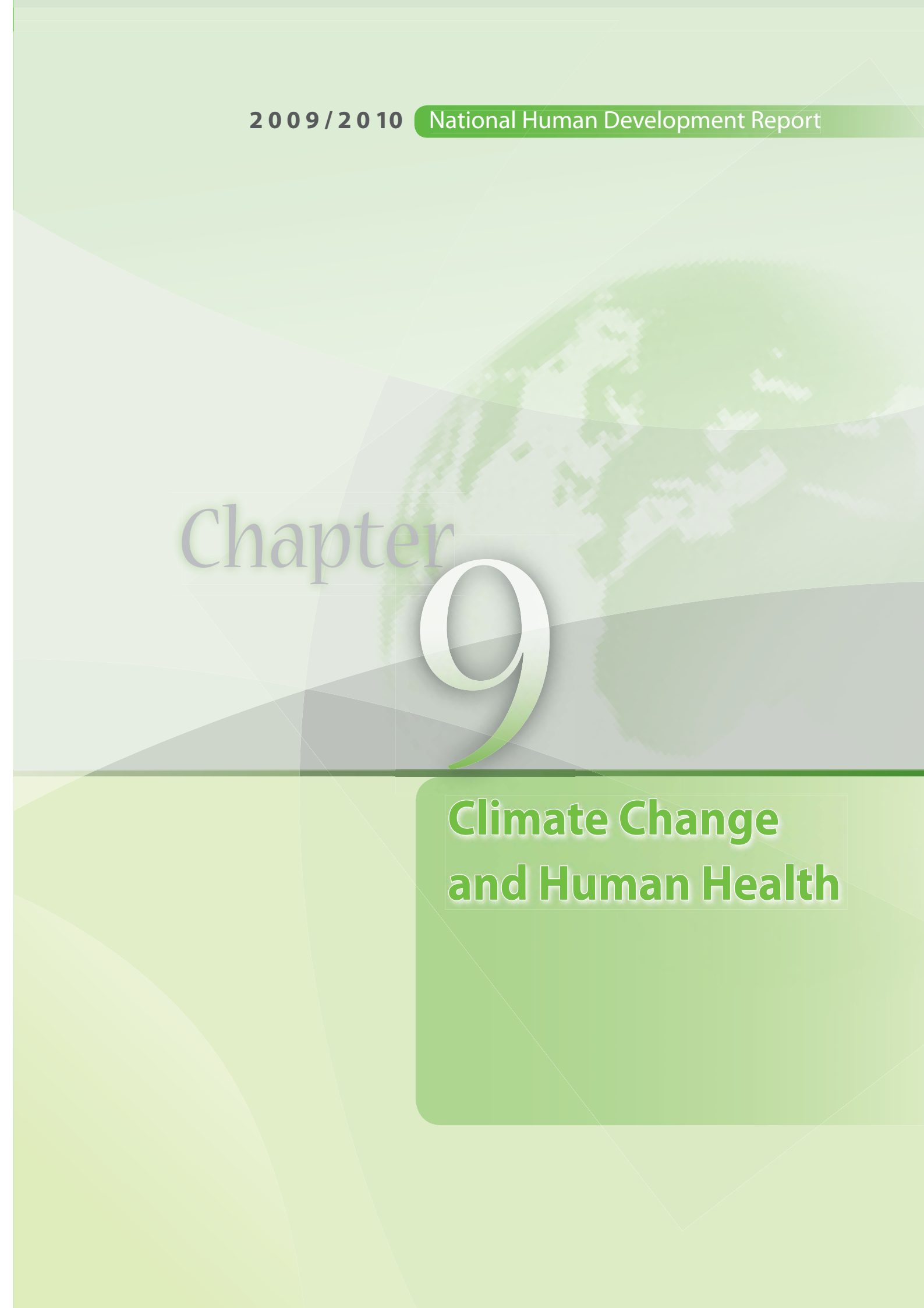


2009/2010

National Human Development Report



Chapter
9

**Climate Change
and Human Health**

9. CLIMATE CHANGE AND HUMAN HEALTH

9.1. Summary

Climate change has a significant impact on human well-being (Box 18). The consequences of climate change include a rising morbidity rate and general human morbidity due to infection and diseases (diarrhoea, dysentery, salmonellas) and non-trans-

missible illnesses (cardiovascular and respiratory illnesses and tumours). Health may be at risk from high temperatures or other changes in the environment, including air and water pollution. Therefore, it is necessary to devise correspondingly effective measures to diminish the harmful effects of climate change on human health.

Box 18. Climate change, health and human development

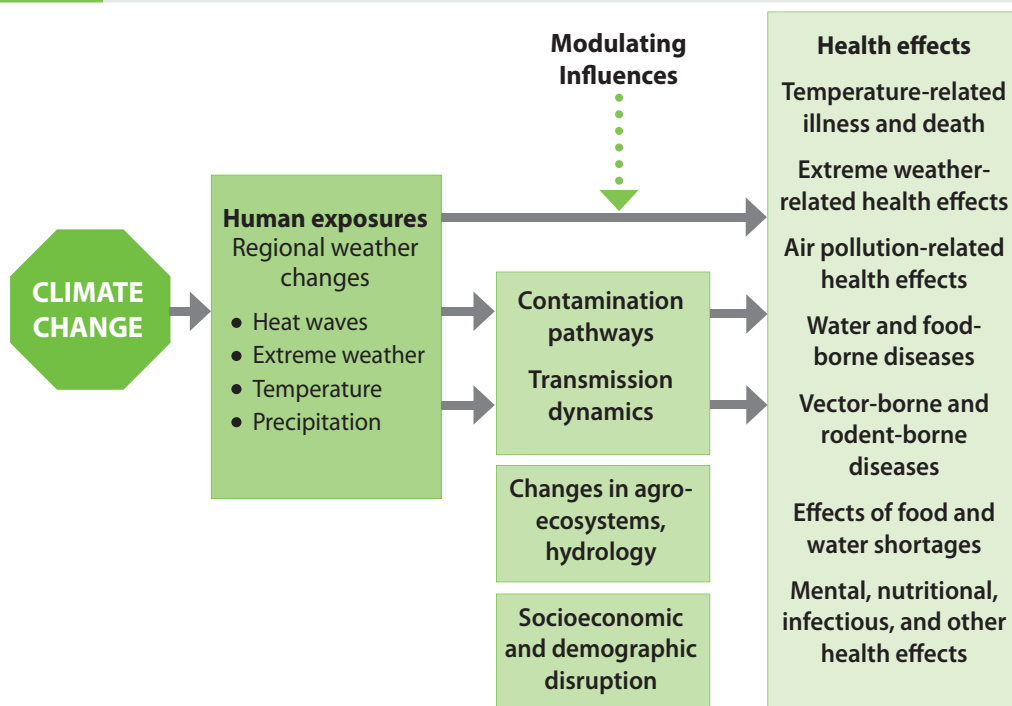
To be able to live a long and healthy life is one of the core elements of human development. In upcoming years to live a long and healthy life might be more difficult and unsecure, due to climate change.

Human beings are exposed to climate change through changing weather patterns (for example, more intense and frequent extreme events) and indirectly through changes in water, air, food quality and quantity, ecosystems, agriculture, and economy. At this early stage the effects are small but are projected to progressively increase in all countries and regions.

Main health effects are expected in the following areas:

- Direct Temperature Effects
- Extreme Events
- Climate-Sensitive Diseases
- Air Quality
- Water availability and water quality
- Indirect impacts via welfare changes
- Indirect impact via changes in ecosystems

Chart 34. Pathways by which climate change affects human health



Source: *Climate Change and Human Health - Risks and Responses*, WHO, WMO, UNEP, 2003.

9.2. The current state of public health in the light of climate change

Today there are more frequent cases of health disorders caused by the changing climate at the global level. Therefore it is necessary to outline specific factors which have harmful effects on health and elaborate necessary prevention measures. Using international¹³⁰ and national¹³¹ sources of reference it may be concluded that human health depends on climate change and how disease is spread. Changes in weather can have direct and indirect impacts on human health. Direct impacts include deaths from floods, low and high temperatures and other climate change-related disasters.¹³² Indirect include rising numbers of infection bearers such as mosquitoes which swarm near flooded land and spread diseases and a larger tick population. Altogether when temperatures are high enough these bearers contribute to developing encephalitis and Lyme disease. Failure to supply the population with good-quality drinking water also increases the risk of an infection spreading. This exacerbates the risks caused by water shortages that are already visible in some parts of the country, especially in the southern region (see the chapter CLIMATE CHANGE AND WATER RESOURCES). Indeed, there is a direct correlation between the maximal frequencies of diarrheic diseases and salmonellas in the hottest months of the year. In fact, the entire population, especially children, are at risk during this period.

Furthermore, heat-waves and growing air pollution represent an enormous risk for the elderly population, as well as for those with chronic cardiovascular illnesses resulting from hyperthermia. Another important risk is increasing exposure to allergic diseases via aeroallergens in part as a result of changing pollen counts, with allergic rhinitis (hay fever) and asthma (aeroallergens are not cause but trigger for this illness) being diseases mostly associated with this risk.

Nonetheless, climate change can also bring one positive effect for human health: as winters grow warmer the number of cold deaths (hypothermia) is set to decline.

Thus, global warming is not a virtual threat anymore. Rather, it is a reality with 300,000 deaths per year or a destructive power equivalent to the tsunami of 2004.¹³³ At the same time in 2003, 12

European countries reported more than 70,000 excess deaths compared to the averages for the preceding five years.¹³⁴ Higher temperatures lead to a drop in agricultural yields and more limited water access, which implicitly may lead to increases in poverty. In developing countries, the poverty level strongly depends on environment protection measures. According to research, 325m people around the world suffer because of frequent natural calamities, such as floods, cyclones or a polluted environment.

At the same time, at the regional and European level the following trends are anticipated as the climate change-related risks:¹³⁵

- increased heat-wave-related health impacts;
- cold-related health effects in particular in populations with a lack of access to energy;
- increased flood-related health impacts;
- increased malnutrition in areas already affected;
- changed food-borne disease patterns;
- changed distribution of infectious diseases which potentially contribute to the establishment of tropical and subtropical species in Europe;
- increased burden of waterborne diseases, in populations where water, sanitation and personal hygiene standards are already low;
- increased frequency of respiratory diseases due to higher concentrations of ground-level ozone in urban areas and changes in pollen distribution related to climate change.

This situation, which is relevant for the Republic of Moldova as well, has not been considered in drafting necessary policies, strategies or recommendations. It has to be mentioned that warnings about the potential negative impact on human health have been included in the First National Communication of the Republic of Moldova,¹³⁶ elaborated as part of the United Nations Framework Conventions on Climate Change, of which the Republic of Moldova is part. However, the basic principles and priorities have not been taken into account in the corresponding documents and have therefore not been implemented.

¹³⁰ Б.А.Ревич.Изменение климата и угроза здоровью населения России. Россия в окружающем мире, 2004. www.rus-stat.ru.

¹³¹ N. Opopol, R. Corobov și a. Schimbările climatului și potențialul impact al acestor fenomene extreme asupra sănătății. Curier medical, 2003; V. Stancu. Studiu privind impactul schimbărilor climatice asupra răspândirii ascaridozei. Schimbarea climei: cercetări, studii, soluții (culegere de lucrări). Chișinău, 2000.

¹³² N. Opopol, R. Corobov și a. Schimbările climatului și potențialul impact al acestor fenomene extreme asupra sănătății. Curier medical, 2003.

¹³³ US Global Change Research Program, 2007.

¹³⁴ Protecting Health in Europe from Climate Change, WHO Europe, 2008

¹³⁵ Ibid.

¹³⁶ The First National Communication of the Republic of Moldova, elaborated in the framework of the UN Convention on Climate Change, Chișinău, 2000.

9.3. Potential impact of climate change on human health

In order to determine the impact of climate change on health, it is necessary to determine relevant health indicators, which can be dependent on climate variations. This analysis will allow us to outline the health issues which are determined by

climate change, general health issues across the country and to provide arguments and suggest measures for diminishing these consequences. The changes in public health indicators depend largely on climate changes (see Table 21).

When general mortality data is taken into consideration (official data of the Ministry of Health) we

Table 21. Climate factors which determine and contribute to the spread of disease

Factor	Direct consequences	Indirect consequences	Direct non-transmissible consequences
Increasing air temperature	Heart attack	Growing mosquito population and potential spread of malaria. Increasing number of vector-borne diseases spreading Lyme disease Tumaour	Severe circulatory diseases: hypertensive disease, Ischemia, myocardial infarction. Severe respiratory disease (bronchial asthma, pneumonia).
Floods	Drowning, injuries, diarrhoeal diseases, vector-borne diseases	Damage to infrastructure for health care and water and sanitation	Circulatory illnesses
Polluted drinking water		Frequent cases of diarrhoea, dysentery, typhoid fever	Increasing number of digestive system sicknesses (gastric ulcer, cholecystitis malfunctions); Urinary-genital system (urinary lithiasis), Bone articulations (arthritis, polyarthritis)

Source: NHDR team.

Table 22. Morbidity rate from infections, per 100,000 cases (according to annual statistical data provided by the National Center for Preventive Medicine)

	2000	2001	2002	2003	2004	2005	2006	2007	2008
Salmonella	15.9	21.3	21.9	22.4	23.5	21.2	32.13	28.12	18.36
Bacillary dysentery	34.0	17.4	17.8	48.5	38.3	54.1	46.04	34.0	20.8
Typhoid fever	-	-	-	-	0.2	0.05	0.03	0.03	0
Intestinal infections from undetermined and wrongly assumed infection agents. toxic food poisonings	-	212.2	232.6	264.2	289.2	367.7	236.4	263.8	230.0
Hepatitis A	-	124.1	213.7	214.4	83.6	30.7	9.88	5.54	2.83
Malaria	-	-	-	0.68	0.14	0.55	0.42	1.31	1.23
Ascariasis	-	-	-	180.6	186.6	182.8	196.1	202.2	177.5
Enteritis, colitis, gastroenteritis, food poisonings caused by identified pathogens	-	-	93.6	98.4	95.9	127.7	149	175.6	179.8

Source: Starea sanitaro-igienică și epidemiologică, indicii de activitate a serviciului sanitaro-epidemiologic de stat (SSES) conform rapoartelor statistice a organelor și instituțiilor SSES pe a.2002. Chișinău, 2003-2008., National Center for Preventive Medicine.

see that there is a growing trend towards mortality from circulatory diseases, tumours, digestive illnesses, traumas and poisonings, and respiratory disorders. The total mortality rate of the population is on the rise as well. Similarly, it is important to compare the infection and non-infection morbidity indicators from the past years. This information is further displayed in Table 22 and Table 23.

According to the data in Table 22, an increase in the prevalence of intestinal infections can be identified over past years, which are caused by undetermined or wrongly identified infection agents, food poisonings, malaria or helminthes. There are some instances of malaria which however remain largely imported. Nonetheless there is a certain risk for local cases in the future. A decline in the number of cases of hepatitis A is due to fluctuating evolution of this malady.

Changes have also been recorded in the development of non-transmissible diseases (Table 23). The data for Table 23 serves as a proxy showing a trend towards increases in instances of illnesses related to climate change: malignant tumour, circulatory and respiratory system diseases.

Interconnection between evolution of health indicators, climate and environment changes

Changes to health indicators may take place only under the direct influence of climate change on the human organism and through indirect environmental factors. Two very important transmission mechanisms, for which the necessary data

is available, are growing temperatures, leading to heat-waves and declining drinking water quality.

One of the most important factors is rising temperatures. According to temperature estimates and projections conducted as part of this Report, the average annual air temperature analysis in the Republic of Moldova during 1990-2007, which is compiled using regression calculation, shows an annual temperature increase of 0,0589°C (see chapter CLIMATE CHANGE AND ITS CHALLENGES FOR MOLDOVA). It means that on average temperature has annually increased during these years by 1,06°C. The year 2007 was the hottest year out of the last 120 years. The average annual air temperature was above the normal level of 2-2.6°C and reached 10.1-12.3°C. The following year, 2008, was the second hottest year in the reference period. The average annual temperature was 9.7-11.8°C, which is higher by 1.2-1.9°C than the norm. Air temperatures maximums registered in 2006-2008 were: + 36 °C (August, 2006), +41.5 °C (July, 2007) and +39.1 °C (August, 2008). The minimum temperatures registered in Moldova since 2006 are on the rise. The minimum temperature in 2006 was -30 °C, while in 2007 it was -24.1 °C and -20.5 °C in 2008.

The projections also show that mean and absolute summer maximum temperatures are set to grow in the forthcoming decades, while higher mean temperatures increase the likelihood of extreme weather events. No less importantly, night temperatures are also expected to grow magnifying health risks stemming from heat-waves still further.

Table 23. Morbidity rate from non-infectious diseases, per 100,000 inhabitants

	2000	2001	2002	2003	2004	2005	2006	2007	2008
Malignant tumour	152.6	163.1	167.8	176.6	190.1	193.4	205.3	209.7	212.7
Psychological disorders	291.0	311.2	352.5	438.4	338.0	349.1	415.5	405.5	
Respiratory system diseases	11,750	10,737	11,192	11,611	10,578	11,035	10,195	9,958	
Diabetes	65.0	89.0	106.0	150.0	167.0	178.0	190.0	193.0	
Circulatory system diseases	1,010	1,297	1,248	1,426	1,843	2,429	2,125	1,972	
Hypertensive disease	-	-	-	-	1,061.0	1,635.0	1,425.0	1,295.0	
Overall diseases	33,773	33,832	35,233	36,117	36,047	36,674	33,440	32,547	32,330

Source: National Center for Preventive Medicine.

In summer 2007 the Republic of Moldova experienced a heat-wave. Then, at the start of the heat-wave, emergency departments recorded increases in the number of calls related to cardiovascular and chronic diseases, and a rise in the number of calls relating to the elderly and infants. However, over the course of the summer, it was noticed that people had somewhat adapted to the heat. This development is in line with the findings of European research projects on the health effects of heat and heat-waves.¹³⁷

Currently, there are no criteria for identifying and recording deaths from heat-related illnesses in the Republic of Moldova, although the Ministry of Health does provide guidance on how best to protect health during a heat-wave. Although the early warning system is considered extremely important, funding has been lacking.¹³⁸

Besides adversely influencing human health through a rising incidence of cardiovascular and respiratory diseases, rising temperatures also create favourable conditions for a worsening of other elements of the environment: underground and surface water quality (see chapter CLIMATE CHANGE AND WATER RESOURCES), air, soil, crops and even food (see chapter IMPACT OF CLIMATE CHANGE ON THE AGRICULTURAL sector). While the chapters discuss a worsening situation in the water sector in more detail, we focus here on the consequences of this state of affairs for human health. Table 24 below displays examples of how underground water quality changed during 2003-2008.

Data analysis shows that chemical, sanitary and microbiological indicators describing water quality in wells have been in steep decline throughout the past six years. Thus, it is possible to trace how the quality of the wells' drinking water has evolved over time. In 2003, 82 per cent of water in drinking wells failed to meet health standards. This share went up to 84.8 per cent in 2008. If this trend goes on unabated we can expect that throughout following 5 years that share of below-standard drink-

ing water will reach 86.7 per cent. A worsening of microbiological indicators for this type of water was also observed: the share of below-standard water went up from 30 per cent up to 38.4 per cent in 2008. If this tendency continues, the share of water that fails to comply with microbiological standards may reach 44.1 per cent in 2012.

Although, as was noted elsewhere, the quantification of the health consequences of climate change will be difficult, given their lack of specificity,¹³⁹ it is still possible to use as a proxy some extrapolations based on the average annual data for previous years. For example, if no measures are taken to adapt the population to climate changes, then it is highly likely that the mortality rate will increase sharply in the short term (up to five years), the mid-term (5-20 years) and long term (over 20 years).

Similar consequences may be valid for morbidity of the population. Specifically, in the short run (5 years), the population morbidity with intestinal infections will increase from 230 cases per 100,000 inhabitants in 2008 to 246 cases per 100,000 inhabitants in 2012. Morbidity with circulatory system illnesses is expected to rise from 1,972 to 2,855 cases. Given such developments, it is possible that the general morbidity increase may also be driven by other diseases which result directly from climate variations.

Obviously, extreme weather events stemming from climate change do not hit different population groups in the same manner: some groups are obviously more vulnerable than others. It appears that as far as health issues are concerned the rural population (especially the poor) will suffer most.

First of all, the health care services infrastructure is much less accessible in rural areas, which means still more pain for the rural population. Furthermore, the rural population has a much higher share of persons who are not registered with family physicians (62 per cent of the total non-registered) as well as a much higher share of those not holding obligatory medical insurance (27.3 per

Table 24. Share of drinking water samples from drinking wells which are not hygienically suitable (%)

	2003	2004	2005	2006	2007	2008
Chemical and sanitary indicators	82,0	83,0	84,0	86,3	82,1	84,8
Microbiological indicators	30,0	31,0	32,0	29,7	31,1	38,4

Source: National Center for Preventive Medicine.

¹³⁷ Assessment of health security and crisis management capacity in the Republic of Moldova, WHO Europe, March 2008.

¹³⁸ Ibid.

¹³⁹ Jonathan M. Samet, Adapting to Climate Change in Public Health, RFF Report, 2009

cent of the rural population vs. 19.9 per cent of the urban population). Moreover, every third person who does not hold medical insurance is from the fifth poorest quintile. Given the higher prevalence of poverty among Moldova's rural population it seems the rural poor come out less prepared for coping with the health risks stemming from climate change.

Secondly, the rural population (around 60 per cent of the total) is much more dependent on the non-centralised supply of water than the urban population. Hence, the decline in the quality of water that we outlined earlier will disproportionately affect the rural population. No less important, one of the groups most vulnerable to intestinal diseases is children, and in this way rural children will be particularly affected. This is quite a worrying prospect as it risks adversely affect human development as well as future educational and employment opportunities for these children. Ill-health might divert households' resources away from ensuring proper education, which could otherwise lead to the promise of better employment opportunities and higher living standards in the future. This effect may be further magnified by the higher incidence of poverty among rural households than among their urban compatriots.

Furthermore, the growing number of hot days is especially dangerous for the elderly and people with chronic diseases. Here again, the rural population is set to bear the brunt of the negative effects, since rural areas have almost twice as many people of pensioner age as urban areas.

Another important vulnerability is the risk of malnutrition. This vulnerability may appear as a confluence of two factors: first, an important share of the rural population is dependent on smallholder subsistence agriculture and, second, the agriculture sector seems to be poised to suffer a significant impact from climate change. In the absence of adaptation policies, severe climate events, such as droughts, floods and hails may ruin crops, leaving small farmers with no food and no income, meaning that rural children will face serious nutrition risks. It is worthwhile mentioning that already in the recent years, approximately 37 per cent to 40 per cent of children have been suffering from iodine deficiencies, poor nutrition and anaemia.

Thus, any consistent adaptation policy should look at specific measures that would ensure relevant protection and health care for rural citizenry. Certainly, this does not mean that urban populations

are immune to the health risks stemming from climate change. It just means that they have a better chance of coping with these effects.

9.4. Possible adaptation measures and recommendations

A number of measures are suggested for preventing the negative impact of climate change on human health and adapting the public health system to weather conditions. These measures mostly lie in the field of responsibility of the Ministry of Health, though some of them will require support from other relevant Ministries and civil society organizations.

- national health policies incorporate only to a limited extent the risks posed to human health by climate change; hence, these issues should be further introduced into the national health policy agenda;
- the national health legislation of the Republic of Moldova should be adjusted to the UN Framework Convention on Climate Change and international progress in this respect;
- the Ministry of Health should update the National Health Action Plan in order to adequately tackle the relevant risks stemming from the climate change;
- measures for combating the consequences of climate change in the Health section of the National Action Plan in relation to the environment;
- have the Ministry of Health elaborate standards concerning preventive measures for protecting humans from climate change as well as procedures and guidelines, such as treatment guidelines for crush injuries, guidelines for emergency surveillance procedures during an earthquake or flood, guidelines for the collection and transportation of laboratory and environmental samples, etc.¹⁴⁰

Practical measures:

- Introduction of an early warning system with regards to extreme weather events, such as heat, and water quality trends posing serious health risks;

¹⁴⁰ Assessment of health security and crisis management capacity in the Republic of Moldova, WHO Europe, March 2008.

- Specifically, for managing negative effects of heat-waves authorities should develop capacities for implementing globally renowned approaches, such as model heat watch systems, based on the identification of weather conditions historically associated with increased mortality in a particular location and then the prospective issuance of a warning when such conditions arise;¹⁴¹
- Extending further medical insurance to fill the gaps in the coverage of the poor and the rural population;
- Implementing sanitation and water-treatment projects, including with donor support, in order to ensure large rural communities and important social institutions have quality water access;
- Organisation of information campaigns for targeted vulnerable groups of the population ;
- During the hot period of the year, provide public transport, work places, hospital areas, institutions for disabled people with air coolers, ventilation systems and medical kits;
- Provide family doctors and ambulances with diagnostic equipment and medical aid kits in case of serious climatic events;
- Examine patients for hypertension illness and other disorders of the circulatory system, intestinal infections and diseases which depend on climate conditions;
- Improve sanitary management in order to improve human health, especially that of pregnant women; coordinate actions between family doctors and specialised consultants;
- Improve preventive treatments for people sensitive to climate conditions in order to diminish the negative impact of extreme climate conditions;
- Develop an aeroallergen monitoring system (currently there is a total absence of data and effort in this area) and asthma surveillance;
- Introduce air quality regulations and ensure the proper implementation of relevant guidance (such as WHO guidance) in this area of concern;
- Develop broad public dialogue involving general public, civil society, and international community emphasising that climate change requires a simultaneous change in behaviour of millions. Government undoubtedly has the responsibility to protect its citizens from the adverse effects of climate change; however, it is also the responsibility of the individuals themselves. Focus on promoting healthy lifestyle though such public health campaigns.

Policy Recommendations

Implementing adaptations for facing climate change impacts will increase the ability of the population to have a decent quality of life in healthy conditions. Measures such as improved health care, better building design and insulation, and the installation of early warning systems, improved emergency preparedness and disaster relief, and a host of other preventative strategies will help alleviate the health risks and impact of climate change, particularly those associated with extreme weather events. These could be included in a National Adaptation Strategy for the Health Sector or as amendments to the existing sector strategy.

These amendments or the Strategy should be developed by the Ministry of Health, which is responsible for the health sector, in conformity with international agreements and conventions, signed and ratified by the Republic of Moldova, under the supervision of the Inter-ministerial Adaptation Commission. This Commission will control the process of elaboration and will ensure the inter-relatedness of all sector strategies and exclude the possibility of conflicting provisions.

- Specific attention should be paid to the health care system, improve its work by building capacity through professional training for medical workers on climate change impacts, new possible diseases, complication of already known diseases, etc.

¹⁴¹ Ibid.

- Changes should be made to the system of health data collection from doctors, which currently is paper based and time consuming. Often data are lost or arrive too late due to the inefficient data collection. First, an assessment should be made to determine all gaps; second, administrative changes should be proposed that would increase the efficiency of data collection and analysis, ensuring the lowest rate of data loss.
- In order to keep track of health development in the country an electronic system of data collection from doctors should be developed. Health centres, hospitals and clinics should be supplied with computers and the necessary software. Doctors should be trained on how to use the system and on the available techniques.
- There should be provisions made for extreme weather events, including a regulation for extreme weather cases, by the common efforts of medical and municipal authorities that would provide for climate change-related health emergency prevention measures. For example: in the case of high temperatures there could be places to offer drinking water for free. Also, appropriate amendments should be made to the work security requirements. For example in cases of extremely hot weather, working hours could be changed.
- A public information and awareness campaign should be prepared and implemented on a continuous basis, in order to prepare and inform the population on the possible health impacts of climate change and also provide adaptation measures to reduce possible negative results.