

# HEAT-HEALTH ACTION PLAN

.....  
TO PREVENT THE HEAT WAVES  
CONSEQUENCES ON THE HEALTH OF THE  
POPULATION IN  
the former Yugoslav Republic of Macedonia



**World Health  
Organization**

REGIONAL OFFICE FOR Europe

Supported by:



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# HEAT-HEALTH ACTION PLAN

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TO PROTECT THE HEALTH OF THE POPULATION OF  
the former Yugoslav Republic of Macedonia  
AGAINST THE EFFECTS OF HEAT-WAVES



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and Nuclear Safety

## ABSTRACT

The Heat-health Action Plan of the former Yugoslav Republic of Macedonia has been developed to implement adaptation measures and prevent health consequences of extreme heat caused by changing weather conditions as a result of climate change. The primary goal of the Plan is to reduce heat-related morbidity and deaths through issuing heat health warnings, with particular emphasis on the most vulnerable population groups, provide timely advice and announcements of upcoming heat-waves, raise awareness amongst the public and health workers, and coordinate and mobilize all available resources in a timely manner to prevent the health consequences of heat-waves.

The Plan consists of activities that will be conducted by governmental representatives and institutions from the health sector as well as other relevant sectors. The aim of the Plan is to provide a multisectoral approach in the response to extreme heat, through prompt action by all institutions designated as responsible within this Plan. This document is in line with the National Platform for Disaster Risk Reduction of the former Yugoslav Republic of Macedonia.

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## Abbreviations

BMU	German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety
CMC	Crisis Management Centre
DPR	Directorate for Protection and Rescue
HMI	Hydrometeorological Institute
MoH	Ministry of Health
NPHI	National Public Health Institute
OHI	Occupational Health Institute
MLSA	Ministry of Labour and Social Affairs
MRC	Macedonian Red Cross
MoEPP	Ministry of Environment and Physical Planning
PHC	Public Health Centre
SSHI	State Sanitary and Health Inspectorate
ULS	Local government units
WHO	World Health Organization

# PREFACE



**A**ccording to the forecasts in the Second National Climate Change Communication of the former Yugoslav Republic of Macedonia in 2008, climate change will result in an increased number and intensity of heat-waves in the former Yugoslav Republic of Macedonia, leading to more frequent extreme weather events (floods, drought, landslides, fires, storms, etc.). Projections of increased morbidity in the former Yugoslav Republic of Macedonia and Skopje in the period after 2035 (2030 for Skopje), related to temperature alone, show marked increase in morbidity with an increase of just 1 °C on average monthly temperatures for the period 1996–2000. This increased morbidity would be greater in April, May and June and on average would show an increase of 10% in comparison to the period April, May and June 1995–2004. The higher temperatures will have greatest impact in urban areas, where the temperature is several degrees higher than in rural areas (Kendrovski 2006).

In the former Yugoslav Republic of Macedonia over 60% of the population lives in the cities. Direct hazards to human health as a consequence of global warming can represent a significant health problem in the context of further urbanization, primarily due to retention of the sun's heat by concrete and asphalt even after the sun has set ('heat island' effect). Those groups most affected by heat-waves are infants and children up to five years old, people who are overweight and people who lose a lot of fluids through sweating in their work. Heat-waves cause heat stroke, fluid loss and cramps and also exacerbate chronic problems associated with pulmonary, cardiac and kidney diseases (Kendrovski 2006).

In order to prevent and combat potential heat-wave health threats, the Ministry of Health, in cooperation with the World Health Organization, have prepared a Heat-health Action Plan, including an early warning system implemented in cooperation with the Hydrometeorological Institute. The goal of this plan is:

- Early prediction of heat-waves and warning to all responsible public health and other institutions, which will contribute to timely information and taking of appropriate measures.
- Reduction of heat-wave-related morbidity and mortality through issuing heat health warnings, especially for those most vulnerable to the effects of heat-waves: the elderly, infants and children up to five years old, the chronically ill, people who are overweight, people in certain professions who work outdoors, people whose socioeconomic status makes them more vulnerable and those who are more vulnerable to the effects of heat-waves because of certain social factors (nationality, profession, education, social isolation, etc.).
- Timely coordination of currently available measures and resources for response to heat-waves.
- Raising awareness amongst the public and health workers of the effects of heat-waves on people's health.

The Heat-health Action Plan of the former Yugoslav Republic of Macedonia encompasses existing activities which will be conducted by Government representatives and institutions, from the health sector as well as from other sectors including: the Ministry of Health, the Public Health Institute of the former Yugoslav Republic of Macedonia and the ten Public Health Centres, the Institute for Occupational Health, the Crisis Management Centre, the Hydrometeorological Institute, the Directorate for Protection and Rescue, departments for improving the living environment within the municipalities (active involvement of the City of Skopje in the first phase), the Ministry of Local Government, Ministry of Education and Science, Ministry of Transport and Communication, Ministry of Labour and Social Policy, the Macedonian Red Cross, NGOs and media representatives.

# INTRODUCTION



It is expected that climate change will cause an increase in average global temperatures, as well as the number and intensity of heat-waves. There is a strong and global scientific consensus that the climate is changing and that the existing trends of global warming, increase in the temperatures and sea levels and the more frequent extreme weather events (heat-waves, fires, storms, floods, drought, landslides, etc.) can lead to lack of food and drinking water, loss of homes, as well as the disappearance of some types of plants and animals. Cities contribute in excess of 60% of greenhouse gas emissions. Urban areas use 75% of the energy and generate all types of waste in similar proportions. People who live in urban areas are more vulnerable to the consequences of climate change – heat-waves, higher levels of air pollution, problems with homes, heating, etc.

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Regarding the effect of heat-waves on the population's health in the former Yugoslav Republic of Macedonia, it is estimated that during the heat-waves in 2007, there 1000 more deaths during the summer period in comparison to the average for the same period 2004–2007. According to projections for mortality trends in the country and Skopje for the period after 2035, an increase of only 1°C in average monthly temperatures compared to the period 1996–2000 will significantly influence the distribution of total mortality expressed as a monthly average.

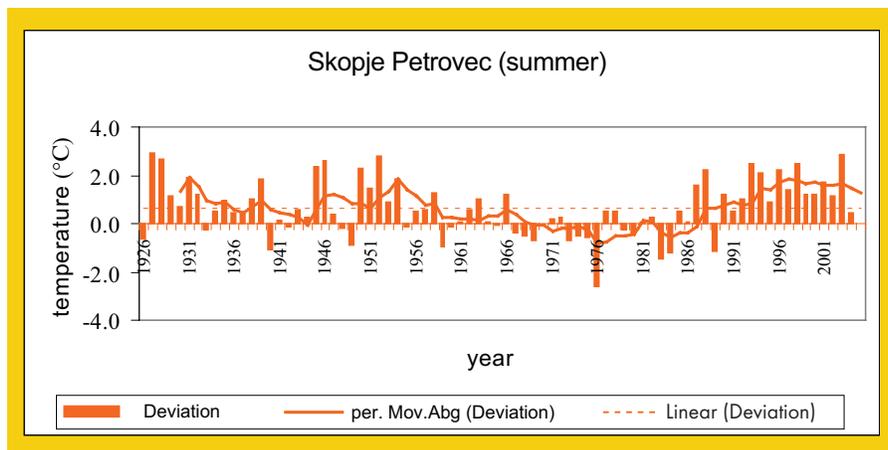
Global climate change will have different consequences on health in Europe in the coming decades. Over the past few years, there has been a noticeable increase in the frequency of hot weather in many European countries. The Mediterranean and Balkan countries are especially vulnerable to heat-waves. There is evidence that it is possible to reduce morbidity and mortality through a variety of heat-wave preparedness and response activities: strengthening and conducting a heat-wave announcements and warnings system (heat-wave early warning system), strengthening preparedness and the health services response, informing the public about the possible effects of heat-waves and how to deal with them, as well as adequate civil engineering planning and housing.

This document outlines the Heat-health Action Plan for the former Yugoslav Republic of Macedonia to prepare for and respond to the health impacts of heat-waves.



# CLIMATE CHANGE IN THE FORMER YUGOSLAV REPUBLIC OF MACEDONIA

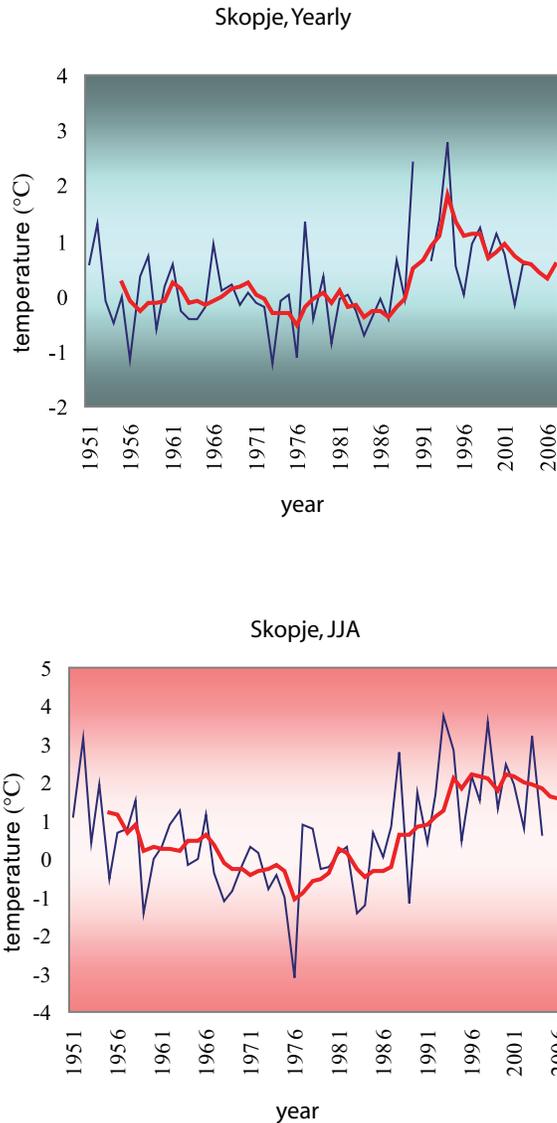
A trend towards higher temperatures in the second half of the 20th century has also been noticed in the former Yugoslav Republic of Macedonia. In terms of rainfall trends recorded in the 20th century, there are differences at regional and local levels. The significantly high mid-year air temperatures are an indicator of climate change in the former Yugoslav Republic of Macedonia in comparison to average for the period 1961 - 1990, from all the meteorological stations in the last twenty years, where the biggest changes were noted in 2000, 2001, 2007 and 2008. During the summer, according to data on maximum temperatures, in recent years extremely high temperatures have been recorded, especially in 1993, 1994, 2000, 2001, 2003, 2005 and 2007.



Graph 1. Deviation of the summer air temperature in comparison to the average summer temperature for the period 1961 - 1990

The highest air temperatures in the former Yugoslav Republic of Macedonia were recorded in July 2007 (43.5°C in Ship, 45.3°C in Gevgelija and 45.7°C in Demir Kapija). The temperature of 45.7°C recorded on 24 July 2007 in Demir Kapija is the highest recorded temperature in the former Yugoslav Republic of Macedonia since the introduction of continual meteorological surveillance in the country. The year 2007 is exceptional in terms of extreme (maximum) temperatures in the months of January, June and July, recorded across almost the whole country.

From analysis of the mean maximum and minimum temperatures over the thirty-year period, there is a marked trend towards annual increase, as well as during the summer period.



Graph 2. Deviations of the mean maximum air temperatures from the average for the period 1961-1990

It is generally evidenced over the last fifteen years that the number of days with maximum temperatures above or equal to 30°C (tropical days), days with maximum temperatures above or equal to 35°C (hot days), as well as the number of days with minimum temperatures above or equal to 20°C (tropical nights) has increased.

The biggest temperature increase is expected by the end of the century for the summer period, accompanied by the biggest decrease in rainfall. Little change in rainfall during the winter period is expected, but it is expected for all other seasons. However, with the increase in temperatures of 2°C above the threshold, the risks to people's health as well as ecological disasters will increase.

# HEAT-WAVE CONSEQUENCES FOR HEALTH

Population health outcomes in hot weather and heat-waves depend upon the level of exposure (frequency, severity and duration), the size of the exposed population and population sensitivity. The health consequences can affect all age groups and result from a wide range of factors (some people are more at risk of heat-related illnesses and death than others). During heat episodes, the increase in body temperature is due to environment and metabolism. This increase has to be eliminated in order to maintain the body temperature at 37°C, a process called thermoregulation. An increase in body temperature of less than 1°C activates the peripheral and hypothalamic heat receptors, which send a signal to the thermoregulation centre in the hypothalamus. This activates skin vasodilatation and initiates sweating. Failure of these body responses can lead to health problems, especially amongst the elderly, who are the most vulnerable.

## Heat-related illnesses

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**Heat oedema** – swelling of the joints, arms and legs, as a result of water retention (aldosterone combined with vein stasis and peripheral vasodilatation) that passes in a few days by acclimatization to the higher temperature. The oedema appears especially on the lower extremities, most often the ankles, at the beginning of the hot season. It is caused by peripheral vasodilatation caused by heat, water retention and salt.

**Heat cramps** – painful cramps in the muscles after hard physical labour, most often in the arms, legs and the abdomen. People who sweat more lose more salt and are therefore more prone to heat cramps, as it is the reduced level of salt in the muscles that leads to cramps.

**Heat rash** – a sign of swelling and rupture of the sweat glands, it looks like small red papules, with itching of the face, neck, upper part of the chest, under the breasts and in the groins and the scrotum region. It affects all ages but most often young children. It appears on parts of the body covered with tight clothes and is indirectly infected with bacteria.

**Heat exhaustion** – extreme thirst, weakness, discomfort, anxiety, dizziness, weariness and headaches. The core temperature may be normal, subnormal or slightly increased (less than 40°C). The pulse is weak with a postural hypotension and shallow breathing. There is no change in mental state. It results from loss of fluids and/or salt as a result of exposure to high temperatures and exhaustion.

**Heatstroke** – the most severe health problem, which occurs because of loss of control of body temperature and the inability to cool through sweating. Body temperature rises to 40°C over 10–15 minutes. If not recognized in time, it may lead to severe damage, and even death.

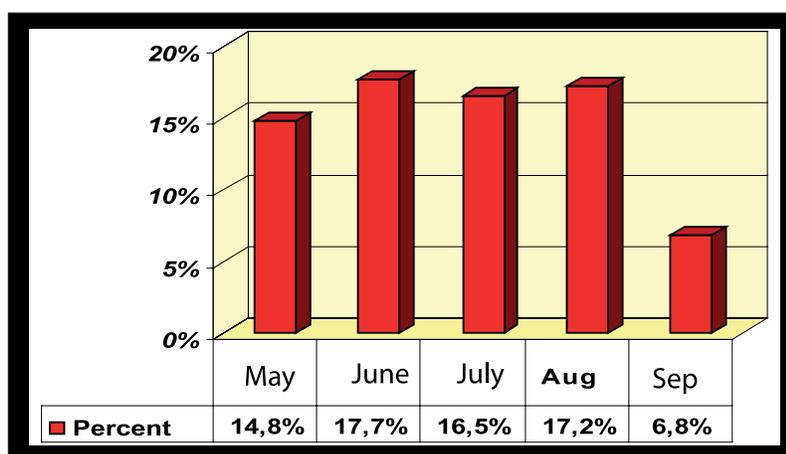
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Source: WHO, 2008 updated from A Bouchama, JP Knochel (2002). Heat stroke. *New England Journal of Medicine*, 346:1978–1988; A Bouchama, M Dehbi, E Carballo-Chaves (2007). Cooling and haemodynamic management in heatstroke: practical recommendations. *Critical Care*, 11(3), available online at <http://ccforum.com/content/11/3/R54> (11 February, 2011).

According to projections for mortality trends in the country and Skopje for the period after 2035, an increase of only 1°C in average monthly temperatures compared to the period 1996–2000 will significantly influence the distribution of total mortality expressed as a monthly average. This increase in the monthly mortality rate would be 4–11% higher in the months of April, May and June and an average of 10% higher compared to the period April, May and June 1995–2004. People with chronic diseases, especially cardiovascular and respiratory, have a high risk of increased mortality during heat-waves. The higher temperatures will have greatest impact in urban areas, where the temperature is several degrees higher than in rural areas (Kendrovski 2006).

Regarding the effect of heat-waves on the population’s health in the former Yugoslav Republic of Macedonia, it is estimated that during the heat-waves in 2007, there 1000 more deaths during the summer period in comparison to the average for the same period 2004–2007. This estimate takes into account that the total increase in fatalities cannot all be attributed to the heat-waves.

The year 2007 is characteristic of the extremely high temperatures in June and July recorded across almost the whole country.



Graph. 6 Excess number of deaths by month during the summer 2007 in comparison to the average for 1994–2007. Source: PHIRM, 2009

During the period of heat-waves in 2007, it has been confirmed that for every 1°C temperature increase above the threshold of 30.1°C, mortality in Skopje increased by 3.2%. It has also been confirmed that the number of Emergency Services interventions in the state during the hot period of the year is also increasing.

Several interventions are crucial for reducing morbidity and mortality due to heat-waves:

- identifying the people at higher risk during heat-waves;
- protection measures for these people and others; and
- rapid intervention when the first symptoms of heat-related illness appear.

# HEAT-HEALTH PROTECTION ACTIVITIES

The protection and improvement of the population's health demands adopting mutual solutions and decisions from the departmental institutions in authority, as well as from all those who directly or indirectly influence the environment. The principle of sharing responsibilities and effective intersectoral cooperation are a base for preventing adverse consequences of negative environmental influences on health. The use of an integrated approach in managing the living environment and health risks requires close collaboration by the leading sectors (health and environment) with the secondary sectors (urban planning, industry, transport, etc.).

One of the major features of the Plan is a heat-wave early warning system which will operate from 1 May to 30 September every year, which will provide information about upcoming heat-waves 48 hours in advance, for five meteorological regions countrywide. This will also act as a trigger for alerting responsible institutions to put in place the agreed actions to reduce the consequences of heat for people's health. Based on average temperatures collected and compared over many years within the cities and regions across the country, and the probability of their occurrence, alerts have been classified by HMI into four categories:

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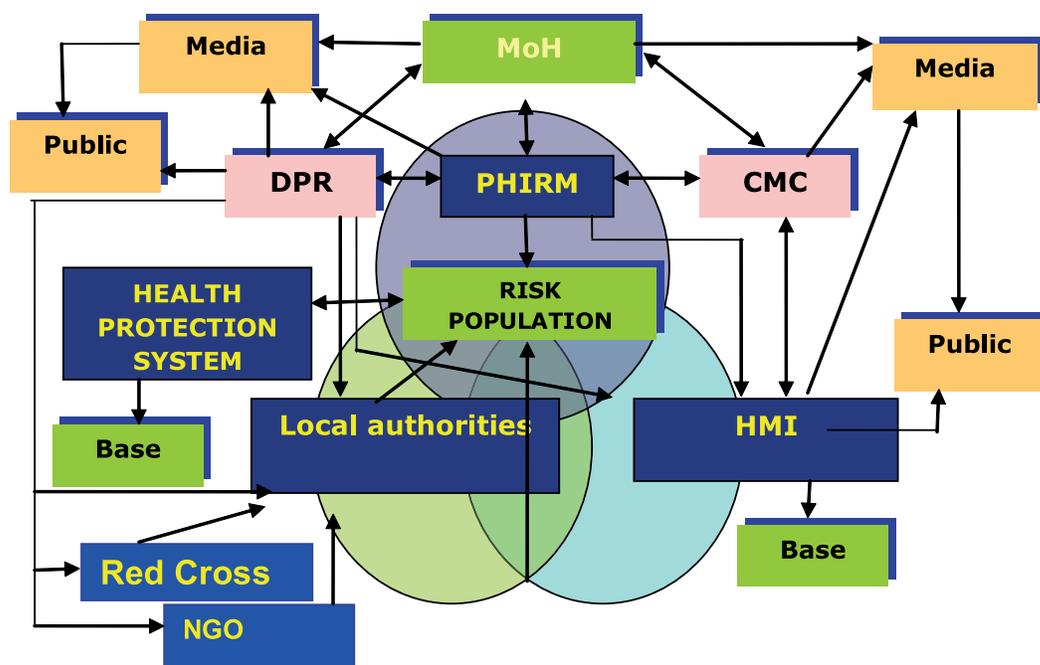
- green level (vigilance)
- yellow level (alert and preparedness)
- orange level (heat-waves)
- red level (emergency)

For each of the above-mentioned levels, this document outlines a set of measures to be taken by health and social care services and other institutions to raise awareness of the risks relating to severe hot weather and what precautions should be taken to reduce those risks. The Plan also explains the responsibilities at national and local level for alerting people once a heat-wave has been forecast, and for advising them how to respond and what to do after receiving the announcement from the HMI. Also, the Plan allocates responsibility and provides guidance for institutions and the public for action to be taken upon receipt of the announcement of a heat-wave by the Hydrometeorological Institute.

**ACTIONS FOR PROTECTING THE POPULATION FROM THE HEALTH CONSEQUENCES OF HEAT IN THE FORMER YUGOSLAV REPUBLIC OF MACEDONIA ARE:**

1. Coordination of institutional involvement and the conducting of the activities outlined in the Plan through the Commission for monitoring heat-health effects;
2. Establishment of a precise system for early announcement of heat-waves (ALERT system for heat-waves) to function from 1 May to 30 September;
3. Communication with the public, the health, educational and social sectors regarding protection during heat-waves in the form of Ministry of Health recommendations for health workers, the population and risk groups, before and during the heat-wave, as well as the responsibilities of the institutions during the dissemination of the recommendations;
4. Recommendations for reducing heat exposure inside enclosed areas in health, social and educational institutions (short-term, medium-term and long-term strategies) and special protection plans for vulnerable population groups;
5. Monitoring and evaluation of the implementation of activities for protecting health from the effects of heat-waves in the former Yugoslav Republic of Macedonia, by monitoring previously confirmed indicators and evaluating the results after every current year.

The following schema depicts functioning of the system for early warning and preventing heat-health effects in the former Yugoslav Republic of Macedonia:



A separate protocol has been developed for giving more precise directions to certain institutions on the measures that need to be undertaken, and specifically for the public health centres and hospitals. In addition, protocols for actions to be undertaken by the Ministry of Health and Crisis Management Centre have been developed.

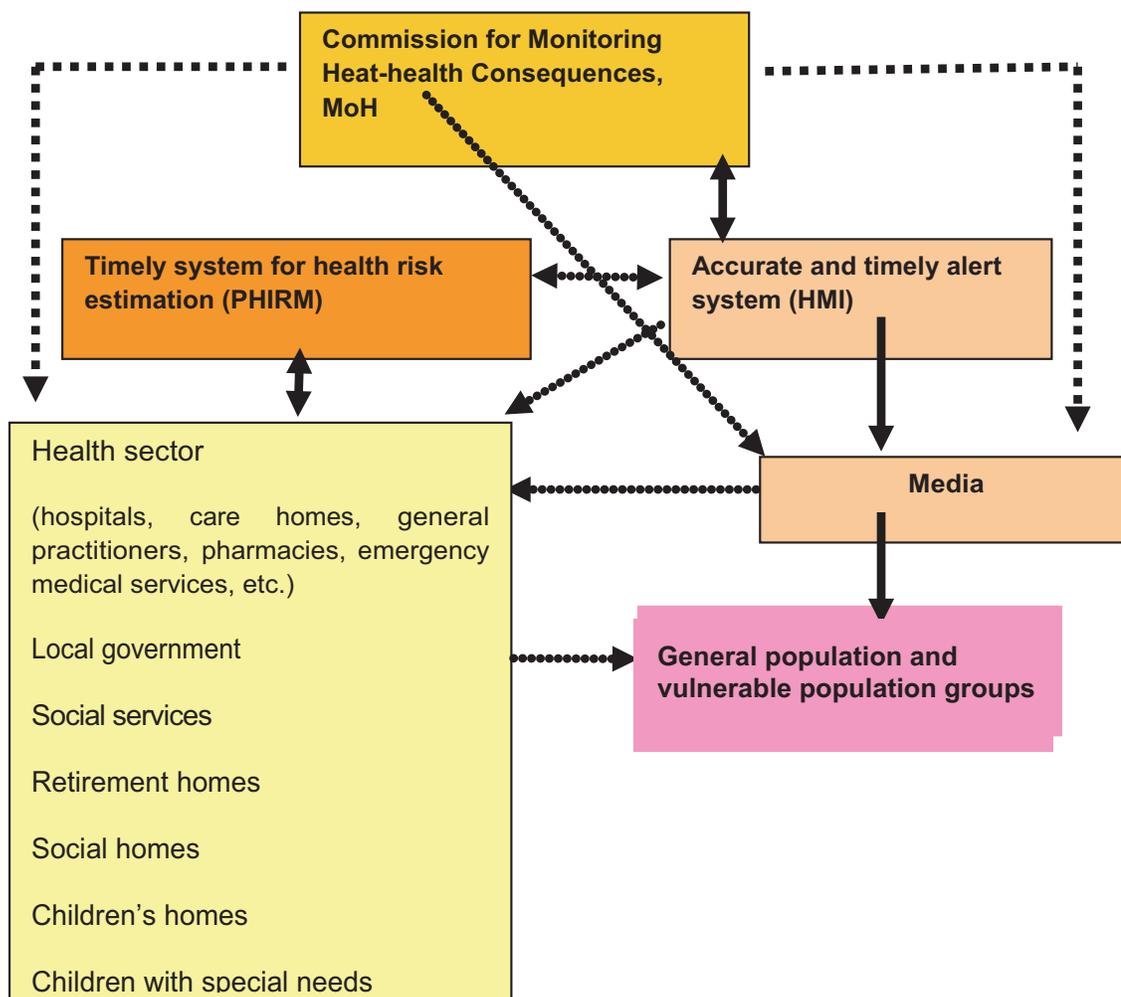
# COORDINATING BODY FOR IMPLEMENTATION OF THE PLAN

Within the Ministry of Health, the Commission for Monitoring Heat-health Consequences has been operational since July 2007. Additionally, a Climate Change and Health Commission was established in July 2010, which participates in the carrying out and surveillance of a wide range of activities connected to climate change and health. Both commissions have participated in the preparation of the Plan and they cooperate in the execution, surveillance and evaluation of the Plan. The Climate Change and Health Commission functions as coordinating body and is responsible for the coordination of the involvement of institutions during the implementation of the activities outlined in the Plan, as well as coordinating multisectoral cooperation, during which the institution with overall responsibility for implementing the Heat-health Action Plan is the Ministry of Health.

The Commission for Monitoring Heat-health Consequences will oversee practical implementation of the activities, especially those connected with the provision of timely information to the public and health workers. It is responsible for implementing actions and activating the Plan. It is recommended that when necessary, people from other relevant institutions are included in the Commission. Implementation of the Plan will be carried out through the following institutions, whose representatives are involved in the coordinating body:

1. Public Health Institute and Public Health Centres
2. The Occupational Health Institute, WHO Collaborating Centre
3. Crisis Management Centre
4. Hydrometeorological Institute
5. Directorate for Protection and Rescue
6. Departments for improving the living environment within the municipalities (in the first phase, active participation of the City of Skopje)
7. The Ministry of Transport and Communications
8. The Ministry of Labour and Social Policy
9. The Ministry of Education and Science
10. Macedonian Red Cross
11. Media
12. Non-governmental sector

In order to provide a coordinated approach in the carrying out of the activities, the flow of information between the lead agency and the other participants in the system will be as shown:



# HEAT-HEALTH WARNING SYSTEMS (ALERT SYSTEM)

The heat-health warning system (ALERT system for heat-waves) is a tool for promptly informing all the participants in the system of upcoming heat-waves, so that they may implement the foreseen measures and activities immediately. This system uses the weather forecast to predict situations which could lead to an increase in mortality and morbidity as a consequence of heat-waves.

As part of the Plan, a web site has been created ([www.toplotnibranovi.mk](http://www.toplotnibranovi.mk)) to monitor heat-wave announcements in the former Yugoslav Republic of Macedonia. It is planned that the information will be automatically delivered via sms or e-mail to the people responsible for implementation of the plan (Annex 5). Each of the responsible persons or institutions, on receipt of the announcement, will take the appropriate measures for each phase, according to the defined procedure.

In order for the heat-wave announcement system to function, the territory of the former Yugoslav Republic of Macedonia has been divided into five zones by the Hydrometeorological Institute and monthly threshold temperatures have been determined for each zone above which the heat-wave announcement alarm activates. The Hydrometeorological Institute of the former Yugoslav Republic of Macedonia uses the Gaius (normal) allocation for determining threshold air-temperature values. These values are reference values for announcing emergency, dangerous and catastrophic weather within the net of major meteorological stations. The distribution by zone of the highest daytime temperature, by city and month, of the meteo alarm is given in Annex 6.

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The institution responsible for monitoring and maintenance of the web site is the Public Health Institute of the former Yugoslav Republic of Macedonia, in cooperation with the Hydrometeorological Institute, where the server is located. The Public Health Institute of the former Yugoslav Republic of Macedonia are responsible, with the Public Health Centres, for risk assessment and have designated persons responsible for implementing actions after the receipt of a heat-wave announcement. They, in cooperation with the Preventive Health Care Sector of the Ministry of Health, will ensure that all activities are implemented according to the previously defined phases and will be in contact with the other contributors to the heat-wave response system.

The essential and common components of the meteo-alarm of the Hydrometeorological Institute concerning hot weather and heat-waves are identifying weather-related situations that adversely affect human health, controlling weather forecasts and implementing mechanisms for issuing warnings when an adverse weather situation is predicted through the meteorological service.

The Public Health Institute of the former Yugoslav Republic of Macedonia, in accordance with its positioning in the health system, is responsible for making health risk assessments and analysing the attributable risk from heat-waves as a risk factor, as well as estimating increased mortality and morbidity according to the best available methodologies. The Public Health Institute will define the population at risk from potential heat-waves, based on national data and medical evidence (and the criteria stated in the introductory part of the Plan).

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- 1.The heat-health warning system (ALERT system) is a tool designed to prevent the negative influence of the thermal environment on health during heat-waves.
  - 2.The distribution by zone of the highest daily registered temperatures by city and month from the meteo-alarm of HMI is provided by the Hydro meteorological Institute (Annex 6).



Map 1. Network of major meteorological stations in the former Yugoslav Republic of Macedonia

An additional source of information at European level which will be used for heat warnings can be found on the EuroHEAT website (<http://www.euroheat-project.org/dwd>), which shows a nine-day forecast for all of Europe. The probability of a heat-wave is calculated from predictions by 51 members of the European Centre for Medium-Range Weather Forecasts. The forecast is updated every day around 11:45 central European summer time.

# IDENTIFYING PEOPLE AT HIGHER RISK DURING HEAT-WAVES (VULNERABLE POPULATION GROUPS)

Defining the population's vulnerability to heat-waves takes a central role in the Action Plan in order for the interventions to be properly targeted. The following risk factors need to be taken into consideration (WHO 2008):

1. Individual risk factors (age and sex, existing illness, use of medication, being overweight, dehydration, reduced ability for acclimatization and pregnancy)
2. Living environment risk factors (housing, urban heat island effect, internal cooling capacity, air pollution and working environment and work place conditions)
3. Social risk factors (loneliness, lack of access to information systems and emergency services)

On the basis of the above risk factors, the following vulnerable groups have been identified in the former Yugoslav Republic of Macedonia:

**The elderly.** Ageing decreases tolerance to heat: thirst is sensed late, the sweating reaction is delayed and the number of sweat glands is reduced. The elderly often suffer from co-morbidity, physical and cognitive impairment and need to take multiple medications;

**Infants and children up to four years** are sensitive to the effects of high temperatures and they also rely on others to regulate their thermal environments and provide adequate fluid intake;

**People with chronic diseases**, especially those with endocrine dysfunctions, cardiovascular diseases, neurological and physiological impairments, chronic respiratory diseases, those with liver and kidney problems and also those with high blood pressure;

**People taking certain medications** which exacerbate dehydration and heat exhaustion, as well as diuretics, anti-inflammatory medicines, some antibiotics (sulphonamide), some antiviral medicines (indinavir), neuroleptics and antidepressants, benzodiazepines, amphetamines, analgesics, beta-blockers, ACE inhibitors and many more;

**Overweight people** are prone to difficulties caused by heat-waves because of the tendency to retain more body heat;

**People in certain occupations**, who work in outdoor conditions and are more exposed to heat-waves or who are exposed to high temperatures and heat radiation in the workplace, or people who lose a lot of fluid during work, etc., may dehydrate and be more sensitive to heat illnesses;

**People whose socioeconomic status** may make them more vulnerable, who because of certain social factors (ethnicity, occupation, education, social isolation, etc.) are vulnerable to heat-wave effects. These include homeless people, people who live in substandard conditions, children on the streets, internally displaced people, refugees, etc.

# COMMUNICATION WITH THE PUBLIC, HEALTH, SOCIAL AND EDUCATIONAL SECTORS

## COMMUNICATION WITH THE PUBLIC

For public information, six key message areas have been defined (WHO, 2008):

1. Keeping the home cool in conditions of high external temperatures;
2. Recommendations for keeping out of the heat;
3. Recommendations for keeping the body cool and hydrated;
4. Ways of helping others;
5. Recommendations for people with health problems;
6. Recommendations for what to do when someone feels unwell; and
7. Recommendations for preventing alimentary infections from unsafe food or water.

Identifying and locating the most vulnerable population groups – isolated, elderly, and homeless – is the most important preparation measure for strengthening activities for these groups of people during hot weather.

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## COMMUNICATION WITH HEALTH, SOCIAL AND EDUCATIONAL INSTITUTIONS

It is crucial that these institutions (hospitals, clinics, retirement homes, help centers, child centers, schools and kindergartens) receive timely information on the measures they need to take to reduce internal exposure to and negative health effects of heat, considering the work they do and the users to whom they provide services (WHO 2008).

SHORT-TERM MEASURES:

- Supplying air-conditioners, especially in patients' rooms, special departments for severe cases, intensive care and emergency departments;
- Providing cool areas in schools, kindergartens, retirement homes and other social institutions;
- Fitting curtains and external shutters on south-facing windows to reduce direct heat exposure;
- Providing drinking water fountains in the halls and waiting rooms of health, social and educational institutions (including schools, kindergartens, retirement homes, etc.).

## LONG-TERM MEASURES:

- Building in thermal roof and window insulation (e.g. double-glazing, K glass and others);
- Using plants and trees for shading, thus reducing the thermal absorption and exposure.

During heat-waves health institutions need to have a heat response plan that includes specific clinical services and health treatments, personnel work plans and supply of air-conditioners for those patients most at risk as well as hospital departments.

It is important that health workers be informed and know how to prevent heat-health effects in the most vulnerable population groups and individuals at risk. This is also important for social and educational institutions.

## COMMUNICATION WITH THE MEDIA

Public information services are necessary for disseminating information to the population in a timely and adequate manner. Communication with the media needs to be ongoing and aimed at providing enough coverage in informative programmes for topics related to protection from heat-waves, as well as in the printed media.

Before the beginning of the summer it is important for the Ministry of Health to hold a media workshop for journalists from electronic and printed media to familiarize them with the Plan activities, the anticipated phases and management. It is of special importance to acquaint the media with the multisectoral approach, the various jurisdictions and the plan for mutual information and communication. The information delivered to the media must be accurate and transparent, to avoid creating panic and mistrust of the institutions responsible for taking action.

During heat-waves, daily announcements will contain information on the daily temperatures, the consequences for the population's health of the same, the activities undertaken, recommendations for the public, and recommendations for employers and employees.

The Public Health Centres, as key institutions at the local level, will carry out the activities of the Commission for Monitoring Heat-health Consequences, in collaboration with the other actors. They will also communicate with the local media and provide information to the public.

Information for the media will also be available on the web site for heat-wave announcements, [www.toplotnibranovi.mk](http://www.toplotnibranovi.mk), as well as on the Ministry of Health and the Public Health Institute web sites.

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3. Recommendations for general practitioners (Annex 3).

4. Recommendations for managers of retirement homes and centres for long-term institutional care (Annex 4).

# REDUCING HEAT EXPOSURE IN CLOSED ENVIRONMENTS

The recommended short-term, medium-term and long-term measures for obtaining a sustainable comfort level in the buildings of health, educational and social institutions are also recommended for workplaces and employees (wherever possible) (WHO 2008).

## SHORT-TERM MEASURES INCLUDE:

1. Providing cool, air-conditioned rooms by using air-conditioners and fans and giving basic advice for staff and patient behaviour (residents). Electric fans may provide relief, but when the temperature is above 35 °C, fans may not prevent heat-related illness – it is important to drink plenty of fluids. The main problem with using air-conditioners is the increased consumption of electricity, which indirectly increases greenhouse gas emissions. It is important that the air-conditioning units are energy efficient.
2. Putting up sun shades on the windows of health, educational and social institutions.

Additionally, staff and patient behaviour and the use of appropriate equipment which work with low energy (to reduce heat) may keep the internal temperature low.

## MEDIUM-TERM MEASURES INCLUDE:

1. Painting walls and roofs with reflective paint;
2. Thermal insulation for roofs and windows (e.g. double-glazing);
3. Ventilated roofs, wall and roof heat-barriers, wall cavities and insulation;
4. Creating so-called 'green zones' within health and social institutions, by using plants and trees for shading, thus reducing heat-absorption and exposure;
5. Building water fountains and springs which will cool the surroundings in health institutions, where there are crowds of people.

Wherever possible, measures should be combined to allow comfortable conditions to be sustained with minimal use of energy. As a result of passive cooling measures, room temperatures can be reduced by 2–5 °C or more. In the long term, adaptation strategies need to focus on improving urban planning and reducing urban heat island effects. Building and urban planning regulations will need to be changed, to promote the constructions of buildings with a high level of insulation and central cooling, that will reduce conduction of heat through the outside of the building. In parallel, it is necessary to consider introducing energy efficiency measures as a response to climate change. More shade in the urban environment can be achieved by larger green areas and use of artificial shading. Additionally, greater reduction of indoor temperatures may be achieved with highly reflective materials. White or bright-coloured materials enable highest reflection of solar radiation. It is necessary to promote the use of so-called 'cool' materials for building elements of the urban environment (roofs, streets, pavements, etc.) through legislation. The use of alternative modes of transport (bicycles) is a win-win strategy which reduces air pollution on the one hand and increases physical activity on the other.

# MONITORING AND EVALUATION OF THE HEAT-HEALTH ACTION PLAN

Monitoring will be undertaken using indicators from the existing available data on health statistics for monitoring the effects of heat-waves on health and the efficacy of interventions (total morbidity data from all causes, admittance of patients to Emergency Medical Services, number of telephone calls to the SOS telephone line, etc.). For monitoring the effects of heat-waves, the following will also be carried out:

- Time series analysis for the period May–September of the current year, of the data for the number of deaths in Skopje (as the biggest urban environment and the single city where statistical investigation can be made because of the number of deaths daily) and their comparison to the meteorological data from the Hydrometeorological Institute;
- Time series analysis of the number of calls to the emergency medical services in certain cities, their grouping according to symptoms and comparison to the meteorological data. During 2010, data from Skopje and Strumica were collected.

It is planned that the analysis of the effects of heat-waves in terms of defined indicators should be carried out by the Public Health Institute of the former Yugoslav Republic of Macedonia and the reports should be delivered to the Climate Change and Health Commission of the Ministry of Health, as coordinating body, through the appropriate services of the Ministry of Health.

The evaluation of the Heat-health Action Plan involves estimating whether the activities carried out have had the desired effect (effectiveness); how cost-effective they are (efficiency); whether they are appropriate for the target population (social acceptance); and whether evaluation has been carried out in all phases of the planning process, development and implementation notwithstanding the fact that this type of plan is very difficult to evaluate because heat-waves are a rare event and the effect of each is different. In 2010, a specially designed questionnaire as a tool for evaluation; at the end of the season it was, in addition, sent to all the interested parties.

At the end of every season a report will be prepared containing the stated parameters. The results from the evaluation and the final Report for every season will be available on the web site ([www.toplotnibranovi.mk](http://www.toplotnibranovi.mk)).

The plan will be supplemented, upgraded and revised in accordance with the evaluation results. Proposed changes based on the evidence will be passed to the Government of the former Yugoslav Republic of Macedonia through the appropriate services of the Ministry of Health.

# FEEDBACK INFORMATION AND CONTROL

Feedback from the institutions involved is envisaged as part of the Plan. Also, the inspection services will provide supervision for the activities carried out.

## FEEDBACK INFORMATION:

- 1.** The Public Health Centres will develop a report for all the activities in points 1–8 of the Protocol for the Public Health Centres, 48 hours after the cessation of the heat-wave period, and submit it to the Public health Institute and the President of the MoH Committee for Monitoring Heat-health Consequences.
- 2.** The feedback on the activities undertaken by other institutions (that do not belong to the health sector) will be sent directly to the President of the MoH Commission for Monitoring Heat-health Consequences, one week after the cessation of the heat-wave period.
- 3.** All feedback will be summarized in one final report by the President of the MoH Commission for Monitoring Heat-health Consequences, which will be sent to all the members of the MoH Commission for Monitoring Heat-health Consequences so that they are informed about the integrated approach and the activities undertaken by all responsible sectors.
- 4.** All the final summary reports from the heat-wave episodes will be analysed after the end of the summer period and be used for the purpose of evaluation.

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## MANAGEMENT OF THE IMPLEMENTATION OF THE ACTIVITIES:

- 1.** Regional and local sanitary inspectorates will be responsible for the implementation of heat-wave-related activities in hospitals and health institutions.
- 2.** There will be close supervision in areas where it is expected the heat-waves will give rise to risk (i.e. visits by the food directorate, visits to hospitals and clinics, inspection of general hygiene conditions, waste disposal, verification of compliance with Ministry of Health recommendations).
- 3.** Occupational health inspectors will be in charge of the implementation of measures for protection of workers' health during heat-waves.

# RESPONSE TO HEAT - WAVES: ACTIONS BY PHASE



The actions in response to heat-waves are grouped into four phases according to the alert level (based on the specific temperature thresholds for the regions of the country as set out in Annex 6).

#### PREPARATORY PERIOD

In this phase, preparations are made for the implementation of activities envisaged within the later phases.

#### **PHASE 0** - GREEN - VIGILANCE

In this phase, temperatures are within the safe limits. This phase is activated from 1 May each year with preparedness of the institutions responsible for implementing the recommendations and measures for heat-wave response. The heat-wave warning system is active.

#### **PHASE 1** - YELLOW - ALERT / PREPAREDNESS

This phase becomes active after the threshold for emergency and dangerous temperatures given in Annex 6 is exceeded.

#### **PHASE 2** - ORANGE - HEAT-WAVES

This phase becomes active after the threshold for heat - waves temperatures given in Annex 6 is exceeded.

#### **PHASE 3** - RED - EMERGENCY

This phase becomes active after the threshold for emergency temperatures given in Annex 6 is exceeded.

# ACTIONS BY PHASE

PHASE	ACTIONS	RESPONSIBLE INSTITUTIONS
<b>PREPARATORY PERIOD 01.04 – 30.04</b>	ACTION NO 1: Checking the functionality of the web site, www.toplotnibranovi.mk, and the SOS telephone line.	<ul style="list-style-type: none"> <li>• Ministry of Health</li> <li>• National Institute of Public Health</li> <li>• Red Cross</li> </ul>
	ACTION NO 2: Printing educational material aimed at the general population, family doctors, managers of health and social institutions and workers (in Macedonian and Albanian languages)	<ul style="list-style-type: none"> <li>• Ministry of Health</li> <li>• National Institute of Public Health</li> <li>• Red Cross</li> </ul>
	ACTION NO 3: Development of plan for distribution of the educational materials aimed at the general population, family doctors, managers of health and social institutions and workers	<ul style="list-style-type: none"> <li>• MoH Commission for Monitoring Heat-health Consequences</li> </ul>
	ACTION NO 4: a) Preparation of letters to all public and private health institutions, educational institutions, retirement homes and geriatric institutions, setting out actions that need to be taken during hot weather to guarantee adequate support for elderly and vulnerable people b) Preparation of letter for general practitioners regarding the measures and activities they need to take to reduce their patients' heat risks c) Preparation of letter for occupational health services and the occupational health inspectorate regarding measures to safeguard workers' health d) Preparation of letter for the State Sanitary and Health Inspectorate regarding measures that will be implemented so that they can activate their control mechanisms E) Preparation of letter for the Emergency Medical Services to start the process of collecting information on the number of telephone calls on a daily basis, checking their internet connections and making technical preparations for the forthcoming summer	<ul style="list-style-type: none"> <li>• MoH Commission for Monitoring Heat-health Consequences</li> </ul>
	ACTION NO 5: Sending information to the Association of Local Authorities for putting public fountains and springs into operation	<ul style="list-style-type: none"> <li>• MoH Commission for Monitoring Heat-health Consequences</li> </ul>
	ACTION NO 6: Defining and confirming methods of getting in contact with the most vulnerable populations. Planning for a proactive approach for lonely elderly people, socially isolated and homeless people, with home visits with the support of the Red Cross, the local authorities and the Centres for Social Care.	<ul style="list-style-type: none"> <li>• MoH Commission for Monitoring Heat-health Consequences</li> </ul> In strong cooperation with the Ministry of Labour and social policy, city of Skopje and the Red Cross

PHASE	ACTIONS	RESPONSIBLE INSTITUTIONS
<p><b>PHASE 0</b>  <b>GREEN LEVEL - VIGILANCE 01.05 – 30.09</b>  Heat-wave warning system is active.  Every time the threshold for green level is exceeded, the responsible institutions receive sms and e-mail.</p>	<p>ACTION NO 1: Activation of the heat-wave warning system (ALERT) by the HMI and its accessibility through the web site, <a href="http://www.toplotnibranovi.mk">www.toplotnibranovi.mk</a></p>	<ul style="list-style-type: none"> <li>Hydrometeorological Institute</li> <li>Public Health Institute of the former Yugoslav Republic of Macedonia</li> </ul>
	<p>ACTION NO 2: Distribution of educational materials for the general population, family doctors, managers of health and social institutions and workers</p>	<ul style="list-style-type: none"> <li>Ministry of Health</li> <li>National Institute of Public Health In cooperation with the Red Cross, ten regional public health centres and the Institute for Occupational Health</li> </ul>
	<p>ACTION NO 3: Announcement to the public to inform them about the upcoming activities for protecting health from heat-waves, reminding them of general protection measures as well as the operation of the SOS telephone line</p>	<ul style="list-style-type: none"> <li>MoH Commission for Monitoring Heat-health Consequences</li> </ul>
	<p>ACTION NO 4: Information on the protection of health from heat-waves made available on the web sites of the responsible institutions, to remind and raise awareness of the necessary measures.</p>	<ul style="list-style-type: none"> <li>Ministry of Health</li> <li>National Institute of Public Health</li> <li>Centres for Public Health</li> <li>Institute for Occupational Health</li> <li>Red Cross</li> <li>Local authorities</li> </ul>
	<p>ACTION NO 5: During the period May–September, initiate the process of:</p> <p>a) Data gathering of the number of deaths according to sex and age</p> <p>b) Daily monitoring of the number of calls to the emergency medical services according to syndromes</p> <p>c) Relevant meteorological data</p>	<ul style="list-style-type: none"> <li>National Institute of Public Health</li> <li>Emergency medical services</li> <li>Hydrometeorological Institute</li> <li>Centre for Crisis Management</li> </ul>
	<p>ACTION NO 6: Delivery of the letters prepared in the preparatory phase (around 15 May each year):</p> <p>a) Delivery of letters to all public and private health institutions, educational institutions, retirement homes and geriatric institutions setting out actions that need to be taken during hot weather to guarantee adequate support for elderly and vulnerable people</p> <p>b) Delivery of letters to general practitioners regarding the measures and activities they need to take to reduce their patients' heat risks</p> <p>c) Delivery of letters to the occupational health services and the occupational health inspectorate regarding measures to safeguard workers' health</p> <p>d) Delivery of letter to the State Sanitary and Health Inspectorate regarding measures that will be implemented so that they can activate their control mechanisms</p> <p>e) Delivery of letters to the Emergency Medical Services to start the process of collecting information on the number of telephone calls on a daily basis, checking their internet connections and making technical preparations for the forthcoming summer</p>	<ul style="list-style-type: none"> <li>Ministry of Health</li> <li>National Institute of Public Health in cooperation with the Ministry of Labor and Social Policy and ten Regional Public Health Centres</li> </ul>

PHASE	ACTIONS	RESPONSIBLE INSTITUTIONS
<p><b>PHASE 1</b>  <b>YELLOW LEVEL - ALERT/PREPAREDNESS</b>  <b>15.06 – 31.08</b>            This phase is active when the temperature thresholds for yellow level are exceeded</p>	<p>ACTION NO 1: Announce recommendations to the public via the media, with special focus on the most vulnerable groups</p>	<p>At National level:            • Ministry of Health/Commission for Monitoring Heat-health Consequences</p> <p>At Local level:            • Centres for Public Health</p>
	<p>ACTION NO 2: Warrant for activating general and specific measures delivered to the health, educational and social institutions to reduce the risks from the prolonged heat for the most vulnerable population groups</p>	<ul style="list-style-type: none"> <li>• Ministry of Health</li> <li>• National Institute of Public Health</li> <li>• Public Health Centres</li> <li>• Ministry of Labour and Social Policy</li> </ul>
	<p>ACTION NO 3: Proactive approach intended for lonely elderly people, socially isolated and homeless people, with home visits with support of the Red Cross and the social care centres, in accordance with the planning in the preparatory phase</p>	<ul style="list-style-type: none"> <li>• Red Cross</li> <li>• Local authorities</li> <li>• Ministry of Labour and Social Policy</li> <li>• Public Health Institute of the former Yugoslav Republic of Macedonia</li> </ul>
	<p>ACTION NO 4: Telephone information SOS line that will provide information and advice to the public brought into operation</p>	<ul style="list-style-type: none"> <li>• Red Cross</li> </ul>

PHASE	ACTIONS	RESPONSIBLE INSTITUTIONS
<p style="text-align: center;"><b>PHASE 2</b> <b>ORANGE LEVEL - HEAT-WAVES</b> Operative when the temperature threshold for orange level is exceeded.</p>	<p>ACTION NO 1: Constant announcements through the public media regarding the alert level</p>	<ul style="list-style-type: none"> <li>• Ministry of Health/Commission for Monitoring Heat-health Consequences</li> <li>• Hydro-meteorological Institute</li> </ul> <p>At Local level:</p> <ul style="list-style-type: none"> <li>• Centres for Public Health</li> </ul>
	<p>ACTION NO 2: Implementation of the specific action plans for times of crisis for health institutions, by public institutions, retirement homes and educational institutions</p>	<ul style="list-style-type: none"> <li>• Ministry of Health</li> <li>• Ministry of Labour and Social Policy</li> <li>• Ministry of Education</li> <li>• Crisis Management Centre</li> <li>• Directorate for Protection and Rescue</li> </ul>
	<p>ACTION NO 3: Activating protection measures for workers who are occupationally exposed to heat (i.e. construction workers, public transport workers, etc.)</p>	<ul style="list-style-type: none"> <li>• Ministry of Health</li> <li>• Crisis Management Centre</li> <li>• Ministry of Labour and Social Policy</li> <li>• Institute for Occupational Health of the former Yugoslav Republic of Macedonia</li> </ul>
	<p>ACTION NO 4: Activating protection measures for vulnerable populations, in accordance with the planning in the preparatory phase</p>	<ul style="list-style-type: none"> <li>• Red cross</li> <li>• Local authorities</li> <li>• Ministry of Labour and Social Policy, Social Work Centres</li> <li>• National Institute of Public Health</li> </ul>
	<p>ACTION NO 5: Recommendation for use of public centres with air-conditioned premises by the most vulnerable groups</p>	<ul style="list-style-type: none"> <li>• Ministry of Health</li> <li>• Ministry of Labour and Social Policy, Social Work Centres</li> </ul>
	<p>ACTION NO 6: Extending operational hours of telephone information line, to provide continuous information and counselling to citizens</p>	<ul style="list-style-type: none"> <li>• Macedonian Red Cross</li> </ul>
	<p>ACTION NO 7: Distribution of drinking water in busy public places by Red Cross volunteers</p>	<ul style="list-style-type: none"> <li>• Macedonian Red Cross</li> </ul>
	<p>ACTION NO 8: Proposing additional measures for consideration by the Government in terms of working hours, for certain sectors where the production process is not affected in the context of people's health, including releasing the most vulnerable population groups from work responsibilities (pregnant women, people over 60, etc.). These measures will be considered separately and specifically for those areas with dangerous and catastrophic heat-waves</p>	<ul style="list-style-type: none"> <li>• Ministry of Health</li> <li>• Government</li> </ul>

PHASES	ACTIONS	RESPONSIBLE INSTITUTIONS
	ACTION NO 1: Constant announcements and press conferences for the heat-wave state of emergency	<ul style="list-style-type: none"> <li>• Ministry of Health</li> <li>• Hydrometeorological Institute</li> </ul>
<p style="text-align: center;"><b>PHASE 3</b>  <b>RED LEVEL - EMERGENCY TEMPERATURES</b>            Operative when the temperature threshold for emergency temperatures is exceeded.</p>	ACTION NO 2: Implementation of the specific action plans for times of crisis for health institutions, by public institutions, retirement homes and educational institutions	<ul style="list-style-type: none"> <li>• Ministry of Health</li> <li>• Ministry of Labour and Social Policy</li> <li>• Ministry of Education</li> <li>• Crisis Management Centre</li> <li>• Directorate for Protection and Rescue</li> </ul>
	ACTION NO 3: Intensifying advice on protection measures for workers who are occupationally exposed to heat (i.e. construction workers, public transport, workers, farmers, etc), if necessary, in consultation with governmental bodies, stopping the working process during this phase	<ul style="list-style-type: none"> <li>• Ministry of Health</li> <li>• Crisis Management Centre</li> <li>• Ministry of Labour and Social Policy</li> <li>• Institute for Occupational Health of the former Yugoslav Republic of Macedonia</li> </ul>
	ACTION NO 4: Intensifying the measures for protection of vulnerable populations, in accordance with the planning in the preparatory phase	<ul style="list-style-type: none"> <li>• Ministry of Labour and Social Policy, Social Work Centers</li> </ul>
	ACTION NO 5: Relocating, in residential centres and institutions, the most vulnerable groups in air-conditioned rooms	<ul style="list-style-type: none"> <li>• Ministry of Health</li> <li>• Ministry of Labour and Social Policy</li> </ul>
	ACTION NO 6: Operating the information telephone line 24 hours a day to provide information and advice to the public	<ul style="list-style-type: none"> <li>• Macedonian Red Cross</li> </ul>
	ACTION NO 7: Proposing additional measures for consideration by the Government in terms of working hours, for certain sectors where the production process is not affected in the context of people's health, including releasing the most vulnerable population groups from work responsibilities (pregnant women, people over 60, etc.). These measures will be considered separately and specifically for those areas with dangerous and catastrophic heat-waves	<ul style="list-style-type: none"> <li>• Ministry of Health</li> <li>• Ministry of Labour and Social Policy</li> <li>• Institute for Occupational Health of the former Yugoslav Republic of Macedonia</li> </ul>
	ACTION NO 8: Procedure for declaring a state of emergency (Annex 8)	<ul style="list-style-type: none"> <li>• Government of the former Yugoslav Republic of Macedonia</li> </ul>



# LIST OF PROTOCOLS

1. PROTOCOL FOR CONDUCTING HEAT-WAVE ACTIVITIES IN THE PUBLIC HEALTH CENTRES
2. PROTOCOL FOR CONDUCTING HEAT-WAVE ACTIVITIES IN HEALTH, SOCIAL AND EDUCATIONAL INSTITUTIONS
3. PROTOCOL FOR CONDUCTING HEAT-WAVE ACTIVITIES IN THE MINISTRY OF HEALTH

# PROTOCOL 1

## FOR IMPLEMENTING HEAT-WAVE ACTIVITIES IN THE PUBLIC HEALTH CENTRES

1. In accordance with the Heat-health Action Plan, the responsible persons in the Public Health Centres will receive the following message via e-mail and/or as a mobile phone text message 24 or 48 hours before the heat-wave:

Heat-wave announcement for [date]

The heat-wave is at alert level \_\_\_ and has an expressed intensity in the \_\_\_\_\_ region. It is necessary to implement the activities from the Heat-health Action Plan for Phase \_\_\_.

Detailed information for implementing health protection measures from Phase \_\_\_ can be found at [http://toplotnibranovi.mk/mk\\_faza1.asp](http://toplotnibranovi.mk/mk_faza1.asp) or in the printed Heat-health Action Plan. The recommendations for the heat-wave health protection of the public and the possible health risks can be found on the printed flyers or at the following web link: [http://toplotnibranovi.mk/mk\\_preporaki\\_opsti.asp](http://toplotnibranovi.mk/mk_preporaki_opsti.asp).

2. On receipt of the message, it is necessary to maintain direct communication with the regional department of the Regional Crisis Management Centre, during which the following announcement is delivered to all the local media:

According to the meteo-alert announcement, tomorrow and/or the days to come increased temperatures are expected in the following cities: \_\_\_\_\_. This represents a potential threat for people's health and under the Heat-health Action Plan is classified as \_\_\_\_\_ level/phase \_\_\_\_\_. The recommendations for the general public from the Ministry of Health and the Public Health Centres for preventive measures against harmful effects on health from the high outside temperatures remain valid. (Quote the measures set out in the announcements from the MoH and PHI.)

INSTITUTION RESPONSIBLE FOR CONTACTING THE LOCAL MEDIA:

• **PUBLIC HEALTH CENTRE IN COOPERATION WITH THE REGIONAL DEPARTMENT OF RCMC**

3. Inform the local populace that detailed information about the effects of heat-wave on people's health and the protective measures can be found on:

SOS FREE TELEPHONE - 02/ 32 21 902  
(10:00 - 18:00 HRS.DURING THE YELLOW AND ORANGE LEVEL ALERTS)  
(24 HOURS DURING RED LEVEL ALERTS)

4. Contact the managers of hospitals, retirement homes and centres for long-term institutional care in the region and provide advice for implementing the recommendations for these institutions given in the Heat-health Action Plan and the educational leaflets.

The Public Health Centres should establish these contacts in the preparatory phase of the Plan and should contact them again after receiving the heat-wave announcements.

RESPONSIBLE INSTITUTION:

- **PUBLIC HEALTH CENTRE IN COOPERATION WITH THE LOCAL CRISIS MANAGEMENT CENTRE**

5. Contact the local occupational health services about, and provide advice for, implementing the recommendations set out in the Heat-health Action Plan for workers' health protection during heat-waves at local level,.

The Public Health Centres should establish these contacts in the preparatory phase of the Plan and should contact them again after receiving the heat-wave announcements.

RESPONSIBLE INSTITUTION:

- **PUBLIC HEALTH CENTRE**

6. Contact the local emergency services in order to obtain information on the number of calls and interventions during heat-waves.

RESPONSIBLE INSTITUTION:

- **PUBLIC HEALTH CENTRE**
- **EMERGENCY SERVICES**

7. Contact the local authorities in the municipalities and provide advice about the need to intensify the functioning of local communal services in terms of more frequent collection of waste and control of possible water-supply problems.

**8.** Contact the local authorities, local social services and Red Cross in order to monitor the application of a more active approach for the elderly and lonely people, as well as the socially isolated and homeless people.

RESPONSIBLE INSTITUTION:

- **PUBLIC HEALTH CENTRE IN COOPERATION WITH THE LOCAL CRISIS MANAGEMENT CENTRE**
- **LOCAL AUTHORITIES**
- **SOCIAL SERVICES**
- **RED CROSS**

**9.** Prepare a report with feed-back information for all the activities in points 1–8, 48 hours after the cessation of the heat-wave period, and submit it to the President of the MoH Committee for Monitoring Heat-health Consequences.

**E-mail: [kendrovski@yahoo.com](mailto:kendrovski@yahoo.com); [jovanka\\_ance@yahoo.com](mailto:jovanka_ance@yahoo.com)**

RESPONSIBLE INSTITUTION:

- **PUBLIC HEALTH CENTRE**

# PROTOCOL 2

## FOR IMPLEMENTING HEAT-WAVE ACTIVITIES IN HEALTH, SOCIAL AND EDUCATIONAL INSTITUTIONS

### **A) PREPARATORY AND GREEN PHASE (APRIL–MAY EACH YEAR)**

In accordance with the Heat-health Action Plan, the following measures should be undertaken in order to protect people's health and the health of the most vulnerable populations from heat-waves:

- 1.** A responsible person should be assigned by the manager of the institution for surveillance of the planning and the carrying out of the activities related to heat-waves. This person should establish immediate contact with the responsible person from the regional Public Health Centre and Crisis Management Centre. All health institutions, residential and nursing homes should provide an e-mail address and mobile phone number to the local Public Health Centre and Crisis Management Centre, to facilitate the transfer of emergency information.
- 2.** Indoor thermometers should be installed in each room where patients and vulnerable individuals spend substantial time (patient rooms, bedrooms, living areas and eating areas).
- 3.** Measures to create cool rooms or cool areas should be in place. Cool areas can be developed with appropriate indoor and outdoor shading, ventilation, the use of indoor and outdoor plants and, if necessary, air-conditioning.
- 4.** If possible, drinking water reservoirs should be placed in the halls and waiting rooms of health institutions (hospitals, clinics, etc.), as well as in the halls of social and educational institutions (including schools, kindergartens, retirement homes, etc.).
- 5.** Personnel planning within the institutions for the summer period should be in place. During the summer months, sufficient staff must be available so that appropriate action can be taken in the event of a heat-wave.
- 6.** Health institutions should ensure their emergency response plan includes actions related to heat-waves and develop them if not present, revise them and make sure personnel are informed (specific clinical services and health treatments, personnel work planning and supplying air-conditioners for the patients most at risk as well as hospital departments). This is also important for social and educational institutions.
- 7.** All the activities envisaged in the recommendations for the managers of health institutions in according with the letter received from the Ministry of Health, as well as the recommendations set out in the Heat-health Action Plan, must be in place.

**B) IN THE EVENT OF A HEAT-WAVE BEING ANNOUNCED (YELLOW, ORANGE AND RED PHASES):**

The Heat-health Action Plan stipulates that the responsible persons from the Public Health Centres (in cooperation with the Crisis Management Centre) establish direct communication with the institutions that cover the affected region 24 or 48 hours before the heat-wave and after receipt of the e-mail/text message.

THE FOLLOWING MEASURES NEED TO BE UNDERTAKEN BY INSTITUTIONS:

1. Indoor temperatures should be monitored at least four times a day.
2. All institutions should aim to ensure that cool areas are created that do not exceed 25°C, especially in areas with high-risk patients.
3. If temperatures exceed 25°C, high-risk individuals should be moved to a cool area that is 25°C or below (obligatory for orange and red phases).
4. Supervision and continuous implementation of the activities set out in the recommendations for the managers of health institutions. During the yellow phase, the appointed person should oversee implementation of the activities for which he/she will write a report to the manager.
5. Prepare a report to the Public Health Centre on the activities carried out, at the end of the preparatory phase (end of May each year) as well as 24–48 hours after the cessation of each period of heat-wave.

RESPONSIBLE PERSON:

- **MANAGER OF THE HEALTH, SOCIAL OR EDUCATIONAL INSTITUTION**

# PROTOCOL 3

## FOR IMPLEMENTING HEAT-WAVE ACTIVITIES WITHIN THE MINISTRY OF HEALTH

In accordance with the Heat-health Action Plan for prevention of health consequences for the population in the former Yugoslav Republic of Macedonia, the following persons within the Ministry of Health will be responsible for implementing the activities envisaged in the four phases of the Plan. The activities will be undertaken under the guidance of the MoH Commission for Monitoring Heat-health Consequences.

1. Head of the preventive health care sector or assigned replacement in case of absence
2. Head of the primary health care sector or assigned replacement in case of absence
3. Head of the hospital sector or assigned replacement in case of absence
4. Head of the disaster preparedness and response sector or assigned replacement in case of absence
5. Department for public relations

The activities begin each year in April, when the preparation (pre-summer) phase for protection against heat-waves becomes active and the actions envisaged for all the four phases of the plan are carried out (more information available at [www.toplotnibranovi.mk](http://www.toplotnibranovi.mk)).

All the letters, orders or instructions are prepared by the MoH Commission for Monitoring Heat-health Consequences with the cooperation and support of the above-mentioned sectors. They will be distributed to the recipient health institutions through the responsible sectors mentioned above. They will be distributed to the other institutions (that do not belong to the health sector) through the responsible Ministries and institutions, as set out in the Plan, coordinated by the MoH Commission for Monitoring Heat-health Consequences.

### INFORMATION FLOW DURING HEAT-WAVES:

1. The MoH Department for Public Relations is responsible for communication with the media. When the heat-wave announcement is received, the MoH Department for Public Relations will immediately contact the President of the MoH Commission for Monitoring Heat-health Consequences (or his replacement in case of absence), with to coordinate the actions.
2. All the additional letters, orders or instructions developed by the Commission for Monitoring Heat-health Consequences will be distributed to the recipient health institutions through the responsible sectors mentioned above.
3. Feedback on the activities undertaken by the health institutions at local level will be sent by the Public health Centres to the Public Health Institute, which will forward the reports to the President of the MoH Commission for Monitoring Heat-health Consequences one week after the cessation of the heat-wave period.
4. Feedback on activities undertaken by the other institutions (that do not belong to the health sector) will be sent directly to the President of the MoH Commission for Monitoring Heat-health Consequences one week after the cessation of the heat-wave period.

5. All feedback information is summarized in one final report which is sent to all the members of the MoH Commission for Monitoring Heat-health Consequences for their information.
6. All the final summary reports from the heat-wave episodes are analysed at the end of the summer period, for the purpose of evaluation.

KEY RESPONSIBLE PERSONS WITHIN THE MINISTRY OF HEALTH:

1. Head of the preventive health care sector or assigned replacement in case of absence
2. Head of the primary health care sector or assigned replacement in case of absence
3. Head of the hospital sector or assigned replacement in case of absence
4. Head of the disaster preparedness and response sector or assigned replacement in case of absence
5. Department for public relations

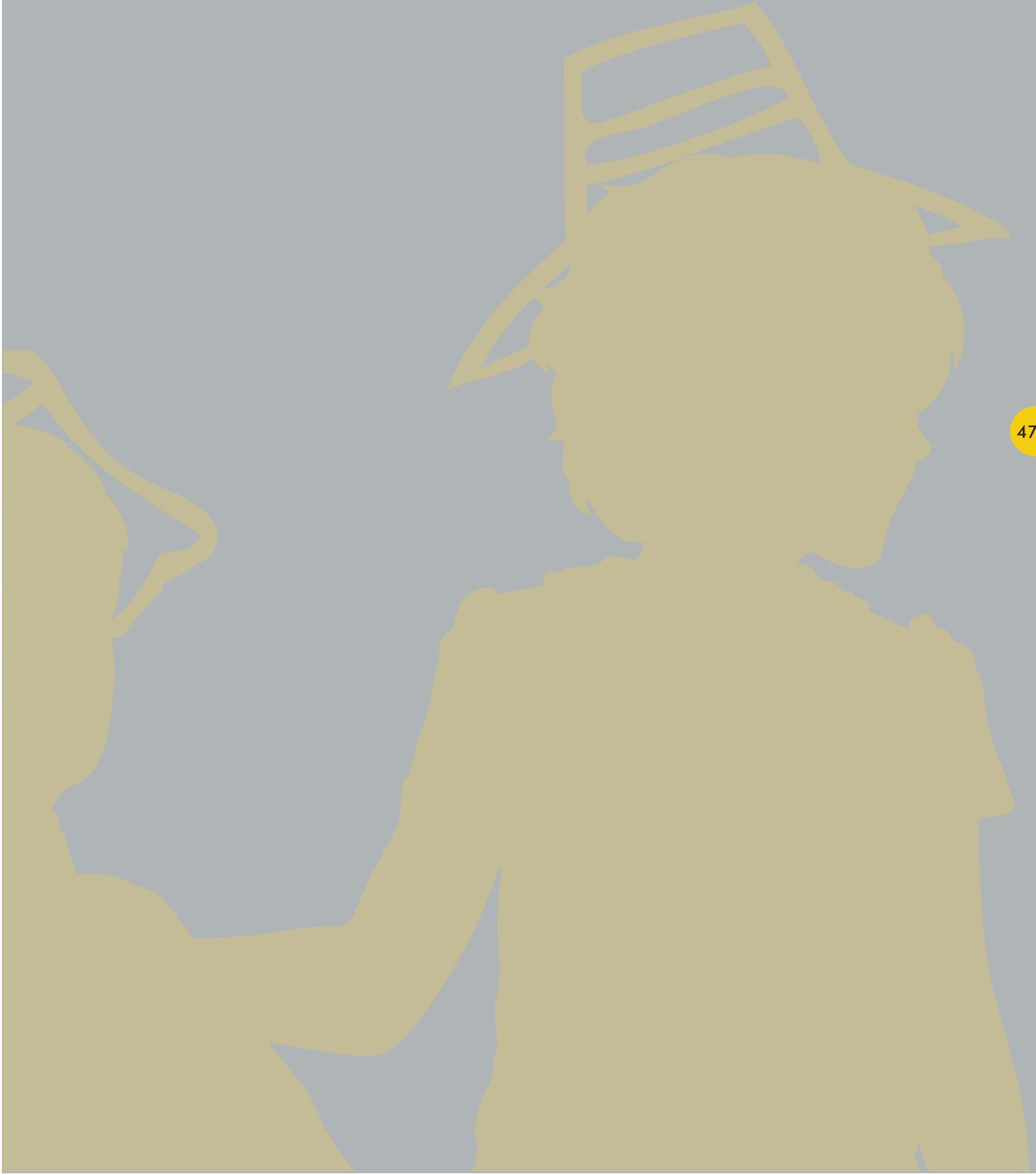
KEY RESPONSIBLE PERSON WITHIN THE INSTITUTE OF PUBLIC HEALTH:

1. Climate change national coordinator or assigned replacement in case of absence

**EACH OF THE RESPONSIBLE INDIVIDUALS IS OBLIGED TO ASSIGN HIS/HER REPLACEMENT IN CASE OF ABSENCE!!!**

# LIST OF ANEXES

1. GENERAL RECOMMENDATIONS FOR THE PUBLIC DURING HEAT-WAVES (INFORMATION LEAFLET)
2. RECOMMENDATIONS FOR GENERAL PRACTITIONERS (INFORMATION LEAFLET)
3. RECOMMENDATIONS FOR THE MANAGERS OF HEALTH INSTITUTIONS, RETIREMENT HOMES AND CENTRES FOR LONG-TERM INSTITUTIONAL CARE (INFORMATION LEAFLET)
4. RECOMMENDATIONS FOR PROTECTION OF WORKERS' HEALTH DURING HEAT-WAVES (INFORMATION LEAFLET)
5. CONTACT LIST OF INSTITUTIONS AND PEOPLE THAT RECEIVE HEAT-WAVE NOTIFICATIONS
6. TEMPERATURE THRESHOLDS FOR THE HEAT-WAVE EARLY WARNING SYSTEM
7. SUMMARY OF RECOMMENDATIONS AND OPTIONS FOR URBAN PLANNING AND LIVING
8. PROCEDURE FOR DECLARING A CRISIS



# ANNEX 1

## GENERAL RECOMMENDATIONS FOR THE PUBLIC DURING HEAT-WAVES

- 1.** Avoid strenuous physical activities (including sport and recreational activities) during the hottest time of the day. Do them before 10 a.m. or after 5 p.m.
- 2.** Wear light and loose fitting clothes (light colours reflect light) of natural materials and, if exposed to direct sunlight, a brimmed hat or cap and sunglasses.
- 3.** Stay in closed, air-conditioned rooms (electric fans cannot provide relief when the temperature is above 35°C). During the day, close windows and shutters; at night when the outside temperature is lower, open windows and shutters.
- 4.** Eat several small, light meals a day. Avoid food which contains fat and high-calories, as well as food with a lot of sugar.
- 5.** Drink plenty of fluids (do not wait to become thirsty), including regular drinks of water and non-alcohol beverages. Avoid beverages with alcohol, caffeine and extremely cold beverages.
- 6.** If you have to go outdoors in this period, take frequent rests in the shade and avoid direct exposure to the sun.
- 7.** Take cool showers or baths several times a day. Alternatives include cold packs and wraps, foot baths, etc.
- 8.** When driving, keep the vehicle window open for ventilation. Completely closed vehicles become too hot. Do not leave anybody in the vehicle!
- 9.** People who are chronically ill, especially those with cardiovascular, neurological or pulmonary illnesses, need to be especially vigilant in following these recommendations and taking their medicines. For any changes in the medical condition, consult your doctor.
- 10.** Keep informed – follow the heat alert and weather forecasts and information; know the important phone numbers and where you can get help for yourself and others.
- 11.** Look after children and elderly and those who need help.

## **IF YOU OR OTHERS FEEL UNWELL:**

- Try to get help if you feel dizzy, weak, anxious or have intense thirst and headache; move to a cool place as soon as possible and measure your body temperature.
- Drink some water or fruit juice to hydrate.
- Rest immediately in a cool place if you have painful muscular spasms (usually in the legs, arms or abdomen) and drink oral rehydration solutions containing electrolytes. Medical attention is needed if heat cramps are sustained for more than one hour.

**If one of your family members or anyone else has symptoms of hot dry skin and delirium, convulsion and/or unconsciousness, call 194 immediately. While waiting for the ambulance, move him/her to a cool place, put him/her in a horizontal position and elevate legs and hips; remove clothing and initiate external cooling, such as with cold packs on the neck, axillae and groin, continuous fanning and spraying the skin with water. Measure the body temperature.**

DO NOT GIVE ANY MEDICATION. PLACE UNCONSCIOUS PERSONS ON THEIR SIDE.  
CONSULT YOUR MEDICAL DOCTOR IF YOU FEEL UNUSUAL SYMPTOMS OR IF SYMPTOMS PERSIST.

## **OTHER POSSIBLE HEALTH RISKS DURING HOT WEATHER ARE FOOD POISONING AND INTESTINAL INFECTIOUS DISEASES**

1. Wash fresh vegetables and fruit before using.
2. Consume cooked food immediately after preparation. If this is not the case, the prepared food should be stored in the refrigerator at 8°C and heated to at least 100°C before consumption.
3. Avoid products containing raw foods, such as home-made mayonnaise (eggs). Care should also be taken when consuming ice-cream and different creams.

**SOS telephone number for information on protection from heat-waves  
02 32 21 902 (10–18 h)**

# ANNEX 2

## RECOMMENDATIONS FOR GENERAL PRACTITIONERS

### **REFRESH YOUR MEMORY ABOUT:**

1. Understanding the mechanisms of heat illness, its clinical manifestation (profile), diagnosis and treatment;
2. Recognizing early signs of heatstroke;
3. Initiating proper cooling and resuscitative measures; for early signs and out-of-hospital treatment, please see the separate information sheet on treatment of heatstroke and other mild heat-related illnesses;
4. Identifying the patients at risk and initiating proper education regarding heat illnesses and their prevention. Education of guardians of the old and infirm and infants is important;
5. Advice for people with chronic disease (reduction of heat exposure, fluid intake, medication intake); and
6. Awareness of the potential side-effects of the medicines prescribed and adjusting dose if indicated.

### **EDUCATE, COUNSEL AND INFORM PATIENTS REGARDING:**

7. The importance of adhering to the recommendations set out in the leaflet for the public;
8. Intake of medicine and fluids according to doctor's recommendations; and
9. For further details, contacting medical and social services, help-lines and emergency medical services.

# INFORMATION FOR MILD AND MODERATE HEAT ILLNESS

CONDITION	SYMPTOMS	MANAGEMENT
<b>HEAT RASH</b>	<p>Small red itchy papules on the face, neck, upper chest, under breast, groin and scrotum areas. This can affect any but is prevalent in young children. Infection with Staphylococcus can occur.</p> <p>It is attributed to heavy sweating during hot and humid weather.</p>	<p>Rash subsides with no specific treatment. Minimize sweating by staying in an air-conditioned environment, taking frequent showers and wearing light clothes.</p> <p>Keep the affected area dry.</p> <p>Topical antihistamine and antiseptic preparations can be used to reduce discomfort and prevent secondary infection.</p>
<b>HEAT OEDEMA</b>	<p>Oedema of the lower limbs, usually ankles, appears at the start of the hot season. This is attributed to heat-induced peripheral vasodilatation and retention of water and salt.</p>	<p>Treatment is not required as oedema usually subsides following acclimatization. Diuretics are not advised.</p>
<b>HEAT SYNCOPE</b>	<p>This involves brief loss of consciousness or orthostatic dizziness. It is common in patients with cardiovascular diseases or taking diuretics, before acclimatization takes place. It is attributed to dehydration, peripheral vasodilatation and decreased venous return resulting in reduced cardiac output.</p>	<p>The patient should rest in a cool place and be placed in a supine position with legs and hips elevated to increase venous return. Other serious causes of syncope need to be ruled out.</p>
<b>HEAT CRAMPS</b>	<p>Painful muscular spasms occur, most often in the legs, arms and abdomen, usually at the end of sustained exercise. This can be attributed to dehydration, loss of electrolytes through heavy sweating and muscle fatigue.</p>	<p>Immediate rest in a cool place is advised. Stretch muscles and massage gently. Oral hydration may be needed using a solution containing electrolytes. Medical attention should be sought if heat cramps are sustained for more than one hour.</p>
<b>HEAT EXHAUSTION</b>	<p>Symptoms include intense thirst, weakness, discomfort, anxiety, dizziness, fainting and headache. Core temperature may be normal, subnormal or slightly elevated (less than 40°C). Pulse is thready with postural hypotension and rapid shallow breathing. There is no mental status alteration. This can be attributed to water and/or salt depletion resulting from exposure to high environment heat or strenuous physical exercise.</p>	<p>Move to a cool shaded room or air-conditioned place. The patient should be undressed. Apply cold wet sheet or cold water spray and use fan if available. Lie the patient down and raise legs and hips to increase venous return. Start oral hydration. If nausea prevents oral intake of fluids, consider intravenous hydration. If hyperthermia above 39°C, OR impaired mental status OR sustained hypotension occur, treat as heatstroke and transfer to hospital.</p>

# ANNEX 3

## RECOMMENDATIONS FOR THE MANAGERS OF HEALTH INSTITUTIONS, RETIREMENT HOMES AND CENTRES FOR LONG-TERM INSTITUTIONAL CARE

Follow the recommendations for the general public during heat-waves given in the information leaflets. Keep the facilities cool and ensure that patients and residents are kept out of the heat, in cool areas, and drink enough fluids.

1. Monitor indoor temperatures. Provide at least one cool room (e.g. air-conditioned room below 25 °C). Move residents to this cool area for several hours each day.
2. Ask general practitioners to review clinical management of residents at risk, for example due to chronic disease.
3. Monitor fluid intake. Offer non-alcoholic, unsweetened beverages.
4. Monitor body temperature, pulse rate, blood pressure and hydration.
5. Monitor closely for any early signs of heat illness and initiate appropriate treatment.
6. Inform and train staff and increase staffing levels if necessary.

### SHORT-TERM MEASURES FOR REDUCING INDOOR TEMPERATURES DURING HOT WEATHER

MEASURES	COMMENT
<b>THERMOMETERS TO MEASURE INDOOR TEMPERATURES</b>	These are useful to measure indoor temperature and to show when action needs to be taken.
<b>INCREASED EXTERNAL SHADING</b>	External shading of windows reduces solar heat gains; internal shading of windows to avoid solar loads inside the room is always advisable.
<b>ELECTRIC FANS</b>	Electric fans may provide relief, but when the temperature is above 35 °C, fans may not prevent heat-related illness – it is important to drink enough fluids.
<b>MOBILE EVAPORATIVE COOLERS</b>	The cooling effect of evaporative coolers increases with temperature and decreases with relative humidity of the air.
<b>LOCAL AIR CONDITIONING</b>	Air conditioners provide relief. If you buy or install air conditioning, please use an air conditioner that is as energy efficient as possible. Proper cleaning and maintenance is important to avoid health impacts. Be aware of electricity blackouts in summer time!

# ANNEX 4

## RECOMMENDATIONS FOR PROTECTION OF WORKERS' HEALTH DURING HEAT-WAVES

### **The occupational health specialist should take into consideration the workplaces at risk:**

- Outdoor workplaces: civil engineering workers, farmers, gardeners, traffic workers, workers that do field work, open-market sellers, firefighters, police officers, soldiers, etc.;
- Indoor workplaces: all workplaces that are not air-conditioned and where there is high temperature exposure and heat radiation.

For workplaces that have a contract with an occupational health specialist under the Safety and Health at Work Act (Government Gazette of the former Yugoslav Republic of Macedonia No. 92/07), coordinated, joint activities should be carried out through cooperation between the occupational health specialist, the employer and the employees.

In addition to regular medical check-ups, the occupational health specialist will need to carry out additional activities, such as providing recommendations, constant education and health examinations for preventive purposes.

### **RECOMMENDATIONS FOR EMPLOYERS:**

- Verification of the technical and technological collective protection measures (appropriate ventilation and air-conditioning if possible);
- Controlling the micro-climate parameters; providing at least one air-conditioned room which will function as a shelter where employees can come to cool off for a while during work);
- Reorganization of the work process: avoiding or reducing outdoor work (avoiding afternoon work); more frequent breaks during work; cooling of the employees by using air-conditioned rooms and providing fluids; reducing physically strenuous work. The recommendations should be adjusted to the type of work;
- Reducing the intensity and production norms of the work; avoiding overtime work; stopping work if necessary;
- Encouraging self-monitoring for symptoms by employees; providing adequate personal protection measures; taking a cautious approach with vulnerable employees (elderly workers, chronically ill, overweight people, pregnant women) and their relocation (those who are not in good physical shape to be transferred to easier working positions); and
- Warning employees about the increased danger from accidents at work and fires; special caution and surveillance during work with chemical substances because of increased danger from fumes.

## RECOMMENDATIONS FOR EMPLOYEES:

### 1. GENERAL RECOMMENDATIONS

- Eat a proper diet with plenty of minerals, proteins and vitamins.
- Drink plenty of fluids (a glass of water at 20 minute intervals). Avoid alcohol and caffeine (because of danger of dehydration).
- Increase salt intake.
- Take adequate rest (short breaks during work).
- Make sure you get enough sleep.
- Take regular showers to cool off and reduce the intensity of physical activities.
- Introduce employees to the process of acclimatization, or adapting the body to high temperatures, which can be partially achieved within 7 days, and fully within 20 days.

### 2. USE OF PERSONAL PROTECTION MEASURES

- Wear working clothes that are made from light, porous materials (natural fibres such as cotton or linen, light colours) and when working outdoors wear sunglasses and hats. Avoid clothes that inhibit sweating. Change clothes after profuse sweating.

### 3. FIRST AID AT WORK

- Recognize symptoms of heat exhaustion or heatstroke (exhaustion, weakness, fatigue, headaches, unconsciousness, paleness, dizziness, vomiting, anxiety, confusion, collapse, convulsions and shock).
- Monitor oneself for symptoms; look out for colleagues (alertness for any symptoms).
- Those who have symptoms of heat-related illness should not be allowed to go home before they stabilize (the greatest number of deaths from heatstroke are on the way home).

### 4. GIVING FIRST AID:

- If a person has hot dry skin and delirium, convulsion and/or unconsciousness, call 194 immediately. While waiting for the ambulance, move him/her to a cool place, put him/her in a horizontal position and elevate legs and hips; remove clothing and initiate external cooling, such as with cold packs on the neck, axillae and groin, continuous fanning and spraying the skin with water. Measure the body temperature. Do not give any medication. Place unconscious persons on their side.

Consult your medical doctor if you feel unusual symptoms or if symptoms persist.

## 3. EMERGENCY EXAMINATIONS

- The occupational health specialist may perform an emergency examination on vulnerable workers: those who are elderly, overweight, pregnant or with a chronic illness (cardiovascular, endocrinological, respiratory, kidney, hepatic, CNS, gastrointestinal, etc.). An individual recommendation and educational approach is required, as well as consultation with the chosen doctor for treatment or requirement for sick-leave.

# ANNEX 5

CONTACT LIST OF INSTITUTIONS AND PEOPLE THAT RECEIVE HEAT-WAVE NOTIFICATIONS VIA SMS AND E-MAIL FROM THE HYDROMETEOROLOGICAL INSTITUTE

CONTACT	INSTITUTION
<b>COMMITTEE (RECEIVE NOTIFICATION BY E-MAIL AND SMS)</b>	
Dr Vladimir Kendrovski	Public Health Institute
Dr Mihail Kocubovski	Public Health Institute
Dr Zarko Shutinovski	Ministry of Health
Dr Jovanka Kostovska	Ministry of Health
Dr Vera Menkovska	State Sanitary and Health Inspectorate
Mr Dragi Tarcugovski	Crisis Management Centre
Dr Aneta Trgacevska	City Red Cross of Skopje
Prof. Dr Jovanka Karadzinska	Institute for Occupational Health
<b>PUBLIC HEALTH CENTRES (RECEIVE NOTIFICATION ONLY BY E-MAIL)</b>	
Representative	Public Health Centre - Kumanovo
Representative	Public Health Centre - Tetovo
Representative	Public Health Centre - Bitola
Representative	Public Health Centre - Kocani
Representative	Public Health Centre - Shtip
Representative	Public Health Centre - Strumica
Representative	Public Health Centre - Ohrid
Representative	Public Health Centre - Prilep
Representative	Public Health Centre - Veles
Representative	Public Health Centre - Skopje
<b>GENERAL HOSPITALS (RECEIVE NOTIFICATION ONLY BY E-MAIL)</b>	
Representative	General hospital - Gostivar
Representative	General hospital - Veles
Representative	General hospital - Bitola
Representative	General hospital - Gevgelija
Representative	General hospital - Debar
Representative	General hospital - Kavadarci
Representative	General hospital - Kicevo
Representative	General hospital - Kocani
Representative	General hospital - Kumanovo
Representative	General hospital - Ohrid
Representative	General hospital - Prilep
Representative	General hospital - Struga
Representative	General hospital - Strumica
Representative	General hospital - Tetovo
Representative	General hospital - Shtip
Representative	World Health Organization

# ANNEX 6

## TEMPERATURE THRESHOLDS FOR THE HEAT-WAVE EARLY WARNING SYSTEM IN °C

REGION I → North-Vardar		May	June	July	August	Sept.
SKOPJE PETROVEC	VIGILANCE	30	34	37	36	32
	ALERT/PREPAREDNESS	32	36	39	38	34
	HEAT-WAVE	35	38	42	40	37
	EMERGENCY	37	41	44	42	39
Veles	VIGILANCE	30	34	37	36	32
	ALERT/PREPAREDNESS	32	36	39	38	34
	HEAT-WAVE	35	38	42	40	37
	EMERGENCY	37	41	44	42	39
REGION II → Osogovo Maleshevo		May	June	July	August	Sept.
BEROVO	VIGILANCE	26	29	31	31	28
	ALERT/PREPAREDNESS	28	31	33	33	30
	HEAT-WAVE	30	33	36	35	33
	EMERGENCY	32	35	38	37	35
Kriva Palanka	VIGILANCE	27	30	32	32	29
	ALERT/PREPAREDNESS	29	32	34	34	31
	HEAT-WAVE	31	34	37	36	34
	EMERGENCY	33	36	39	38	36
REGION III → South-Vardar		May	June	July	August	Sept.
DEMIR KAPIJA	VIGILANCE	31	35	37	37	33
	ALERT/PREPAREDNESS	33	37	40	39	35
	HEAT-WAVE	35	39	42	41	37
	EMERGENCY	37	41	45	43	39
GEVGELIJA	VIGILANCE	31	35	37	37	33
	ALERT/PREPAREDNESS	33	37	40	39	36
	HEAT-WAVE	35	39	42	41	38
	EMERGENCY	38	41	44	43	41
STRUMICA	VIGILANCE	30	34	36	35	32
	ALERT/PREPAREDNESS	32	35	38	37	34
	HEAT-WAVE	34	37	41	39	37
	EMERGENCY	36	39	43	41	39
STIP	VIGILANCE	30	34	36	36	33
	ALERT/PREPAREDNESS	32	36	39	38	35
	HEAT-WAVE	34	38	42	40	38
	EMERGENCY	37	41	44	42	40
REGION IV → Pelagonia		May	June	July	August	Sept.
PRILEP	VIGILANCE	28	32	35	35	31
	ALERT/PREPAREDNESS	31	35	38	37	33
	HEAT-WAVE	33	37	41	39	35
	EMERGENCY	36	40	44	41	37
BITOLA	VIGILANCE	28	32	35	35	31
	ALERT/PREPAREDNESS	31	35	38	36	33
	HEAT-WAVE	34	37	40	38	35
	EMERGENCY	36	39	43	40	37

<b>REGION V → Ohrid-Prespa</b>		<b>May</b>	<b>June</b>	<b>July</b>	<b>August</b>	<b>Sept.</b>
<b>OHRID</b>	<b>VIGILANCE</b>	26	29	32	32	28
	<b>ALERT/PREPAREDNESS</b>	28	31	34	33	30
	<b>HEAT-WAVE</b>	30	33	36	35	32
	<b>EMERGENCY</b>	32	35	38	37	34
<b>REGION VI → Polog-Poreche</b>		<b>May</b>	<b>June</b>	<b>July</b>	<b>August</b>	<b>Sept.</b>
<b>TETOVO</b>	<b>VIGILANCE</b>	28	32	35	34	31
	<b>ALERT/PREPAREDNESS</b>	31	34	37	36	33
	<b>HEAT-WAVE</b>	33	36	39	39	35
	<b>EMERGENCY</b>	35	39	42	41	38
<b>LAZAROPOLE</b>	<b>VIGILANCE</b>	22	25	28	28	25
	<b>ALERT/PREPAREDNESS</b>	24	27	31	30	27
	<b>HEAT-WAVE</b>	27	29	34	33	30
	<b>EMERGENCY</b>	29	31	37	35	33

# ANNEX 7

## SUMMARY OF RECOMMENDATIONS AND OPTIONS FOR URBAN PLANNING AND LIVING

MEASURES	EXAMPLES	ADVANTAGES	DISADVANTAGES
SHORT-TERM MEASURES	<ul style="list-style-type: none"> <li>Advice on behaviour</li> <li>Access to cool places</li> <li>Room air conditioners</li> </ul>	<ul style="list-style-type: none"> <li>Cheap, immediate benefit</li> <li>Can be implemented by individuals</li> </ul>	<ul style="list-style-type: none"> <li>Inherently inequitable increase in energy use and greenhouse gas emissions</li> <li>Potential adverse health impacts of room air conditioners, e.g. airborne infections</li> </ul>
MEDIUM-TERM MEASURES	<ul style="list-style-type: none"> <li>Increased albedo of building envelope</li> <li>External shading</li> <li>Insulation</li> <li>Decreasing internal heat load</li> <li>Passive cooling technologies</li> <li>Efficient active cooling</li> </ul>	<ul style="list-style-type: none"> <li>Can be designed without increase in energy consumption and implemented at building or city scales</li> <li>Synergetic effects throughout the year</li> </ul>	<ul style="list-style-type: none"> <li>Advance planning needed</li> <li>Selection of measures at the building scale needs to consider local circumstances</li> <li>Moderately expensive</li> <li>potential risk of 'designing buildings for a heat-wave' and forgetting the rest of the year</li> </ul>
LONG-TERM MEASURES	<ul style="list-style-type: none"> <li>Building regulations</li> <li>Urban planning</li> <li>land-use changes</li> <li>Mitigation of climate change</li> </ul>	<ul style="list-style-type: none"> <li>Reduced energy consumption and greenhouse gas emissions</li> <li>Can be combined with active mobility and air pollution reductions</li> <li>Inherently equitable, with major potential health benefits</li> </ul>	<ul style="list-style-type: none"> <li>Costly</li> <li>Long lead times</li> <li>Requires political will (in the case of climate change mitigation, even at international level)</li> </ul>

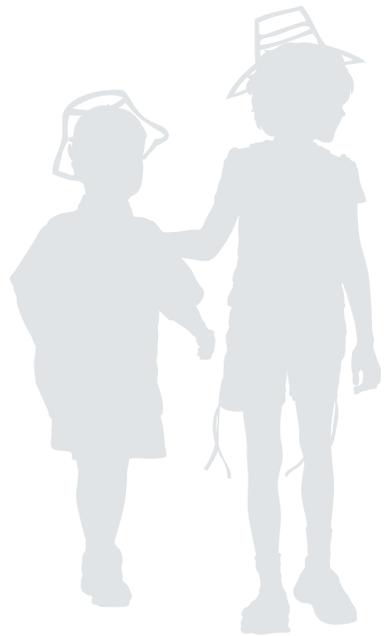
# ANNEX 8

## PROCEDURE FOR DECLARING A CRISIS

IN THE EVENT OF A CRISIS, THE CRISIS MANAGEMENT CENTRE CALLS AN URGENT MEETING OF THE ASSESSMENT GROUP (FROM CMC) IN ORDER TO CONSIDER THE NECESSITY FOR THE AUTHORITIES TO TAKE THE NECESSARY MEASURES AND ACTION. THE ASSESSMENT GROUP EXAMINES ALL THE FINDINGS, INFORMATION AND REPORTS ON THE SPECIFIC CONDITIONS AND PROVIDES RECOMMENDATIONS TO THE GOVERNING COMMITTEE (A GOVERNMENT BODY FOR COORDINATION AND MANAGING OF THE CRISIS MANAGEMENT SYSTEM WHICH CONSISTS OF THE MINISTERS OF INTERNAL AFFAIRS, HEALTH, TRANSPORT AND COMMUNICATION, DEFENCE, FOREIGN AFFAIRS AND THE MANAGER OF THE ASSESSMENT GROUP). IF NECESSARY, OTHER FUNCTIONARIES CAN BE INCLUDED. THE MANAGING COMMITTEE, TAKING INTO CONSIDERATION ALL THE FINDINGS ON THE CONDITIONS IN THE FORMER YUGOSLAV REPUBLIC OF MACEDONIA AS WELL AS THE PROPOSAL OF THE ASSESSMENT GROUP, INFORMS THE GOVERNMENT ABOUT THE SPECIFIC CONDITIONS, OR RECOMMENDS TO THE GOVERNMENT OF THE FORMER YUGOSLAV REPUBLIC OF MACEDONIA TO DECLARE A CRISIS. ON THE BASIS OF THE CONCLUSIONS OF THE MANAGING COMMITTEE, THE GOVERNMENT OF THE FORMER YUGOSLAV REPUBLIC OF MACEDONIA MEETS URGENTLY TO MAKE A DECISION TO DECLARE A CRISIS IN THE ENDANGERED AREA AND ENGAGE ALL AVAILABLE HUMAN AND MATERIAL RESOURCES TO COMBAT THE CONSEQUENCES OF THE SAME. AFTER THE DECISION HAS BEEN TAKEN, THE MAIN HEADQUARTERS OF THE CRISIS MANAGEMENT COMMITTEE, WHICH HAS TO BE IN CONSTANT SESSION, IS ACTIVATED.

## References

- Bouchama A (2007). Thermophysiology, pathophysiology and clinical management of heat-related illness. Riyadh, King Faisal Hospital and Research Centre.
- Government of the former Yugoslav Republic of Macedonia (2008). Second National Communication on Climate Change. Skopje.
- Kendrovski V (2006). Climate change vulnerability analysis of the health sector in the Republic of Macedonia with proposed adaptation measures. Institute of Public Health, Skopje.
- Klein Tank A et al. (2002). Climate of Europe: assessment of observed daily temperature extremes and precipitation events. De Bilt, KNMI.
- Ministry of Health of the former Yugoslav Republic of Macedonia (2009). National Crisis Preparedness Plan. Skopje.
- World Health Organization Regional Office for Europe (2008). Heat Health Action Plans Guidance. [http://www.euro.who.int/\\_\\_data/assets/pdf\\_file/0006/95919/E91347.pdf](http://www.euro.who.int/__data/assets/pdf_file/0006/95919/E91347.pdf)



It is expected that the climate change will cause an increase in the average global temperatures, as well as the number and intensity of heat waves. Recent heat – waves in Europe have led to a rise in related mortality, but the adverse health effects of heat waves are largely preventable. Prevention requires portfolio of actions at different levels, including strengthening and conducting a heat-wave announcements and warnings system (heatwave early warning system), strengthening the preparedness and the health services' response, timely informing the public about the possible heat-wave consequences and how to deal with them, as well as improvements to housing and urban planning.

This document contents the activities as part of the “Heat - health action plan to prevent the heat waves' consequences on the health of the population in the former Yugoslav Republic of Macedonia”. The document has been developed as part of the project “Protecting health from climate change – a seven country initiative”, implemented with financial support from the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety of the Federal Republic of Germany.



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