

Health and the environment with focus on the Eastern Mediterranean Region

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Introduction

Environmental effects on health are associated with several factors: absent or inadequate environmental health services, such as water supply, sanitation, solid and hazardous waste management and shelter; environmental degradation, such as pollution of air, water and soil, and food contamination; global environmental problems, such as reduction of biodiversity and degradation of ecosystems through deforestation, global warming, ozone layer depletion and contamination by persistent organic chemicals; and industrial accidents. The indirect health effects of environmental conditions and changes, such as the implications of a limited episode of food contamination on a country's food exports, may be more significant than their direct health effects.

A significant part of the population of the Eastern Mediterranean Region (EMR) suffers from an insecure or low level of income. In 2006 the average GDP per capita in the Region was estimated at only US\$ 2030. Moreover, out of 530 million inhabitants, 226 million lived in countries with a GDP per capita less than US\$ 1000 [1]. This has far-reaching effects on environmental degradation and impairment of health; poor people are not protected against disease and lack the resources and motivation to protect

the environment. The Region is also experiencing rapid urbanization, which leads in many instances to haphazard development. Urban facilities and services are often unplanned and overwhelmed by population growth and overcrowding, resulting in various health hazards. The high regional population growth rate (2.1%) often outpaces the capacity to provide environmental health services, amplifying adverse effects of environmental pollution.

Environmental factors linked to health

Water access and quality

Water demand in the Region is growing fast and water availability is decreasing to crisis levels. Nevertheless wastage of water is widespread, and the water resources available are threatened by salt intrusion and other kinds of pollution; indeed the whole issue of water shortage has not been addressed in depth. Mitigation measures are rarely defined in an integrated manner and water demand management is practised in only a few countries. The reuse of wastewater in agriculture, and for the development of green belts and recreational areas, is practised to varying degrees to alleviate water shortages. However, in many cases,

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raw or inadequately treated sewage is used in an unregulated manner. Such practices can affect the health of agricultural workers and lead to contaminated foodstuffs, which expose consumers to health risks [2].

Polluted water can be a source of deadly disease: globally, 1.5 million people, most of them children, die each year of diarrhoeal disease linked to inadequate water supply and hygiene and 860 000 deaths per year are

caused by malnutrition induced by unsafe water, inadequate sanitation and insufficient hygiene in children under 5 years [3], and in Bangladesh over 35 million people are at risk from drinking-water supplies with high levels of arsenic [4].

In the Region, 78 million people had no access to improved water sources in 2004 and 177 million had no access to sanitation facilities [5]. Figures 1 to 4, based on data

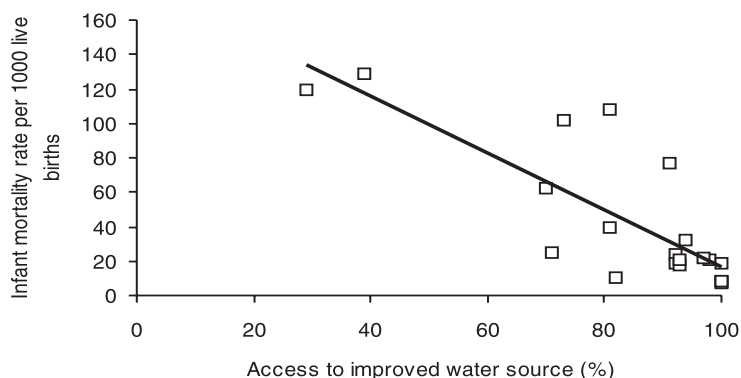


Figure 1 Association between access to improved water source and infant mortality in the WHO Eastern Mediterranean Region

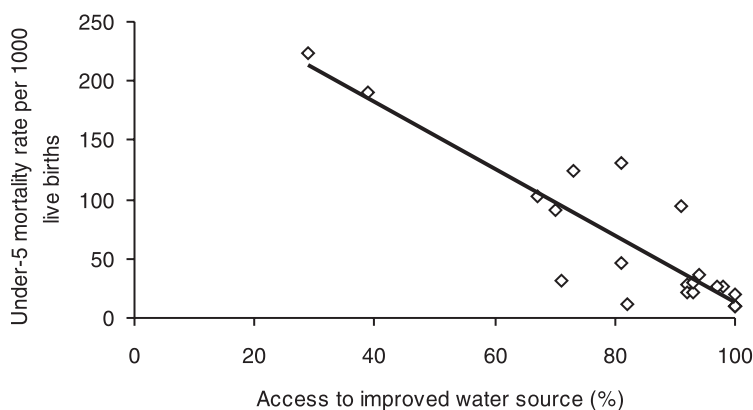


Figure 2 Association between access to improved water source and under-5 child mortality in the WHO Eastern Mediterranean Region

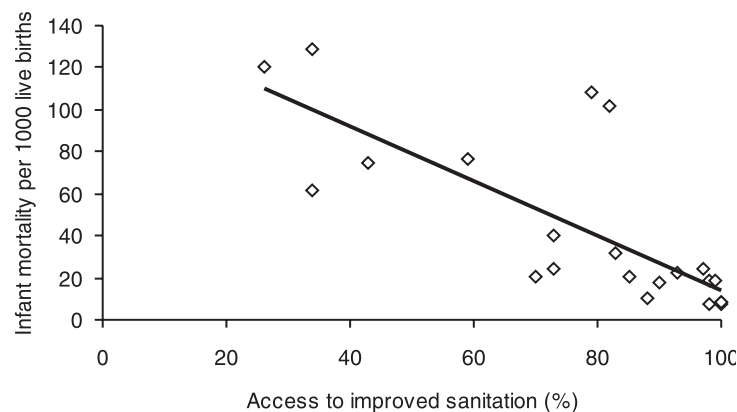


Figure 3 Association between access to improved sanitation and infant mortality in the WHO Eastern Mediterranean Region

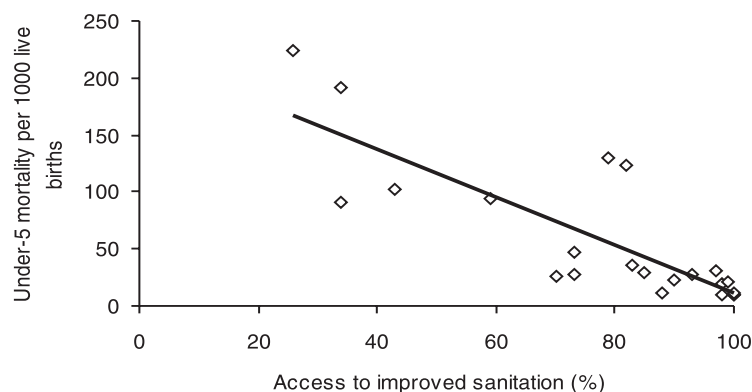


Figure 4 Association between access to improved sanitation and under-5 mortality in the WHO Eastern Mediterranean Region

in Table 1, show the association between level of access to water supply and sanitation and child mortality. In addition, water supply is intermittent in many countries and may compromise the integrity of the water distribution network and the quality of the water distributed.

Desalination is one strategy that has been used in the EMR to address water scarcity, mainly in the Gulf Cooperation

Council countries where drinking-water is a blend of desalinated water and ground-water. The need to assess the technical problems associated with water quality at the different stages of the desalination processes and the distribution and consumption of water with very low mineral content was addressed by the World Health Organization (WHO) Regional Office for the Eastern Mediterranean (EMRO), who, on behalf of

Table 1 Population access to water and sanitation in countries of the WHO Eastern Mediterranean Region

Country	Population ^a			Water supply coverage			Sanitation coverage			Infant mortality (per 1000 live births)	Under 5 mortality (per 1000 births)		
	Total (× 1000)	Urban %	Rural %	% Access to improved water source	Urban	Rural	Total	% Access to improved sanitation	Urban			Rural	Total
Afghanistan	28 574	24	76	63	31	39	49	29	34	129.0	191.0		
Bahrain	716	90	10	100	NA	100 ^b	100	NA	100 ^b	7.6	10.1		
Djibouti	779	84	16	76	59	73	88	50	82	102.0	124.0		
Egypt	72 642	42	58	99	97	98	86	58	70	20.5	26.2		
Iran (IR)	68 803	67	33	99	84	94	86 ^c	78 ^c	83 ^c	32.1	36.0		
Iraq	28 057	67	33	97	50	81	95	48	79	107.9	130.0		
Jordan	5 561	79	21	99	96	97	94	87	93	22.0 ^d	27.0 ^d		
Kuwait	2 606	96	4	NA	NA	100 ^b	NA	NA	100 ^b	8.2	10.0		
Lebanon	3 540	88	12	100	100	100	100	87	98	18.6	19.1		
Libyan Arab Jamahiriya	5 740	87	13	72 ^c	68 ^c	71 ^c	97	96	97	24.6	31.0		
Morocco	31 020	58	42	99	56	81	88	52	73	40.0	47.0		
Oman	2 534	78	22	85	73	82 ^c	97	61 ^c	88 ^c	10.3	11.1		
Pakistan	154 794	34	66	96	89	91	92	41	59	77.0	94.0		
Palestine	3 587	72	28	94	88	92	78	61	73	24.2	28.3		
Qatar	777	92	8	100	100	100	100	100	100	8.1	10.7		
Saudi Arabia	23 950	88	12	97	63 ^c	92 ^c	100	NA	99 ^b	18.6	21.7		
Somalia	7 964	35	65	32	27	29	48	14	26	120.0	224.0		
Sudan	35 523	40	60	78	64	70	50	24	34	62.0	91.0		
Syrian Arab Republic	18 582	50	50	98	87	93	99	81	90	18.0	22.0		

Table 1 Population access to water and sanitation in countries of the WHO Eastern Mediterranean Region (concluded)

Country	Population ^a		Water supply coverage		Sanitation coverage		Infant mortality (per 1000 live births)	Under 5 mortality (per 1000 births)			
	Total (× 1000)	Urban %	Rural %	% Access to improved		% Access to improved sanitation					
				water source							
				Urban	Rural						
Tunisia	9 995	64	36	99	82	93	96	65	85	20.3	30.0 ^e
United Arab Emirates	4 284	85	15	100	100	100	98	95	98	7.7	9.9
Yemen	20 329	26	74	71	65	67	86	28	43	75.0	102.0

^aSource: [5]; data for 2004.^bSource: [1]; all estimates for 2004 unless otherwise noted.^cYear 2000.^dYear 2002.^eYear 2001.

NA = not available.

WHO as a whole, led the preparation of the WHO Guidance Document on desalination for safe water supply [6]. Assessments of the vulnerability of desalination facilities to accidental pollution and other emergencies are also needed.

Safe water and adequate sanitation are basic human rights and, together with hygiene education, are fundamental to protecting health, increasing the sense of well-being, and improving economic and social productivity. EMRO has a 3-year plan to gather scientific data which will allow it to undertake work to determine the minimum water requirement for health, a critical issue in a region where water scarcity is the rule and drought an inescapable fact.

Air quality

Anthropogenic sources of air pollution have existed at least since humans discovered fire; investigations of ice in Greenland show that 2500 years ago lead and copper concentrations in the air exceeded natural levels due to extensive smelting of ores in the open air [7]. Air pollution has worsened rapidly with industrialization and the resultant widespread use of fossil energy sources, increased manufacturing and “chemicalization” of daily life.

Outdoor air quality is a matter of concern in many cities, particularly the megacities, but indoor air pollution is an even greater source of concern. Globally, indoor air pollution from solid fuel use is responsible for 1.6 million deaths due to pneumonia, chronic respiratory disease and lung cancer, with the overall disease burden exceeding the burden from outdoor air pollution fivefold [8]. High priority needs to be given to improving indoor air quality in both rural and urban areas. This should include strong action to prevent passive inhalation of tobacco smoke.

Solid waste disposal

In many countries of the Region, particularly in the secondary cities, there are serious shortcomings in the collection, transportation and disposal of solid waste. Uncollected solid wastes dumped near roads are common features in countries with large populations and high population densities. In some areas, housing may be situated in the midst of dumping sites. The indiscriminate burning of solid waste is also a major problem in certain countries; for example, it contributes to the well publicised autumnal black smoke events over Cairo. Scavengers in the solid waste disposal sites are at high health risk. Disposal of health care wastes mixed with municipal solid waste has been reported in many areas. In recent years, however, health care waste management has started to receive the necessary attention.

Climate change

The Fourth Assessment Report of the Intergovernmental Panel on Climate Change established that climate change is unequivocal and is caused by anthropogenic activities [9]. WHO has recognized the importance of climate change and its potential impact on health security for many years [10,11]. Indeed, climate change will adversely and profoundly affect the fundamental determinants of health – water, air and food – and is projected to decrease the availability of fresh water in the Region, with consequences for public health protection and food production.

The public health consequences of climate change include extreme weather-related mortality, affecting the elderly, the chronically sick and the poor; an increase in water-borne and food-borne diseases, and in acute respiratory infections and allergies due to dust storms; an increase in the geographic range and incidence of vector-borne

diseases, such as malaria, leishmaniasis and schistosomiasis; and the emergence of diseases not seen much before in the Region, such as dengue fever. Forced migration and malnutrition are also likely to result, with health consequences of their own.

The public health action that is required includes preventative action aimed at moderating the impact of climate change on the key determinants of health (water, air and food) and measures to assess and manage the additional burden of disease that will be brought about.

Ionizing radiation and electromagnetic fields

The exposure of human beings to ionizing radiation from cosmic rays and radioactive nuclides in the earth's crust is an inescapable feature of life. The application of ionizing radiation in medicine has become widely established for diagnosis and therapy, bringing overwhelming benefits to patients with proper use and represents the largest man-made source of radiation exposure for the global population. However, prolonged exposure to even low levels of ionizing radiation is associated with increased ill health, hence the importance of raising awareness of health workers and the population at large to this risk.

Concern has been expressed about the potential health risks associated with electromagnetic fields since the 1970s; suspected effects range from change in behaviour, childhood leukaemia and other forms of cancer, to Parkinson and Alzheimer diseases. Unlike ionizing radiation, which has enough energy to break chemical bonds (and thus can damage living cells), low frequency electromagnetic radiation (0–300 GHz) has insufficient energy to ionize atoms or fragments of molecules, but may interact with a biological system in a number of other ways, such as by inducing

small changes of voltage and electrical current within the human body. Numerous studies have been published on the health effects of electromagnetic fields, and expert groups and panels have been established to review and evaluate the available data. So far, such efforts have not provided firm evidence to prove or disprove a causal association between exposure to electromagnetic fields and outcomes of public health significance.

Natural and man-made emergencies

The Region is particularly affected by natural and man-made emergencies which degrade environmental conditions in two ways: through catastrophic events that markedly affect the environment, such as floods, drought, earthquakes, fire and industrial accidents; and through disruption of essential environmental health services, such as water supply and sanitation, solid waste and air quality management, which are often already strained [12].

The disruption of water and power supplies was widely witnessed during the invasion of the Palestinian territories in 2002. In Iraq, wastewater collection and treatment facilities throughout the country were non-functional after the Gulf Wars due to partial destruction of pumping and treatment facilities, lack of spare parts and intermittent lack of electricity.

Health effects of air pollution are normally characterized by long-term build up; in air pollution emergencies, however, such as in Bhopal, India in 1977, the effects are immediate and often lethal. In 1991, fires in hundreds of Kuwaiti oil wells caused dramatic, visible effects on air quality at the subregional level [13].

Industrial accidents and transport accidents involving hazardous materials are increasing worldwide. The impact on the affected communities is enormous and the

medical, psychological and economic burden is heavy. Death and injury do not reflect the full health impact of these disasters, as the indirect effects, such as population displacement, economic losses, stress and social upheaval in the community, may be of even greater magnitude [12].

Though rare, radiation accidents have many medical, administrative, legal, social and psychological implications. The most serious nuclear accident occurred in 1986 in Chernobyl nuclear power station, releasing large amounts of radioactive material over vast areas of Belarus, Ukraine and the Russian Federation; even countries far from nuclear power stations need effective radiation protection programmes. Particular concerns were expressed in the Region in relation to the use of depleted uranium in Iraq and to nuclear powered ships cruising in the Gulf area. The possible use of depleted uranium during the 2006 war in Lebanon was the subject of intense debate, even after a joint International Atomic Energy Agency, United Nations Environment Programme and WHO joint fact-finding mission had concluded in February 2007 that there was no evidence of the use of depleted uranium in the conflict.

Emergencies are also often the occasion for spreading damaging rumours as the one regarding chemical and radiological contamination of seafood along the Somali coast in the aftermath of the 2006 Asian tsunami.

Other factors

Many other important sources of environmental health hazards are known to exist in the Region, such as noise pollution, soil contamination, and occupational hazards; in fact the Region is subject to the superposition of traditional, modern and emerging environmental health problems.

Box 1

It has been estimated that more than one-fifth of all deaths throughout the world are due to diseases arising out of environmental conditions. In the case of infantile diarrhoea, the number of deaths attributable in large measure to an unhealthy environment has in some countries reached alarming proportions. [...]

The [First] World Health Assembly allotted to environmental hygiene a top priority ranking with those accorded to malaria, maternal and child health, tuberculosis and venereal disease.

Source: Chronicle of the World Health Organization, 1948, II, No. 8–9.

Health burden of environmental conditions

It is striking to note how the estimations made in 1948 regarding the health effects of environmental conditions (Box 1) are consistent with the recent WHO estimates, that globally 24% of the disease burden and 23% of all deaths are attributable to environmental factors. Among children 0–14 years of age, the proportion of deaths attributed to the environment was as high as 36% [14]. For the Region, it has been estimated that this proportion varies between 13% in countries where coverage with essential environmental health services is high and an alarming 30% in countries where access to such services is still problematic (Table 2). Table 2 also shows clearly the importance of indoor air pollution and water supply and sanitation in relation to health protection.

It should be noted that environmental health is not only important for health protection and promotion but also for health equity (Box 2). Indeed, environmental health is a pillar of health security.

Addressing the issue of health and the environment

Many national strategies and plans of action related to health and environment have been prepared and implemented throughout the

Region but despite some progress in reducing mortality attributable to environmental causes in certain countries, sustained and amplified efforts are needed. The reasons why strategies and actions have not worked effectively relate primarily to weak institutional systems, unadapted and unenforced legislation, insufficient access to and use of health and environment information for decision-making, insufficient manpower both in number and training, and lack of leadership of the health sector in pushing for health and environmental action by other sectors and avoiding conflicting sectoral strategies in matters of health and environment. On the other hand, facilitating factors are often missing; the most important of these is political commitment, but include also linkage with the basic development needs approach, environmental health impact assessment and use of economic instruments.

WHO's approach

The WHO Eleventh General Programme of Work 2006–2015 [15] has analysed current health challenges and concluded that health is increasingly seen as a key aspect of human security and occupies a prominent place in debates on priorities for development. Over the past 20 years there have been major gains in life expectancy overall, but there are widening gaps in health status. The importance of economic, social, and

Table 2 Environment burden of disease in countries of the WHO Eastern Mediterranean Region

Country	Environmental burden of disease (% of total burden)	Environmental burden of disease (DALYs/1000 capita, per year)	Selected risk factors (DALYs/1000 capita, per year) Water, sanitation and hygiene (diarrhoea only)		
			Water, sanitation and hygiene (diarrhoea only)	Indoor air	Outdoor air
Afghanistan	29	217	52	36	0.2
Bahrain	14	16	-	-	0.4
Djibouti	30	123	35	3	3
Egypt	19	38	6	0.2	2
Islamic Republic of Iran	20	37	-	0.1	1
Iraq	26	88	17	0.8	5
Jordan	20	31	4	-	0.8
Kuwait	14	15	-	-	1.1
Lebanon	18	32	2	-	1.4
Libyan Arab Jamahiriya	17	25	-	0.2	3
Morocco	20	35	7	0.5	0.2
Oman	19	25	-	-	1.1
Pakistan	28	83	22	14	2.3
Qatar	16	18	0.6	-	0.6
Saudi Arabia	20	32	-	-	1.1
Somalia	27	184	48	-	0.4
Sudan	24	86	18	2.4	1
Syrian Arab Republic	17	26	4	0.6	0.9
Tunisia	17	27	2	0.3	0.6
United Arab Emirates	18	25	0.6	-	1.8
Yemen	28	100	29	13	0.7

Source: [15].

DALY = disability-adjusted life year.

environmental determinants of health has grown. Demographic and epidemiological transitions now combine with nutritional and behavioural transitions, influenced by globalization and urbanization, to create unfavourable new trends.

To face health challenges in an efficient manner, WHO moved into a 6-year mid-term strategic plan, within which 13 organization-wide strategic objectives have been defined which are to be achieved by

Box 2

The adverse health impacts from human-induced environmental changes will be distributed unequally. The poor, the geographically vulnerable, the politically weak and other disadvantaged groups will be most affected. Addressing the intersection between social determinants of environmental change and the impact of environmental change on health inequities will benefit sustainable ecology and population health alike. Health inequities will benefit sustainable ecology and population health alike.

Source: *Interim Statement, WHO Commission on Social Determinants of Health, 2007*

the Organization in the 6-year term. This should anchor the Organization in results-based management.

Strategic objective 8, which reads, “To promote a healthier environment, intensify primary prevention and influence public policies in all sectors so as to address the root causes of environmental threats to health”, is entirely relevant to health and environment; however other strategic objectives are equally relevant, namely Strategic objective 5 in relation to environmental health aspects of emergencies, Strategic objective 7 for the promotion of healthy settings approaches and Strategic objective 9 in regard to food safety.

An area where WHO/EMRO is looking to lead the way is in social responsibility. The regional Strategic objective 8 plans to demonstrate during the coming 6 years the feasibility that WHO only contract with corporations that respect at least occupational health and environmental legislation.

Given the emphasis WHO is placing on the determinants of health, prominent among which are environmental factors, it will be in good position in the coming few years to support its Member States in assessing, correcting and preventing health risks related to environmental factors and hence in achieving the health-related Millennium Development Goals [16].

There are however certain important prerequisites if we are to succeed in tackling the effects of environmental conditions and changes on health: individuals and communities need to become the guardians of their health and environment; shared agendas and plans of action need to be formulated around the core functions of public health and environmental management; and alliances need to be established between health and environment sectors to develop joint activities and programmes that would be beneficial for both sectors.

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