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The Elderly under Urban Heat Pressure – Strategies and Behaviours of Elderly Residents against Urban Heat

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1 BACKGROUND

Urban areas especially suffer from hot days because of the urban heat island effect. Heat periods have impacts on urban residents; in particular, the elderly group, above 65 years, is suffering from the impacts of heat stress. Studies about previous heat impacts have revealed that the morbidity and mortality rate of the elderly are increased during and post heat periods. This has been observed for several US-cities (Anderson & Bell, 2009; O'Neill et al., 2003), as well as for several European cities such as London (Hajat et al., 2002), Paris (Fouillet et al., 2008; Vandentorren et al., 2004) and Rome (Michelozzi et al., 2003). The heat wave in the summer of 2003 in Europe resulted in about 70.000 deaths (Robine et al., 2008). Regarding Vienna, similar impacts of heat waves have been noticed (Hutter et al., 2007, Moshammer et al., 2006).

It is projected that climate change will further increase heat waves in number, intensity and duration during the 21st century affecting most land areas (IPCC, 2007). There will be an increase in hot days with temperatures above 30°C and tropical nights (with temperatures not below 20°C) (Formayer et al., 2007/2008). The living conditions of the urban population will be negatively influenced particularly by long lasting and intensive heat waves.

As cities have a large and increasing elderly population and a high number of those living isolated in poor housing conditions, the issue becomes far more important in the near future in particular as more heat periods are predicted because of climate change (Hutter et al., 2011). Thus, the reduction of the vulnerability of elderly people is a prior aim for city administrations. One strategy in reducing heat stress impacts is changing residents' behaviour during heat waves. Unfortunately, knowledge on adaptive behaviour of the edlerly during heat waves is often lacking.

2 PROJECT OBJECTIVES

The aim of the 3-year STOPHOT-project is the reduction of the vulnerability of elderly people (> 65 years) living in cities (in this case Vienna) against urban heat. This study develops sustainable short- and long-term preventive measures for the built environment and green spaces, and measures encouraging proper behaviour of the elderly. It will have a specific focus on social meeting places, in- and outdoors, avoiding social isolation. This study appears to be the first comprehensive one in Austria, developing adaption measures in an inter- and transdisciplinary manner, reducing the vulnerability of elderly urban residents. It specifically investigates elderly awareness of heat risks, perception of heat stress and adaptive behavior avoiding heat impacts (Wanka et al., 2012). The empirical study will identify gaps between 1) actual and recommended behavior of the elderly and 2) proposed or existing stakeholder health-related strategies and efficacious measures recommended by the medical resp. public-health experts.

3 METHODS

Several partners from different working fields (health, planning, seniors, …) are part of this project (Figure 1). A mixed-methods design that combines both qualitative and quantitative methods is used to take into account the viewpoints of different disciplines and actors (Figure 2).

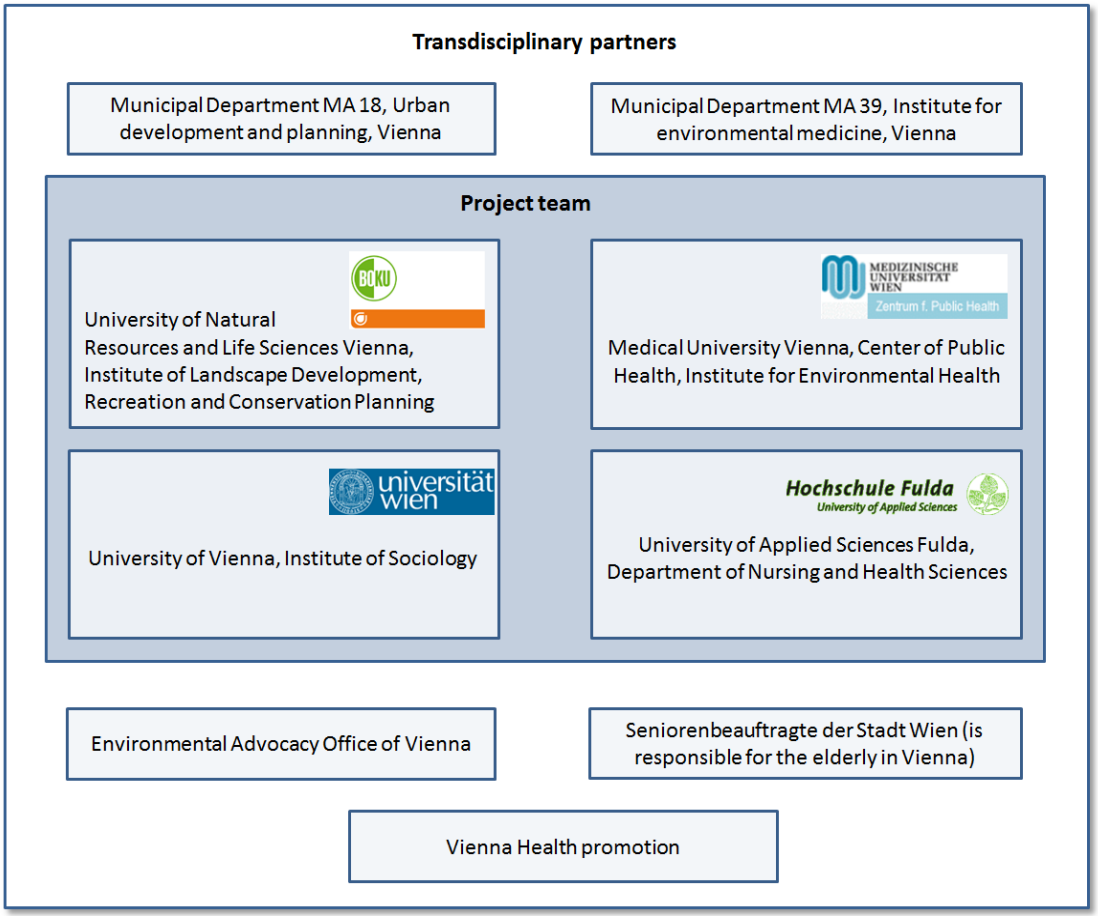

Fig. 1: STOPHOT-project team and partners

- Several types of urban study areas were selected. These types represent varying degrees of green spaces and socio-economical levels in and out of heat islands of Vienna. Older peoples' attitudes towards climate change, their awareness and perception of heat stress as well as their adaptive behaviour were investigated per study area type. Using a standard questionnaire, 400 subjects over the age of 65 were interrogated via anonymous telephone interviews in their private homes (in- and outside urban heat islands) in 2011. A telephone survey among younger persons for controlling age as major independent variable (n=200) was done. In addition, face-to-face interviews with elderly living in retirement and care homes in- and outside urban heat islands were carried out (n=200).
- Fifteen in-depth interviews with stakeholders from city planning, green space management, health care, retirement and care homes etc. were carried out between June and December 2011. The interviews focused on stakeholders' awareness, perception of climate change risks and their perceived relevance of heat impacts on elderly residents. It also provided an overview on the degree of stakeholders' activities reducing the vulnerability of the elderly. Using the free listing method adaption measures were collected. A inteview guide was developed, the interviews were recorded and transformed into text form and analysed using a qualitative content-analytical text analyses (Mayring, 2010), supported by ATLAS.ti software.
- Then the study identified the gaps between actual behaviour of elderly and recommended behaviour with respect to in- and outdoor activities and gaps between proposed or existing stakeholder strategies aimed at reducing the vulnerability of older people and efficacious measures from the medical point of view.

- First results were presented in stakeholder workshops and first sustainable management and planning measures for urban heat islands were developed.
- In the next step the elderly will evaluate developed adaption strategies and management measures. For this purpose, a survey among elderly living in urban heat island will be carried out using a stated preference model (discrete choice experiment; Louviere et al., 2000). With face-to-face interviews, the elderly (n=200) will be asked to evaluate alternative configurations of hypothetical/existing adaption measures which are defined as combinations of physical, social and managerial factors. To ease the evaluation of the heat avoiding scenarios visualization of scenarios will be provided, using digitally calibrated images, which strictly controls the variables under investigation (Arnberger & Eder, 2011a,b).
- These results will be presented in a second stakeholder workshop to refine management and planning measures.

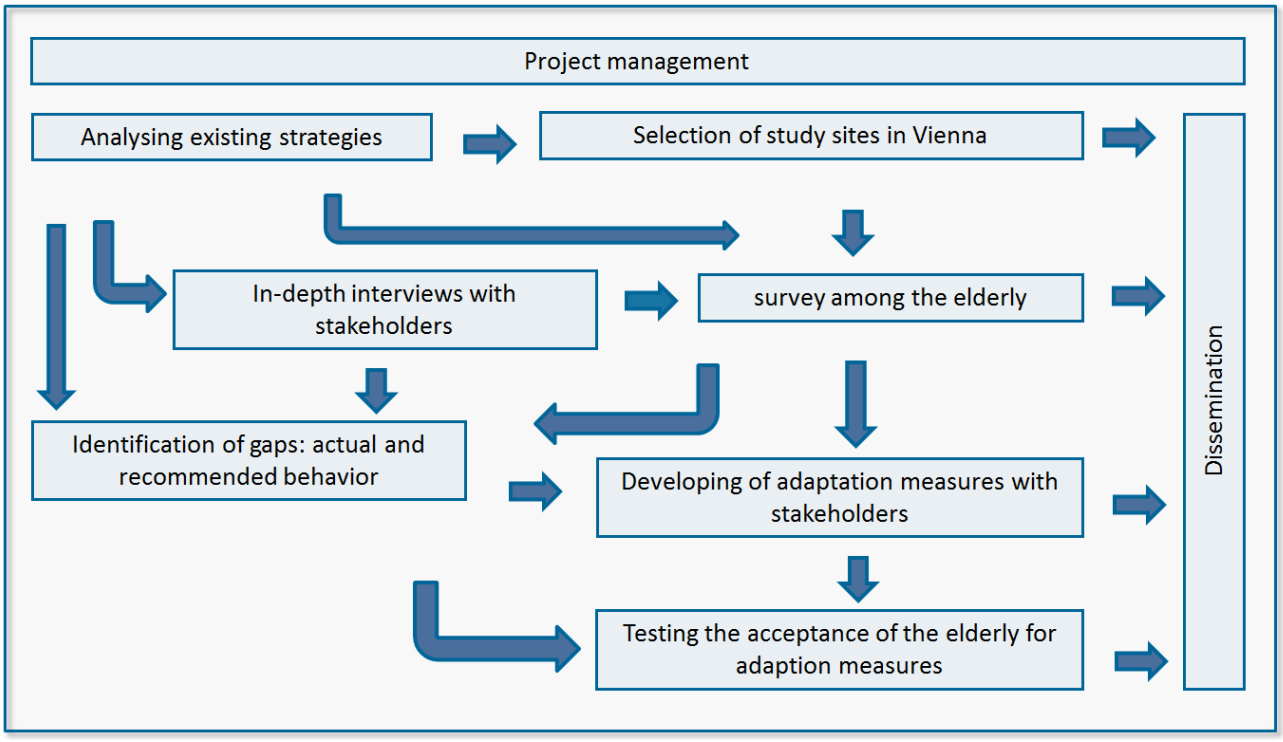

Fig. 2: Workflow plan of the STOPHOT-project

4 RESULTS

4.1 Elderly's perception of and behaviour during heat waves

The survey among the elderly aimed to work out 1) whether elderly people perceive climate changes and rises in temperature, 2) how they react to it physically and mentally, and 3) how they adapt to these changes. An overview of the results is provided below.

Elderly people and climate change awareness

Half of the elderly respondents living at home and half of the elderly respondents living in retirement homes stated that they have experienced more hot days, hot nights and longer heat periods today than ten years ago. Accordingly, the vast majority perceived climate change to be a serious problem that might have catastrophic consequences. Retirement home inhabitants, persons with a higher educational status und persons living in areas with little green spaces were more aware of this problem. However, the majority of the elderly also stated that climate change will not affect themselves anymore because of their old age.

Heat stress and its effects on elderly people

Elderly people felt most comfortable at temperatures which range from 21°C to 25°C during the day and 18°C to 23°C during the night. Particularly among women, sensitivity to heat increased with age.

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Heat primarily affected the elderly's energy balance. Reported heat impacts on physical wellbeing were fatigue and sleeping problems. On the one hand, heat caused senses of pleasure. While both older and younger people (18 to 55 years) frequently reported these symptoms, older people sufferred more from heat stress. Risk groups, defined as people who suffer most from heat stress, comprised:

- younger people (18 to 55 years) with a low socio-economic status who live in socially disadvantaged areas
- older people (65 years and older) with a low socio-economic status, poor health condition, who tended to be socially isolated

The latter group was more likely to withdraw from the public life during hot periods. Those who didn't withdraw appeared to suffer from fewer heat induced ailments. Factors that increased the likeliness to stay at home were a disadvantaged neighborhood, dissatisfaction with and lack of social neighborhood networks and age discrimination in the residential area.

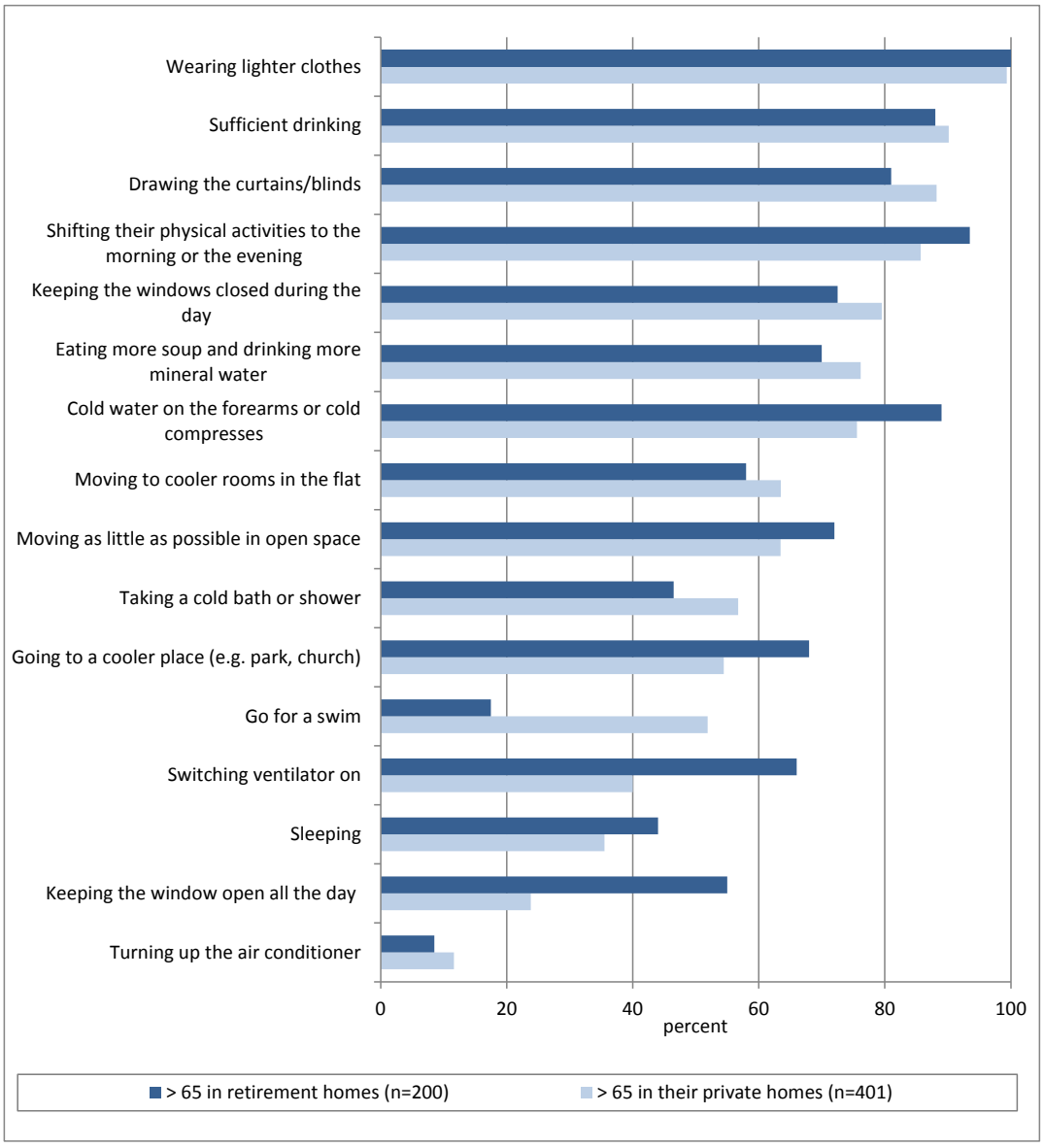

Fig. 3: Reported activities against heat stress (survey 2011)

Strategies to coping with heat stress

Altogether respondents felt well informed about the right behavior during a heat wave. Seniors living at home mentioned most frequently newspaper, television and radio as sources of information. In contrast, respondents living in retirement homes mentioned most frequently home management, doctors and care personnel as sources of information. This group perceived personal information as more helpful than media

information. The most common recommendation elderly people received from their doctor (especially those living in retirement homes) was to increase their liquid intake during a heat wave.

Seniors themselves claimed drinking as one of their most commonly deployed measure against heat stress. Other often mentioned measures were wearing lighter clothes, drawing the curtains, shifting their pysical activities to the morning or the evening hours and keeping the windows closed during the day. Elderly people reduced their activity level to a greater extend than younger people.

The majority of older people stayed in their apartment when it was hot. They perceived the home to be cooler than the outdoors. Those who went out, did less suffer from heat stress. They visited semi-public (gardens, inner yards) and public (parks, waters) areas. Older people showed a preference for parks and green spaces, while the younger ones favoured blue spaces.

4.2 Stakeholders' views on urban heat and the elderly

Stakeholders had different perceptions on the topic of urban heat and the elderly. Most experts were aware of climate change and heat waves, but most of them had not yet considered them with respect to the elderly. Whereas stakeholders from the field of "planning / green space" have already dealt with the topic heat and climate change (mostly at workshops/conferences), representatives of older people had only discussions on that topic with senior citizens, but no experiences at scientific level.

The experts were able to name a lot of measures to make the summer heat in the city bearable for the elderly. In total, 79 different measures were mentioned. On average one expert named 13 measures.

The measures stated most frequently were "sufficient drinking", "greening of roofs/facades/courtyards", "planting and preservation of trees/avenues", "keeping/including more green in the city" and "more drinking fountains in public spaces".

Depending on their discipline, the experts focussed on different measures. Representatives from the sector "planning / green spaces", for example, named many measures which were related to public (green) spaces, such as "ventilation of the city", "greening of roofs/facades/courtyards", "planting and preservation of trees and avenues". Representatives of the elderly as well as representatives from the health sector had their focus on individual measures such as "sufficient drinking", "right food", "appropriate clothes", "avoiding midday heat" etc.

Although the stakeholders were able to name a number of measures, only few measures have so far been implemented for the elderly in Vienna. The representatives from retirement homes mentioned the following measures which have already been implemented in their retirement homes: drinking fountains in the common areas, diet food on heat days and apartments with heat protection. The care station has been moved to the ground floor due to the summer heat. Furthermore, posters and billboards as well as announcements inform about heat waves and provide recommendations regarding proper behaviour.

In addition, the city of Vienna provides a heat wave warning system and a list of recommendations regarding proper behaviour, which has already been distributed to those elderly who live alone in private homes.

Experts differrently assessed the present risk of urban heat for older people living in private homes. Some experts thought that there is already a risk for elderly people, especially if there is no person who looks after them, others believed that the risk will significantly increase in the future. The risk of the elderly living in retirement homes was estimated to be as high as that of those living in private homes. Representatives of the elderly, though, regarded the risk level to be lower due to residential care in retirement homes.

5 CONCLUSION

The elderly are particularly vulnerable towards heat stress. With urban populations ageing, and urban temperatures rising, planning and design of urban areas must increasingly consider the interaction of social and climatic factors as an important part of becoming an age-friendly city.

However, many relevant stakeholders in Vienna did not feel any direct responsibility regarding the issue, only few measures have so far been implemented for the elderly in Vienna. Therefore, a responsible person and multidisciplinary collaboration between the different organisations and working groups are needed; at the moment, synergies seem to be missing.

Study results suggest that heat is essentially a social problem in three ways. First, people with a lower socio-economic status tend to live in disadvantaged areas, in which heat exposure and heat stress are increased by building density, building materials, lack of public and green spaces and other environmental and planning factors. Second, once exposed to heat, people with a lower socio-economic status suffer more from heat stress due to their generally poorer health (caused by bad living and working conditions as well as unhealthy lifestyles). Third, the study has provided new insights in how disadvantaged groups tends to deploy unfavourable coping strategies, like staying at home in a hot apartment.

Recommendations for concrete measures and activities reducing the vulnerabilitis of the elderly can be drawn from these conclusions. The measures have been discussed and evaluated by stakeholders of urban planning, senior and social work as well as climate research in the course of a World Café. STOPHOT recommendations for urban outdoor planning comprise for example:

Challenge	**Description of Measures**
Accessibility	Elderly friendly and climate adapted corridors to reach public and green spaces and parks For example: Green paths and corridors Accessible public toilets and information about where to find them
Mobility	Elderly friendly and climate adapted resting possibilities like mobile benches that can be moved to shadowy or sunny places (depending on the weather and season)
Privacy	Elderly people enjoy to be outside, yet they express a need for semi-public places and places in public space where they can withdraw and have a moment of quietness
Maintenance	Provision of infrastructure (e.g. benches in green spaces) is not sufficient, it must be maintained. Urban planners should cooperate with local initiatives, NGOs and organisations offering leisure activities for older – and younger – people.

Heat has to be seen as an environmental factor which is not natural and unchangeable, but as part of social inequalities that can be balanced. Resilience and individual coping strategies have to be supported by community-planning initiatives (e.g. green corridors, community gardening).

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