
Home: Tel.:_____Time:_____
Mobile: Tel.:_____Time:_____
Work: Tel.: _____Time:_____
Email:_____
Any comments _____

Annex 8.2 Standard Operating Procedures

8.2.3 SOP 3 Quality Assurance Methods

DEMOCOPHES

SOP 3

Quality Assurance Methods

WP 2

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Contents

1 Introduction

This standard operating procedure (SOP) deals with quality management of field work in the framework of DEMOCOPHES. Three main aspects of quality assurance will be described.

To be able to perform field work with high quality, detailed and well worked out directions of use are necessary. Such detailed guidelines for single procedures will be laid down in the so called **Fieldwork Manual**. The description of how to prepare such a Fieldwork Manual, and what is its contents, can be found in the first part of this SOP. The Fieldwork Manual - adapted in each participating country - is a central element of quality assurance, as its daily use is the first step on the way to a survey of high quality.

High quality of field work is also closely connected with the ability of the interviewers to perform the interviews in an appropriate way. To put emphasize on this, the **training of the interviewers** is outlined in the second part of this SOP.

Another important part of quality assurance is quality control. **Quality control measures** encompass internal and external quality control, which both are necessary as it is the interest of all partners involved that field work is performed in a harmonized and correct way. To warrant this, field work has to be controlled and checked: the way to do this is described in the third part of this SOP.

2 Fieldwork Manual

2.1 Use and objectives

The Fieldwork Manual describes all steps of field work and provides papers and SOPs for all essential steps: detailed instructions are listed, and check-lists for all important steps of the procedures of field work are compiled. Because of these exhaustive guidelines, the Fieldwork Manual serves as the basic material to train the interviewers (see part 3 of this SOP).

Each country participating in DEMOCOPHES has to elaborate its own Fieldwork Manual on the basis of this example. Adaptations have to account for national specifics, e. g. in some countries it is not allowed to compensate the burdens of participants with an incentive, so in these countries the passages concerning incentives used in this example have to be adapted. Adaptations should only be done where necessary and be as similar as possible to this example. After acceptance of these adaptations by the Central Unit of DEMOCOPHES all papers have to be translated into the national language.

As the Fieldwork Manual is essential for the high quality of the survey, it has to be prepared by the survey office at the very beginning of the survey. It should be used as a reference book for everyday use and therefore everyone who is involved in DEMOCOPHES (NMU, survey office, field work team (=interviewer) and people involved in data management and evaluation) should have her/his own edition of the Fieldwork Manual and is responsible for its regular updating. Updated papers or pages will be provided by the NMU.

2.2 Structure

In practice the Fieldwork Manual is a folder that is provided to all persons who have to be informed about the field work details or are involved in field work. This folder is divided into two main sections. In the first section the basic modules of DEMOCOPHES are explained. The second, bigger, section is the extensive annex where all information for conducting the field work is included in detail: master copies, documents for written information needed for the participants and questionnaires and check lists.

An overview of the structure of the Fieldwork Manual gives **Table 2.1**.

Table 2.1: Overview of the contents of the Fieldwork Manual

Following, the two sections of the Fieldwork Manual are described.

Basic modules

As shown in **Table 1** the first section of the Fieldwork Manual, the “basic modules”, starts with an outline of the objectives of the Pilot Study. More information than the overview contains the second part of the basic modules, the National Study Protocol. This has to be developed by each MS based on the Common EU Pilot Study protocol. It includes general agreements (adapted to national specifics) in study design, recruitment, field work, HBM-samples (biological material), data management, ethics and data protection, and communication. It also includes more detailed information on particular procedures in the SOPs in its annexes (e. g. SOPs for study design and field work are, inter alia, Selection of Participants, Recruitment and Field Work, Questionnaires and Interview Conduct). The National Study Protocol contains information about all important parts of DEMOCOPHES and should be read and completely understood by every person involved in the survey.

In the “Management and Organisation” part, all involved institutions and personnel and their tasks are explicitly described and the plan for the procedure of the whole field work including the recruitment is noted down. This includes, inter alia, descriptions of all materials which each staff member needs to fulfil her/his tasks. The requirements of the examination centres are laid down and the schedule for the leasing of the necessary rooms.

In the “Ethics and Data protection” part of the basic modules of the Fieldwork Manual the institutions and authorities involved in the Pilot Study are named and all procedures connected with their approval or consent are written down.

In part 5 of the basic modules of the Fieldwork Manual the way results are being reported to the participants are described, including all involved steps.

As mentioned above, quality management and quality measurement are important elements for the field work. In the 6th part of the basic modules of the Fieldwork Manual all single parts belonging to quality management are listed and explained, e. g. continuous quality control during the interviewer training, control of the field work, control of the questionnaire data, control of data and data input. Internal and external quality control have to take care of these issues.

Annex

The annex, also subdivided in several parts, builds the second section of the Fieldwork Manual. It is very important for a standardized procedure as it contains all written materials needed. These materials should be filed into the folder in the form of a register to facilitate the access to the papers.

All written materials that are used to communicate with the participants or to communicate between different team members in a standardized way like letters of invitation, schedules helping to organise field work, as well as all descriptions of how all the pieces of equipment in the field have to be used, are laid down in this Annex section of the Fieldwork Manual. Diagrams that give an overview about how things work together, as could be found in some SOPs, could also be filed in this Annex section (see also list below).

Following, a list of materials that should be laid down in the Annex section of the Fieldwork Manual is shown. Most of this material was already mentioned before and examples shown in the annexes of the Study Protocol, but it is worthwhile to file letters, questionnaires, lists, overviews and descriptions of procedures in the Annex because it is easier to find the materials when filed in a register form. This list is just an example and doesn't claim completeness, it has to be adapted to the specific national situation and then be translated into the respective language of the participating country:

Annex A) The written materials (see WP 5, if nothing else is indicated)

1. Cornerstone paper about the survey
2. Information leaflet with study description
3. Form for informed consent to be signed
4. Data protection sheet
5. Letter to ask the population registries for selection (Appendix to Annex 8.2.1)
6. Letter to explain the survey to the principals of schools and other school authorities (if selection of children will be done via schools)
7. Letter of invitation for the child, addressed to the family
8. Letter of invitation for the mother, if she was drawn by the inhabitant registry
9. Reply card (Appendix II.3.1 to Annex 8.2.2)
10. Reminder Letter (to send the reply card)
11. Letter of confirmation of time and date of appointment, including informed consent form
12. Reminder Letter (to send the informed consent)
13. Letter of thanks – for participants who did not meet inclusion criteria
14. Letter for reporting results to participants

Annex B) Questionnaires and information for the interviewers (see Annex 8.3)

1. Recruitment interview
2. Non-responder questionnaire
3. Basic questionnaire
4. Questionnaire for the urine samples (see WP 3)
5. Questionnaire for the scalp hair samples (see WP 3)
6. Handout for conversation and FAQ

Annex C) Some SOPs and their appendices

1. Questionnaires and Interview Conduct (see Annex 8.2)
2. First-Morning Urine Sampling (see WP 3)
3. Scalp Hair Sampling (see WP 3)
4. Sampling Packing and Shipment (see WP 3))
5. Sample Reception and Registration (see WP 3)

D) Lists, sheets and check lists

1. The protocol sheet to collect all individual information (Appendix II.3.2 to Annex 8.2.2 Recruitment and Field Work)
2. Diagram of the procedure of the home visit (see Annex 8.2.2
3. Diagram of the recruitment procedure in the sample location or

diagram of the recruitment procedure in the school (see Annex Annex 8.2.2)

4. Check list for internal quality control (Appendix of this SOP)
5. Check list for “external” quality control (Appendix of this SOP)
6. Schedule for home visit or visit of examination centre
7. Complete equipment of the examination office
8. Specimen result sheet /list of already visited participants
9. …….
10. …….. *anything that comes up in the participating country*

3 Training of the interviewers

An integrated part of the quality assurance is the training of the interviewers. Preferably, the interviewers engaged for DEMOCOPHES should already be experienced in interviewing participants of scientific surveys. But even if experienced interviewers are appointed, they have to be trained especially for this Pilot Study. Basis for the education is the Fieldwork Manual which must be ready and harmonized between all involved partners within the country and between participating countries before training starts. The education procedure should be accompanied by the scientists who are in charge of internal and/or external quality control because they know the little pitfalls waiting in the practise. In larger surveys the training of the interviewers itself might be supervised and as such be part of an internal quality control, but this is not necessary for the small scale Pilot Study. For DEMOCOPHES it is important that the questionnaires are tested and that the interviewers train the conduct of all questionnaires and all parts of the home visit and sample taking. The training of the interviewers has to be performed with special diligence. Annex 8.2.4 SOP 4 Questionnaires and Interview Conduct gives more

advice on how to perform the interviews and on the behaviour and demeanour of the interviewers.

To maintain quality during field work, not only the training of the interviewers at the start of the field work is important, but also the transmission of experiences collected during single home visits. This can support quality of field work. Everyone involved in field work has to keep a log-book. Positive and negative experiences have to be written down in the log-books and have to be exchanged not only with the other team members but also with the members of the survey office to allow learning from each other. Some experiences could also be worthwhile to be communicated to NMU of other countries.

Already at the beginning of the survey, the criteria for quality targets have to be fixed and also how to deal with errors. Both aspects have to be part of the interviewer training.

4 Quality control measures

Quality control measures accompany all steps of survey conduct. During quality control the two implementations of quality management have to be combined:

- strategies to avoid and reduce mistakes and
- strategies to find mistakes.

To avoid and reduce mistakes especially for study design and field work, SOPs and the Fieldwork Manual have to be elaborated. To find mistakes, the control of the correct performance of field work is a first part of quality control. This control can easily be performed if all written materials are used as guidelines for mistake detection.

Additionally **check lists** to facilitate the control of the field work have to be developed. Finding mistakes while performing field work can be done either by the interviewers themselves - internal quality control (see 4.1) - or by external controllers –external quality control (see 4.2). For some parts of the field work, examples for check lists for internal and external quality control can be found in the Appendix (see Appendix 4.1 and 4.2) of this SOP.

As already mentioned in the interviewers' training part, the dealing with mistakes has to be clear before they occur. Every error that has been detected in the process of control has to be documented and corrected immediately. Severe mistakes have to be transmitted to the survey office or the NMU. There the reasons have to be evaluated, a viable solution has to be found and the problem and its solution have to be communicated and if necessary, the Fieldwork Manual has to be updated in the respective parts (pages).

4.1 Internal quality control

Internal quality control means that each step of field work is controlled – mostly - by the staff member who will perform or has performed the field work him/herself. The dealing with respective check lists (see below) will be part of the training of the field teams.

Check lists have to be developed for the field work starting at that time when the addresses and the responsibility are transferred to the field work team.

Internal check lists include:

- Before start of field work: check of the transferred material necessary for conducting field work and check if all appointments for the sampling location have been fixed in advance and have been compiled in the visit schedule
- Before a home visit (resp. at centre): the check of the papers and all what is needed for a home visit has to be prepared
- After a home visit (resp. at centre): check of all documents →has everything been filled out and have all samples been taken, labelled and handled correctly? Is the protocol sheet filled out and kept in a safe place? Experiences written down in the log-book?
- Between home visits (resp. at centre): function of the hot line, handling of last minute cancels, handling of the samples, data management etc.
- At the examination centre: check of rooms and equipment of the examination centre

Check lists for the internal quality control are listed in Appendix 4.1 of this SOP.

4.2 "External" quality control

In the context of DEMOCOPHES "external" quality control - or field visits - means the control of work of the field team members by researchers from the survey office or from the NMU's, responsible for the survey.

External quality control is normally performed by institutions not involved in the survey, e. g. other university or private institutes to control the procedures. For large population studies such an external control is essential.

In the case of DEMOCOPHES, study design, recruitment, field work etc. were already controlled by a scientific board of COPHES so an external control by an external institute is not necessary. All papers have been discussed by the scientists involved in COPHES and therefore this kind of external control has already been performed before start of the survey and the control performed by scientists working for COPHES but not directly involved in the field work is sufficient.

Check lists for the "external" quality control are listed in Appendix 4.2 of this SOP.

Appendix

4.3 Check list for internal quality control

The criteria mentioned below can be used for internal quality control to warrant quality of the field work for the DEMOCOPHES Pilot Study. The check list is just an example and has to be adapted to the particular situation of each participating country. Also extensions in the data processing and ethics part and maybe other parts are necessary.
Internal quality control means that the person who conducts the interview will perform the quality control.

Detailed proof-criteria are given in the Fieldwork Manual.

Before start of field work

Sample location_____

Date: __ . __ . ____

Controlled by: _____

---

1. Are all materials ready for the start of the field work?
   Yes O **No** O
   Missings are marked and will be completed:

Materials:

- Fieldwork Manual
- Additional flyers and information leaflets
- copies of all questionnaires
- copies of consent form
- pencils and other writing material to fill out questionnaires
- blanc paper
- and all other papers/materials mention under Home visit

2. Does the phone and computer work properly (internet, emails)?
   Yes O **No** O
3. Have all appointments for the sampling location been fixed in advance and have been compiled in the visit schedule?
   Yes O **No** O

Annotations:

Before a home visit

Sample location_____

Date: ___ . ___ . ____

ID of the Mother/ Child: _____/_____

Controlled by: _____

---

1. Are address and phone number for the next visit known?
Yes O **No** O

2. Time needed for travelling to the next home visit and route is known?
Yes O **No** O

3. Is the written consent available?
Yes O **No** O

4. Are all questionnaires and papers for the next visit prepared?
Yes O **No** O
Missings are marked and will be completed:

1. Protocol sheet
2. Non-responder questionnaire (in case of refusal at door or abortion of home visit)
3. Recruitment questionnaire (+ substitute)
4. Basic questionnaire (+ substitute)
5. Questionnaire for the collection of urine samples (one for mother, one for child)
6. Questionnaire for the collection of scalp hair samples (one for mother, one for child)
7. Handout for conversation and FAQ
8. Schedule for home visit or visit at examination centre
9. Information how to take the urine sample
10. Log-book
11. Overshoes
12. Identification as interviewer for the DEMOCOPHES study (Interviewers identity card)
13. Pencils to fill in the questionnaires

5. Are all materials for the next visit prepared?
a) Complete equipment for taking hair samples:
scissors and comb
hand gloves
tape
plastic bag
b) Equipment to accept the urine vessels
plastic bag
cool box
replacement vessel
c) Incentives

After Home visit

Sample location_____

Date: ___ . ___ . ____

ID of the Mother/ Child: _____/_____

Controlled by: _____

---

1. Have all questionnaires been performed and all papers been filled in?

Yes O **No** O

Missings are marked and will be completed:

1. Protocol sheet
2. Non-responder questionnaire
3. Recruitment questionnaire
4. Basic questionnaire
5. Questionnaire for collection of the urine samples
6. Questionnaire for collection of the scalp hair samples

2. Have all samples been taken?

Yes O **No** O

Urine sample from mother
Urine sample from child
Hair sample from mother
Hair sample from child

3. Have experiences of this home visit been noted down in the log-book?

Yes O **No** O

4. Is another visit or phone contact necessary?

Yes O **No** O

If Yes: why and when

---

5. Are protocol sheets, consent forms and answered questionnaires locked after finalisation?

Yes O **No** O

Between home visits

Sample location_____

Date: ___ . ___ . ____

ID of the Mother/ Child: _____/_____

Controlled by: _____

---

1. Does the phone and computer work properly (internet, emails)?
   Yes O **No** O
2. Are last minute changes of appointments dealt with properly?
   Yes O **No** O
3. Have all samples been packed for storage or shipping?
   Yes O **No** O
4. Have all data been entered into the computer?
   Yes O **No** O
5. Has a daily backup of the data files been performed?
   Yes O **No** O

At the examination centre

Sample location_____

Date: ___ . ___ . ____

ID of the Mother/ Child: _____/_____

Controlled by: _____

---

1. Does the examination centre look tidy and cosy (reception and waiting zone, room to perform the interviews, toilets)?

Yes O **No** O

2. Are the rooms of the examination office fully equipped?

Yes O **No** O

Missings are marked and will be completed:

- One room should be equipped with a reception desk and should have a waiting zone (with material to entertain the children).
- The other one should be used for taking, handling and storage of the urine and hair samples and all materials and performing interviews.

Furniture and other material for the waiting zone:

- Reception desk /Table and two chairs for team members
- At least 5 chairs for participants
- Coat rack with umbrella stands
- Door mats (mud wiper)
- Games/books for accompanying children of different age
- Table with magazines for the waiting zone
- Mineral water and cups
- Separate Toilette and wash basin

Furniture and other material for the second room:

- Refrigerator for urine samples
- Table
- Laptop /Computer
- Chair for the participants to sit down while taking the hair sample
- Scissors
- One-way hand gloves
- Tape for the hair samples
- Plastic bags for the hair samples
- Boxes for storing the hair samples
- Replacement urine vessels
- Lockable cupboard for storing protocol sheets, consent forms and already used questionnaires and the laptop used for data entry

3. Does the door bell ring if used?

Yes O **No** O

4. Have signs been fixed that the examination centre can be found?

Yes **O** **No** **O**

4.4 Check list for "external" quality control

The criteria mentioned below shall be used for "external" quality control to warrant quality of the field work for the DEMOCOPHES Pilot Study. The check list is just an example and has to be adapted to the particular situation of each participating country. Also extensions in the data processing and ethics part and maybe other parts are necessary.
"External" in the frame of DEMOCOPHES means that supervisors form the survey office or researchers from the National Management Unit (NMU) control the performance of the field work staff.

Detailed proof-criteria are given in the Fieldwork Manual.

Checklists are provided to the following separate issues:

- Recruitment
- Preparation for the home visit/ materials
- Home visit
- In the centre

Items are continuously numbered.

Recruitment

Interviewer-No.:_____
Sample Point: _____
ID of the Mother/Child:_____/_____
Date: __ . __ . ____
Controlled by: _____

1. Place and mode of recruitment:

centrally: from survey office (by call) O

from sample location O **by call** O **personally** O

2. Is the attempt to reach subjects at different times of day made?

Yes O **No** O

3. Do the interviewers conduct themselves adequately well towards the subjects?

Yes O **No** O

4. Is the subject adequately motivated to participate in the conversation?

Yes O **No** O

5. Is the subject asked if the controller may listen to the phone call?

Yes O **No** O

6. Are culturally relevant factors taken into consideration?

Yes O **No** O **Does not apply** O

7. Are the subjects adequately informed of all relevant contents and procedures during the environmental investigation? This includes:

• Duration of the home visit	**Yes** O	**No** O	
• Investigation is free	**Yes** O	**No** O	
• An incentive will be received after the investigation is completed	**Yes** O	**No** O	
• Presence of the child from age 6-11 during home visit	**Yes** O	**No** O	
• Participation is voluntary	**Yes** O	**No** O	
• Data confidentiality	**Yes** O	**No** O	
• Results will be communicated	**Yes** O	**No** O	
• Proof (of participation) for school or employer	**Yes** O	**No** O	**Does not apply** O
• Samples to be collected (morning urine and scalp hair from mother and child, respectively)	**Yes** O	**No** O	

8. Is the recruitment questionnaire correctly administered at phone?

Yes O **No** O

9. Can the interviewer correctly answer any questions that the subjects may have?

Yes O **No** O **Does not apply** O

10. If the person does not meet the inclusion criteria, is she friendly said good-bye and thanked?

Yes O **No** O **Does not apply** O

11. Is the protocol sheet correctly filled out on (attempted) contact?

Yes O **No** O

12. Is the protocol sheet correctly completed on termination?

Yes O **No** O **Does not apply** O

13. Are the subjects' scheduling wishes accommodated?

Yes O **No** O **Does not apply** O

14. In the case of non-participation, are the questions on the non-responder questionnaire asked and documented?

Yes O **No** O **Does not apply** O

15. Is the mailing of the appointment confirmation and the written informational material initiated?

Yes O **No** O **Does not apply** O

Annotations:

Preparation of the home visit/ materials

Interviewer-No.:_____
Sample Point: _____
ID of the Mother/Child:_____/_____
Date: __ . __ . ____
Controlled by: _____

16. Is the protocol sheet on hand during preparation for the visit?

Yes O **No** O

17. Is there a **signed consent** form from the mothers on hand?

Yes O **No** O **not controlled,** O**, because** _____

18. Does the interviewer have the subject's telephone number on hand?

Yes O **No** O

19. Does the interviewer know the child's age?

Yes O **No** O

20. Does the interviewer know the subject's address and the necessary drive time?

Yes O **No** O

21. Are all the papers and materials needed for the home visit labelled with the participant-ID and correctly assembled in the subject folder?

• Protocol sheet	**Yes** O	**No** O	
• Recruitment questionnaire	**Yes** O	**No** O	
• Basic questionnaire	**Yes** O	**No** O	
• 2 Questionnaires for urine sampling	**Yes** O	**No** O	
• 2 Questionnaires for hair sampling	**Yes** O	**No** O	
• Non-Responder-Questionnaire	**Yes** O	**No** O	
• Incentive	**Yes** O	**No** O	
• Bag to take the urine vessels	**Yes** O	**No** O	
• Replacement urine vessels	**Yes** O	**No** O	
• Certificate of participation for school and employer	**Yes** O	**No** O	**Does not apply** O
• Substitutes for all questionnaires	**Yes** O	**No** O	
• Scissors, oneway gloves, tape, plastic bags, to take hair samples	**Yes** O	**No** O	

• Overshoes	**Yes** O	**No** O	
• Log-book	**Yes** O	**No** O	

22. Is a **cool box** ready to cool down the urine sample?

Yes O **No** O

Annotations:

Home visit - General observations **Interviewer-No.:**_____
(correspondingly: conduct of interviews at examination centre) **Sample point:** _____
ID of the Mother/Child:_____/_____
Date: __ . __ . ____
Controlled by: _____

Duration from: _____ till: _____

23. Are the demeanour and appearance of the interviewer adequate?

Yes O **No** O⇒ Reason:_____

24. Does the interviewer present his/her identification?

Yes O **No** O **not necessary** O

25. Does the interviewer present the controller correctly?

Yes O **No** O⇒ Reason:_____

26. Does the interviewer enter the residence with overshoes?

Yes O **No** O**,**

because_____

27. Are cultural issues taken into account?

Yes O **No** O **Does not apply** O

28. Is the investigation briefly explained to the subject again (if necessary)?

Yes O **No** O **Does not apply** O

29. Is the interview performed in a quiet place (TV turned off, other family members somewhere else)?

Yes O **No** O **Does not apply** O

30. Does the interviewer mention when the written findings will be available and what they will include?

Yes O **No** O⇒ Reason:_____

31. Does the interviewer have a log-book in order to immediately write down any unusual events?

Yes O **No** O⇒ Reason:_____

32. Does the interviewer explain at the end of the home visit where one would direct any questions that may come up?

Yes O **No** O⇒ Reason:_____

33. Is the incentive given out?

Yes O **No** O

34. Are all subject documents correctly and completely filled out?

Yes O **No** O

Annotations:

Home visit -Basic questionnaire

Start:_____, End:_____ **Interviewer-No.:_____**
Sample Point: _____
ID of the Mother/Child:_____/_____
Date: __ . __ . ____
Controlled by: _____

35. Are the questions read to the subject verbatim?

Yes O **No** O ⇒ **which questions:_____**

36. Does the interviewer take the time to read the question so that the subject understands them?

Yes O **No** O ⇒ **which questions:_____**

37. Are adequate responses given to questions from the subject?

Does not apply O **Yes** O **No** O ⇒ **which questions:_____**

38. Are the "General Instructions and Explanations for the Interview" followed for individual questions?

Yes O **No** O ⇒ **which questions:_____**

39. Is the use of filters correct?

Yes O **No** O ⇒ **which questions:_____**

Annotations:

Home visit -Sample collection

Interviewer-No.:_____
Sample Point: _____
ID of the Mother/Child:_____/_____
Date: __ . __ . ____
Controlled by: _____

40. Does the interviewer correctly and comprehensibly answer questions from the subject concerning the collection of samples?

Does not apply O **Yes** O **No** O ⇒ **which questions:**_____

41. ***Morning urine sample***

42. Were the urine samples from mother and child delivered?

Yes O **No** O**, because:**_____

43. Does the interviewer label the urine vessels correctly?

Yes O **No** O **caught up: Yes** O **No** O

44. Does the interviewer ask whether the sample was correctly collected (whole sample was collected)?

Yes O **No** O **Does not apply** O

45. Does the interviewer ask (plausibility check) how the sample was stored?

Yes O **No** O **Does not apply** O

46. Does the interviewer ask how many hours have been between samples and the last visit to the toilet?

Yes O **No** O **Does not apply** O

47. In case of no morning urine sample: Is a replacement container given to the participant, the procedure of sample collection explained again and the transfer (day, time, place) to the field team checked and documented?

Yes O **No** O **Does not apply** O

48. Are the data documented in the questionnaire “collection of urine specimen”?

Yes O **No** O**, missings:**_____

49. Does the interviewer ask the questions belonging to food?

Yes O **No** O**, missings:**_____

50. ***Scalp hair sample***

51. Is the scalp hair sample from mother and child taken?

Yes O **No** O**, because:**_____

52. Has the sampling of the hair samples been performed correctly?

Yes O **No** O

53. Does the interviewer label the hair samples correctly?

Yes O **No** O **caught up: Yes** O **No** O

54. Is the information of the hair sampling documented in the questionnaire “collection of hair specimen”?

Yes O **No** O**, missings:**_____

Annotations:

In the examination centre

Interviewer-No.:_____
Sample Point: _____
ID of the Mother/Child:_____/_____
Date: __ . __ . ____
Controlled by: _____

55. Does the interviewer take care of the family in the centre?

Yes O **No** O **Does not apply** O

56. Is a smooth workflow provided for in the centre?

Yes O **No** O **Does not apply** O

57. Are unnecessary waiting times avoided for the subjects?

Yes O **No** O **Does not apply** O

58. Are materials for the waiting zone presented (e.g. magazines, toys for kids)?

Yes O **No** O **Does not apply** O

59. Can the interviewer correctly answer any questions that the subjects may have?

Yes O **No** O **Does not apply** O

60. Has the consent form been collected?

Yes O **No** O **Does not apply** O

61. Are the sample vessels collected and labelled correctly?

Yes O **No** O **Does not apply** O

62. Does the centre have a room adequate for performing the interview?

Yes O **No** O **Does not apply** O

63. Does the centre look tidy and cosy?

Yes O **No** O **Does not apply** O

64. Can the centre easily be found, is it well described where it is located?

Yes O **No** O **Does not apply** O

Annotations:

_____

_____

_____

Review of survey documents

Sample location /Team: _____
Date of the review ____.__ . ____
Controlled by: _____

ID of the Mother/Child:_____/_____
Date of the home visit:__.__._____

Protocol sheet:
everything okay **Yes** O **No** O **Reason:**_____

If no telephone number existed: Did the interviewer visit the home address three times to check if person is reachable personally?

Yes O **No** O **Does not apply** □

Non-responder questionnaire:
everything okay **Yes** O **No** O **Reason:**_____

Recruitment questionnaire
***everything* okay** **Yes** O **No** O **Reason:**_____

Basic questionnaire
***everything* okay** **Yes** O **No** O **Reason:**_____

Questionnaire: collection of urine sample for mother and child separately
***everything* okay** **Yes** O **No** O **Reason:**_____

Questionnaire: collection of hair sample for mother and child separately
***everything* okay** **Yes** O **No** O **Reason:**_____

Has the backup of the data daily been applied?

Yes □ **No** □ Reason:
:

Annotations:_____
_____
_____
_____
_____
_____
_____

Annex 8.2 Standard Operating Procedures

8.2.4 SOP 4 Questionnaires and Interview Conduct

DEMOCOPHES

SOP 4

Questionnaires and Interview Conduct

WP 2

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Contents

1 Introduction

This guideline provides in the first part information on the types of questionnaires used in DEMOCOPHES and how the MS should handle them (see chapter 1-4) and in the second part (see chapter 5 ff.) on the conduct of the interviews during the home visit.

In epidemiological studies a questionnaire is an essential element and the most appreciated measure of personal characteristics. With the help of questionnaires, the study is able to gain, for example, information about lifestyle and smoking behaviour, nutrition and/ or exposure pathways from the participants. A recruitment questionnaire is also very useful to exclude people who don't fulfil the necessary requirements and to assess selection bias, which is mostly done with the help of a non-responder questionnaire. Based on questionnaire data, the study population can be appropriately characterized and factors influencing the biomarker levels can be identified.

The questionnaires to be used in DEMOCOPHES will be delivered are in Annex 8.3. A version containing the underlying hypothesis for each question together with notable references and with explanations for the interviewers and their training is in Annex 8.3.3. Most questions have already been used in different studies, so their reliability has been proven. Of particular importance are questions on the socio-economic status (SES) of the family. These questions will be discussed more in detail in section 3.1.

Before starting with the field work, the questionnaires have first to be tested in each country. Therefore this guideline also suggests how to perform the testing phase (chapter 4).

The second part of this guideline consists of recommendations for interviewing the participants. During the personal interview all information needed for DEMOCOPHES should be gathered from the participants. Since it has to be avoided that the participants break off an interview, training of interviewers is crucial.

2 Questionnaires used in DEMOCOPHES

During the Pilot Study several questionnaires will be used to cover different aspects of the study. The basic questionnaire will be the main source of information. In this questionnaire the mothers are interviewed about both their and their child's behaviour and living conditions. Quite short questionnaires which deal with assessment of the inclusion/exclusion criteria, with the sampling of the specimen and a non-responder questionnaire will also be used. The following questionnaires are included:

(1) Recruitment questionnaire
(2) Questionnaire on collection of urine specimen
(3) Questionnaire on collection of hair specimen
(4) Basic questionnaire
(5) Non-responder questionnaire.

The questionnaires will be performed in the specified order. This order will be most efficient, because in case a participant refuses to donate either the urine or the hair sample (or even both), it would be unnecessary to conduct the basic questionnaire, because the family only **counts as a case**, if all samples have been taken and in addition, about 80 % of the questions of the basic questionnaire have been answered. The interviewer has to estimate the percentage of answered questions and some of the questions of the basic questionnaire are mandatory for possibly deriving reference values; these must definitely be answered, so that the family can count as a case (see **Table 1**).

The **recruitment questionnaire** (1) will address the criteria for eligibility of the participant (see *inclusion/exclusion-criteria*). It will be filled in during the first telephone call between the interviewer and the potential participating mother.

Questionnaires on the collection of urine (2) and hair (3) specimen will be used to get information on sampling conditions of the specimen. The questionnaires on the collection of urine and hair specimen are conducted with both mother and child in connection with hair sampling and handing over of the urine samples.

The **basic questionnaire** (4) consists of modules that are easy to identify and easy to change. Here all relevant information for interpreting the study results is collected, among them socio-demographic facts for defining statistical subgroups. The modules that are included are:

(1) Residential environment and residence,
(2) Nutrition (exposure-related foods only),
(3) Smoking behaviour,
(4) Exposure-relevant behaviour,
(5) (Mother's) occupation,
(6) Socio-demography.

Table 1: Absolutely mandatory questions

Question	Explanation
How often did you / or your child eat fish / fish products?	Important for mercury reference values
Does anyone smoke in your flat/house?	Might serve as an indicator for creating cotinine reference values
o Do you smoke? o How much do you currently smoke per day on average? o Does your child smoke?	Active smoking behaviour might be necessary to know for deriving cadmium and cotinine reference values
Do you (or does your child) have teeth with amalgam fillings?	Important for mercury reference values
What education do you have?	To get at least one indicator for socio-economic-status

The **non-responder questionnaire** (5) is essential to assess a potential selection bias and is only addressed to people who are not interested in taking part in DEMOCOPHES, but agreed to answer few questions. This questionnaire has to be very short: it includes only 6 questions on socio-demography, smoking and nutrition. It would be preferable to check also inclusion/ exclusion criteria in advance, but people who already showed their unwillingness to participate cannot be bothered with too many questions. The potential bias resulting from the missing preselection has to be taken into account. A SOP on how to assess selection bias and on how to calculate response rate will be provided by WP 4.

3 Member State–specific modifications of the basic questionnaire

All in all, the five questionnaires of DEMOCOPHES contain more than 100 questions on several topics of lifestyle behaviour and socio-demography. These questions as well as the accompanying response categories have to be used in each MS. The order and wording of the questions and answers must not be changed, but they have to be translated (like all DEMOCOPHES- papers) in the national languages. All changes have to be reported to the EU Central Management Unit (EU CMU).

The socio-demographic part of the **basic questionnaire** consists of a few questions on the socio-economic status (SES) of the family. It was not possible to give universal response options for those categories, because they might differ from MS to MS, depending on national standards. In case that adaptations are required within a MS, the wording of the questions must remain the same. The general explanations to these questions and how answers might be adapted are given in this chapter. The advantages and disadvantages of the approaches have to be evaluated and further discussed by the statistical experts group, which consists of several COPHES-members. WP 4 will be responsible for the implementation of those methods in DEMOCOPHES.

3.1 Indicators of the socio-economic status (SES) of a family

In many national and international epidemiological studies data on socio-demographic facts are collected via questionnaires. In order to include more than one characteristics, usually these indicators are combined to build up an index, which then describes the SES of the families. Typical and often used indicators are:

- Education of the mother and/or father (see 3.1.1)
- Current occupational situation of the mother and/or father and occupational prestige (see 3.1.2)
- Net household income (see 3.1.3).

There are several options how to combine the indicators into an index.
However, the combination of different indicators results in an index which can be divided in three main categories (“upper”, “middle” and “lower” SES). The upper end category could be defined as “(relatively) high SES”, the lower one as “(relatively) low SES”. This definition may include a latent danger of misinterpreting the results in the end. It has to be pointed out that a “(relatively) low SES” according to this definition does not mean that the interviewed family really belongs to a lower social class (and vice versa).

It has to be kept in mind that the index can only be used in the evaluations if all necessary indicators can be collected in all MS.

Besides this general index, analysis can also be done on the single indicators. Environmental exposure might be more closely linked to a specific SES indicator

than to the general index. For example, one could relate nutritional habits to the net household income. However, in studies on environment and health the education of the mother often turned out to be the best indicator of SES.

In DEMOCOPHES, the outcomes of the above mentioned indicators *education*, *labour status and occupation* and *household net income* should be used to create the SES of the families. As it is common practice in other epidemiological studies (see, for example, the German Environmental Survey GerES), these questions intend to gather the required information for the mothers and also for the fathers or partners. The highest outcome for each status indicator will be used to create the family SES. For an example, see **Table 2**.

Table 2: Creation of a family's SES

	Educational level (see 3.1.1)	**Labour status (see 3.1.2)**	**Occupation (see 3.1.2)**
Mother	Upper secondary education	Carrying out a profession	Skilled worker
Father/ partner	First stage of tertiary education	Further training	Technician

This example shows that though the father has a higher education, his labour status is below the mother's status. Therefore, the father's educational level and the mother's labour status together with the father's occupation (marked cells) would be used for the creation of the family's SES.

3.1.1 Educational level

One question in the socio-demographic module of the **basic questionnaire** is about the parents´ highest educational level. In every MS, school education is performed at different stages with different degrees of qualification. The following ISCED-classification (International Standard Classification of EDucation) is provided by UNESCO and is used in various European studies.

The mentioned stages have to be operationalized in the **basic questionnaire** according to the MS educational system.

- No formal education or below ISCED-1 (ISCED -0). This stage of education includes any pre-school and kindergarden education (age groups 3/5-5/7).

- Primary education, or first stage of basic education (ISCED 1): This stage of education includes the first stage of the compulsory education, which usually starts for children not younger than five years. The upper age limit depends in each country on the typical age for entry into primary education. In countries where the term "basic education" is not precisely defined, the first six years of

education should be defined as ISCED level 1. This level category also includes programmes suited to children with special needs education.

- Lower secondary education, or second stage of basic education (ISCED 2): The second educational phase starts after completing the first six years of primary education and continues to the end of compulsory education (if existing in the MS), normally after the 9th or 10th year of schooling. In some countries this degree enables the owner to start on-the-job training or a further education.

- (Upper) secondary education (ISCED 3): This graduate level describes an educational degree of general or on-the-job training. Usually it lasts 2-3 years and has been finished at the age of 18-20. Graduates are enabled to work on the trained job or to visit a university or comparable institution for further education. This level includes also special needs education programmes for older children and adult education.

- Post-secondary non-tertiary education (ISCED 4): This term describes any additional education after graduating the ISCED level 3, but not university education, which is part of level 5. Level 4 includes for example evening classes or lectures in adult education centres.

- First stage of tertiary education (ISCED 5): This stage covers university education which does not automatically lead to an advanced research education. The graduates did not achieve the doctoral degree, but lower university degrees like B.Sc., M.A. or a Diploma.

- Second stage of tertiary education (ISCED 6): The highest educational level is reached with the creation of a doctoral thesis of publishable quality. It enables the owner to perform advanced research education and in some countries this stage goes along with teaching qualification.

3.1.2 Occupational status

Another important information for creating the SES-index is the current occupational situation of the mother and the father/spouse/partner. The first indicator is the self-declared labour status. For this question no response categories have to be adapted, it was taken from the list of the core social variables defined by eurostat[14].

The question provides information on the normal or current "main" labour status as perceived by the respondent. It covers carrying out a profession (broken down by full time/part time) and other labour status types, as shown in the following list.

[14] Eurostat, 2007: Task Force on Core Social Variables, eurostat methodologies and working papers, final report 2007.

A.	Carrying out a job or profession, including unpaid work for a family business or holding, including an apprenticeship or paid traineeship, etc.
	Full time
	Part time
B.	Unemployed
C.	Pupil, student, further training, unpaid work experience
D.	in retirement or early retirement or has given up business
E.	permanently disabled
F.	in compulsory military or community service
G.	fulfilling domestic tasks
H.	other inactive person

As an additional SES indicator, the classification of occupations might be used. In the respective question of the basic questionnaire the classification is performed according to the "International Standard Classification of Occupations (ISCO)[15], worked out by the International Labour Organization (ILO).

A	Manger
B.	Professional
C.	Technician or associate professional
D.	Clerical support worker
E.	Service or sales worker
F.	Skilled agricultural, forestry of fishery worker
G.	Craft and related trade worker
H.	Plant or machine operator or assembler
I.	Elementary occupation
J.	Armed forces occupation

ISCO defines three levels. The above categories represent the 10 major groups. Each of these groups is divided into sub-major groups which then are divided into minor groups. During the training sessions COPHES will provide the respective lists that will help to categorize the occupations into the 10 major groups offered by the question in the basic questionnaire.

[15] Up to 2010 a version known as ISCO-88 was used, which was updated in 2011 by the version ISCO-08.

3.1.3 Categories of household income

The last question on an SES indicator in DEMOCOPHES collects information on the net household income. To define MS-specific income categories, each MS has to contact their statistical agency to find out about the distribution of the total net household income of all types of households measured in Euro. The mean net income is the basis for categorization.

Using this mean income, the income categories in the basic questionnaire of DEMOCOPHES should be characterised as a percentage of the mean net household income. Please be aware that the mothers can only be asked about the total disposable household income, regardless of number and age of household members and thus this is not an “equivalent” income.

Each MS has to calculate the MS-specific category limits according to this directive. For feasibility reasons, it is recommended that the category limits have to be rounded to units of 250 € for low incomes, to units of 500 € for medium incomes and to units of 1000 € for high incomes. As an example, **Table 3** gives the percentage categories and the corresponding income categories of Germany.

Table 3: Question about income categories for German households

	Perhaps you can indicate the category your household’s total income belongs to. What is your monthly income after taxes and social insurance contributions?			*Amounts of household net income should be adapted according to the national income distribution of the MS.*
			Proportion in GerES IV	
	< 50 % of the MS mean net income	< 1500 €	~ 17%	
	50 % - < 60 % of the MS mean net income	1500 – < 1750 €	~ 6%	
	60 % - < 75 % of the MS mean net income	1750 - < 2000 €	~ 9%	
	75 % - < 90 % of the MS mean net income	2000 - < 2500 €	~ 22%	
	90 % - < 115% of the MS mean net income	2500 - < 3000 €	~ 15%	
	115 % - < 150 % of the MS mean net income	3000 – < 4000 €	~ 18%	
	150 % - < 200 % of the MS mean net income	4000 - < 6000 €	~ 12%	
	> 200 % of the MS mean net income	> 6000 €	~ 2%	

Note: The mean net household income is 2.914 Euro (Statistisches Bundesamt, 2005)

Categories describing net incomes lower than the median are more often represented. This is due to psychological reasons, because people with lower

incomes should also have the possibility to choose between several income groups to avoid the feeling of discrimination of lower income groups. Reversely, wealthier families tend to understate their net income. Therefore the middle and upper income categories are more expanded. For statistical evaluations, the lowest categories will later be combined.

To assign the predefined eight income categories to the SES, they might later be combined to three groups.

In the German study GerES IV, which was conducted 2003 – 2006, evaluations of all families with children aged 6 to 11 showed that the lowest income group (up to 60% of mean net income) contained about 23% of all families. The medium group consisted of about 45% and the highest group (>115% of mean net income) of about 32% of all participants.

The income distribution of the population as provided by the statistical agency can be compared to the income distribution of the sample to assess selection bias.

3.2 Summary of adaptations

All in all, in the module on socio-demographic issues of the **basic questionnaire**, some adaptations of the response categories might be necessary in different MS. This might include adaptations:

- to the respective national educational levels,
- to the occupational prestige and
- to the respective national categories of household income.

Special attention might have to be given to the fact that the question on household income cannot be asked in all MS, because of different privacy standards.

4 Preparation and testing of the questionnaires

The questionnaires for DEMOCOPHES will be delivered to all MS in English, but the interviews will be hold in one of the national languages. After the required adaptations (see chapter 3) were performed (and transferred into English), the first task for each NMU is therefore to translate the questionnaires into the national language(s).

For this translation procedure COPHES will deliver recommendations which will have to be followed by each participating country.

It must be checked whether there are differences in understanding due to the translation, because it is extremely important to avoid any misunderstandings. Cultural conditions which may cause problems have to be considered carefully. The EU CMU has to be informed about any problem concerning the questionnaires, and suggestions to solve the problem have to be accepted by the EU CMU.

Once the wording is correctly adjusted, the resulting questionnaires have to be tested. Therefore about five test-interviews have to be carried out by the survey office starting with the **recruitment interview** via telephone, continuing with the **questionnaires on the collection of urine and hair specimen** and ending up with the personal interview with the **basic questionnaire**. Interviewees must not be scientists. During this procedure problems in understanding or interview conduct can be detected and must be reported to the National Management Units (NMU).

These test-interviews should be coordinated and performed by the person who will later on be in charge of the field work interviewer as a supervisor and as an emergency stand-in for a field interviewer. Usually, this is a team member of the respective national institute in charge of DEMOCOPHES.

5 Interview Conduct

The second part of this SOP consists of guidelines on the interview conduct. The training of the interviewers as well as the different stages of the interview are explained (see chapter 5.1. and 5.2). A guideline for the correct interview conduct is provided and will cover the main aspects to be carefully considered. Additionally, criteria for the selection of the interviewers are named (see chapter 6) and information for the interviewer for a successful interview conduct is given (see chapter 7).

5.1 Training of the interviewers

After optimizing the questionnaires, a training phase not only on the questionnaires, but also on the interview conduct should be started. Of particular importance during this training phase is the exercise of the personal interview. This should also include specific training on different perceptions of the questions due to cultural differences. Training of the interview is essential for a successful interview conduct.

As the training phase will proceed within a relatively short time frame, it is suggested that the selected interviewers should exercise the interview conduct by interviewing each other during a training course held by the survey office. An optimum scenario would be that the interviewers consult families from their circle of acquaintances who are neither familiar with the topic nor with scientific research nor with being interviewed and to practise the complete process with these families, including shipping and collecting sampling vessels and taking hair samples. But this scenario will only be manageable if time and financial resources allow this approach.

It has to be pointed out that on the one hand this process is essential for the training of the interviewers, because this is a direct way to get first-hand experience in interview conduct and its accompanying problems (see chapter 5 and 6). On the other hand these test-interviews should again be used to identify interviewees´ problems in understanding and answering the questions and arrange necessary adjustments.

Field work is the essential instrument of DEMOCOPHES, so the interviewers have to be trained with the help of the questionnaires. After training on the general background and objectives has been finished, the test-interviews mentioned above have to be performed as a small practical part, which may be expanded by each participating country individually (meaning that if more test-interviews seem to be necessary, the survey office has to organise this).
The information listed in the following has also to be considered during the training phase! This means, the focus of training should not only be laid on the special needs of DEMOCOPHES, but also on general considerations on the interview process.

5.2 Stages of the interview

The whole interview process consists of two main parts. Regardless of the stage (recruitment or basic interview), the interviewer always has first to welcome the participants before starting with the interview. The following hints are to be considered during both the recruitment and the basic interview, because they are effective for a telephone interview as well as for a personal interview.

5.2.1 The welcome

Before the interview process starts the interviewer has to review all significant steps of the interview, reflect the objectives of the study, remind the structure of the whole process and think of a pleasant start and welcome. He/ she has always to carry the protocol sheet with him/ her where all essential data on the family are collected and also the necessary equipment for the performance of the sampling (see Annex 8.2.2 SOP 2 Recruitment and Field Work).

To not cause the participants any inconvenience and pollute their homes, the interviewer should bring shoe covers with him/ her. Depending on the cultural habits or the respective situation at the families, interviewers can either use the shoe covers or put off their shoes. It also should be remembered not to smoke in the participant's home. Also the interviewer must not walk around and inspect the family's house without an offer.

The interviewer must always take the interviewer's identity card with him/ her and introduce him-/herself by showing his/ her identity card, telling his name and the name of the institution, welcome the mother and child (and in some cases other family members) friendly and address her with her full name, so she feels directly concerned. The interviewer should thank her for her willingness to take part in the study and to sacrifice her time to the survey (which will last about 60 – 90 minutes).

The interviewer should always be able to answer related questions, to show interest in doubts of the families, to get the family interested in and to explain the objectives of the study. Examples for this are given in the general instructions and explanations for the interview.

He/ she must speak clearly, slowly and in a suitable sound intensity. Sentences should be short and should contain as less conjunctive forms as possible, because this weakens the necessity of the study. Foreign/ unknown words as well as technical and scientific terms have to be avoided.

If the contact person gains a positive impression, it is easier to get in touch with and to convince her to take part in the interview. A little help would be a smile at the interviewee; even in a telephone interview this can be transmitted. Besides, it is necessary to give a candid but firm occurrence and to signalize the contact person that participating in the study is at full on a voluntary basis.

5.2.2 The interview

During the interview the **recruitment questionnaire** resp. the **questionnaires on the collection of urine/ hair specimen** and the **basic questionnaire** have to be performed. These questionnaires were developed over a long period and include questions which have been already used in different epidemiological studies. They were also tested in advance several times to detect any specific problems in the participating countries (see chapter 4).

To assure a good atmosphere and the necessary attention for the personal interview at the child's home, the interviewer should conduct the interview in a quiet room in the flat/ house, in which preferably no additional family member will be present and also no television or radio will be active during the interview conduct. In case the personal interview will be computer assisted, there should be a table or something like that to place the laptop on in this room and a socket, too. Furthermore, the interviewer should keep the mobile phone quiet, so it cannot interrupt the interview.

During the interview, the interviewer has to read out the questions to the mother. The child does not need to stay in the room after the sampling procedure has successfully taken place. The interviewer must not change the wording or the order of the questions and modules. He/ she will only be allowed to explain unknown terms to the interviewee according to the glossary. The interviewer has to be polite and patient, even if this means to explain similar facts several times. Nevertheless, the interviewer should take care that the foreseen time limit (60 – 90 minutes) is not exceeded.

Every time the interviewer has completed all interviews in one household, he/ she should shortly summarize its progress and results in a log-book, which is part of the quality assurance (see Annex 8.2.2 SOP 2 Recruitment and Field Work). Here, special occurrences, questions and/ or achievements should be noted. It is very important that the interviewer as well as the survey office have the opportunity to learn from these experiences.

6 Selection of the interviewers

The selection of the interviewers is another, independent process, which should be performed early in the preparation stage of DEMOCOPHES by the NMU or its subcontractor. The interviewers must possess some general skills which would ease the contact to the families and will be a great benefit for the interview process itself and are listed below:

- a driver's license
- willingness to drive from home to home
- willingness to work in the evening and at the weekend
- experience with computers
- experience with and knowledge in the topic "Environment and Health"
- good dealing with people, especially with children
- no reservations about people of different social classes or ethnic origins
- a cultivated appearance.

In addition to these obligatory skills, there are some features which would be desirable:

- local knowledge of the sampling points
- a communication style which goes partly along with local habits
- experience in interview conducts.

7 The interview process

The interview process itself consists of several parts. It starts with the recruitment interview conducted via telephone. After this has successfully taken place, the interviewer will visit the family at their home (or the family will come to the examination centre, respectively). There he/ she first collects the urine vessels from the mother and the child and the questionnaires on the collection of urine specimen are performed (for both mother and child). After that, the interviewer collects the hair samples and the questionnaires on the collection of hair specimen are filled in. Finally, the basic interview will be conducted.

7.1 Recruitment interview

The study performance starts with recruiting the participants. After they had sent back the reply card and showed their interest, they receive a phone call from the interviewer during which it has to be found out whether the volunteers meet the inclusion criteria or not and if they were really interested in taking part in DEMOCOPHES (**recruitment questionnaire**). If they do so, the interviewer will make an appointment for a home visit.

If the mother makes an appointment for the home visit when her husband is also at home, this has to be accepted. The presence of the husband may be inevitable especially for families with a migration background.

During this interview the main information on the participants, which means the correct names, address, telephone number and identifying codes, are collected on the protocol sheet, which the interviewer has to take along with him at the home visit or interview at the examination centre. The protocol sheet contains the most personal information of the participants, which is to be kept more secure in the sense of data protection. During the interview the interviewer can easily fall back on these data – e.g. to remember the names. At the end of each day the protocol sheets have to be stored at a safe and locked place.

If the volunteers have to be excluded from the survey because one exclusion criterion is met, a polite cancellation of the interview has to be the consequence. If potential participants refuse to take part, they should kindly be asked to answer the **non-responder questionnaire** to assess selection bias. The performance of this questionnaire should not be time-intensive – because the family already signalled their lack of interest -, but nevertheless the interviewer always has to be friendly and should not take the refusal personally.

7.2 Home visit

After having completed the recruitment interview successfully, the interviewer will visit the family at home (or, in some cases, the families will come to the examination centre). There he/ she takes the required samples and conducts the basic questionnaire. This stage is considered the main part of the interview process. **Figure 1** shows the procedure of the personal interview during the home visit or the interviewee's visit in the examination centre, respectively.

There might occur problems with the questions or doubts of the participants whether to take part in the study or to answer certain questions. The interviewer must not take these objections personally, but accept them and react seriously and factually. Some questions that might occur and arguments to convince unsure people to participate (at an earlier stage) are given in the general instructions and explanations for the interview. The main objectives of the personal interview are still to gather as much information as possible and not to induce the mother to break off the interview.

7.2.1. Sampling

Before conducting the interview with the basic questionnaire, the interviewer has to take the urine vessels from the volunteers. If mother or child has forgotten to sample their morning urine, they will have the opportunity to do this the next morning. The interviewer then offers to come back the next day at a suitable time and collect the samples. If they reject this offer, the interviewer has to politely break off the examination process and say goodbye to the interviewee, because only if all samples are donated and all questionnaires are completed, the family can be counted as a case in the Pilot Study (see part 2). After the acceptation of the urine vessels the **questionnaires on collection of urine samples** will follow.

The procedure continues with taking the hair sample from both mother and child. Again, the examination process will be stopped at this point if the mother or the child does not agree on sampling. Instructions on the correct procedures on hair sampling are provided from WP 3. A respectful and careful approach is expected. In connection with the sampling, the **questionnaires on collection of hair samples** have to be filled in.

7.2.2 Basic interview

The last step consists of the interviewer-guided **basic questionnaire**. Preferably this takes place during a home visit. It takes about one hour. During the visit the interviewer has to consider individual and cultural circumstances to not bother or frighten the families (see above).

The interviewer has to ask the questions in the predefined order and with the assistance of the list of given frequency categories (see Appendix of this SOP). In case the mother has to think about a question (e.g.: "How many hours does your child spend outdoors?"), the interviewer should ask her kindly to estimate the answer.

If the answer is impossible or very implausible or inconsistent, the interviewer asks the mother to think again. But if the mother does not change her answer, the interviewer has to accept it, even if it is obviously wrong. For example, the mother's answer to the question "Does anybody smoke in this flat/ house?" is "No", but it smells like somebody smoked recently or there is a full ashtray on the table.

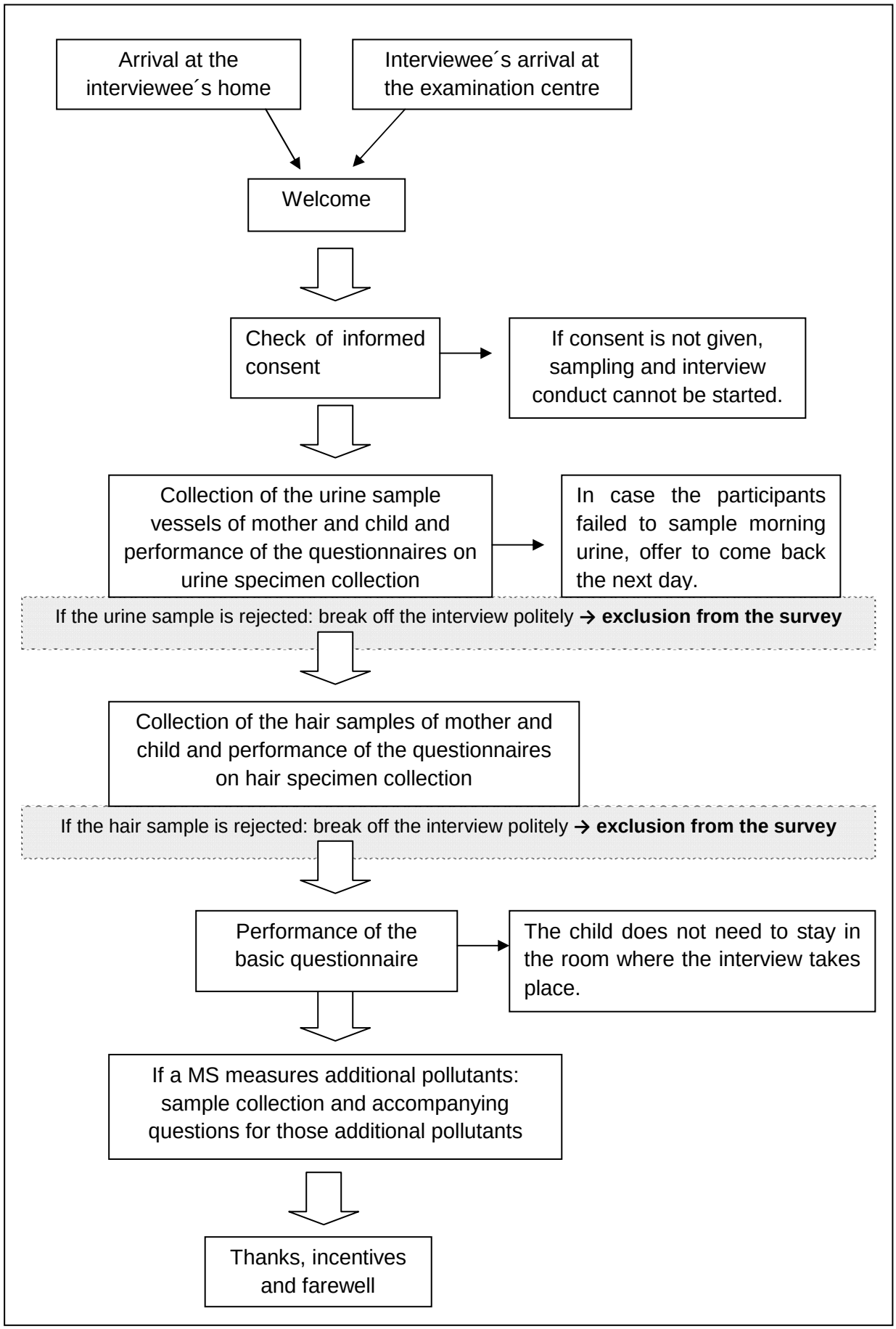
An approach which allows the interviewer to re-ask a question is one of the benefits of a personal interview in combination with a home visit. However, the interviewer must be very careful when questioning an answer given by the interviewee, because the mother could easily feel misunderstood. Therefore this approach will also be part of the interviewer training.

8 Summary

Questionnaires and interview conduct are two important aspects to consider during the field work of DEMOCOPHES. In the Pilot Study, five questionnaires will be used to collect data on the participants. An essential instrument to compare different social groups is the creation of a SES- index, which might be combined using data on education, occupation and income, derived from the basic questionnaire which is described in the first part of this SOP.

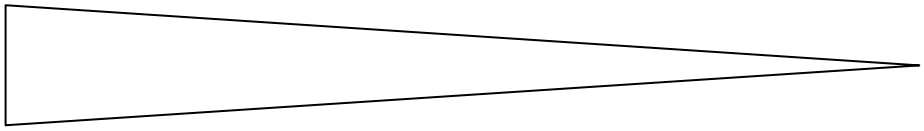
In the second part of this SOP, the general aspects that have to be considered during the different stages of the home visit are presented. Additionally, the interview process is explained in detail. The conduct of the interviews is crucial for the success of DEMOCOPHES. Therefore the interviewers have to fulfil certain criteria and they have to be trained before field work starts.

Figure 1: Procedure of the personal interview

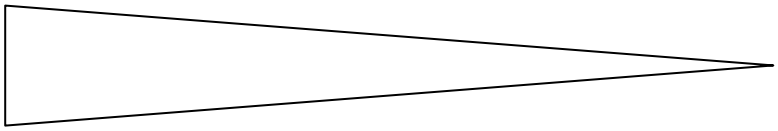


8.1 Appendix: List of given frequency categories for the basic questionnaire

B. Nutrition

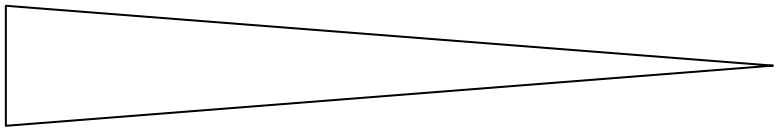
3.	**How often do you drink alcohol? Base your answer on the last year.**							
		>1 glasses a day	5-6 glasses a week	2-4 glasses a week	1 glass a week	1-3 glasses a month	<1 glass a month	never
	Descending order : 							

B. Nutrition

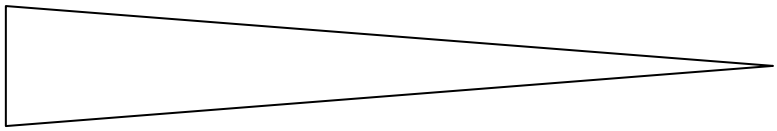
4. + 5.	**Ms.** *[name]***, how often did you /** your child **eat the following foods in the last 4 weeks?**								
		several times a day	daily	several times a week	1x a week	2-3x a month	1x a month	almost never	
	Descending order : 								

B. Nutrition

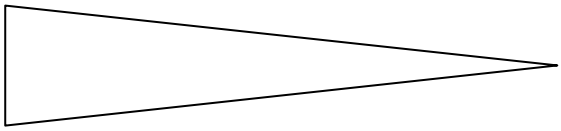
6. + 8.	**Ms.** *[name]***, how often did you /** your child **eat fish/fish products in the last 4 weeks?**								
		several times a day	daily	several times a week	1x a week	2-3x a month	1x a month	almost never	
	Descending order :								



B. Nutrition

7. + 9.	**Ms.** *[name]***, how often did you /** your child **eat the following <u>fish products</u> in the last 4 weeks?**								
		several times a day	daily	several times a week	1x a week	2-3x a month	1x a month	almost never	
	Descending order : 								

C. Smoking behaviour

8.+9.	**How often are you /** your child **exposed to tobacco smoke in indoor settings?**		
		daily 4-6x a week 2-3x a week 1x a week less often never	
	Descending order : 		

D. Exposure-relevant behaviour

1. + 2.	**Ms.** *[name]***, how often do you /** does your child **use…?**					
		(almost) every day	about every second day	about 1x a week	less often/ never	
	Descending order :