OPERATIONAL TOOL ON ENVIR AND HEALTH MEASURES OF ADAPTATION'S EFFECTIVENESS AND EVIDENCE OF THEIR USE

Deliverable D.T1.3.2   **03 2019**

Aims:

The report describes available measures and indicators that can be used to verify the effectiveness of adaptation actions in reducing people exposure and contrasting air pollution induced health effects(focus on most vulnerable groups).

Leading role: ARPAE

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This report aims at providing the framework for planning implementetion actions to identify measures to be taken to sustain the adaptation of population, and specifically of vulnerable groups, to air pollution episodes and indicators of effectiveness.

Background

Whilst chronic-degenerative diseases have been associated with long-lasting exposure to environmental pollutants, much less is known about the effects that acute exposure may play on the exacerbation of these pathologies. The environmental origin of cardiovascular disease and tumors has been proved by epidemiologic studies. Accumulating evidence indicates that also neurodegenerative diseases and dysmetabolic syndromes may be caused by environmental exposures..

As the knowledge of the early events in the onset of diseases is improving, due to the use of high-throughput technologies, which provide a global picture of gene-environment interactions, it is becoming evident that environmental pathologies share the initiating and early events at molecular and cellular level.

The common origin of environmental pathologies is represented by the modulation of the immune response leading to inflammation, usually a consequence of an initiating event represented by the binding of environmental pollutants. As the stimulus (exposure) continues, the acute inflammation evolves into chronic inflammation and alterations at tissue and organ level.

These early events can be regarded as targets for actions of primary prevention especially in the most fragile population groups.

Selected themes for action

Primary prevention is defined as the measures to be adopted to prevent disease, while secondary prevention focuses on avoiding the recurrence of a diseases or its progression.

Primary prevention of environmental pathologies should be based on minimizing the exposure by removing or reducing the pollutants of concerns or, should the exposure occurs, on adopting measures to increase the resistance to disease.

AWAIR may be regarded as a set of primary prevention actions leading to mitigation (reducing exposure) and/or resilience (preventing disease occurrence or progression). The project mainly focuses on vulnerable population groups, including children, aged people or patients with chronic diseases

At least three different actions can be explored to increase the resistance to diseases onset or progression related to the air pollution episodes:

1) changing the therapeutic regimen for patients affected by chronic diseases
2) promoting education about healthy and safe habits

3) encouraging personal strategies to prevent the exacerbation of acute response to pollution

1) **Changing the therapeutic regimen for patients affected by chronic diseases**
   The main goal of this deliverable is to set several actions to support strategies to mitigate the effects of SAPEs on the exacerbation of pre-existing diseases in vulnerable groups of population

   a. Chronic respiratory diseases
      Subjects with chronic respiratory diseases (COPD, asthma) are often advised to take extra measures to prevent detrimental effects from air pollution episodes, such as reducing the time outdoor, wearing masks. These strategies often include an adjustment in the therapeutic regimen.

      This population will then be the first target of the mitigation and adaptation actions.

   b. Cardiovascular diseases
      Some parameters of cardiovascular diseases, such as the blood pressure or the heart rate, have been recognized as good indicators of adverse responses to air pollution, showing contrasting response in relation to the kind of pollution. While blood pressure arises in response to ultrafine particles and traffic components, such as black carbon, in the first 5 days of air pollution episodes, it decreases in response to ozone increase. Hypertensive patients, however, have usually a good control on their medications. They can easily check their blood pressure levels and are instructed by their general practitioners on the modalities to readjust their therapeutic regimen in case of blood pressure peaks.

   c. Diabetes
      Environmental pollution is thought to play a key role in the onset of diabetes, due to the presence of endocrine disruptors in the environmental mixture. Whilst the environmental origin of the diabetes has already been described, it is not clear if air pollution acute episodes may affect blood glucose levels. A recent study on non-diabetic subjects showed that medium-term exposure to PM was positively associated with glucose measure. However, no scientific evidence exist on the acute response of diabetic patience to peaks of air pollution

Actions will be undertaken:

- Involving experts in respiratory chronic conditions possibly related to air pollution physicians to discuss measures for counteracting the SAPEs effects (changing in the therapeutic regimen, adopting measures to decrease the exposure)

- Involving experts in dysmetabolic diseases and physicians to discuss measures for counteracting the elevation of blood glucose (changing in the therapeutic regimen and/or in diet)

- Collecting information on the possible role of SAPEs on the elevation of blood glucose, possibly by recruiting diabetes patients, who voluntarily measure their blood glucose levels during the peaks of air pollution (SAPEs). This action will also serve to improve and implement knowledge on the possible direct relationships between high levels of specific contaminants and the worsening of the diabetic condition. An extensive literature review will be carried out to set up an adverse outcome pathway scheme.

2) **promoting education about healthy and safe habits**

This action can be also regarded as altering unhealthy and unsafe habits.

Diet can be considered as one of the key strategy than can be adopted as a measure of primary prevention. If immune-response and immune response-related inflammation is the first response of organism to air pollution episodes, mainly due to the oxidative stress induced by environmental pollution, anti-oxidants from diet may play an important role in reducing the risks. This action can be also combined with a mitigation measure that take into account the cooking methods. Cold weather is often associated with changes in diet habits, including the ancestral need for mammalians to increase the level of fat, as energy storage. These changes imply higher consumption of fatty food and longer cooking methods (as an example stewed beef). It is well known that several hazardous environmental pollutants bioaccumulate in animal fat. Thus, the consumption of comfort winter food during air pollution episodes may increase the exposure to hazardous chemicals from different matrices: outdoor, indoor (cooking) and food.

Actions will be taken:

2.1) promoting education to consumption of food rich in anti-oxidants

2.2) promoting the use of cooking methods that increase the benefits from the anti-oxidants-rich diet and minimize the increase of indoor pollution.

2.3) altering unhealthy habits, such as reducing smoking

3) encouraging personal strategies to prevent the exacerbation of acute response to pollution

This action should be regarded as a set of educational initiatives, which may include booklets, leaflets, seminars, forum addressed to the targets of this projects, specifically vulnerable (aging) people.

Modalities to support the implementaion of operational tools on environmental and health measures of adaptation effectiveness

1) Appropriate working groups among the AWAIR partners will be set up, including experts of respiratory, cardiovascular and diabetes conditions to address the goal of the project. Reports from the working group discussion will be produced and conclusions will be used to provide recommendations to patients. Working Groups discussions will be ensured by teleconferences and at least 1 meeting in the upcoming 12 months.

2) To improve the understanding of the relationships between SAPEs and exacerbation of preexisting diseases and the knowledge on the mitigation and adaptation actions to be undertaken, a workshop will be organized to discuss these topics at a scientific and international level. The workshop will also include a forum with the associations of patients to improve the communication and patients' compliance.

This deliverable is connected with

Deliverable	**D.T2.2.6** Assessing the effectiveness of mitigation and adaptation actions/measures at each FUA	**D.T2.2.7** AWAIR APP created to inform local health inst and/or nursuries/schools/citizens	
Activity	**A.T2.1** – Definition of actions in the target FUAs		
Output	**O.T2.1** Pilot actions for mitigation and adaptation to SAPEs	**O.T2.3** Development of an APP to alert citizens and stakeholders and promote the adoption of different lifestyles	**O.T3.3.1** **Training on best practices to cope with SAPEs for stakeholders**

WPs	Activity	Partner Reference and Contact	Expert Name and Contact
WG1	Respiratory disease		
WG2	Cardiovascular Disease		
WG3	Diabetes		