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QUANTIFYING DISEASE FROM INADEQUATE HOUSING

EDITORIAL REVIEW MEETING

**World Health Organization
Regional Office for Europe**

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Quantifying disease from inadequate housing

Editorial review meeting

Bonn, Germany, 8-9 September 2008

Quantifying disease from inadequate housing



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ABSTRACT

The WHO European Centre for Environment and Health is addressing the question “how much human health is negatively affected by inadequate housing?” to support European policy-makers. To review and assess the first compilation draft quantifying the environmental burden of disease (EBD) for housing-health linkages, selected experts were invited to an editorial review meeting in Bonn.

The meeting participants reviewed all chapters and provided advice to WHO on the EBD assessments and their evidence base. Comments will be forwarded to the authors of individual chapters. Further advice was given on the production of the general chapters (Introduction, Conclusions and Policy implications) and the main messages such a report should deliver for different audiences such as research communities, policy-makers or housing professionals.

The WHO secretariat was charged with a number of tasks for finalizing the current chapters in collaboration with the authors, developing new versions for general chapters, and identifying authors for chapters on important housing and health topics that are not yet covered.

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Meeting context

The WHO European Centre for Environment and Health is addressing the question “How much human health is negatively affected by inadequate housing?” to support European policy-makers.

With the support of the German Ministry of Environment, an editorial group of experts was invited to a meeting in Bonn to review and discuss a first draft of examples and case studies on environmental burden of disease (EBD) assessments of inadequate housing.

The draft had been compiled by a number of international experts on specific housing and health issues as an outcome of a common working group process which was supported by two WHO expert meetings on quantifying the burden of disease from inadequate housing, held in Bonn in 2005 and 2006.¹ The draft report addressed the quantification of health impacts of housing factors such as noise, crowding, house dust mites, lead, tobacco smoke, cold, formaldehyde, carbon monoxide and other selected risk factors. The draft also addressed the health benefits of housing improvements and building solutions.

The editorial group was requested to assess the strength and evidence base for each of the examples and case studies, and identify key messages for scientists and policy-makers to be addressed in the opening and concluding sections.

Introduction to the meeting

Dr. Michal Krzyzanowski, Acting Head of the WHO Bonn Office, welcomed the participants and emphasized the importance of the work of the group in assessing the health implications of inadequate housing conditions using the WHO Environmental Burden of Disease (EBD) methodology. He noted that the final report should support the strengthening of health systems in the European Region and provide policy-makers with clear advice on actions to improve living conditions and reduce the prevalence of diseases associated with inadequate housing. To ensure that the recommendations and assessments made by this report are based on recent evidence, he requested that the participants critically review whether the findings meet the evidence standards developed by the WHO EBD publications; and he asked for recently produced WHO evidence (air quality guidelines, night noise guidelines etc.) to be adequately reflected and taken up by the final report.

Before the meeting started, Matthias Braubach was selected as chairperson for the first meeting day to chair the discussion about the technical chapters, while Annette Prüss-Üstün was selected as chairperson for the discussions on the conclusion and policy chapters on day 2.

Michael Baker was selected as rapporteur to take notes of the decisions made and provide a draft report of the meeting to WHO.

¹ See http://www.euro.who.int/Housing/evidence/20080327_5 for details and the reports

Project status and meeting objectives

To start the meeting and introduce the history of the project, Matthias Braubach (WHO) provided the participants with a short overview of the objectives of the meeting and the working steps previously made; focusing on the results of the first and second expert meeting (2005, 2006) to select and formulate the chapters for full EBD assessments or evidence summaries. The work process was critically reviewed and the status of the draft report was presented to the meeting participants. All but two chapters contained in the draft had been reviewed by WHO Headquarters as well as by two or three peer reviewers. Chapters were therefore considered to be in a final format for editorial and general discussions on the strengths and weaknesses of individual chapters; needs for consistency between chapters; and the key messages to be derived for the technical as well as policy implications and conclusive chapters.

Table 1 below shows the status of the chapter drafts as sent out to the meeting participants for review and comment prior to the meeting. In addition, table 1 identifies chapters for which authors are currently required as they would ideally have a place in an EBD compilation on inadequate housing.

Table 1: overview of chapters

Chapters (by risk factor)	Status
Damp and mould	peer-reviewed and updated chapter
House dust mites	peer-reviewed and updated chapter
Home safety	to be developed
Carbon monoxide	peer-reviewed but chapter not yet updated
Crowding	peer-reviewed and updated chapter
Indoor cold	peer-reviewed but chapter not yet updated
Traffic noise	peer-reviewed and updated chapter
Neighbour noise	peer-reviewed and updated chapter
Pests	peer-reviewed and updated chapter
Formaldehyde	peer-reviewed and updated chapter
Nitrogen dioxide	peer-reviewed and updated chapter
Environmental Tobacco Smoke	draft chapter available, waiting for ETS exposure data by WHO HQ
Radon	to be developed
Heat waves	to be developed
Housing conditions (mental health)	peer-reviewed and updated chapter
Lead	peer-reviewed and updated chapter
Particulate Matter in indoor spaces	peer-reviewed and updated chapter
Particulate matter at traffic hotspots	peer-reviewed and updated chapter
Solid fuel combustion	peer-reviewed and updated chapter

Solution chapters	Status
Housing interventions and health	peer-reviewed and updated chapter
Home improvements and cost benefits	to be developed
Ventilation	draft chapter available, to be restructured

Context chapters	Status
Introduction	First chapter draft for editorial review
Conclusions	First chapter draft for editorial review
Policy implications	First chapter draft for editorial review

WHO work has so far focused on the identification of internal consistency issues within and between chapters; the degree of subsequent integration of comments made by peer reviewers; and the production of first drafts and conceptual notes for the introductory, conclusive and policy implication chapters.

Wrapping up the short overview of the project and its status, Mr. Braubach provided the following objectives as the key tasks for the meeting:

1. Review of chapters regarding consistency, evidence used and key message on health burden;
2. Brainstorming of key messages for introduction, conclusions and policy chapters derived from all chapters in general.

Continuing the provision of the overall context to the meeting participants, Annette Prüss-Üstün from WHO HQ gave a short overview of the EBD concept and methods.

She highlighted that the EBD is a concept to assess the overall burden of disease of specific environmental health risk factors in order to provide information to policy makers for health priority-setting and mechanisms for preventative action.

The EBD utilizes an exposure-based approach and is usually expressed in DALYs (Disability Adjusted Life Years) showing the impact of certain risk factors over a lifetime, combining both mortality and morbidity. The HQ-coordinated EBD publication series was initiated in 1999, starting with the first issue on methods and continuing with separate EBD publications on how to address roughly 16 environmental risk factors. Additional activities include the development of global estimates of EBD, country guides and country profiles.

One important feature is that the EBD publications represent guides that indicate how to assess the EBD on a given level, e.g. the national level. Each guide provides the methodology and data sources in a transparent way, therefore providing national governments with the necessary guidance for making national estimations using national and more detailed data sources. This feature will also be a key element of the EBD of inadequate housing, as international data is often rare and many chapters cannot provide more than indications and rough assessments based on limited evidence.

Presentation and discussion of the report draft

Michael Baker then presented the report draft and provided the meeting participants with some key questions for the editorial review meeting.

General points

The overall scope of the report was to inform policy-making based on a quantification of the health impact of living conditions. To this end, the EBD housing report combines a diverse mix of EBD assessments with evidence reviews where the knowledge base is insufficient.

Alongside policy-makers the target audience also includes public health researchers, the housing design and construction sectors, and the interested public. The content will be especially useful for health researchers as the report covers a wide range of housing hazards in

a single volume; while many researchers work in very specialized technical areas and thus will benefit from the breadth of coverage.

As the EBD report will be a large volume with scientific content, the report format itself is considered too detailed to be used by people in policy-making. Therefore, an executive summary and a policy implementation chapter will be of assistance and may potentially be used in a separate, short and policy-focused publication leaving out the technical chapters and conclusions. Next to the full-length report providing the background evidence; such a shortened report targeted at policy messages may be up to only 10-12 pages, highlighting key policy sections of the full report.

Michael Baker made clear that the EBD report does include a variety of housing hazards, but does not cover the socio-economic aspects of housing. The definition of the relevant hazards is given below:

The EBD housing report includes

- Hazards from poor quality housing - those arising from the design and performance of the house and the plot it is built on;
- Hazards from human activities within housing - those arising from the way the occupants use the house;
- Hazards from housing neighbourhoods – arising from the immediate environment of the house.

The EBD housing report will not cover

- Hazards from the socioeconomic aspects of housing – arising from the inability of society to ensure an adequate supply of affordable, secure, suitable housing for all its population.

It was recommended that on socio-economic aspects, the recent report of the WHO Commission on Social Determinants (WHO, 2008) can be referenced.

As a next issue, the question about the title of the EBD housing report was raised. Since the evidence review was global, yet with application and exposure data being restricted to the WHO European Region, the title needs to reflect this restriction and make clear that the report is – in the first instance – a guide to the application of the EBD concept on housing risk factors based on examples from the WHO European Region. After discussion of the available options, it was agreed that a title proposal be developed by WHO in Annex 1 of the meeting report.

Furthermore, WHO was requested to provide an updated proposal on a Table of Contents in the edited report version sent back to authors for approval (see Annex 2). The editorial review group suggested various possibilities for arranging the content chapters, such as

- Distal causes vs. proximal causes;
- Social, physical, chemical, biological, building and equipment;
- Pathologies;
- Health outcomes;
- Broader settings.

In discussing the Table of Contents, it was noted that the contents be organized by specific hazards rather than housing conditions that are at the core of the hazards. It was recommended to address this weakness by adding some paragraphs to the introduction on the housing conditions that underlie all risk factors; possibly using the causal web developed in earlier meetings. Further ideas on how to structure the Table of Contents were provided by meeting participants for consideration by WHO.

In discussing the overall report draft, the editorial review group suggested that there would be negative effects from not including important disease burden areas in the report as this could understate the overall EBD from housing. The participants therefore urged WHO to work towards the production of key chapters on domestic injuries, radon and heat as listed in table 1 above. In addition, the group recommended making contact with ongoing research projects assessing the health impact of indoor environment conditions and possibly inviting or including the assessments they make in the EBD report.

Methodological issues

The methodology of the EBD concept is based on a simple core formula to derive Population Attributable Fraction (PAF) or Impact Fraction (IF):

$$PAF = \frac{p(RR - 1)}{p(RR - 1) + 1}$$

However, there are minor variations across chapters and one of the editorial tasks of WHO will be ensuring the consistent application of the core formula. In parallel, the editing process will have to address the lack of DALY assessments in some chapters.

Depending on the availability of exposure data by country, and the variety of data and health impacts by country, the report will attempt to present data for Europe, European sub-regions (A,B,C), and individual countries. As the provision of data varies a lot across chapters, a common format will be suggested to the authors.

Regarding the quality of evidence for exposure-response assessment, the group observed that several chapters were not matching the standards set by recent EBD publications. It was suggested to go back to the authors of the respective chapters, and ask for a structured update of the available evidence before final approval of the chapter.

Organisation and format

Based on the report draft provided prior to the meeting, the editorial review group found consensus that the report shall provide

- General chapters, notably
 - Executive summary;
 - Introduction;
 - Conclusions,
 - Policy implications.
- Specific EBD chapters addressing quantifications of the health impact of selected housing hazards.

- Specific evidence review chapters summarizing the current knowledge on a housing hazard for which evidence is insufficient to produce an EBD estimate.

The meeting participants also recommended preparing a model chapter (for both EBD assessment chapters and evidence reviews) that can be provided to the authors to assist the adaptation of their chapters. The model chapters should also suggest a summary box in which each chapter will summarize the main data elements used and results provided.

Discussion of EBD chapters

The strengths and weaknesses of individual EBD chapters, as well as their overall relevance and key findings, were then discussed by the group. Several specific comments and suggestions on the editorial changes and specific needs for clarification by the authors were made by the meeting participants and noted by WHO. Together with a WHO review of the integration of the peer review comments received, these individual chapter issues were to be dealt with directly in collaboration with the authors. To this end, all suggested changes were to be added to the edited versions of the chapters in track-change mode, and sent out to authors for clarification and action.

Suggestions made by the editorial group were to

- possibly consider the chapter on traffic noise and cardiovascular effects as a EBD assessment chapter;
- merge the two available chapters on particulate matter;
- consider the formaldehyde chapter as evidence summary only.

Content of Introduction, Conclusion and Policy Implication chapters

Next to the topical chapters, it was decided that the final report should contain an introductory chapter to outline the background and objectives of the report, and a conclusive chapter summarizing the main findings from a more strategic perspective. In the final chapter, a discussion of the potential policy implications and ways forward was required.

The editorial review group discussed a suggested format for the three chapters, and came up with the following recommendations to WHO:

Introduction

The introduction chapter should address or cover the following aspects:

- Overall introduction to housing and health (possibly giving a definition for housing) and especially the right to housing.
- Background and aims of the report: first, some paragraphs need to address the history of the project. Then, it has to be made clear that the report addresses both scientists and policy-makers. Also, it is to be stated that this report is a guide on using EBD assessments in the housing setting, and that the chapters represent examples of the application of this –

or adapted – methodologies for quantification of health risks. Each country is invited to add its own national data sources and carry out such an EBD assessment.

- Scope of the report: which topics are being covered, how they were selected and a short acknowledgement of the relevant topics that are missing. Moreover, the introduction needs to convey that while the coverage of evidence is global, the application of data is restricted to the WHO European region.
- Methodology: Provision of the overall EBD method and the formula used; and announcement that for some chapters the method has been modified (details on methods are to be found in these respective chapters).
- Basic assumptions for the EBD assessment: the EBD method starts with risk factors that are very specific (mites, mould, cold, etc.) but these are already the effects of specific housing problems and conditions. A section of the introduction therefore needs to address how housing conditions translate into exposure conditions. For this, the causal web developed for earlier EBD meetings can be modified.
- Socio-economic aspects / inequalities and possibly the environmental justice debate (could also be included in the policy chapter)

Conclusions

For the conclusion section, a draft proposal was suggested that would be based on a

- Summary of results;
- Description of uncertainties.

Following in-depth discussion, the recommendations of the meeting participants were:

- Make a clear distinction between EBD estimate chapters and evidence summaries / review chapters. In this context, it was suggested to move the traffic noise chapter to the EBD chapter section, and move the formaldehyde chapter to the review chapter section.
- Some information on the distal factors contributing to specific hazards (proximal factors) is to be added to make the chapter more related to housing.
- For Table 2 in the current draft, the following formal changes were recommended:
 - Express as rates per 100,000;
 - Reconsider whether to include total numbers of cases. Identification of the biggest killers may be based too heavily on indications only;
 - Reflect upon consistency of column 2 (AF versus PAF).
- For categorizing / summarizing the results in a more strategic way and not chapter by chapter, a system / categorization is needed. It was suggested to consider:
 - the EnVIE framework – ambient environment, building as structure, fixed equipment, other equipment, behavioural;

- other alternatives - Global environment, neighbourhood environment, immediate neighbourhood, building, apartment/dwelling, equipment, compartment/room, other components.
- The conclusions should be presented in a more positive way, considering
- housing not only part of the problem but also part of the solution.
- As much as possible, the conclusion section should also address how much of the EBD may be preventable (this especially raises the question of whether the intervention chapter should be considered a technical chapter as the other chapters, or rather a special one that may even follow after the conclusion chapter).

Policy implications

Proposals for the policy implication chapter were discussed in detail. The group agreed that this chapter is a key element of the report; and also suggested that the policy conclusions – together with an executive summary of the EBD assessments and evidence reviews – should be developed into a separate document targeting policy-makers and government officials.

The proposed draft consisted of four main sections:

- Prioritization of housing issues;
- Improving the evidence base;
- Policy response;
- Specific strategies.

The editorial review group first of all recommended transferring the first two sections (prioritization and evidence base) to the conclusion chapter, noting that they were of a more technical nature.

Further comments made by the group were:

- There is a need to emphasize that housing is a powerful social instrument since by intervening through housing, they may help to solve non-housing problems as well;
- Instead of an overload of technical details, the report should present realistic examples of practical action that can be taken;
- The policy chapter needs to target a wider audience, including construction sector experts and, therefore, it needs to be considered in broader terms;
- The chapter needs to mention the multiple dimensions of housing and decision-making, including cost-effectiveness analyses to be developed;
- The policy chapter should contain a matrix of problems and possible interventions
 - Distinguishing between problems directly caused by housing and those caused indirectly through being part of wider public health problems. What can be done? Where do solutions lie? Design, materials, maintenance, campaigns...?;
 - distinguishing between solutions that are direct, shared, behavioural, socio-economic;

- List all relevant stakeholders that can become active or affect changes, and designate their specific tasks or responsibilities. The chapter needs to sensitize architects, engineers etc to implications;
- The chapter needs to refer to socio-economic aspects / inequalities and possibly the environmental justice debate (which could also be done in introductory chapter).

Other sections

Next to these main chapters of a general nature, there should also be

- Preface;
- Executive summary;
- Affiliations and acknowledgments;
- List of abbreviations.

Working steps and tasks for further progress

The main responsibility for further progress is with the WHO secretariat. Major steps for producing a final draft are:

1. Revision of individual chapters and discussion of comments made by the editorial review group:
 - Editing changes;
 - Feedback to authors;
 - Revision;
 - Further review.
2. Revision of draft versions and production of final drafts for:
 - Executive summary;
 - Introduction;
 - Conclusions;
 - Policy implications.
3. Filling important gaps by acquisition of new chapters:
 - Home injuries (EBD assessment needed);
 - Inadequate ventilation (possibly as solution section);
 - NO₂ (evidence summary);
 - Radon (evidence summary);
 - Heat waves (evidence summary).
4. Assuring that data within chapters is in line with WHO Indoor Air Quality Guidelines published (ventilation, NO₂, Radon, Formaldehyde, CO, etc)
5. Process of merging and editing final document:
 - Merging all chapters after final approval by authors;
 - Submission to WHO HQ for review and approval;
 - Technical editing and production.

6. Timetable

Fall 2008	Spring 2009	Summer 2009	Fall 2009
Updating and editing chapters			
Getting back to authors with comments of editorial review group			
Identifying authors for missing chapters			
	Final drafts approved by authors		
	Finalization of review for new chapters		
	Finalization of new chapters		
		Submission to WHO HQ	
		Editing process	
			Lay outting and production
			Official launch

Annex 1: Suggested title for the report

Title suggested: “The Burden of Disease associated with selected housing conditions”.

Subtitle: “Summary of evidence with particular relevance to higher-income countries and application to Europe”

Annex 2: Suggested table of contents

Preface

Executive summary

Introduction

EBD assessments:

Physical, biological and chemical housing risk factors

- Damp, mould and asthma onset in children
- House dust mites (HDM) and asthma
- Indoor cold and mortality
- Indoor carbon monoxide (CO) and mortality
- Lead in houses and health effects

Housing and urban design-related housing risk factors

- Home safety and unintentional injuries (author to be confirmed)
- Traffic noise exposure and cardiovascular disease

Social and behaviour-related housing risk factors

- Environmental tobacco smoke (ETS) and respiratory disease
- Household crowding and tuberculosis

Evidence summaries:

- Solid fuels and respiratory diseases
- Formaldehyde and respiratory symptoms in children
- NO₂ and respiratory symptoms (to be confirmed)
- Proximity to heavy traffic pollutants and health effects
- Rodents, cockroaches, pests and health effects
- Housing quality and mental health
- Neighbour noise and hypertension
- Housing-related heat wave mortality (to be confirmed)
- Radon and health effects

Housing solutions:

- Adequate ventilation as a solution (to be confirmed)
- Housing interventions and health benefits
- Housing investments: health care budget benefits (to be confirmed)

Conclusions

Policy implications

Acknowledgements

List of acronyms

Annex 3: List of participants

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