SCORCH

Funded by
European Union
Civil Protection

HEAT PLAN COMPILATION

DELIVERABLE 2.1

Grant agreement no.	826565
Project start date	01/02/2019
Duration of the project	24 months
Deliberable number	2.1
Deliverable leader	Université catholique de Louvain
Dissemination level	Public
Status	Final
Submission date	31/07/2019
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This project has received funding from the European Union's Directorate-General for European Civil Protection and Humanitarian Aid Operations (DG ECHO) under grant agreement No 826565.

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Heat plan compilation

Deliverable 2.1

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Acknowledgement

The authors would like to thank International Advisory Board members Sophie Lokietek, Jorgen Sparf and Werner Hagens for providing feedback and useful insights.

Preface

This report presents the work that has been performed by SCORCH partners to create an overview of national heatwave plans as part of WP2.

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1. Introduction

Background & objectives of SCORCH

Extreme temperatures, including heat and cold waves, are climatological hazards. Both in the EU as well as in EU-Neighbourhood countries, research has shown that heatwaves cause a rise in morbidity and mortality. Since heatwaves are not restricted to country borders, a cross-border approach is required to ensure collective preparedness and response to mitigate the impacts on communities and limit the financial and health costs.

The overall objective of SCORCH is to reduce the impact of heatwaves on vulnerable, urban populations through improved risk communication strategies based on existing EU plans and guidelines. In addition, we will measure risk perception and behaviour in communities in EU-neighbourhood countries through surveys and foster a cross-country culture of prevention and cooperation.

Why this overview?

To make maximum use of existing knowledge and strategies on heatwaves, the project starts out by collecting existing heatwave plans of EU countries. Based on these plans we aim to identify the necessary building blocks that make up a heatwave plan. Through this overview and a literature review on studies that evaluated existing heatwave plans (deliverable 2.2.), we aim to help find a standard for developing a heatwave plan and apply this to the development of the risk communication strategies in WP4.

This report outlines the methodology used for collecting and subsequently analysing existing heatwave plans; and describes the results of this effort.

2. Methodology

Which plans are eligible?

The collection of heatwave plans focuses on existing plans and guidelines within the EU. Specifically, we use the following criteria to select the plans:

a. the plan is developed for an EU country or country in the European continent;
b. the plan is issued on the national level by a national authority or agency;
c. heat is a main topic of the plan; and
d. for practical purposes, the plan needs to be available in English or translatable to English (using Google Translate for documents).

Table 1 provides an overview of the plans that meet our criteria and that are part of the overview. In total, 14 plans are eligible. The table also mentions the authority responsible for the development of the plan, and the years of the first and last versions of the plans. Since some heatwave plans have already been evaluated by the involved stakeholders (e.g. BE, FR, NL, ES, UK) and have been further improved based on these evaluations, readers should take note that some plans are more mature than others.

Nevertheless, other heatwave plans exist that would have fulfilled the inclusion criteria, but are not included here for reasons explained below. First, based on a study by Bittner et al. (2013), we know that in Hungary, Monaco, Moldova, Romania and Serbia heatwave plans exist, though we were not able to retrieve them through standard searches. Second, a national adaptation strategy for heat may also have been developed in Cyprus following an EU LIFE project (Giannakopoulos et al., 2014), but it could not be found. Finally, for some countries we have identified plans and guidelines that do not match the criteria. This includes regional heatwave plans or guidelines published on a news website. These documents are not included in the overview. However, since they might be valuable for developing a heatwave plan, we list these documents in annex 1.

Table 1 – overview of collected plans

Country	Title (translated to English)	Responsible authority	First version	Latest update
Austria (AT)	Heat protection plan (Arrouas & Ditto, 2017)	Ministry of Health	2017	-
Belgium (BE)	Federal plan for heat and ozone peaks (Tsachoua & Reynders, 2016)	Ministry of Health	2005	2016[1]
Finland (FI)	Health care cold and heat guide. Model for use by regional actors 2011-2012 (Alen et al., 2011)	Health care centre Research centre	2011	
France (FR)	National heatwave plan (Ministère des Solidarités et de la Santé, Ministère de l'Intérieur, Ministre de la Cohésion des Territoires, Ministère du Travail, & Secrétariat d'Etat Chargé des Personnes Handicapées, 2017)	Ministry of Civil Security Ministry of Health Ministry of Interior Affairs	2004	2018
Germany (DE)	1. Climate change and health – Information on health effects of summer heat and heatwaves, and tips for preventive health protection (Mücke, 2008) 2. Recommendations for action – Heat action plans to protect human health (Straff & Mücke, 2017)	Ministry of Environment	2008	2017
Italy (IT)	National prevention plan for the effects of heat on health (de Martino, 2018)	Ministry of Health	?	2018
Lithuania (LT)	Order on national public health and heat prevention (Sveikatos apsaugos ministrė, 2015)	Ministry of Health	2015	-
Luxembourg (LU)	Action plan in case of great heat (Direction de la Santé, 2018)	Ministry of Health	?	2018
Macedonia (MK)	Heat-health action plan. To prevent the heatwaves consequences on the health of the population in the former Yugoslave Republic of Macedonia (Kendrovski & Spasenovska, 2011)	National Public Health Institute WHO	2007	2011
Netherlands (NL)	National heat plan (Hagens W.I. & van Bruggen M., 2015)	Ministry of Health	2007	2015
Portugal (PT)	Contingency plan for extreme adverse temperatures – heat module (Freitas, Silva, Diegues, Santiago, & Selada, 2014)	Ministry of Health	2014	-
Spain (ES)	National plan for preventive actions for the effects of excess temperatures on health (Ministerio de Sanidad Consumo y Bienestar Social, 2018)	Ministry of Health	2004	2018

[1] During the research period, a new version of the Belgian heatwave plan was published (Federale Overheidsdienst Volksgezondheid Veiligheid van de Voedselketen en Leefmilieu, 2019)

Country	Title (translated to English)	Responsible authority	First version	Latest update
Sweden (SE)	Managing health effects of heatwaves – guidance to action plans (Folkhälsomyndigheten, 2017)	Public Health Authority	-	2017
Switzerland (CH)	Epidemiology and public health – heatwave measures toolbox (Ragettli & Röösli, 2017)	Ministry of Health	2017	
United Kingdom (UK)	Heatwave plan for England – protecting health and reducing harm from severe heat and heatwaves (Public Health England, 2014)	Public Health Authority	2004	2014

Overall workflow

The figure below describes workflow underlying the creation of this deliverable. The process is organised into three stages: stocktaking, analysis and report.

A. Stocktaking

The first step in the process is to identify and collect national plans. We start out by identifying national plans referred to in review articles (e.g. Boeckmann & Rohn, 2014; Lowe, Ebi, & Forsberg, 2011; Toloo, Fitzgerald, Aitken, Verrall, & Tong, 2013b, 2013a).

Next, for those countries that are not mentioned in these articles, we conduct a web search. The same keywords are used for each country, though they are translated to the country's dominant language. Specifically, the following keywords are used:

- *Country name* + national heatwave plan
- *Country name* + heat alert
- *Country name* + national heat health warning system
- *Country name* + plan + heat + health

If this does not lead to the identification of a national plan, the next step is to search the websites of public health authorities and meteorological institutes. By using the "Google Translate plug-in", it is possible to understand the content of these websites even when they are not available in English or another language covered by the research team.

When this second step also does not lead to the identification and collection of a national plan, we reach out to public health authorities, meteorological institutes or researchers who have published on the country's national plan before.

Heatwave plans that are only available in foreign languages, are translated to English by using Google Translate for documents. We chose this platform over e.g. DEEPLE, as it offers translation from a larger number of languages.

B. Analysis

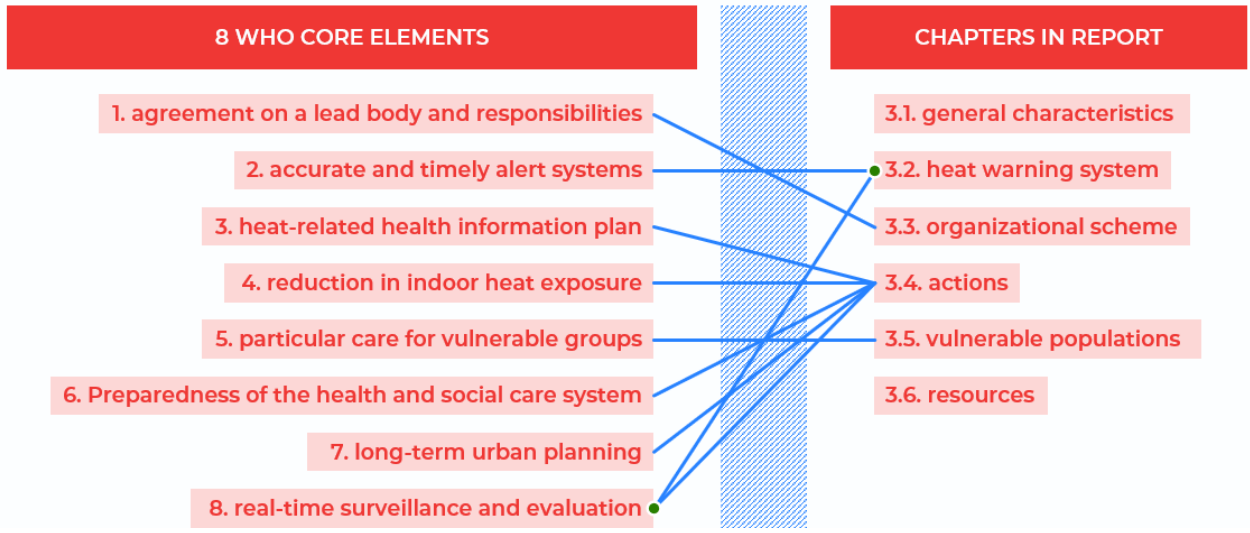
The collected plans are imported and analysed inductively in NVivo, a software program for conducting qualitative analyses. We begin with a descriptive analysis to identify key characteristics of each plan (e.g. date of creation, date of latest update). Next, we use axial coding (i.e. a qualitative research technique based on grounded theory used to make connections between data (Bryman & Burgess, 1994)) to organise the content of the plans in thematic categories (e.g. involved stakeholders, targeted vulnerable populations).

The maturity of the collected plans varies from prototypes (e.g. Luxembourg's plan) to complete plans that have been in use for several years (e.g. France's plan). Therefore, the comparison between the plans is mainly descriptive.

C. Report

The structure of the report is based on the eight core elements which have been identified by the WHO as important to the successful implementation of heat-health action plans (Bittner et al., 2013; WHO Regional Office for Europe, 2008). Figure 2 describes the relations between these eight elements and the chapters in this report. The first chapter gives a general overview of the objectives of the national heatwave plans and the types of plan we identified. The second chapter discusses WHO elements 2 and 8, and the third chapter discusses element 1. The fourth chapter contains information on WHO elements 3, 4, 6, 7 and 8, as they all relate to actions described in the heatwave plans. The fifth chapter discusses WHO element 6. Finally, chapter 6 discusses different types of resources that are mentioned in the heatwave plans.

Figure 2 – link between WHO core elements and report



3. Overview of the national plans and their content

3.1. General characteristics

A. Objective

All countries, except Luxembourg, define a clear objective that the heatwave plan has to accomplish. We identify four main themes:

1. **to prevent** negative health effects of heat, in particular in populations considered at risk or vulnerable;
2. **to raise awareness** on the health impact of heat in the general public, vulnerable populations and their caretakers, and involved authorities and organisations;
3. **to coordinate** actions among authorities and organisations; and
4. **to forecast** heat and other adverse weather conditions in a timely manner.

While all national plans focus on heat, some also include other meteorological or environmental phenomena such as ozone (BE, LT), air pollution (DE, PT), UV radiation (LT, PT) and fire (PT, UK). Table 2 synthesises the objectives of the national plans. Chapter 3.2.A contains more information on the warning parameters.

Table 2 – Overview of objectives as described in plans

Country	Objective of the plan
AT	The main objective of the Austrian Heat Protection Plan is to reduce heat stress and prevent additional climate change-related negative health effects in the population in especially heat-prone areas (e.g., urban areas affected by the heat-island effect). In addition to climate change, broad demographic changes in Austrian society are to be expected. Changes in population size, age distribution, number of single-person households, or other demographic characteristics have implications on the handling of the environment, but also on specific needs (e.g., heat sensitivity increases with age). The plan serves to increase awareness of the health-related problems caused by prolonged heatwaves. Practical tips and a guide for authorities and institutions should help to prevent heat-induced illnesses and fatal casualties.
BE	The plan primarily aims at specific objectives similar to those in the previous plan, namely: • predicting and anticipating great heat or ozone peaks; • defining the actions to be implemented at national level to prevent and limit the effects on health; • in the event of the threshold values being exceeded, ensuring the coordination of specific actions (health, environment and communication measures) between the federal government and all sub-areas; and • adapting prevention and crisis management measures as well as possible by paying particular attention the most at-risk populations.
FI	The guide brings together knowledge on the effect of cold and heat on humans and on measures to prevent a health impact. The guide provides information on healthy body reactions to cold and heat exposure, as well as counselling and guidance on health hazards for particularly vulnerable age groups and different patient groups.
FR	The aim of the 2017 plan is to anticipate the arrival of a heatwave, to define the actions to be implement at local and national level, to prevent and limit the health effects of these and to better adapt the prevention and management measures at territorial level. Additionally, particular attention is given to the specific populations identified. The plan is based on four axes: • prevent the effects of a heatwave; • protect populations by implementing adapted management measures at the levels of meteorological vigilance; • inform and communicate; and capitalise on experiences.
DE	1. The objective of a heat action plan is to reduce exposure to heat (where possible with the same measures) and UV radiation, by means of preventive behavioural and setting-based measures to avoid heat- and UV-related illnesses and deaths. Each individual can take preventive behavioural measures. Awareness raising geared to each target group is needed in this context. In addition, setting-based preventive measures need to be taken, which include changes in the living and working environment. 2. An action plan would be suitable to efficiently communicate the health impacts of climate change, particularly of extreme heat, and on the other hand to achieve a risk behaviour that is appropriate for the situation and establish preventive options for action. The action plan should contain behavioural and setting-based preventive measures in all fields of prevention.
IT	The plan implements the following initiatives: • activation of city=specific forecasting and alarm system – Heat Health Watch Warning (HHWW) – based on the analysis of historical mortality and variable weather data;

Country	Objective of the plan
	• coordination and definition of the information flow for the dissemination of information on the level of risk to health, and identification of the referents of the local plans for heatwaves; • management of health surveillance of health effects (mortality and morbidity daily); • technical support for the identification of population subgroups susceptible to effects of heat; • updated list of services and call centres on the territory in favour of the elderly population; • surveillance of first aid access (extended to all year); • training of health workers and institutional referents of local plans for heatwaves; and • review and update of the guidelines for the prevention of the effects on health of heatwaves intended for representatives of local institutions; • preparation of the guide to fight forest fires.
LT	The objective of implementing the action plan is to protect the health of the population against heat and to raise public awareness of the dangers of heat, in particular to protect the heat sensitive people. This includes: • reducing the negative impact of heat on public health by increasing heat-sensitive people awareness; and • ensuring and promote - within national, regional, local authorities and legal bodies - close cooperation between individuals on public health and heat to improve information for people who are sensitive to heat.
LU	(The document does not outline an objective)
MK	The Heat-health Action plain aims to prevent and combat potential heat-wave health threats. This includes an early warning system, which is 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 heat health warnings, especially for those most vulnerable to the effects of heat-waves; • timely coordination of currently available measures and resources for response to heat-waves; and • raise awareness amongst the public and health workers of the effects of heat-waves on people's health.
NL	The National Heatwave plan is aimed at timely notifying organisations that persistent hot weather is predicted, so that measures can be taken to reduce the inconvenience caused by persistent heat and (where possible) prevent it. The National Heatwave plan is in fact a communication plan in which the information must be delivered in a timely and complete manner to risk groups and in their immediate environment. This environment consists, among other things, of the institutions with which the vulnerable group has contact, but other care providers and volunteers are also part of the environment. This awareness and knowledge are a prerequisite for adequate action in a period of persistent heat.
PT	The general objective of the Contingency Plan is to minimise the negative effects of intense heat on the health of the population by means of an effective risk assessment and the development of appropriate responses by the competent health authorities, based on the availability of all information considered relevant and in collaboration with all the entities involved. The present plan also has specific objectives: • strengthen interinstitutional coordination;

Country	Objective of the plan
	• improve the forecast, alert and response system; • define intervention guidelines / recommendations; • provide information to the general population and to the most vulnerable groups, in particular, on measures and procedures to be adopted in the heat; and • monitor morbidity and mortality from possible heatwaves.
ES	The objective of this Plan is to reduce the impact of excess temperatures on the health of the population. The strategy is based on the following actions: • development of the Environmental Information System that includes the prediction of temperatures; • information to the population on the effects of excessive heat and on protection and prevention measures; • development of the Mortality Information System; • information to health professionals and social services; • coordination with social services for the identification of the risk groups, especially both children and very greater; and • coordination with the administrations and competent entities.
SE	This guidance is intended to provide support and recommendations to municipalities, county councils, regions and private actors in their work on developing action plans to strengthen the ability to handle negative health effects. It is hoped that the guidance will help to reduce the risk of the population and especially the vulnerable groups to die or to fall ill due to heatwaves.
CH	The toolbox is a compilation of measures to minimise negative health effects of heatwaves. It is a tool designed to help the cantons, to design their own heat reaction plan. Successful prevention includes measures at various levels. This includes: • awareness and training of the population and the actors of the health system; • management of extreme events; and • long-term adjustment the increasing heat load.
UK	The purpose of this heatwave plan is to reduce summer deaths and illness by raising public awareness and triggering actions in the NHS, public health, social care and other community and voluntary organisations to support people who have health, housing or economic circumstances that increase their vulnerability to heat. Communities can also help their neighbours, friends and relatives to protect against avoidable harm to health this summer.

B. Type of plan: non-committal versus enforceable

Another important characteristic of a heat plan is the extent to which its implementation can be enforced by the responsible authorities. We identify three types of heatwave plans that represent varying degrees of enforceability:

- **Recommendations for developing a plan.** The plan contains recommendations for regional authorities, local authorities and/or relevant organisations with regard to the development of a heatwave plan. These recommendations usually include a description of the elements that are preferably included in a heatwave plan, and/or a suggestion for how to organise the implementation of these elements. As stakeholders are free to develop a heat plan how and when (if) it suits them, this type of plan is the least enforceable and very non-committal.
- **Guidelines.** The plan contains a (specific) description of actions and measures that are to be implemented in the case of a heatwave. This can also include an organisational scheme and can include the assignment of specific roles and responsibilities to relevant stakeholders. Guidelines are often non-committal and not enforceable, unless when they are turned into laws and regulations.
- **Laws and regulations.** The plan describes the actions and measures that stakeholders are legally obliged to take when a certain alert level is activated. In some cases, the entire plan is legally enforceable, in other cases the plan is a combination of non-committal guidelines and enforceable laws.

Table 3 – Overview of the types of national plans

Content	Country														
	AT	BE	FI	FR	DE	IT	LT	LU	MK	NL	PT	ES	SE	CH	UK
Recommendations for developing a plan															
Guidelines for action															
Laws and regulations															

3.2. Warning system

A warning system is an instrument that can prevent negative health impacts during heatwaves. The purpose of a warning system is to warn the public and relevant stakeholders about the occurrence of a heatwave. A timely warning allows them to implement the heatwave plan. Warning systems are based on the monitoring of certain parameters. When these parameters exceed predefined criteria, an alert level is triggered (McGregor, Bessemoulin, Ebi, & Menne, 2015; WHO Regional Office for Europe, 2008). Below we first identify and describe the warning parameters included in each plan.

Except for the heatwave plan of Lithuania, all heatwave plans include some kind of warning system. Next, we recount the alert levels that each the plan uses. Finally, we elaborate on the target populations and the communication channels through which the warning is distributed.

A. Warning parameters

All national plans, except for those of Finland, Lithuania and Sweden, define one or more warning parameters on which their heat warning system is based. Temperature is included in all other plans as a warning parameter. Table 4 provides an overview of the warning parameters per country.

Table 4 – Overview of the parameters used

	Countries											
Warning parameters	AT	BE	FR	DE	IT	LU	MK	NL	PT	ES	CH	UK
Air pollution												
Indoor temperature												
Fire												
Morbidity												
Mortality												
Medical activity												
Other criteria												
Ozone levels												
Temperature												
Other meteorological factors												

Table 5 describes the parameters in more detail. In addition, we also make note of the scale on which the parameters are monitored, which ranges from the organisational to the national level. Finally, for each parameter, responsible authorities have to define thresholds in relation to the alert levels. In the plans, however, we only find thresholds for meteorological parameters. These are described in annex 2.

Table 5 – Overview of warning parameters

	WARNING PARAMETER	SCALE OF APPLICATION
Air pollution	Monitor levels of air pollution (FR)	regional: FR
Indoor temperature	Check indoor temperature regularly during hottest periods in areas where vulnerable people reside (UK, MK)	organisational: UK, MK
Fire	Expected fire propagation days and pollutants transported by wind to densely populated areas (PT)	regional: PT
Morbidity	Use of Bio Meteorological Indicators associated with certain risk levels (FR) Surveillance of morbidity effects (PT) on a daily base (CH, DE, ES, UK, IT) Health risk assessments and risk analyses based on indicators from existing data on health (MK) Surveillance and assessment of risks associated with exposure to excessive temperature (CH, ES, UK)	scale not specified: DE, ES, UK, PT regional: CH, FR urban regions: IT, MK national: MK
Mortality	Estimating increases in mortality using general mortality data (MK) Time-series analysis for May-September on mortality data Comparison of mortality data to meteorological data (MK, PT, ES, UK) Daily mortality monitoring (CH, DE, ES, IT, UK) Data analysis at the end of the season (FR, MK) Compare current mortality data to data obtained in previous years, to identify excess mortality even before thresholds are exceeded (ES)	scale not specified: DE, ES, UK, PT regional: CH, FR, PT sample of communes: FR urban regions: MK national: MK, PT
Medical activity	(Real-time) data on: • the use of emergency services (DE, FR, UK, IT, MK) • calls to SOS telephone lines (DE, UK, MK) • GP consultations (DE, UK) Analysis on the impact of a heatwave on the use of emergency care (FR) Data on the saturation of hospitals (FR) Time series analysis on emergency calls, grouping of data according to symptoms and comparison to meteorological data (MK)	scale not specified: DE, FR, UK, IT, MK
Other criteria	Locally relevant criteria (AT) Drought (UK, FR) Supply of drinking water (DE, FR) Saturation of funeral operators (FR) Electricity supply (DE, FR) Need for adjusted working times or work stoppages (FR) Organisation of events (PT) Transport infrastructure (UK)	scale not specified: DE, FR
Ozone levels	Daily ozone levels (DE, PT) Daily and hourly ozone levels (BE)	scale not specified: PT national: BE regional: DE
Temperature	Fixed thresholds (BE, IT, LU, PT, MK, NL) Threshold temperatures based on p95 of the historical series for maximum and minimum temperatures during summer (ES) Threshold temperatures based on health risk (UK, FR)	scale not specified: DE, LU, NL urban regions: ES, FR, IT, MK, PT, UK

	Warning parameter	Scale of application
	Threshold based on a Heat Index, a combination of meteorological criteria (CH) Predicted duration of hot weather or heatwave (BE, ES, UK, FR, IT, LU, NL, PT) Weighted average of predicted daily maximum temperature and daily mean of sensed temperature (AT) Nightly cooling in the form of average minimum temperature (AT, DE, LU, PT) Predicted nightly average maximum temperatures (UK) Predicted daily average minimum temperature (BE, ES, FR, PT) Predicted daily average maximum temperatures (BE, CH, UK, ES, FR, LU, MK, NL, PT) Observed maximum temperature (PT) Average predicted temperatures at 8AM, 14PM Predicted maximum (IT) or average maximum (DE) sensed temperature Sudden rise in temperature (PT)	regional: AT, CH, ES, UK, FR, IT, MK, PT national: BE
Other meteorological factors	Humidity (CH, DE, FR) Wind speed (DE) Heat radiation (DE) Solar radiation (DE) UV radiation (CH, DE, PT)	scale not specified: CH, DE, FR, PT

B. Alert levels

Overall, we find that warning systems can include up to five different alert levels from level 0 to 4. However, not all countries include all five levels in their plan: the Netherlands, Portugal, Sweden and Switzerland use three alert levels; Austria, Germany[2], Italy, Luxembourg and Spain use four alert levels; and Belgium, France, Macedonia and the United Kingdom use five alert levels. As mentioned above, Finland and Lithuania do not have a warning system and are thus not included in this part of the analysis. Sweden does not describe warning parameters, but does have a warning system.

Table 6 – Overview of alert levels per country

Alert level	Countries												
	AT	BE	FR	DE	IT	LU	MK	NL	PT	ES	SE	CH	UK
0													
1													
2													
3													
4													

Regardless of the number of alert levels that the warning system uses, there are similarities between the countries in how the levels are defined, and in the actions associated with a certain alert level. In general, the five levels can be described as follows:

- **Level 0 – preparedness.** Preparation for heatwaves all year round, including long term planning, evaluating previous experiences, evaluating and optimising existing measures and ensuring everything is prepared for the next summer.
- **Level 1 – vigilance.** This is the minimum alert level and is in place every year during the summer months (May-September), which is the period that heatwaves are most likely to occur. This alert level means that authorities, organisations and individuals should be aware of what to do when an alert is raised, and should prepare to implement necessary measures.
- **Level 2 – hot weather.** This alert is issued when the threshold temperatures are expected to be exceeded, but the health risks are still limited. This alert level can also mean that some measures are implemented, such as informing

[2] Although from table 6 it may seem that the German warning system skips a level, in the plan the marked levels follow upon one another. The reason that level 1 is not marked, is that the German plan does not have a level 1 as defined below.

stakeholders, informing the public and ensuring the readiness of stakeholders to implement certain measures.

- **Level 3 – heatwave.** This alert is issued when the threshold temperatures further increase and/or threshold temperatures are exceeded during a longer period of time. These temperatures are likely to cause adverse health effects. At this level, the measures taken under level 2 are intensified, and additional measures are taken to protect the general public and specific vulnerable populations.
- **Level 4 – emergency.** The heatwave causes significant health issues and affects other sectors (e.g. agriculture, traffic, energy, ...) besides health. The measures taken under level 3 are intensified. In addition, a crisis cell can be activated that is tasked with assessing and managing the risks.

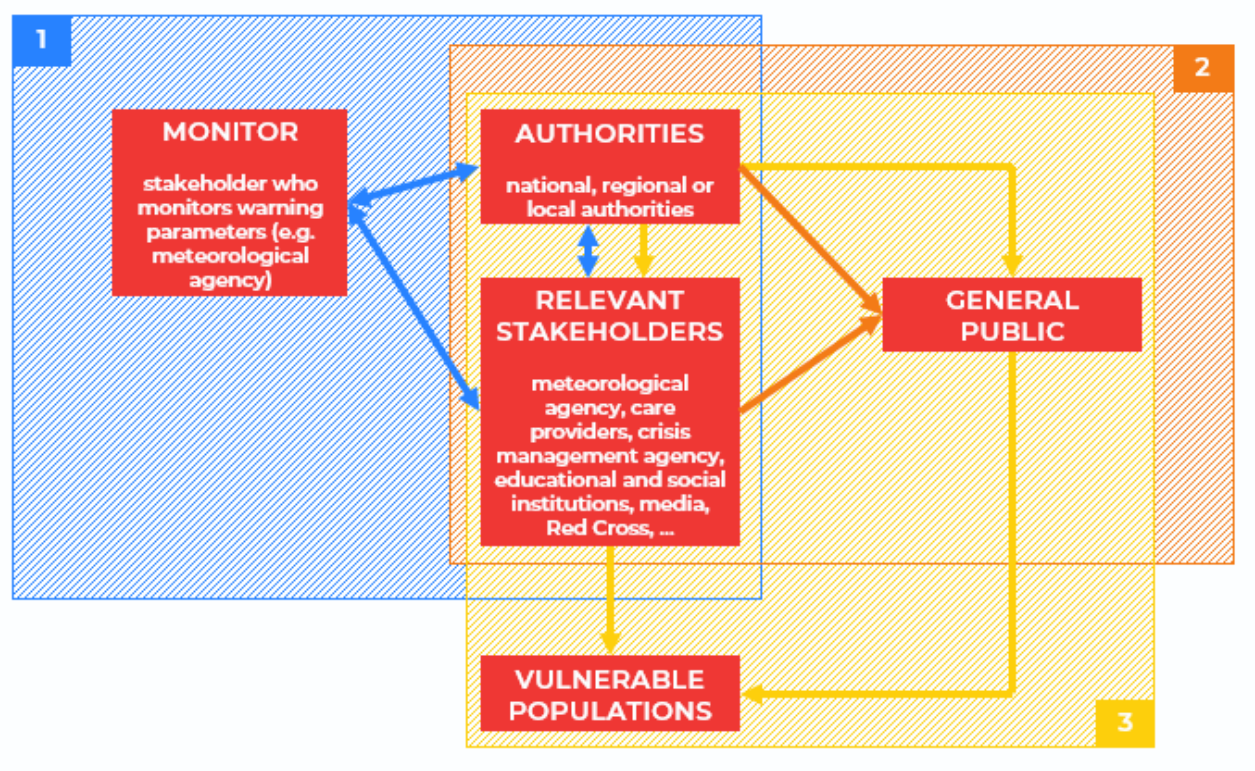
Annex 2 provides a more detailed description of the alert levels used in each plan, including the criteria for triggering an alert level and specific actions linked to a specific alert level.

C. Types of communication and service flows

Based on the analysis, we find that warning systems consist of up to three types of flows. The term flow refers to a process of interaction through which information and/or services are disseminated. Each flow serves another purpose and involves other stakeholders. The first two flows generally aim at informing and raising awareness; whereas the third flow also includes other services (i.e. care and monitoring). Figure 3 provides a synthesis of these three flows. For information on the specific roles and responsibilities of the involved stakeholders, we refer to chapter 3.3 and annex 3.

The warning system starts by activating the first flow (1 in figure 3), and is followed by the second (2 in figure 3) and/or third flows (3 in figure 3). While most heatwave plans mention specific actions with regard to vulnerable populations, not all countries include these actions as part of the warning system. In other words, not all countries include a third flow.

Figure 3 – Synthesis of possible flows in a warning system



The first type of flow (1) is a communication flow, which involves authorities and other relevant stakeholders (e.g. crisis management agency or care providers). The monitoring organisation usually triggers the flow, but afterwards communication will not be one-directional. The aim of this flow is to inform authorities and stakeholders of parameter values, to trigger the alert and to initiate actions. The (initial) information is usually conveyed over email, which allows for personal and detailed communication. For this purpose, the stakeholder responsible for starting the flow may have access to a pre-established list of email addresses.

The second type of flow (2), is a one-directional communication flow targeted at the general public. The aim of this flow is to inform as many people as possible about the occurrence of a heatwave, to raise awareness about the health impact of heat, and to provide advice on how to respond. Channels that are used to communicate these messages include television and radio, websites of authorities and relevant stakeholders (e.g. meteorological agency or social services), online newsletters, a telephone hotline, and leaflets and posters distributed by authorities and relevant stakeholders (e.g. pharmacies or social centres).

Finally, the third type of flow (3) specifically targets vulnerable populations. The aim of this flow is to inform vulnerable people (and their caretakers) about the occurrence of

a heatwave and to trigger the activation of certain services (e.g. mobile teams that make house visits). For this purpose, some countries promote the registration of vulnerable people (by themselves, caretakers or another organisation) prior to the summer period to ensure they can receive additional care and monitoring in the event of a heatwave (FR, LU, MK, ES, CH, UK).

3.3. Organisational scheme

A. Stakeholders and their roles

This section discusses the organisational scheme of the different heatwave plans. Except for Finland, Italy and Lithuania, all countries define roles and responsibilities of stakeholders in varying degrees of detail. Specifically, we discuss the involvement of those stakeholders for which the heatwave plans explicitly define roles and responsibilities in relation to the warning system. Hence, stakeholders that are mentioned in the plan without reference to a specific role or responsibility are not included in this part of the analysis. This implies that a plan can mention more stakeholders than those included here.

Table 7 provides an overview of the types of stakeholders that are included in the heatwave plans and the roles assigned to them. The most frequently included stakeholders are the meteorological agency (all countries), care providers (i.e. hospitals, elderly homes, GPs, nurses, etc.) (9 countries), Ministry of Health (7 countries), local or regional authorities (6 countries) and other ministries (6 countries). The countries that include the most types of stakeholders are Macedonia (13), United Kingdom (9), France (8), Luxembourg (7) and Portugal (6).

A stakeholder can perform one or more roles within the heatwave plan, and this can differ between countries. We identify the following roles:

- **Author (A):** responsible for developing and setting up the (national) heatwave plan (see also table 1);
- **Activator (Ac):** responsible for triggering the heatwave warning system and activating the plan;
- **Coordinator (C):** responsible for coordinating the implementation of the plan and/or cooperation between stakeholders
- **Informer (I):** (co)responsible for diffusing information to other stakeholders and/or end users;
- **Monitor (M):** responsible for monitoring warning parameters and informing other stakeholders or end users of the values of warning parameters;
- **Implementer (Im):** responsible for implementing the heatwave plan to ensure health of vulnerable people and the general public with respect to heat;
- **Evaluator (E):** responsible for documenting, monitoring/or and evaluating the heatwave plan and course of action.

Table 7 – Overview of the stakeholders involved

Stakeholders	Countries														
	AT	BE	FI	FR	DE	IT	LU	LT	MK	NL	PT	ES	SE	CH	UK
Care providers	A I Im		A	Im	C I Im		I		A E Im	A Im	Im		E I		A I Im
Community groups															A I Im
Crisis or risk management body		Ac E			C Im				M						
Cross-government body		Ac I M							Ac			E I			Ac E
Designated responsible actor				Ac	C				A I M				Ac E		Ac I
Educational and social institutions					C Im				A I Im			Im			
Emergency services	Im				C Im				M		Im				
Local or regional authorities	I	I		Ac I Im	A C E		Im		Im			A I Im			
Media				I			I		I	I	I				I
Meteorological agency	Ac I M	I M		I M	Ac I M		I M		Ac I M	Ac I M	I M	I M	Ac I M	I M	Ac I M
Ministry of Health	A I Im	A E I M		A C E I Im M		A	A Ac I Im	A	A I Im	A	A I		A	A	A E Im
Other ministries				A	A		I		Ac						Im
National (or regional) public health agency	I Im			I Im M					Ac I Im M	Ac I	Ac I M	Im		Ac I M	E I Im M
Prime minister				Ac											
Red cross							I Im		I Im	I					
Sector and interest organisations										A I					

B. Stakeholders and their responsibilities

Table 8 provides a more detailed overview of the specific roles and responsibilities that are or can be assigned to a stakeholder when a certain alert level (AL) is activated.

Table 8 – Overview of stakeholders and their roles and responsibilities

STAKEHOLDERS	RESPONSIBILITIES
Care providers	Develop and implement heatwave plans (NL, MK, UK) (AL 0-3) Develop and implement business continuity plans (CH, FR, UK), AL 0-4) Document and report activities (SE) (AL 1-2) Ensure and maintain preparedness to implement measures (UK, NL, PT) (AL 1-3) Environmental and infrastructure improvement (UK) (AL 0-4) Heatwave hotline (LU, MK) (AL 1) Identify, monitor and assist vulnerable people (FR, MK, LU, PT, UK) (AL 0-3) Provide information on alert level and protection measures (AT, DE, SE, UK) (AL 1-4) Raise awareness on health impact of heat, heatwave plan and measures (UK, MK, SE) (AL 0-3) Report, evaluate and/or monitor warning parameters (MK, SE) (AL 1-3)
Community groups	Develop and implement a plan to identify, monitor and support vulnerable people (UK) (AL 0-4) Provide information on health impact of heat and protection measures (UK) (AL 1)
Crisis management agency	Monitor warning parameters (MK) (AL 1-4) Evaluate and communicate health risk (BE) (AL 2-4)
Cross-government (interregional, interministerial)	Ensure and maintain preparedness to implement measures (BE) (AL 1) Evaluate actions to manage risk (ES, UK) (AL 3-4) Inform on warning parameters and/or alert level (BE, ES) (AL 0-4) Trigger alert (MK, UK) (AL 4)
Designated responsible actor (minister, department, commission)	Activate crisis centre and/or implement necessary measures (FR, UK) (AL 4) Develop and ensure system to support vulnerable people (MK) (AL 0) Document and report activities (SE) (AL 2-3) Monitor, evaluate and report warning parameters (MK) (AL 1-4) Prepare and provide information (MK, UK) (AL 0, AL 4) Trigger alert and provide information on alert (SE) (AL 2-3)
Educational and social institutions	Ensure a heatwave plan exists (MK) (AL 0) Inform personnel on actions (MK) (AL 0) Implement heatwave plans (MK, ES) (AL 0-4)
Emergency services	Implement heatwave plans (AT) (AL 2-3) Provide data on warning parameters (MK) (AL 2) Provide support to vulnerable people (PT) (AL 3)
Local/regional authorities	Activate and maintain system to support and assist vulnerable people (FR, MK, LU) (AL 1-4) Develop and implement heatwave plans (ES) (AL 0) Heatwave hotline (FR) (AL 3) Mobilise media (FR) (AL 3) Provide information on plan, health impact of heat and vulnerable people (AT, ES, FR) (AL 0-4) Provide information on alert level (AT, BE, ES) (AL 0-4) Trigger alert (FR) (AL 3)

Stakeholders	Responsibilities
Media	Provide information and recommendations (FR, LU, NL, MK, PT, UK) (AL 1-4)
Meteorological agency	Collect, analyse and monitor relevant meteorological data (all countries) (AL 0-4) Provide information on weather situation and warning parameters reaching thresholds (all countries) (AL 0-4) Provide technical expertise (FR, UK) (AL 1-4) Trigger alert and activate heatwave warning system (AT, NL, MK, SE, UK) (AL 1-4)
Ministry of Health	Control crisis communication (FR) (AL 4) Define vulnerable population (LU) (AL 1) Ensure and maintain preparedness to implement measures from plan (MK, UK) (AL 0-1) Heatwave hotline (AT, LU, FR) (AL 1, AL 3-4) Mobilise media (FR, MK) (AL 1-4) Monitor, evaluate and report levels of warning parameters and their health impact (BE, FR) (AL 0-1, AL 3) Report, evaluate and update plan and measures (BE, UK) (AL 0) Prepare and provide information on plan, alert level, vulnerable people (AT, BE, FR, LU, MK, PT) (AL 0-4) Trigger alert and activate plans (LU) (AL 2-3)
Other ministries	Ensure and maintain preparedness to implement plans (UK) (AL 0) Provide information plan and alert level (LU) (AL 1-3) Trigger specific action plans (MK)
Public health agency (national and/or regional /local)	Ensure and maintain preparedness and implementation of plan (MK, ES, FR, UK) (AL 0-4) Heatwave hotline (AT) (AL 4) Mobilise media (MK) (AL 2-3) Monitor, analyse and report warning parameters (CH, FR, MK, UK, PT) (AL 1-4) Prepare and provide information on plan and/or alert level (CH, FR, NL, MK, UK, PT) (AL 0-4) Prepare and provide information on protective measures (NL) (AL 1-3) Provide expertise and support (FR) (AL 3) Report, evaluate and update plan (UK) (AL 0) System to identify, support and assist vulnerable people (MK, UK) (AL 0-4) Trigger alert and activate plan (CH, NL, MK) (AL 1-3)
Prime minister	Activate interministerial crisis cell (FR) (AL 3) Appoint designated minister (FR) (AL 4) Trigger alert and maximum mobilisation (FR) (AL 4)
Red cross	Distribute water (MK) (AL 3) Define and implement system to support and assist vulnerable people (MK, LU) (AL 0-4) Ensure and maintain preparedness to implement measures from plan (MK) (AL 0) Prepare and provide information and support on protective measures (Mk, NL) (AL 0-3) Heatwave hotline (LU, MK) (AL 0-4)
Sector and interest organisations	Prepare and provide information on protective measures (NL) (AL 1-3)

3.4. Actions

A heatwave plan is an instrument to manage emergencies related to heatwaves. Activities in emergency management are commonly divided in four categories: mitigation, preparedness, response and recovery (Larsson, 2008). We will present the actions included in the heatwave plans in relation to these categories. Furthermore, we will add evaluation as a fifth and separate category in this report. Evaluation is an important stage in the process to ensure effectiveness and efficiency, and to establish acceptance among the public and involved stakeholders (WHO Regional Office for Europe, 2008).

- **Mitigation:** actions and measures aimed at reducing the damaging effects of heatwaves. Risk analysis can provide a solid foundation for developing these actions.
- **Preparedness:** actions and measures to prepare for the event of a heatwave and possible undesired health effects.
- **Response:** actions and measures to implement in the event of a heatwave.
- **Recovery:** actions to return to normal conditions and to repair damage caused by heatwaves.
- **Evaluation:** the evaluation of actions and measures during and after a heatwave.

Table 9 – Overview of emergency management and related actions

Type of action	Emergency response stages				
	Mitigation	Preparedness	Response	Recovery	evaluation
Care for vulnerable groups	Develop a system to identify and support vulnerable population (LU, MK, UK)	Register vulnerable people (FR, LU) Ensure vulnerable groups are appropriately supported (UK)	Ensure that health and social institutions implement protective measures (UK) Implement protective measures (MK) Monitoring of vulnerable people with evaluation visits (LU) Ensure follow-up for vulnerable groups (PT) Mobilise home visits or other social watch devices (FR, LU, MK, ES, CH, UK) Relocate vulnerable people to refreshed rooms or shelters (MK, PT)		
Implementation of the plan		Development of heatwave or contingency plans by care providers (FR, LT, LU) or local authorities (ES)	Activate the warning system and communicate alert level (AT, BE, FR, DE, IT, LU, MK, NL, PT, ES, SE, CH, UK) Ensure agreed responses are mobilised as required (UK)		
Information and behaviour		Develop measures to increase risk awareness (UK) Education and training of medical and social and care personnel (DE, CH)	Channel for answering questions by the public (BE, NL, SE) Communication plan to raise awareness and communicate heat		

Type of action	Emergency response stages				
	Mitigation	Preparedness	Response	Recovery	evaluation
		Ensure health and social institutions and event organisers are aware of the heatwave plan (UK) Prepare information material (MK)	warning (FR, NL, PT, SE, ES, CH, UK) Communicate alerts to staff and ensure awareness (UK) Guidelines for citizens to protect themselves from heat (AT, BE, FI, FR, DE, IT, LT, LU, MK, NL, PT, ES, SE, CH, UK) Guidelines for vulnerable groups (DE) Guidelines for care providers (AT, FI, UK) Mobilise media (FR, DE, LU, MK, PT, SE, CH, UK) Telephone hotline (AT, BE, FR, DE, LU, MK, PT, CH, UK)		
Infrastructure	Improve or increase insulation (DE, FI, MK, UK) Passive cooling and use of constructing materials that reduce heat (DE, FI, MK, CH) Make use of cooling technologies (DE, MK, SE, CH)	Ensure the availability of refreshed establishments or shelters (FR, DE, MK, PT) Identify or create cool rooms (UK) Install cooling aids (e.g. fans, blinds, sun sails, ...) (DE, MK) Provide drinking water fountains (MK) Install indoor thermometers (MK)	Inform people on the availability of refreshed establishments or shelters (FR, DE, MK, PT)		
Policy and planning	Building regulations (FI, MK, PT, UK)				

Type of action	Emergency response stages				
	Mitigation	Preparedness	Response	Recovery	evaluation
	Land use planning (FI) Spatial planning (PT, CH, UK) Urban planning (FI, DE, MK, PT, SE, CH, UK) Climate change planning (FI, CH, UK) Limit air pollution by reducing precursor emissions (BE)				
Other sectors	Engage communities and voluntary sector to support local emergency plans (UK)	Consider effects on water and power supplies, and their consequences (DE, MK)	Increase waste collection (MK) Check water supplies (MK)		
Optimize or adapt care		Check storage of medicines is according to instructions (SE) Ensure and program capacities and capabilities of care facilities (e.g. bed management, staff schedules) (FR, DE,) Review potential adaptation of medical treatments (DE) Ensure care providers are engaged in preparing for heatwaves (NL, UK)	Implementation of heatwave or contingency plans by care providers (FR, LT, LU, MK) Support carers to remain fit and well during heatwaves (UK) Ensure responsiveness of care providers (PT) Ensure business continuity of care providers (UK, SE, CH) Mobilise community and voluntary support (UK) Permanence of care in outpatient care (FR)	Check storage of medicines was according to instructions (SE)	
Real-time surveillance		Monitor warning parameters (AT, BE, FI, FR, DE, IT, LT, LU, MK, NL, PT, ES, SE, CH, UK)	Monitor warning parameters (AT, BE, FI, FR, DE, IT, LT, LU, MK, NL, PT, ES, SE, CH, UK)		

Type of action	Emergency response stages				
	Mitigation	Preparedness	Response	Recovery	evaluation
		Monitor capacities and capabilities of care facilities (FR, PT)	Monitor capacities and capabilities of care facilities (FR, PT)		
Reduction in heat exposure		Employers must consider heat in risk assessments (FR) Stimulate a culture of prevention at work (FR)	Implement measures to protect workers (FR, MK) Review safety of public events (UK) Support organisations to reduce travel (UK) Monitor indoor temperature (MK)		
Report and evaluate				Organise a feedback process with stakeholders (SE)	Collect information on heat and health and preventive measures (BE) Document, report and evaluate activities (AT, BE, DE, IT, FR, MK, PT, ES, UK) Evaluate health impact of heatwave (LT, MK) Gather the monitoring and evaluation committee (FR) Organise a feedback process with stakeholders (FR, MK, SE)
Revise					Improve communication strategies to stakeholders and public (BE) Reconsider and redefine procedures for triggering alert (BE) Revise plan based on reports and feedback (DE, FR, MK, PT, ES, UK)

3.5. Vulnerable populations

Based on the analysis of the different heatwave plans, we distinguish four categories of vulnerable people: age, environmental factors, medical factors and social factors. Table 10 provides an overview of the vulnerable populations that are included in the different plans. Besides these four groups, there is also a technical difference between those who are vulnerable due to intrinsic factors (e.g. age, medical factors and social factors) and those who are at risk due to exposure (e.g. environmental factors and social factors).

Age is considered as a risk factor in every heatwave plan, except Italy. Both the young and elderly are more vulnerable to heat. Young children are at risk to be negatively impacted by heat because their lungs are still growing, their limited fluid reserve capacity inhibits adaptation to fluid losses and their thermoregulation is not yet fully developed. Elderly people are at risk because their body is less quick to react to heat, they are less aware of heat and thirst, their sweat glands are less productive and they are more sensitive to air pollution. In addition, elderly people are more likely to suffer from chronical illnesses, to use medication, to reside (temporarily) in a care facility or to be socially isolated, which further increases their vulnerability to heat.

Only a few heatwave plans explicitly mention environmental factors as a risk factor: Austria, Germany, Lithuania, Macedonia, Portugal, Spain and the United Kingdom. Environmental factors can contribute to heatwaves and further exacerbate their impact. Therefore, people living in certain areas are more likely to experience stronger and more frequent heatwaves. In some areas, heatwaves are more likely to occur because of geographic factors, e.g. a valley where heat is trapped because air circulation and moisture are blocked by mountain ranges. Secondly, urbanised regions are also more vulnerable to heat because of the heat absorbent capacity of asphalt, brick, concrete and dark roofs, and the lack of green spaces. Thirdly, as heat tends to increase air pollution, thresholds reach unhealthy values much quicker in areas with a pre-existing pollution.

All plans (except the Italian plan) distinguish several medical factors that increase people's vulnerability to heat, although there are differences in the specific factors that are considered. First, most countries include people that suffer from a chronic or pre-existing illness, either physical or mental, as a vulnerable group that is at a greater risk of being negatively affected by heatwaves. Specific illnesses that the plans mention include cardio-vascular pathologies (e.g. hypertension, heart insufficiency or arteriosclerosis), neurological pathologies (e.g. central nervous system diseases, Parkinson or Alzheimer), endocrine pathologies (e.g. diabetes or hyperthyroidism), psychiatric diseases (e.g. depression, eating disorder or schizophrenia), lung pathologies (COPD or asthma) and obesity. Second, a majority of the plans also includes

people who are dependent on others (e.g. because they are hospitalised) or whose mobility is limited (e.g. because they are physically impaired) as a vulnerable group. Especially when they also live alone or with someone who is also vulnerable to heat. Third, most plans also include people who use certain medication or abuse substances (alcohol, drugs and smoking) as a vulnerable group. Finally, some plans also include pregnant women as a vulnerable group.

Finally, social factors can also increase someone's vulnerability to heat. First, people without a social network (e.g. socially isolated, homeless, migrant) are more vulnerable, especially in combination with other factors. Second, good housing conditions (e.g. isolation or air conditioning) and access to cool spaces are important for people to allow their body to cool down. These might be difficult for homeless people or people with a lower income. Third, people who are physically active during the day (e.g. athletes, labourers) are vulnerable to heat. Finally, ethnic minorities, migrants and tourists who are not familiar with the weather and where to take refuge from the heat, or who do not speak the language are also more vulnerable to heat.

Table 10 – Overview vulnerable populations

Factor	Vulnerable people	AT	BE	FI	FR	DE	IT	LT	LU	MK	NL	PT	ES	SE	CH	UK
Age	Elderly															
	Babies and young children															
Environ-mental	Areas subjected to heat															
	Urban regions															
	Polluted areas															
Medical	Chronically ill															
	Hospitalised or patient															
	Limited mobility															
	Mentally ill															
	Obese															
	Pre-existing disease															
	Pregnancy															
	Substance abuse															
	Use of medication															
Social	Ethnic background															
	Homelessness															
	Housing conditions															
	Physically active															
	(Religious) fasts															
	Socio-economic status															
	Socially isolated															
	Tourist															
	Workers															
	Migrants															

3.6. Resources

The inclusion of certain actions and warning parameters in a heatwave plan, as well as their successful implementation, are highly dependent upon the availability of necessary resources such as data, human resources (e.g. staff) and financial resources (McGregor et al., 2015).

- **Data:** depending on the warning parameters that are monitored, different actors are involved in the plan. However, the plans usually only specify which stakeholders are responsible for analysing and reporting on the data, but they do not provide details on which actors are assigned to acquire certain data and in which way they are supposed to do this.
- **Human resources:** during a heatwave, some plans rely on volunteers and/or on the mobilisation of mobile teams or additional staff. Most plans, except that of Luxembourg, do not specify who will fund these additional human resources. Finding volunteers and additional staff, when mentioned, is defined as a responsibility of local actors.
- **Financial resources:** the development, implementation and evaluation of heatwave plans require financial resources, but except for brief references, most plans do not discuss budget.

Table 11 provides an overview of the resources discussed by the heatwave plans, and if specified, of the stakeholders responsible for providing them and the stakeholders that will use them.

Table 11- Resources and stakeholders involved

	RESOURCES	STAKEHOLDERS THAT PROVIDE RESOURCE	STAKEHOLDERS THAT USE RESOURCE
Data	Meteorological and environmental parameters (temperature, ozone, air pollution, ...)	Meteorological agency (all countries), interregional agency (BE)	Interregional agency (BE), regional authority (FR), crisis or risk management body (FR), care providers (DE), social institutions (DE)
	Health indicators (medical activity, morbidity and mortality)	Emergency services (DE, LU), care providers (DE, ES), telephone hotlines (DE), local and regional authorities (DE, IT, ES), local or regional sources (PT), surveillance system (IT, ES, UK)	Ministry of Health (FR, IT. LU), regional authority (FR), national and/or regional health agencies (DE, MK, PT, ES, UK)
	Indoor air temperature	Care providers (UK)	
Human resources	Volunteers	Community groups (UK), buddy system by local authority (CH)	
	Mobile teams	Care providers (FR), Red Cross (LU, MK), social institutions (MK, ES)	
	Additional staff		
Financial resources	Funding heatwave plan	Ministry of Health (AT)	
	Funding information documents	Ministry of Health (CH, FR)	
	Funding spots for broadcasting on television and radio	Ministry of Health (FR)	
	Funding for at-home visits and care for individuals that can claim dependency insurance	Ministry of Health (LU)	
	Execution of the plan	State Budget Law (PT), emergency preparedness funds (SE)	

4. Summary

This report provides an overview of national heatwave plans of 14 European countries. Using the 8 core elements of heatwave plans according to the WHO as a basis, we set out to explore the content of the collected heatwave plans. Table 12 provides an overview of the inclusion of core elements in the different plans. Note that, however, the extent to which and the detail of the content on the core elements was actually included vary strongly between the countries.

Overall, we find that the collected heatwave plans are very diverse. Most countries define a lead body and responsibilities, have a warning system, communicate heat-related health information to the public and stakeholders, monitor agreed warning parameters and evaluate the plan in some way.

Less included elements are measures to reduce indoor heat exposure, particular measures to care for vulnerable groups, measures to ensure the preparedness of health and social systems, and long-term urban planning.

Table 12 – inclusion of WHO core elements in national heatwave plans

WHO CORE ELEMENTS	CHAPTER	COUNTRY														
		AT	BE	FI	FR	DE	IT	LT	LU	MK	NL	PT	ES	SE	CH	UK
1. Agreement on lead body and responsibilities	3.3															
2. Accurate and timely alert system	3.2															
3. Heat-related health information plan	3.4															
4. Reduction in indoor heat exposure	3.4															
5. Particular care of vulnerable groups	3.4, 3.5															
6. Preparedness of the health and social care system	3.4															
7. Long-term urban planning	3.4															
8. (Real-time) surveillance …	3.2, 3.4															
… and evaluation	3.4															

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Annexes

Annex 1 – Overview of relevant material

A. Documents from countries included in this report

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Annex 2 - Description of alert levels per country

Country	Alert levels				
	0	1	2	3	4
AT		**Green** Criteria: normal temperatures for time of year	**Yellow** Criteria: temperatures are higher and possibly cause adverse health effects in vulnerable population	**Orange** Criteria: temperatures are high and likely cause adverse health effects in vulnerable population	**Red** Criteria: temperatures are extremely high and likely cause significant adverse health effects
BE	**Preparation** **Criteria:** 01/10 until 14/05 **Actions:** preparation and evaluation	**Watchfulness** **Criteria:** 15/05 until 30/09 Actions: start of actions	**Warning level 1** **Criteria:** at least 2 consecutive days of average minimum above 18°C and average maximum above 30°C **Actions:** inform stakeholders and public, monitor parameters	**Warning level 2** **Criteria:** at least 3 consecutive days of average minimum above 18°C and average maximum above 30°C, AND/OR the day before an hourly ozone concentration above 240 µg/m^3 and the day itself a concentration above 180 µg/m^3 **Actions:** inform stakeholders and public, monitor parameters, monitor actions, prepare for alarm phase	**Alarm phase** **Criteria:** at least 3 consecutive days of average minimum above 18°C and average maximum above 30°C, AND both the day before and the day itself an hourly ozone concentration above 240 µg/m3 **Actions:** inform stakeholders and public, gather risk cells and activate crisis cell if necessary, monitor parameters
FR	**Preparation** **Criteria:** before seasonal watch **Actions:** provide stakeholders with preventive information to distribute to public	**Green – seasonal watch** **Criteria:** 01/06 until 31/08 **Actions:** verify warning systems and operational nature of measures, preventive communication to	**Yellow** **Criteria:** a peak of intense heat above alert thresholds but limited to 1-2 days, OR expected IBMs are close to thresholds but heat intensification is unlikely,	**Orange** **Criteria:** regional criteria (population size, pollution level, rallies, ...) **Actions:** mobilise stakeholders, implement management measures (for vulnerable	**Red** **Criteria:** exceptional heatwave with collateral effects in different sectors **Actions:** intersectoral measures, maximum mobilisation and

Country	Alert levels				
	0	1	2	3	4
		public, monitor parameters	OR expected IBMs are close to thresholds and heat will intensify **Actions:** scaling up management measures and reinforce seasonal watch measures, inform stakeholders and public, prepare for next level, monitor parameters	populations), monitor measures in place, monitor parameters, mobilise health reserve and strengthen care structures if necessary, monitor and report care activities and capacities, activate crisis cell if necessary, inform public, (inter)regional coordination of stakeholders	coordination of state's response
DE	**Preparation** **Criteria:** all year **Actions:** develop communication plan, define awareness campaign, prepare communication material, define competences and responsibilities of stakeholders, develop and implement medium- and long-term measures related to buildings and urban planning, develop plans for care organisations, provide infrastructure for cooling		**Strong heat load** **Criteria:** 2 days with perceived temperature >32°C and poor night-time cooling **Actions:** inform stakeholders, short-term measures	**Extreme heat load** **Criteria:** perceived temperature >38°C in early afternoon **Actions:** inform stakeholders and public, short-term measures	

Country	Alert levels				
	0	1	2	3	4
IT		**No risk** **Criteria:** no risk, city-level criteria **Actions:** monitor parameters	**Low risk** **Criteria:** a low risk expected for the next 24-72 hours Actions: monitor parameters, inform stakeholders, monitor vulnerable population, inform public	**High risk** **Criteria:** high risk expected for the next 24-72 hours **Actions:** extend monitoring period until 30 September, inform stakeholders, monitor vulnerable population, inform public	**Persisting high risk** Criteria: high risk conditions persist for 3 or more days **Actions:** extend monitoring period until 30 September, inform stakeholders, monitor vulnerable population, inform public
LU		**Preparatory phase** **Criteria:** - **Actions:** monitor parameters, establish indicators for rapid detection of health problems, implement patient care plans, create information sheets for public, inform stakeholders, develop information strategy for public, develop measures for vulnerable population	**Orange alert** **Criteria:** 32-35°C OR >30°C for over 3 days without night cooling OR average of 23°C during 3 days OR other indicators reach threshold values **Actions:** monitor parameters, monitor vulnerable population, monitor care structures, inform public, inform stakeholders, apply protocols in institutions of vulnerable populations	**Red alert** **Criteria:** >35°C OR >30°C for over 4 days without night cooling OR other indicators reach threshold values **Actions:** monitor parameters, increase monitoring of vulnerable population, inform public, inform stakeholders, apply protocols in institutions of vulnerable populations	**Exceeding normal levels of health** **Criteria:** - **Actions:** create crisis agency, strengthen plans, involve municipalities to monitor vulnerable populations, involve fire and rescue services, requisition of necessary means, specific measures

Country	Alert levels				
	0	1	2	3	4
MK	**Preparatory phase** **Criteria:** 01/04-30/04 **Actions:** prepare information to stakeholders and public, prepare and check functionality of communication tools, develop plan to distribute communication information, technical preparations, activate public water fountains and springs, define and confirm methods to contact vulnerable populations, monitor parameters, identify stakeholders to be involved, prepare and provide infrastructure for cooling of public and vulnerable populations, ensure availability of sufficient staff during summer, prepare emergency response plans, ensure measures are ready to be implemented in social and educational institutions	**Green level – vigilance** **Criteria:** 01/05-30/09, temperatures are within safe limits **Actions:** activate warning system and its accessibility, inform public and stakeholders, monitor parameters, prepare for activation next level, monitor indoor temperatures, provide infrastructure for cooling of public and vulnerable populations, ensure availability of sufficient staff during summer, prepare emergency response plans, implement measures in social and educational institutions	**Yellow level – alert and preparedness** **Criteria:** 15/06-31/08, regional and city-level temperature thresholds **Actions:** inform public, activate general and specific measures, inform stakeholders, monitor vulnerable populations, monitor indoor temperatures, provide infrastructure for cooling of public and vulnerable populations, monitor and report activities and measures	**Orange level – heatwave** **Criteria:** regional and city-level temperature thresholds **Actions:** inform public and stakeholders, implement crisis plans for public, health, care and educational institutions, activate measures for vulnerable populations, recommendations for use of cooled infrastructure, distribute drinking water, propose additional measures for certain sectors and vulnerable populations, monitor indoor temperature, monitor and report activities and measures	**Red level – emergency** **Criteria:** regional and city-level temperature thresholds **Actions:** inform public, implement crisis plans for public, health, care and educational institutions, intensify protection measures for vulnerable populations, relocate vulnerable groups to cooled infrastructure, propose additional measures for certain sectors and vulnerable populations, monitor indoor temperature, monitor and report activities and measures, declare a state of emergency

Country	Alert levels				
	0	1	2	3	4
NL		**Vigilance** **Criteria:** 01/06-01/09 **Actions:** prepare for periods of extreme heat, define or actualise measures	**Pre-warning phase** **Criteria:** possibility of 4 or more days >27°C **Actions:** inform stakeholders, alertness, ensure measures can be implemented	**Warning phase:** **Criteria:** expected 4 or more days >27°C **Actions:** inform stakeholders, activate heatwave plan, inform public, activate local/institutional heatwave plans, implement measures	
PT		**Green alert** **Criteria:** normal temperatures **Actions:** monitor parameters, ensure measures are maintained	**Yellow alert** **Criteria:** 1 day >32°C and 2 more days ≥32°C, minimum temperatures ≥21-23°C, regional temperature thresholds, Index-Alert-Icarus 0,01-0,99, other factors (ozone, UV, fire) are also considered **Actions:** inform public and stakeholders, strengthen responsiveness of health care	**Red alert** **Criteria:** 3 days ≥35°C, 2 days minimum temperatures ≥26°C, regional temperature thresholds, Index-Alert-Icarus >1, rise in temperature ≥6°C, other factors (ozone, UV, fire) are also considered **Actions:** inform public and stakeholders, activate measures in accordance with contingency plans, provide infrastructure for cooling of vulnerable groups and public, monitor vulnerable groups, ensure responsiveness of health care	

Country	Alert levels				
	0	1	2	3	4
ES		**Absence of risk** **Criteria:** regional and city-level threshold temperatures **Actions:** inform stakeholders, monitor parameters, activate action programs, inform public, report on parameters	**Yellow alert** **Criteria:** regional and city-level threshold temperatures **Actions:** inform stakeholders, monitor parameters, activate action programs, inform public, report on parameters	**Orange alert** **Criteria:** 3 or 4 days of temperatures above threshold, regional and city-level threshold temperatures **Actions:** reinforce and intensify yellow alert measures, involve interministerial commission and local authorities, adopt additional general and specific measures	**Red alert** **Criteria:** 5 days of temperatures above threshold, regional and city-level threshold temperatures **Actions:** reinforce and intensify orange alert measures, involve interministerial commission and local authorities, risk management and assessment
SE		**Warning message** **Criteria:** at least 3 days ≥26°C **Actions:** inform public	**Class 1 warning** **Criteria:** at least 3 days ≥30°C **Actions:** inform stakeholders, report activities and measures, general and specific measures, monitor parameters and warning level	**Class 2 warning** **Criteria:** at least 5 days ≥30°C AND/OR at least 3 days ≥35°C **Actions:** inform stakeholders, report activities and measures, general and specific measures, monitor parameters and warning level	
CH		**Vigilance** **Criteria:** summer period **Actions:** monitor parameters	**Increased alert readiness** **Criteria:** Heat Index >90 for at least 3 days **Actions:** monitor parameters, inform stakeholders	**Heat alarm** **Criteria:** Heat Index >90 for at least 3 days and expected to last **Actions:** monitor parameters, inform stakeholders, trigger	**Danger level** **Criteria:** Heat Index >93 for at least 5 days

Country	Alert levels				
	0	1	2	3	4
				warning, define danger level, inform public, activate measures relating to danger level, increase staff or care infrastructure	
UK	**Long term planning** **Criteria:** all year **Actions:** long term planning (spatial planning, housing, ...), identify vulnerable populations, ensure measures and local plans are in place, infrastructure changes (pavement, housing, green spaces), development of local community emergency plans, define measures to reduce health impact, prepare continuity plans, awareness campaign, improve monitoring and analysis of parameters	**Heatwave and summer preparedness (green)** **Criteria:** 01/06-15/09 **Actions:** issue alert, ensure awareness and preparedness of stakeholders and public, implement measures, identify, monitor and support vulnerable populations, ensure local heatwave plans, engage solidarity in communities, ensure continuity plans, provide infrastructure for cooling, monitor and report on parameters,	**Alert and readiness (yellow)** **Criteria:** 60% risk of heatwave in next 2-3 days **Actions:** issue alert, monitor and report on parameters, ensure readiness and swift actions, inform public and stakeholders, monitor vulnerable populations, monitor indoor temperatures, provide infrastructure for cooling,	**Heatwave action (amber)** Criteria: regional threshold temperatures, average 30°C during day and 15°C during night **Actions:** issue alert, specific actions for vulnerable populations, inform public, mobilise community and voluntary support, monitor vulnerable populations, activate continuity plans, ensure measures can be implemented, activate community emergency plans, monitor and report on parameters,	**National emergency (red)** **Criteria:** prolonged heatwave affecting sectors other than health **Actions:** issue alert, continue actions of level 3, implement national emergency response actions, monitor and report parameters, assess risks in all sectors and response flexibly,

Annex 3 - Overview of stakeholders and their roles and responsibilities

Stakeholders	Alert level (AL)	Roles and responsibilities	Partners	Targeted users
Care organisations (elderly homes, hospitals, ...)	AL 0 (UK)	Ensure measures to reduce heat levels and poor air quality (UK)		
	AL 0-4 (UK)	Provide – indoors and outdoors – cool spaces (UK)		
	AL 0-3 (UK) AL 2 (CH)	Prepare and implement business continuity plans (CH, UK), e.g. short-term increase of staff or hospital beds		
	AL 0 (UK, MK)	Develop heatwave plans (UK) or include heatwave actions in existing emergency plans (MK)		
	AL 0 (MK, UK)	Develop a system to identify and support vulnerable population (MK, UK)	Red Cross (MK), Local authorities (MK), Social institutions (MK)	
	AL 0 (UK) AL 1 (UK)	Raise awareness on health impact of heat (UK)	Partners in health (UK), Personnel (UK)	Personnel (UK), Vulnerable people (UK), General public (UK), Educational institutions (UK), Social institutions (UK)
	AL 0-1 (MK, SE) AL 0-3 (UK)	Ensure awareness of heatwave plans and measures (UK, MK, SE)		Personnel (UK, MK), Care homes (UK), Hospitals (UK), Social institutions (MK), Educational institutions (MK), Vulnerable people (UK)
	AL 1 (LU)	Define criteria for vulnerable people (LU)	Red Cross (LU), Ministry of Health (LU)	
	AL 1 (MK)	Report, evaluate and monitor warning parameters (MK)	Public health agency (MK)	
	AL 1-3 (MK, LU) AL 2-3 (UK) AL 3 (FR, PT)	Monitor (MK, UK, LU, PT) and assist vulnerable people through visits/phone calls (FR, MK, UK, LU)	Red Cross (LU, MK), Ministry of Health (LU), Partners in health (FR, UK), Local authorities (FR,	Vulnerable people (FR, LU, MK, PT, UK)

Stakeholders	Alert level (AL)	Roles and responsibilities	Partners	Targeted users
			MK), Regional authorities (FR), Ministry of labour (MK), Public health agency (MK)	
	AL 1 (LU, MK)	Heatwave hotline (LU, MK)	Red Cross (LU, MK), Ministry of Health (LU)	
	AL 2-3 (SE)	Follow up information on alert level (SE)		
	AL 2 (UK) AL 2-3 (SE)	Inform stakeholders of alert level (UK, SE)		Personnel (UK, SE)
	AL 1 (UK) AL 2 (NL) AL 1-3 (PT)	Ensure and maintain preparedness (UK, NL) and responsiveness (PT) to implement measures from plan		
	AL 2-3 (SE) AL 3-4 (AT)	Provide relevant information material (AT, SE)		Personnel (SE), General public (SE), Vulnerable people (AT, SE)
	AL 1-2 (SE)	Document and report activities (SE)		
	AL 4 (FR)	Mobilisation of health reserve (FR)	Designated responsible person (FR)	
Community groups	AL 0-4 (UK)	Develop and implement a community emergency plan to identify, monitor and support vulnerable people (UK)		
	AL 1 (UK)	Provide information on health impact of heat and protection measures (UK)		General public (UK), Vulnerable groups (UK)
Crisis management agency	AL 1-4 (MK)	Monitor warning parameters (MK)	National health institute (MK), Emergency services (MK), Meteorological institute (MK)	
Cross-government (interregional, interministerial)	AL 0-4 (ES) AL 1-4 (BE)	Inform other stakeholders of warning parameters reaching thresholds (BE, ES)	Civil contingencies (ES) Meteorological institute (BE)	Local authorities (ES)
	AL 1-3 (BE)	Provide information on alert level (BE)	Ministry of Health (BE)	Care organisations (BE), National health agencies (BE), General public (BE), Media (BE
	AL 1 (BE)	Ensure and maintain preparedness to implement measures (BE)		

Stakeholders	Alert level (AL)	Roles and responsibilities	Partners	Targeted users
	AL 3 (ES) AL 4 (UK)	Evaluate actions necessary to manage risk (ES, UK)	Local authorities (ES), Civil contingencies (UK), Meteorological agency (UK), Relevant ministries and partners (UK)	
	AL 4 (MK, UK)	Trigger alert (MK, UK)		
Designated responsible actor	AL 0 (MK)	Define and confirm system to contact vulnerable people (MK)	Red Cross (MK), Local authorities (MK), Social institutions (MK), Relevant ministries (MK)	
	AL 0 (MK) AL 4 (UK)	Prepare (MK) and provide (MK, UK) relevant information material	Ministry of Health (MK) Red Cross (MK)	General public (MK) Care organisations (MK) Social institutions (MK) Vulnerable people (MK)
	AL 1-4 (MK)	Monitor, evaluate and report warning parameters (MK)	Red Cross (MK), Local authorities (MK), Relevant ministries (MK)	
	AL 2-3 (SE)	Receive/update the alarm and alert other (local) stakeholders of alert level (SE)		Care organisations (SE)
	AL 2-3 (SE)	Document and report activities (SE)		
	AL 4 (FR)	Activates the interministerial crisis centre (FR)	All concerned ministries (FR)	
	AL 4 (FR, UK)	Operational management of the crisis (FR, UK)	All concerned ministries (FR) or departments (UK)	
	AL 4 (FR)	Trigger the mobilisation of the health reserve (FR)		
Educational and social institutions	AL 0 (MK)	Ensure that emergency response plan includes actions related to heatwaves (MK)		
	AL 0 (MK)	Inform personnel on heatwave actions such as specific services and treatments (MK)		Personnel (MK)
	AL 1-3 (MK) AL 0-4 (ES)	Implement action plans (MK, ES)		Vulnerable people (ES)
Emergency services	AL 2 (AT) AL 3 (AT)	Implement cautionary measures (AK)		

Stakeholders	Alert level (AL)	Roles and responsibilities	Partners	Targeted users
	AL 2 (MK)	Provide data on medical activity to crisis management agency (MK)	Crisis management agency	
	AL 3 (PT)	Transport vulnerable people to shelter (PT)		
Local/regional authorities	AL 0 (ES)	Local health authorities should develop and implement a heatwave plan (ES)	Ministry of Health (ES)	
	AL 0-3 (ES) AL 3 (FR) AL 3-4 (AT)	Provide information about plan, health impact of heat, vulnerable population and measures (ES, FR)	Ministry of Health (ES)	Health professionals (ES) General public (ES, FR) Care organisations (AT) Media (AT), Local actors (FR)
	AL 0-3 (ES) AL 3-4 (AT, BE) AL 3 (FR)	Provide information on alert level (AT, BE, ES, FR)		General public (AT, ES, FR), Care organisations (AT), Media (AT), Local actors (FR)
	AL 1 (LU)	Provide an application form that vulnerable people can use to request monitoring visits and assistance (LU)		Vulnerable people (LU)
	AL 1-4 (MK) AL 3 (FR, MK) AL 4 (LU)	Activate and maintain system to support and assist vulnerable people (FR, MK, LU)	Red Cross (MK), Local authorities (MK), Relevant ministries and partners (MK), Crisis agency (MK), Local authorities (FR), Care organisations (FR)	Local authorities (FR), Vulnerable people (MK)
	AL 3 (FR)	Trigger alert (FR)	Regional health agency (FR)	Vulnerable people (FR)
	AL 3-4 (FR)	Implement specific measures adapted to local situation (FR)		
	AL 3 (FR)	Mobilise media (FR)		
	AL 3 (FR)	Heatwave hotline (FR)		General public (FR)
	AL 3 (FR)	Provide a list of vulnerable people if necessary (FR)	Regional authorities (FR)	
Media	AL 1-4 (FR, MK) AL 1-2 (PT) AL 2-3 (UK) AL 3 (LU)	Provide information and recommendations (FR, LU, MK, PT, UK)	Public health agency (FR), Ministry of Health (MK), Regional public health centres (MK)	General public (FR, MK, PT, UK), Care organisations (PT), Vulnerable people (MK, UK)

Stakeholders	Alert level (AL)	Roles and responsibilities	Partners	Targeted users
Meteorological agency	All levels – all countries	Collect, analyse and monitor relevant meteorological data (all countries)	Public health agency (MK)	
	All levels – all countries	Provide information on weather situation and warning parameters reaching thresholds (all countries)	Ministry of Health (FR) Public health agency (FR)	Interregional agency (BE) Regional health agency (FR) Public health agency (NL) General public (FR) Designated actor (LU)
	AL 1 (FR) AL 4 (UK)	Provide technical expertise (FR, UK)		
	AL 1-4 (MK, UK) AL 2-3 (SE)	Trigger alert and activate heatwave warning system (MK, SE, UK)	Public health agency (MK)	Relevant ministries and partners (UK)
Ministry of Health	AL 0 (BE)	Evaluate parameter levels and their health impact from previous summer (BE)		
	AL 0 (BE, UK)	Report, evaluate and update plan and measures (BE, UK)	Public health agency (UK)	
	AL 0 (MK) AL 1 (UK)	Ensure and maintain preparedness to implement measures from plan (MK, UK)	Public health agency (MK), Red Cross (MK), Relevant ministries and partners (UK)	
	AL 0 (MK)	Prepare relevant information material (MK)	Public health agency (MK) Red Cross (MK)	General public (MK) Care organisations (MK) Social institutions (MK) Employees (MK)
	AL 1 (BE) AL 3 (FR)	Monitor, analyse and report warning parameters (BE, FR)	Public health agency (FR)	
	AL 1 (LU)	Provide information material on the possibility to monitor vulnerable people (LU)	Ministry of Interior Affairs (LU) Ministry of Health (LU) Red Cross (LU)	Care organisations (LU) Local authorities (LU)
	AL 1 (LU)	Define criteria for vulnerable people (LU)	Care organisations (LU) Ministry of Health (LU)	
	AL 1 (BE, FR, UK) AL 2 (FR, UK) AL 3 (FR, UK)	Provide information on the alert level (AT, BE, FR)		Partners in health (BE), Care organisations (AT), General public (AT), Media (AT)

Stakeholders	Alert level (AL)	Roles and responsibilities	Partners	Targeted users
	AL 3-4 (AT)			
	AL 1 (LU) AL 3-4 (FR)	Heatwave hotline (LU, FR)	Red Cross (LU) Ministry of Health (LU)	
	AL 2-3 (LU)	Trigger alert and implementation of measures (LU)	Ministry of Family (LU)	
	AL 1-4 (MK) AL 3-4 (FR)	Mobilise media (FR, MK)	Meteorological institute (MK) Local health agencies (MK) Public health agency (FR)	General public (FR)
	AL 1 (BE, MK, PT) AL 1-3 (LU) AL 1-4 (FR) AL 3-4 (AT)	Provide information on protection measures (AT, BE, FR, LU, MK, PT)	Care organisations (LU), Social institutions (LU), Local authorities (LU, MK), Red Cross (MK), Relevant partners (MK), Ministry of Health (MK), Public health agency (MK)	General public (BE, FR, MK, PT), Relevant partners (BE, MK) Vulnerable people (LU, MK), Care organisations (MK, PT), Relevant ministries and partners (MK, PT), Media (PT)
	AL 4 (FR)	Control communication with regards to crisis cell (FR)	Crisis management agency (FR) Designated person (FR)	
Other ministries	AL 0 (UK)	Ensure and maintain preparedness to implement measures from plan (UK)	Relevant ministries and partners (UK)	
	AL 1-3 (LU)	Provide information on protection measures and alert level (LU)	Ministry of Family (LU)	Care organisations (LU), Vulnerable people (LU)
	AL 1-4 (MK)	Trigger specific action plans and measures depending on alert level (MK)	Ministry of labour (MK) Care organisations (MK) Educational and social institutions (MK)	Vulnerable people (MK), General public (MK)
Public health agency (national unless specifically mentioned)	AL 0 (ES, UK: regional) AL 0-4 (MK) AL 1-4 (UK) AL 1-2 (FR: regional)	Ensure and maintain preparedness and implementation of measures from plan by other stakeholders (MK, UK) (ES, FR, UK: regional)	Ministry of Health (MK) Red Cross (MK) Other relevant partners (MK), Local authorities (ES)	

Stakeholders	Alert level (AL)	Roles and responsibilities	Partners	Targeted users
	AL 0-2 (MK) AL 0-2 (UK) AL 1-2 (FR: regional) AL 3-4 (FR)	Prepare (MK) (FR: regional) and provide (MK, UK, FR) (FR: regional) relevant information on plan and measures	Local authorities (MK), Ministry of Health (MK), Red Cross (MK), Meteorological agency (UK), Relevant ministries and partners (MK, UK), Relevant partners (FR), Regional authorities (FR)	General public (MK, UK) Care organisations (MK, UK), Social institutions (MK), Employees (MK), Media (FR), Ministry of Health (FR)
	AL 0 (UK)	Report, evaluate and update plan and measures (UK)	Public health agency (UK)	
	AL 0 (UK) AL 1-4 (MK)	System to identify (UK: regional), support and assist vulnerable people (MK)	Red Cross (MK), Local authorities (MK), Relevant ministries and partners (MK), Crisis agency (MK)	Vulnerable people (MK)
	AL 1-2 (MK) AL 1-3 (CH: regional)	Trigger alert and activate heatwave warning system and specific measures (MK) (CH: regional)	Meteorological agency (CH, MK), Ministry of Health (MK), Relevant ministries and partners (MK)	Care organisations (MK), Educational and social institutions (MK), Vulnerable people (MK)
	AL 1-4 (UK) AL 1 (MK) AL 1-3 (CH: regional) AL 2 (PT: regional) AL 3-4 (FR) AL 3 (FR: regional)	Monitor, analyse and report on warning parameters (FR, MK, UK) (CH, FR, PT: regional)	Care organisations (MK), Meteorological institute (CH, MK), Crisis agency (MK)	Regional health agencies (FR), Interministerial commission (FR), Designated minister (FR), Ministry of Health (FR), Relevant ministries and partners (FR)
	AL 3 (FR: regional)	Provide expertise and support (FR: regional)		Regional authorities (FR), Local care organisations (FR)
	AL 1 (UK) AL 2 (CH: regional) AL 3 (PT: regional)	Provide information on the alert level (UK) (CH, MK, PT: regional)	Meteorological agency (UK),	Relevant partners (UK), Local care organisations (PT, MK)

Stakeholders	Alert level (AL)	Roles and responsibilities	Partners	Targeted users
	AL 4 (MK: regional)			
	AL 2-3 (MK)	Mobilise local media (MK: regional)		Vulnerable groups (MK)
Prime minister	AL 3 (FR)	Activate interministerial crisis cell (FR)		
	AL 4 (FR)	Appoint designated minister (FR)		
	AL 4 (FR)	Trigger alert and maximum mobilisation (FR)	Ministry of Health (FR)	
Red cross	AL 0 (MK)	Ensure and maintain preparedness to implement measures from plan (MK)	Ministry of Health (MK) Public health agency (MK)	
	AL 0 (MK)	Prepare relevant information material (MK)	Ministry of Health (MK) Public health agency (MK)	General public (MK) Care organisations (MK) Social institutions (MK) Employees (MK)
	AL 0-3 (LU)	Develop and implement measures to support existing care networks (LU)	Ministry of Health (LU), Care organisations (LU)	
	AL 1-3 (LU)	Receive, analyse, list and approve requests for monitoring visits and assistance to vulnerable people (LU)	Local authorities (LU)	Care organisations (LU)
	AL 0-4 (MK) AL 1-3 (LU)	Define and implement system to support and assist vulnerable people (LU, MK)	Care organisations (LU), Ministry of Health (LU), Ministry of labour (MK), Social institutions (MK), Public health agency (MK), Local authorities (MK), relevant ministries and partners (MK), Crisis agency (MK)	Vulnerable people (MK)
	AL 3 (MK)	Distribute water (MK)		General public (MK)
	AL 0-4 (MK) AL 1 (LU)	Heatwave hotline (LU, MK)	Care organisations (LU) Ministry of Health (LU)	
Risk agency	AL 2-4 (BE)	Evaluate health risk and communicate to other stakeholders (BE)		Regional and federal crisis agencies (BE), Media (BE), General public (BE)