



Social and gender inequalities in environment and health



EUROPE



Fifth Ministerial Conference on Environment and Health

“Protecting children’s health in a
changing environment”

Parma, Italy, 10–12 March 2010



EUR/55934/PB/1
22 January 2010
100125
Original: English

Social and gender inequalities in environment and health

Conference Secretariat

WORLD HEALTH ORGANIZATION • REGIONAL OFFICE FOR EUROPE
Scherfigsvej 8, DK-2100 Copenhagen Ø, Denmark Telephone: +45 39 17 12 52/16 06 Fax: +45 39 17 18 78/18 92
E-mail: parma2010@euro.who.int World Wide Web address: <http://www.euro.who.int/parma2010>

Front cover photo credit: WHO/Ivor Prickett.

Address requests about publications of the WHO Regional Office for Europe to:

Publications

WHO Regional Office for Europe

Scherfigsvej 8

DK-2100 Copenhagen Ø, Denmark

Alternatively, complete an online request form for documentation, health information, or for permission to quote or translate, on the Regional Office web site (<http://www.euro.who.int/pubrequest>).

© **World Health Organization 2010**

All rights reserved. The Regional Office for Europe of the World Health Organization welcomes requests for permission to reproduce or translate its publications, in part or in full.

The designations employed and the presentation of the material in this publication do not imply the expression of any opinion whatsoever on the part of the World Health Organization concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted lines on maps represent approximate border lines for which there may not yet be full agreement.

The mention of specific companies or of certain manufacturers' products does not imply that they are endorsed or recommended by the World Health Organization in preference to others of a similar nature that are not mentioned. Errors and omissions excepted, the names of proprietary products are distinguished by initial capital letters.

All reasonable precautions have been taken by the World Health Organization to verify the information contained in this publication. However, the published material is being distributed without warranty of any kind, either express or implied. The responsibility for the interpretation and use of the material lies with the reader. In no event shall the World Health Organization be liable for damages arising from its use. The views expressed by authors, editors, or expert groups do not necessarily represent the decisions or the stated policy of the World Health Organization.

CONTENTS

	Page
Acknowledgments	iv
Introduction.....	1
Social and health inequalities.....	1
Social inequalities in environment and health risk distribution.....	2
WHO work on social inequalities and environmental risk	2
Evidence summary: Current knowledge on social inequalities and environmental risk ..	4
Inequalities in environmental risks related to income, education and other indicators of SES	5
Inequalities in environmental risks related to gender	7
Inequalities in environmental risks related to marginalized population groups.....	9
Inequalities in environmental risks across the life-course.....	10
Conclusion	12
Addressing the inequalities: key recommendations.....	13
Reducing inequalities while promoting healthy environments for all	13
1. Improve daily living conditions.....	14
2. Tackle the inequitable distribution of power, money and resources	15
3. Measure and understand the problem and assess the impact of action....	16
Actions in situations of uncertainty	16
References	17

Acknowledgments

This policy brief has been developed by the WHO Secretariat on the basis of three expert meetings on social inequalities and environmental risks that were supported by funds from: the Federal Ministry of the Environment, Germany (Environment and health risks: the influence and effects of social inequalities, 9–10 September 2009) (WHO, 2009a); the Tuscany region, Italy and NHS Scotland (WHO/Health Behaviour of School-Aged Children (HBSC) Forum, 19–20 October 2009); and the Ministry of Health of Spain (Gender inequalities in environment and health, 11–12 November 2009).

WHO acknowledges the contributions made by all participants at these meetings, and the background papers summarizing the evidence that were provided by invited experts. The full text of the evidence reviews is available in the WHO technical document *Environment and health risks: a review on the influence and effects of social inequalities*, prepared for the Fifth Ministerial Conference on Environment and Health. Selected evidence reviews have also been published in the February 2010 issue of the *European Journal of Public Health*.

Key points

This document summarizes the currently available evidence on social and gender inequalities in environment and health and provides recommendations for actions and interventions by international, national and local actors.

- Significant social inequalities in environmental exposures exist between and within countries, as well as within communities. In most cases reported by the literature, the disadvantaged population groups are disproportionately more exposed to environmental risk factors. Low income and poverty are the strongest determinants of increased risk.
- The overall evidence base is incomplete. Information on environmental health determinants often cannot be analysed considering sociodemographic variables such as income, education, employment, age, sex or ethnicity. Assessment of the magnitude of socially induced environmental inequalities, and identification of priorities and of most vulnerable risk groups are therefore difficult.
- Issues of environmental and social justice and gender mainstreaming should be given more careful consideration by national and local policy-makers. A fairer distribution of environment and health resources should be an integral responsibility of actors in the environment, spatial planning and sustainable development sectors.
- Countermeasures to prevent and mitigate inequalities must take into account the driving forces behind such inequalities. Thus action must be taken at multiple levels to:
 - uncouple the link between social determinants and environmental inequalities through targeted actions focusing on the most vulnerable and disadvantaged population groups;
 - stop and reverse environmental inequality trends by providing healthy environments for all.

Introduction

Social and health inequalities

Social inequalities leading to inequalities in health¹ have received increasing attention in research and policy-making in recent years, and have been the subject of a variety of meetings, publications and governmental reports. Still, successful action to reduce and prevent social and health disparities is difficult to implement. This policy brief therefore aims to present the current evidence on the impact of social factors and gender on inequality in environmental risk, and provides a list of policy recommendations for developing action addressing these inequalities.

The Commission on Social Determinants of Health (CSDH) was established by WHO in 2005 to marshal the existing knowledge about what can be done to promote health equity and, by so doing, to focus global attention on the challenges of achieving greater health equity within and between countries by acting on the social determinants of health. This was on the premise that "... interventions aimed at reducing disease and saving lives succeed only when they take the social determinants of health adequately into account" (Lee, 2005). In 2008, the CSDH published its final report in which governments are urged to improve the daily living conditions of the population, provide equal opportunities to all citizens and better measure and understand the problem (CSDH, 2008).

At the regional level, health inequalities have also been the focus of work by the WHO Regional Office for Europe, the most recent examples being the intergovernmental meeting in Norway in April 2009 to discuss health inequalities in the context of the global economic crisis (Health in times of global economic crisis: implications for the WHO European Region, 1–2 April 2009) (WHO, 2009b) and, in the context of health systems and health service accessibility, the WHO European Ministerial Conference on Health Systems: "Health Systems, Health and Wealth", Tallinn, 25–27 June 2008) (WHO, 2009c). The WHO European Office for Investment in Health and Development and the Gender and Health programme both provide technical and policy assistance to Member States in acting to address health inequalities, while the Children's health and environment programme has focused largely on the reduction of the burden of disease specific to children.

Next to WHO, global actors such as the United Nations Development Programme, the United Nations Children's Fund, the United Nations Environment Programme and the World Bank have programmes in place for addressing key social determinants while focusing on poverty, education, gender and other social determinants. Health status is one of the outcomes considered in the work undertaken by these agencies.

¹ Note on terminology regarding the terms inequality and inequity: "In the public health community, the phrase *social inequalities in health* carries the same connotation [as *social inequities in health*] of health differences that are *unfair and unjust*" (Whitehead and Dahlgren, 2006, page 4). Furthermore, there is only one word for the two terms in some languages and no distinction is made between inequalities and inequities when they are translated. In this policy brief, the term "inequality/ies" is therefore used and refers to health inequalities considered unfair, unjust and preventable or avoidable.

In the context of the European Union (EU), the European Commission recently issued a communication on *Solidarity in health: reducing health inequalities in the EU* (Commission of the European Communities, 2009), together with a background document presenting options for strengthening EU efforts to tackle health inequalities. In parallel, the EU is also supporting a number of regional and international projects focusing on the assessment and mitigation of health inequalities.

Social inequalities in environment and health risk distribution

Some groups within the population are at greater risk of experiencing harmful environmental conditions as a result of their social circumstances. This environmental dimension of social inequality and its multiple facets, known as environmental justice or environmental (in)equity, has in recent years been increasingly recognized both by researchers and national governments. The Fourth Ministerial Conference on Environment and Health, held in Budapest in 2004, already touched upon the issues of social determinants in its declaration (WHO, 2004), and the relevance of the increasing social divide within many Member States was identified as a future challenge at the Intergovernmental Mid-term Review held in Vienna in 2007 in the context of an evaluation of progress made on the Budapest commitments (WHO, 2007).

In preparation for the Fifth Ministerial Conference on Environment and Health, a working paper on *Socioeconomic inequalities – Scenarios, recommendations and tools for action* was presented to the Member State delegations at the Third High-Level Preparatory Meeting (Bonn 27–29 April 2009) to frame the discussion on how the economic crisis may affect environment and health conditions and aggravate existing inequalities, and to present the activities carried out by the WHO Regional Office for Europe in this context (WHO, 2009d).

WHO work on social inequalities and environmental risk

As part of the preparatory work for the Ministerial Conference, WHO has commissioned a number of evidence reviews and organized expert meetings to discuss both the current knowledge on the association between social inequalities and environmental risks in the WHO European Region, and the available and suitable intervention mechanisms. WHO reviewed the available evidence on social inequalities to describe the distribution of environmental risk in different population groups, stratified by socioeconomic variables such as income, education and occupation, and other parameters such as gender, ethnicity or age. The full text of the evidence reviews is available in the WHO technical document *Environment and health risks: a review on the influence and effects of social inequalities*, prepared for the Fifth Ministerial Conference. Selected evidence reviews and a commentary have also been published in the February 2010 issue of the *European Journal of Public Health* (Braubach et al., 2010; Bolte et al., 2010; Martuzzi et al., 2010; Deguen and Zmirou-Navier, 2010; Braubach and Fairburn, 2010).

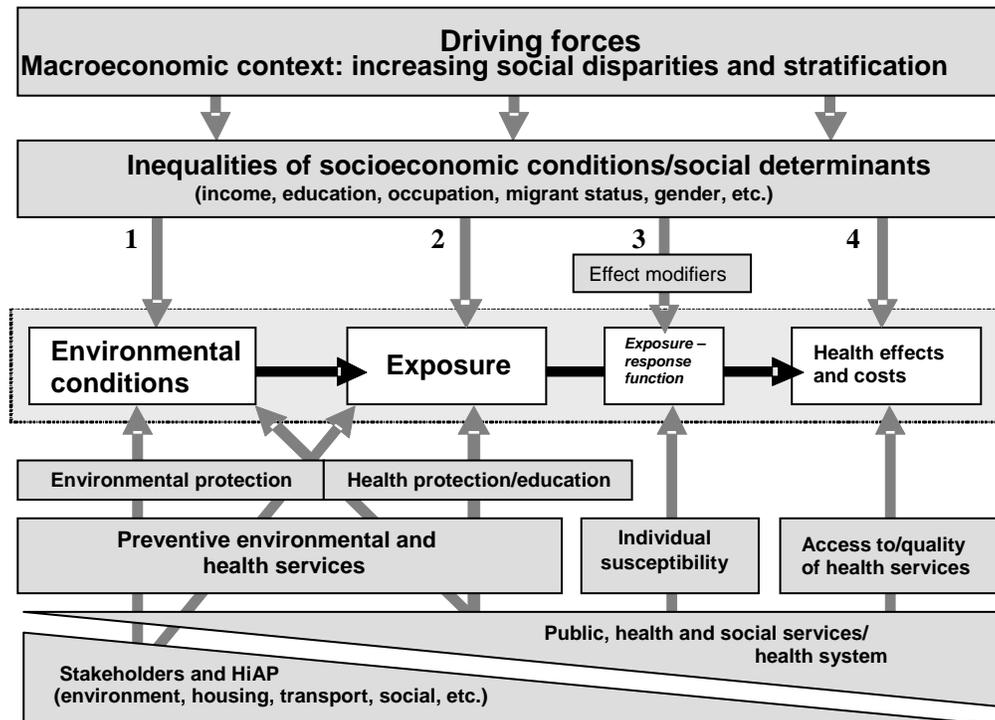
Based on the assessment of the inequalities, their main mechanisms and the most affected groups, policy recommendations have been developed, taking into account

existing case studies and experiences with interventions to reduce environmental inequalities associated with social determinants.

The work followed a conceptual model that was developed jointly by WHO programmes on environment and health and endorsed by Member States at the Third High-Level Preparatory Meeting in Bonn in April 2009. The model structures and identifies the potential pathways through which social inequalities may influence exposure to and health outcomes from environmental risks. The model suggests four major pathways, as shown below.

- *Arrow 1.* Social determinants are associated with quality of environmental conditions. Disadvantaged groups may live and work in, or be surrounded by, less favourable environmental conditions than the general population.
- *Arrow 2.* Factors attributed to social inequalities (such as knowledge and health behaviour) compound exposure. Given the same environmental conditions, disadvantaged groups may be more exposed than the general population.
- *Arrow 3.* Factors attributed to social inequalities (such as health status and biological sensitivity) influence the exposure–response function. Given the same exposure, disadvantaged groups may be more vulnerable to adverse health effects, for example, because of synergistic interactions between multiple risk factors.
- *Arrow 4.* Social inequalities have a direct impact on health outcomes, which may operate through both environmental and nonenvironmental mechanisms. However, given the same exposure–response situation, disadvantaged groups may also be more vulnerable to adverse health effects because of poorer access to services (e.g. emergency medical services in rural areas, inadequate insurance cover) and a reduced ability to mitigate or cope with detrimental effects (e.g. lack of information, reduced access to services). The absolute magnitude of the impact might be also higher in disadvantaged groups because of higher prevalence of background morbidity.

Fig. 1. The WHO framework model on social inequalities and environmental risks



Source: WHO, 2009d.

Arrows 1 and 2 together represent the exposure differential, describing the increased exposure risk, while arrow 3 represents the vulnerability differential, accounting for an increased translation of environmental exposure conditions into negative health effects.

The provision of healthy environments and the reduction of adverse health effects – presented in the lower part of the framework model – is not exclusively a task for environmental agencies or health care services but a common responsibility of all sectors and stakeholders, as proposed in the Health in All Policies approaches.

Evidence summary: Current knowledge on social inequalities and environmental risk

There are significant social inequalities in exposure to and negative health outcomes arising from adverse environmental conditions. Such inequalities exist between countries, within countries and within communities.

Socioeconomic status (SES) variables such as income, employment and education are found to be strong determinants of environmental health risk. Gender and ethnicity can modify the relationship between socioeconomic status, environment and health, but they can also directly affect exposure and health-related inequalities arising from biological, social, cultural and behavioural differences. Furthermore, the relationship may also depend on age-related aspects.

Most research identifies people from lower socioeconomic groups as being more exposed to environmental hazards (WHO, 2010). This is valid for environmental risks encountered in the following settings:

- in dwellings (environmental tobacco smoke (ETS), biological and chemical contamination and indoor air pollution, thermal comfort, sanitary equipment, injury risks);
- in the residential environment (lack of urban amenities and public safety, noise, proximity to polluted areas and waste disposal sites, traffic-related air pollution);
- in the transport sector, especially with reference to road traffic injuries;
- in the workplace (occupational injuries, exposure to harmful substances, stress).

Occasionally, reversed patterns are encountered. In Sweden, children in deprived areas were found to be less likely to be affected by specific injury types, but more affected by others. Dutch evidence showed that low-income households had greater noise exposure levels, but increased exposure was found in the well-off population when specifically looking at aircraft noise. Similarly a study showed that in Rome the percentage of population with high exposure to traffic related air pollution increased with income.

Inequalities in environmental risks related to income, education and other indicators of SES

Low-income households more often live in inadequate residential buildings, where they are more frequently exposed to dampness and mould, which affect respiratory health and allergies. Fuel poverty and low income are also associated with an increased use of solid fuels for heating, which has been shown to increase exposure to indoor air pollutants such as carbon monoxide, benzene, particulate matter and formaldehyde. Because of their family roles and the greater time that they spend at home, women are more affected by indoor pollutants.

One of the major and persisting inequalities strongly related to income and SES concerns sanitary amenities. Throughout the Region, low-income households most often lack a bath or shower. In addition, lack of a toilet for the private use of the household is still a major poverty-related issue in several countries, including some EU member states. Furthermore, poor pre-existing levels of water, sanitation and hygiene may be exacerbated by future water scarcity caused by climate change.

In Romania, 11.2% of the highest income group report having no flush toilets, as compared to 68.8% of the lowest income group (Eurofound, 2008). In 2008, 32 504 customers in Brussels, 217 416 in Wallonia and 174 822 in Flanders were officially in arrears with the payment of their water bills and, throughout Belgium, 1215 customers were cut off from water supply (Anon, 2009).

The home also is a major setting for passive smoke exposure which takes place significantly more often in homes of low-income and low-education households, with some studies indicating child ETS exposure being three to four times higher in these groups.

Crowding remains a major problem in many Member States, especially in the eastern part of the Region. Within the EU, shortage of space affects one in four lowest-income households versus one in seven high-income households.

One of the strongest and most consistent links found in terms of social inequality and residential location is related to ambient air quality. Overall, disadvantaged households tend to live more often in or near large urban and industrial areas and near to major traffic routes, and thus are more likely to be exposed to poor ambient air quality.

NO₂ exposures around Swedish homes were almost double for low-income compared to high-income groups (Chaix et al., 2006), while in Finland, being employed was associated with 16 µg/m³ versus 42 µg/m³ for unemployed persons (Rotko et al., 2000).

From an exposure perspective, those in higher socioeconomic groups may be better able to protect the air quality within their homes from ambient air pollution through better ventilation systems and may be less exposed while commuting (if travelling in an air-conditioned car instead of by moped, for example); from a vulnerability perspective, those in lower socioeconomic groups may have reduced protective factors such as diet, underlying health status and access to health care, as well as limited knowledge about protective behaviours (or limited possibility of applying such knowledge) and other competing and contributing risk factors.

Next to air pollution, neighbourhood-related risks associated with social gradients are lack of green spaces, overall neighbourhood deprivation, noise exposure, and proximity to polluted or polluting sites. Persons from lower socioeconomic backgrounds more often spend their time in deprived or inhospitable neighbourhoods, with a direct association being found with mental health outcomes such as anxiety and depression. Lack of public safety is also strongly associated with the deprivation level of neighbourhoods and the social status of households. As a part of neighbourhood quality, access to green spaces is frequently mentioned as a key dimension of inequality, with lower accessibility levels to public green areas for low-income neighbourhoods. Consequently, evidence indicates that the frequency of physical activity is negatively affected by perceived safety in deprived neighbourhoods as well as by a lack of greenery.

In Switzerland, households with low social status are exposed to the highest noise levels, which regularly exceed the national limit values (Braun-Fahrländer, 2004).

Noise exposure in residential areas is a key problem, especially in urban settings, and is largely related to street traffic noise. Evidence from various countries consistently finds that low-income households are much more often exposed to traffic noise, which may even exceed national limit values.

Finally, residential location is associated with a variety of problems related to industrial pollution, waste sites or other environmental threats (e.g. flooding) that affect specific areas only. In the case of industrial emissions, the emitting plants tend to be located in deprived areas. Similar gradients related to waste treatment sites are found in various

countries, and concerns exist (mainly in, but not limited to, the eastern part of the WHO European Region) over uncontrolled or illegal landfills and dumping sites.

Most of the available evidence on injuries relates to the transport sector, but there is a growing evidence base for unintentional injuries in children. These studies very often show that children of low socioeconomic status and from less affluent areas tend to sustain – or die from – injury to a greater extent than others. This applies to most causes of injury such as road traffic, drowning, poisoning, falls and burns, and in different settings (e.g. home, work, transport).

One study reported that, in England and Wales, children from families with the lowest occupational status had a 37.7 times higher death rate due to exposure to smoke, fire and flames than those from families with more favourable occupational status (Edwards et al., 2006).

The occupational health literature contains a profusion of studies linking specific hazardous environments to occupational injuries and illnesses. Although the broad socioeconomic context is rarely considered in these studies, evidence suggests that the relationship between occupational skill level and health is strongly modified by education and income, with other factors such as unemployment, immigration status, ethnicity and gender playing a significant role as well. Higher education, for instance, is related to higher occupational skill levels and fewer environmental risks.

Those in low-status, low-income jobs are more likely to experience stress-related symptoms. Stress may act as an effect modifier, meaning that those who are stressed are more likely to succumb to disease and accidents, given a comparable exposure to hazards. The additional effects of stress-related behaviours, such as smoking, excessive alcohol consumption or violence, also need to be considered.

Illegal work, precarious employment and child labour mostly affect vulnerable and marginalized populations such as immigrants or people with lower levels of education, and thus must be considered a major source of environmental and health inequalities.

Inequalities in environmental risks related to gender

Due to biological (sex) and sociocultural (gender) differences, men and women are affected by environmental factors in different ways and their levels of sensitivity differ. Gender norms and values affect men's and women's exposure to environmental risks in different ways, including through the types of behaviour they adopt. Societies tend to assign roles to men, and a division of labour that promotes risk-taking behaviour and causes them to neglect their health. In many societies, women still have less access to health information, care, services and resources to protect their health. Furthermore, gender interacts with race, ethnicity and social strata, resulting in unequal benefits among various social groups and between men and women. The evidence available in relation to gender inequalities in environment and health shows marked differences in both exposure and vulnerability between men and women (for example, personal exposures are strongly socioeconomically determined for men but are much less clear or consistent for women).

Traditional practices in Tajik villages make women and girls responsible for bringing water to their houses, which takes up a significant part of their daily routine. Because of this, many girls usually have no choice but to drop out of school (TajWSS Newslines, 2009).

The still persistent division of labour within households dictates that, in certain parts of the Region, women and young girls spend much of their time collecting drinking water, which restricts them from attending school. This is especially relevant to the rural populations of eastern Europe and, to a great extent, the Caucasus region and central Asia. Young girls, particularly after puberty, are also less likely to attend classes if the school does not have suitable hygiene facilities. As adults, educated girls are more likely to have smaller, healthier families; their children are less likely to die and are more likely to receive an education than the children of less-educated mothers.

The effects of environmental tobacco smoke have serious implications on girls, who are more vulnerable than boys to the impact of smoking on respiratory symptoms and lung function (Holmen et al., 2002).

Differences in vulnerability interact with gender inequalities to affect women's respiratory function. Swedish data show that women report ailments in the form of allergies and respiratory or skin hypersensitivity to a greater extent than men. In Bordeaux, the effects of air pollution were greater for women than for men among the elderly and, in Barcelona, older women were at greater risk of dying as a result of exposure to black smoke than were men. On the other side of the European Region, Armenian women reported that, because of a prolonged scarcity of fuel, many urban dwellers had taken to burning municipal waste for cooking and home heating, resulting in increased exposure – especially in women – to several hazardous agents such as dioxins, polycyclic aromatic hydrocarbons and heavy metals.

In Turkey, older women were more likely to suffer unintentional injury in the home (1.26 times more risk); this is linked to them spending more time in the home than men (Evcil et al., 2006).

Persistent gender inequalities in exposure to injuries and risk-taking behaviour continue to affect boys' health. Data from all over Europe show that, from the age of between one and two onwards, reported injury rates are higher for boys than for girls. There is clear evidence that adolescence is a period of heightened vulnerability to injury, with the gap between the risk of injury in boys and girls widening during this time. These differences are consistent over time and continue throughout adulthood and into old age. Evidence also shows that boys are more physically active than girls and it has been suggested that higher male injury rates are, at least in part, attributable to this.

Exposure to chemicals remains of greatest concern. Apart from differences in hormonal status, sex-related differences in sensitivity to toxic substances might be due to differences in detoxifying activity. Animal research indicates a five times higher detoxifying capacity in males than in females. An important difference is that women usually have a higher percentage of body fat than men, and this is associated with a

larger storage of lipophilic chemicals. Up to 300 synthetic chemicals have been found in body fat and breast milk, and many of them have been shown to be carcinogenic or toxic to the brain and nervous system.

Women may be more often exposed to chemicals at home and at work, while men tend to work in more risky workplaces and suffer more frequently from unintentional injuries (Lynn, 2009).

Within the occupational sector, gender issues remain in many countries where work conditions do not account for gender differences. In such cases, women are more likely to be adversely affected because of biological differences. Furthermore, work at home is mostly carried out by women but little information is available regarding potential risks and inequalities.

Inequalities in environmental risks related to marginalized population groups

Evidence on environmental impacts on health are rather limited in the case of specific and marginalized population groups such as migrants (documented and undocumented), refugees or Roma people. Although some good studies have been conducted by, for instance, nongovernmental organizations, most evidence comes from exclusively local case studies, is often scattered and fragmentary, and offers little opportunity for comparison. Systematic evidence at the national level is rare.

Individuals not registered as workers or residents in a particular location, such as immigrants with no visas or permits, may be particularly exposed and vulnerable to environmental risks through a range of processes that include limited income, poor housing quality, stigmatization and hazardous or unprotected work, as well as behavioural factors.

Precarious working conditions,² which potentially increase exposure to environmental risks, mostly affect marginalized population groups such as immigrants or refugees, but may also be a problem for individuals with a low level of education. Informal working conditions are a major source of environmental and health inequalities and violations of national standards on occupational safety, hygiene and working conditions, entailing a variety of hazardous exposures.

15% of Roma settlements in Hungary were within 1 km of an illegal waste dump and 11 % were within 1 km of animal carcass disposal sites (Gyorgy et al., 2005), while Serbian Roma settlements had 2–3 times less frequent water supply and hygiene amenities (Sepkowitz, 2006).

Housing conditions are very often the main problem for marginalized groups, who tend to be excluded from the housing market, for socioeconomic reasons beyond their control as well as because of discrimination. Consequently, inadequate shelters, often built by the people themselves and with little provision of facilities like energy and

² Precarious working conditions may be represented by informal work, child labour and slavery/bonded labour.

water, affect large parts of marginalized populations such as the Roma. Such informal settlements tend to occur in unsafe and unhealthy areas, and may also involve the production of food on contaminated ground. Regarding social inequalities, in some countries, waste disposal facilities tend to be disproportionately located in areas in which most of the residents are from ethnic minorities or of low socioeconomic status.

Inequalities in environmental risks across the life-course

Although age in itself is not a social determinant of health inequalities, across the life-course, some age groups are likely to be more physiologically vulnerable to specific environmental risks. Young children and older people are likely to spend more time in the home than others. If this is combined with inadequate social circumstances, causing less favourable living conditions, an increased vulnerability to certain residential or neighbourhood hazards may lead to more severe health effects in those vulnerable population subgroups. Examples of such hazards are:

- ETS (especially in children);
- household products such as cleaning agents, detergents and household chemicals; and
- any environmental threat that is directly related to the home or neighbourhood environment.

In the residential setting, the main point of interest relates to the provision of adequate and safe transport options and infrastructure. Those most vulnerable are considered to be children, mothers with babies, people with functional limitations and older people, i.e. those who depend the most on transport services. The main consequences of such inequalities are restrictions on social activity.

Child-specific inequalities

A large proportion of the burden of disease among children in Europe is attributable to environmental factors, and recent evidence indicates that childhood environmental exposure may also increase health inequalities occurring later in life. Still, very few studies address social inequalities in environmental risk for children and there is very little evidence from eastern European countries. The current state of knowledge on environmental inequalities among children and adolescents in Europe therefore largely reflects the common body of evidence for social inequalities in the whole population, as summarized above. However, it is well known that exposure to environmental hazards is more detrimental to children as their physiological vulnerability is higher.

Inequalities exist for unintentional injury in children from road traffic accidents, falls, drowning, burns and poisoning. These outcomes have the steepest social gradient of all causes of childhood mortality, and socioeconomic disparities exist at all levels of injury severity. Studies indicate that, the more severe the injury, the greater the socioeconomic differences. This has been observed for most causes of injury (e.g., traffic, poisoning, burns) and also for several settings (e.g., home, work, transport). There is also an age differential within the child age group: small children are at greater risk of injury within

the home from falls, burns and poisoning, while older children are at greater risk of injury from road traffic accidents.

Prenatal and childhood exposure to chemicals remains a major concern, as there may be variations in the ability to absorb chemicals (children absorb lead twice as fast as adults) and in susceptibility to damage (greater vulnerability of the fetus to many toxic and mutagenic compounds). This emphasizes the need for prevention of harmful exposure of women, especially those of child-bearing age.

Because of the variety of methodological approaches and studies on the one hand and a lack of child-specific data for many topics and from many European countries on the other, it is currently not possible to produce an overall assessment or to quantify the magnitude of environmental inequalities among children and adolescents in Europe. Patterns of environmental inequality vary across populations and countries, the overall pattern based on the available fragmentary data is that children living in adverse social circumstances suffer from multiple and cumulative exposures, are more susceptible to a variety of environmental toxicants, and often lack environmental resources or access to quality health care that could reduce the health consequences of environmental threats.

Inequalities related to working age

The evidence on inequalities in risks related to working environments and affecting age groups from late teens to pre-retirement has been summarized in earlier sections. These inequalities may be also complicated by gender, and affect health for the rest of the life span. While often considered to be an attribute of the type of work, they can be vastly mitigated by appropriate regulatory and institutional arrangements. These arrangements are usually weaker, or more poorly implemented, in less affluent (parts of) societies.

Inequalities related to ageing/older age

Although there is relatively little evidence on environmental inequalities among older people, the available literature seems to suggest three major pathways for environmental exposure gradients in older age: lower affordability, higher vulnerability to risk factors, and reduced functional capacities.

On average, older people tend to live in older homes which often have low-quality living conditions, often exacerbated by the fact that the elderly often cannot afford better housing. While exposures related to such situations are partially air pollution-related (related to heating and cooking systems), the main issue is thermal comfort and fuel poverty. Older residents are recognized as the major risk group affected by cold in winter (because of fuel poverty), and the most vulnerable in heat-wave situations (because of housing conditions and increased physical vulnerability). The 2003 heat-wave in France had the highest mortality ratio in older people living in poor quality housing.

Several epidemiological studies have also identified older people as being more sensitive to the harmful effects of air pollution because of pre-existing diseases. A weakened immune system, typical for older people, is a major factor of vulnerability when linked with environmental risk factors.

It is estimated that around two thirds of the population above 65 years has some type of physical constraint, while only about 30–40% of the European housing stock can be defined as “accessible” for persons with physical constraints (European Disability Forum, 2003).

Finally, environmental inequalities are triggered by the physical restrictions on older people, which make them a risk group for injuries, especially linked to falls in the home, leading to serious long-term health problems or institutionalization. Consequently, older people show the highest burden of disease for falls and have lower quality daily life because of a reduced person–environment fit. Their increased level of disability has also been related to elderly people being most at risk of flood death in the case of natural disasters.

Conclusion

Synthesis of evidence

The available evidence is based on studies conducted in a limited number of countries and there is almost no data available for many of the newly independent states of the former Soviet Union and the south-east European countries. Overall, it is clear that, in countries for which data is available, social and gender inequalities play a role in the distribution of environmental hazards and related health effects. Inequalities in the adverse effects of hazardous substances in air (both indoor and outdoor) are fairly well documented, while there is a significant lack of data regarding environmental exposures through water or food. Evidence is available, to some extent, on inequalities in relation to housing, traffic, working environment and waste management.

Most of the available evidence indicates that those with lower socioeconomic status bear a disproportionate burden of exposure and experience higher risks. Some evidence takes an age perspective, within which the very young and the elderly (for specific exposure situations) appear to be most at risk. From a gender perspective, the evidence indicates that men are at higher risk for some negative environmental health effects and women for others (for both biological and social reasons). However, evidence is still scarce since data is not systematically disaggregated by sex and, even where such data is available, it is rarely used to undertake a gender analysis. The evidence on minorities is largely focused on ethnicity and migrants, with specific ethnic groups and migrants facing a higher risk of environmental exposure, linked to socioeconomic deprivation.

Limitations of the evidence review and knowledge gaps

The evidence on social inequalities in environmental risk presented above provides a basis for policy action (discussed below) and exposes some important knowledge gaps in terms of data and mechanisms. There is a serious lack of evidence outside a few countries in western Europe and, even for those countries where research has taken place, the data is often scattered and incomplete. Most research on inequalities has focused on socioeconomic status, while other factors such as gender, age, migration status or ethnicity have been less frequently studied.

The health implications of social inequality in environmental risk or exposure have been infrequently studied. Several studies focus on environmental justice concepts, looking at differences in exposure between population subgroups, but assess neither the associated health impacts (positive or negative) nor the distribution of those health impacts between population subgroups. Other studies focus on health inequality and describe social gradients in health, but do not identify the health determinants involved. An assessment of the full extent of health inequality associated with environmental factors, although difficult based on the available evidence, is of great interest.

More detailed data and better analytical techniques are needed to: (i) quantify the likely impact of the different risk factors shaping the health of population subgroups; (ii) identify those risk factors (including social determinants) that are preventable; (iii) disentangle the role of competing risk factors, such as tobacco or diet, in influencing health outcomes; (iv) recognize and better understand the cumulative effect of multiple exposures; (v) study the additive and synergistic (or, less likely, antagonistic) interaction between social and economic factors and environmental hazards; and (vi) understand better the nature of the age- and gender-mediated differential vulnerability of children, adults and elderly people to environmental pressures.

Addressing the inequalities: key recommendations

Reducing inequalities while promoting healthy environments for all

Countries seeking countermeasures to mitigate social and environmental inequalities must take into account the driving forces behind and root causes of these inequalities. However, it is clear that there are no shortcuts to undoing these inequalities, which reflect decades of social processes. A successful strategy must thus distinguish between short-term and long-term objectives, and different approaches need to be chosen to tackle socially triggered environmental inequalities.

- In the longer term, disadvantaged groups are likely to benefit most from interventions to provide a safer environment simply because they are more often exposed to inadequate environmental conditions. The general improvement of environmental conditions to the benefit of all population groups should thus result in a relatively higher reduction of environmental risks for the most affected groups.
- As a short-term approach, targeted actions and campaigns – based on identifying the groups with the highest or a specific risk of suffering from environmental inequalities – should be pursued in the policy agenda at local, national and international levels. Such prioritized actions would naturally complement the more general approaches towards healthier environments for all and make sure that specific exposures that cannot be influenced by environmental conditions are also tackled. To ensure reductions in inequalities and improvements for the most disadvantaged, strategies to protect those vulnerable or most affected groups should apply different approaches. In parallel, caution must be taken to ensure that inequalities are not increased by such interventions and gender-related vulnerabilities, in particular, need to be taken into account, following the gender mainstreaming approach of WHO.

The progress made in synthesizing and consolidating the evidence base for action on social determinants of health fully applies in the environmental domain. As a result – and especially in the absence of national or local data to inform priorities – the recommendations of the CSDH provide the basis for any governmental action to reduce social inequalities in environmental risks through efforts to:

- improve daily living conditions
- tackle the inequitable distribution of power, money and resources
- measure and understand the problem and assess the impact of action.

1. Improve daily living conditions

The implementation of settings-based approaches focused on the daily life of the population can help to reduce and mitigate environmental inequalities. The main settings for reducing environmental inequalities are the built and neighbourhood environment (including private homes, schools, day care centres or residential homes), the urban and spatial planning sector, the transport sector, and the employment sector. However, the health sector could also be considered a relevant setting. Gender-specific differences in living conditions, e.g. determined by various activity patterns, should be considered as well.

Benefits of settings-based approaches

- Settings-based approaches consider where the affected or disadvantaged population groups can be best reached and where they are most often at risk. Such approaches enable authorities to concentrate efforts and resources for reducing environmental inequalities. Furthermore, they may provide more control to the disadvantaged groups over the environment and increase environmental awareness.
- Reducing environmental and health inequalities and providing environmental justice should be an integral part of environmental health governance and spatial planning systems. This calls for an increased integration of environmental and health impact assessment elements into statutory planning processes (regional, urban or infrastructure), towards establishing healthy settings for daily life.

Health system action – leading by example

- Social inequalities will inevitably be associated with a higher disease burden in disadvantaged population groups. In this context, health systems need to diagnose not only the respective disease but also identify and report the “social context” involved in disease development in order to inform health policy on the root causes of ill health.
- Adequate and affordable primary health care services (including basic occupational health services) and health infrastructures accessible to socially disadvantaged groups should be considered an essential component of preventing, addressing and reducing social inequalities in environmental health outcomes, and thus need to be further strengthened.

- Specific and locally adapted solutions need to be found for dealing with the health problems of marginalized populations who may have inadequate health insurance coverage or other factors that may affect eligibility or demand for health and environmental services.

2. Tackle the inequitable distribution of power, money and resources

There are a number of tools and approaches that could be applied to establish and maintain equitable environmental conditions. While different approaches may work more or less well in different Member States, it is important to note that the consideration of equity needs to be visible in all governmental decision-making, as specific actions and sectoral campaigns will only achieve specific and sectoral results, and may even increase other inequalities.

Environmental and health equity in all policies, systems and programmes

- Tackling environmental inequalities – irrespective of their origin – calls for the commitment not only of health and equity advocates but also of non-health sectors (e.g., environment, transport, occupational, agriculture, housing, spatial planning, social, education, culture). It is necessary to bring together activities as well as evidence from all actors involved in shaping the environmental conditions of the population, and to consider their work and policies through an environmental inequality perspective.
- Examples from different Member States have shown that policies and decisions taken by the non-health sectors can be effective in reducing environmental health risks. Use of a Health in All Policies approach has been shown to increase levels of collaboration between health and non-health actors, something that is essential to addressing inequalities as part of a national agenda instead of through a single-sector approach.
- Engagement should be sought from non-health actors to contribute to the reduction of inequalities through their own policies, while health actors should be encouraged to support, and provide adequate data to guide, the actions taken.

Political empowerment – inclusion and stakeholder involvement

- From an inequality perspective, large benefits can be expected from collaboration between national actors and local authorities, and partnerships with other agencies, including civil society groups, trade unions, nongovernmental organizations and actors from trade and industry. In addition to maximizing scarce resources, such collaboration will help to bring together different perspectives regarding production, prevention, mitigation and consequences of environmental risks and the distribution of exposure among population subgroups.
- Increased participation by the disadvantaged groups will help to identify and reduce those inequalities that are most relevant, and enable the affected persons to become part of the policy processes identifying solutions.

3. Measure and understand the problem and assess the impact of action

Governments, as well as regional and local authorities, should initiate and maintain mechanisms that make it possible to assess the role of social and gender determinants in environmental risk and to identify the most vulnerable population groups.

Using data tools to describe and understand the problem

- Environmental impact assessment and health impact assessment approaches need to be further developed to incorporate dimensions of equity by assessing not only the project-related future environmental or health impacts, but also their distribution within society.
- Beyond standardized and sectoral monitoring and surveillance systems, government ministries need to assess whether they have sufficient data to deal with the complexity of environment and health issues and consider investing in appropriate intelligence systems. Developing such intelligence systems by pooling all kinds of data from all partners would be of enormous benefit in helping to resolve evidence gaps and guide effective and equitable risk reduction policies.
- Addressing gender inequalities across programmes and policies will not only improve their efficacy but also impact on the reduction of social inequalities. The systematic use of sex-disaggregated data together with gender analysis and the elimination of gender bias in research will allow policy-makers to better assess and address the magnitude of the gender-associated social inequalities.

Research and evaluation

- Interventions and projects tackling inequalities in environmental and occupational health exposure or outcomes need to be evaluated at the request of governmental actors in charge of or funding such activities. Exchange of these experiences and a compilation of successful actions will help to develop the currently insufficient evidence of what works with regard to policy implementation, including cost-effectiveness.
- Research priorities need to be identified and research activities supported to help assess the magnitude of environmental inequalities related to social factors and gender, to identify the mechanisms linking social determinants and gender with inequality in environmental and occupational risk, and to assess the direct health outcomes of these inequalities. Such activities should be carried out at various levels (local, national, international), while researchers should strive to define and use consistent indicators to inform policy-making and set priorities for action.

Actions in situations of uncertainty

For any government, limited data on exposure to environmental risks – and especially the lack of data stratification by social determinants or gender – should be a reason of concern, as it potentially represents a component of environmental inequality in itself.

The lack of data on risk groups and their specific exposure to environmental inequalities should not be a barrier for action. In the absence of any data to indicate priorities for action, available technology and information should be used to provide safe and healthy environments for the whole population throughout the country. Ultimately, primary prevention approaches, also covering socially disadvantaged groups, are likely to provide more sustainable and equitable use of resources than would remedying the health consequences of social and environmental inequalities at a later stage.

References

Anon (2009). *Verslag Armoedebestrijding 2008 – 2009 Deel 1 – Een bijdrage aan politiek debat en politieke actie [Report on poverty alleviation 2008 – 2009 Part 1 – A contribution to political debate and political action]*. Brussels, Steunpunt tot bestrijding van armoede, bestaansonzekerheid en sociale uitsluiting [Centre for poverty alleviation, existence uncertainty and social exclusion], (<http://www.armoedebestrijding.be/publications/verslag5/Verslag2009.pdf> accessed 28 December 2009).

Bolte G, Tamburlini G, Kohlhuber M (2010). Environmental inequalities among children in Europe – evaluation of scientific evidence and policy implications. *European Journal of Public Health*, 20(1): 14–20.

Braubach M, Fairburn J (2010). Social inequities in environmental risks associated with housing and residential location—a review of evidence. *European Journal of Public Health*, 20(1): 36–42.

Braubach M et al. (2010). On the way to Parma: understanding and addressing the influence that social inequities have on environmental health. *European Journal of Public Health*, 20(1): 12–13.

Braun-Fahrländer C (2004): Die soziale Verteilung von Umweltbelastungen bei Kindern in der Schweiz. In: Bolte G, Mielck A (eds.): *Umweltgerechtigkeit. Die soziale Verteilung von Umweltbelastungen*. Weinheim, Juventa: 155–173.

Chaix B et al. (2006). Children's exposure to nitrogen dioxide in Sweden: investigating environmental injustice in an egalitarian country. *Journal of Epidemiology and Community Health*, 60:234–241.

Commission of the European Communities (2009). *Solidarity in health: reducing health inequalities in the EU. Communication 567, 20 October 2009*. Brussels, Commission of the European Communities (http://ec.europa.eu/health/ph_determinants/socio_economics/documents/com2009_en.pdf, accessed 28 December 2009).

CSDH (2008). *Closing the gap in a generation: health equity through action on the social determinants of health. Final Report of the Commission on Social Determinants of Health*. Geneva, World Health Organization
(http://www.who.int/social_determinants/thecommission/finalreport/en/index.html, accessed 15 October 2009).

Deguen S, Zmirou-Navier D (2010). Social inequalities resulting from health risks related to ambient air quality – A European review. *European Journal of Public Health*, 20(1): 27–35.

Edwards P et al. (2006). Deaths from injury in children and employment status in family: analysis of trends in class specific death rate. *British Medical Journal*, 333:119–122.

Eurofound (2008). *Second European Quality of Life Survey – First Findings*. Dublin, European Foundation for the Improvement of Living and Working Conditions
(<http://www.eurofound.europa.eu/pubdocs/2008/52/en/1/EF0852EN.pdf>, accessed 28 December 2009).

European Disability Forum (2003). *Disability and Social Exclusion in the European Union. Time for change, tools for change. Final study report*. Brussels, European Disability Forum
(<http://cms.horus.be/files/99909/MediaArchive/pdf/disability%20and%20social%20exclusion%20in%20the%20eu.pdf> accessed 28 December 2009).

Evcı E, Ergin F, Beser E (2006). Home accidents in the elderly in Turkey. *Tohoku Journal of Experimental Medicine*, 209: 291–301.

Gyorgy U et al. (2005). Roma Colonies in Hungary – Medical Care of Children and Hygienic Conditions. *Orvosi hetilap [Hungarian Medical Journal]*, 146(15):691–699.

Holmen TL et al. (2002). Gender differences in the impact of adolescent smoking on lung function and respiratory symptoms. the Nord-Trøndelag Health Study, Norway, 1995–1997. *Respiratory Medicine*, 96(10):796–804.

Lee JW (2005). Public health is a social issue. *Lancet*, 365(9464):1005–1006.

Lynn H (2009). *Linking breast cancer and our environment: politics and prevention*, Utrecht, The Netherlands, Women in Europe for a Common Future.

Martuzzi M, Mitis F, Forastiere F (2010). Inequalities, inequities, environmental justice in waste management and health. *European Journal of Public Health*, 20(1):21–26.

Rotko T et al. (2000). Sociodemographic descriptors of personal exposure to fine particles (PM_{2.5}) in EXPOLIS Helsinki. *Journal of Exposure Analysis and Environmental Epidemiology*, 10:385–393.

Sepkowitz KA (2006). Health of the world's Roma population, *Lancet*, 367(9524):1707–1708.

TajWSS Newslines (2009). *Tajikistan Water Supply and Sanitation project Newslines*. 1, 15 January 2009. Project newsletter issued by the Swiss Agency for Development and Cooperation (SDC) and OXFAM.

Whitehead M, Dahlgren G (2006). *Concepts and principles for tackling social inequities in health: Levelling up (part 1)*. Copenhagen, WHO Regional Office for Europe (<http://www.euro.who.int/document/e89383.pdf> accessed 18 January 2009).

WHO (2004): Declaration. *Fourth Ministerial Conference on Environment and Health*. Budapest, Hungary, 23–25 June 2004. Copenhagen, WHO Regional Office for Europe (<http://www.euro.who.int/document/e83335.pdf> accessed 28 December 2009).

WHO (2007). Main recommendations and conclusions of the Intergovernmental Midterm Review (IMR). *24th Meeting of the European Environment and Health Committee (EEHC)*. 25–26 October 2007, Bonn, Germany. Copenhagen, WHO Regional Office for Europe (http://www.euro.who.int/document/eehc/24th_eehc_bonn_edoc9rev2.pdf accessed 28 December 2009).

WHO (2009a). *Environment and health risks: the influence and effects of social inequalities. Report of an expert group meeting*. Bonn, Germany 9–10 September 2009. Copenhagen, WHO Regional Office for Europe (<http://www.euro.who.int/document/E93037.pdf>, accessed 28 December 2009).

WHO (2009b). *Health in times of global economic crisis: implications for the WHO European Region. Report of a WHO meeting*. Oslo, Norway, 1–2 April 2009. Copenhagen, WHO Regional Office for Europe (http://www.euro.who.int/document/HSM/Oslo_report.pdf, accessed 28 December 2009).

WHO (2009c). *WHO European Ministerial Conference on Health Systems: “Health Systems, Health and Wealth”*. Tallinn, Estonia, 25–27 June 2008: report. Copenhagen, WHO Regional Office for Europe (<http://www.euro.who.int/Document/E92150.pdf>, accessed 28 December 2009).

WHO (2009d). Socioeconomic Inequalities – Scenarios, recommendations and Tools for Action. In: *Third High-Level Preparatory Meeting*. Bonn, Germany, 27–29 April 2009. Copenhagen, WHO Regional Office for Europe (http://www.euro.who.int/Document/EEHC/29th_EEHC__Bonn_edoc15.pdf, accessed 15 October 2009).

WHO (2010). Environment and health risks: a review on the influence and effects of social inequalities. In: *Fifth Ministerial Conference on Environment and Health*. Parma, Italy, 10–12 March 2010. Copenhagen, WHO Regional Office for Europe.

The WHO Regional Office for Europe

The World Health Organization (WHO) is a specialized agency of the United Nations created in 1948 with the primary responsibility for international health matters and public health. The WHO Regional Office for Europe is one of six regional offices throughout the world, each with its own programme geared to the particular health conditions of the countries it serves.

Member States

Albania
Andorra
Armenia
Austria
Azerbaijan
Belarus
Belgium
Bosnia and Herzegovina
Bulgaria
Croatia
Cyprus
Czech Republic
Denmark
Estonia
Finland
France
Georgia
Germany
Greece
Hungary
Iceland
Ireland
Israel
Italy
Kazakhstan
Kyrgyzstan
Latvia
Lithuania
Luxembourg
Malta
Monaco
Montenegro
Netherlands
Norway
Poland
Portugal
Republic of Moldova
Romania
Russian Federation
San Marino
Serbia
Slovakia
Slovenia
Spain
Sweden
Switzerland
Tajikistan
The former Yugoslav Republic
of Macedonia
Turkey
Turkmenistan
Ukraine
United Kingdom
Uzbekistan

World Health Organization
Regional Office for Europe

Scherfigsvej 8, DK-2100 Copenhagen Ø, Denmark

Tel.: +45 39 17 17 17 Fax: +45 39 17 18 18 E-mail: postmaster@euro.who.int

Web site: www.euro.who.int