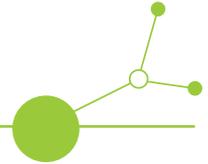


D.2.3.1: EVALUATION OF THE PILOT ACTION



Version 4

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1. The Summary

As the planet continues to warm, not all regions are heating up at the same pace. Over the last thirty years, the global average temperature has increased by around 0.26°C per decade. But in Europe and the Arctic, the rate of warming is more than double the global average. Europe is the fastest-warming continent and has warmed by approximately 0.53°C per decade since the mid-1990s (climate.copernicus.eu).

The 3 warmest years on record for Europe have all occurred since 2020, and the 10 warmest years have been since 2007. Heat stress is the leading cause of climate-related deaths in Europe and the frequency, intensity and duration of heatwaves are expected to increase in the coming decades (WHO).

In order to be prepared for heat and heat waves, 4 European cities have implemented 4 different pilot actions. Hajdúböszörmény in Hungary has installed 47 green islands spread in 23 locations all over the city. In Maribor pergolas have been installed in the playground of two kindergartens protecting the kids and the adults from sun and heat. The city of Weiz in Austria intends to improve the well-being of elderly and workers of a care home by installing a cooling system that receives electricity through solar panels. Finally, the city of Worms has set up a Heat Action Network for a heat resilient city.

The results of the evaluation of the pilot action in **Hajdúböszörmény** show that the average temperatures and the maximum temperatures under the green islands were lower in 2025 compared to 2024. This is because in 2025 the vegetation was denser and provided more shade than in 2024. The planted greenery has been essential in creating cooler microclimates by offering shade, promoting evapotranspiration, and lowering the amount of heat absorbed by built surfaces. Alongside the quantitative data, qualitative feedback from the wellbeing questionnaires also confirmed the positive reception of the pilot action. Participants frequently emphasised the comfort and practicality of the shaded areas, often referring to them as a valuable “service” on hot summer days.

The installed green islands received particularly positive feedback from the older age group, who expressed strong appreciation and gratitude. A written response from the Retirement Home highlighted that, residents greatly enjoy the island, actively tend and use it, and would gladly welcome additional installations in the future. Based on our observations, residents also make frequent use of the islands in playgrounds and bus stops, where they are considered highly beneficial. At these locations, people often spend half an hour to an hour, which would be uncomfortably long under direct sunlight, whereas the shaded environment provides a much more pleasant experience.

However, some residents expressed criticism, noting that the young trees and climbers initially provided little shade. As the greenery matures, its effectiveness will become clearer, but early perceptions were shaped by impatience for visible results. Future communications on green infrastructure should better address this expectation.

The pilot action in **Maribor** have been successfully implemented. The pergolas, built from locally sourced wood and designed to support climbing plants (kiwi and grapevine), were installed in the beginning of 2024 to enhance outdoor thermal comfort and promote heat resilience through nature-based solutions. The primary impact of the pergolas was on the outdoor microclimate, particularly in areas where children play during hot weather.

The results show that, during the transitional months (June and September), outdoor air temperatures in the pergola zones were up to 5°C lower compared to fully exposed areas, demonstrating localized shading and buffering effects even before full vegetation coverage.

Staff and teachers at both kindergartens praised the new pergolas for creating a more pleasant and cooler outdoor environment where children spend more time outside and behave more calmly during hot days. They also noted that planting and caring for vegetation helps foster children’s environmental awareness.



The pergolas now serve as educational and demonstration tools, linking nature-based design with real microclimatic benefits.

As vegetation matures, further cooling and comfort improvements are expected, confirming that green pergolas are an effective, replicable, and educationally valuable solution for climate adaptation in public childcare facilities.

The findings of the **Weiz** Pilot show that the selected technical solution and governance model meet the project's main goals. Although the installation was completed late in the season, which limited the amount of real-time data available, the analysis based on technical specifications offers a solid indication of how the system is expected to perform.

The pilot confirms that PV-supported cooling is not only technically feasible but also economically and environmentally beneficial when compared with conventional systems or other alternatives. The solution provides thermal comfort, reduces energy use, and relies on renewable energy, supporting long-term sustainability. These results highlight the value of this approach for similar institutions where vulnerable groups need reliable protection from heat stress.

In the senior center in Weiz, the PV-supported cooling system was the most effective option for ensuring thermal comfort. However, measures such as shading, better insulation, and natural ventilation can further reduce cooling needs and may be appropriate for other contexts or as complementary actions. Taken together, these strategies can strengthen resilience and lower operational costs over time.

The evaluation of the **Worms** pilot shows that creating a local heat protection network is a very effective way to implement and maintain heat adaptation strategies. All quantitative and qualitative indicators confirm that the pilot met its goals and, in some areas, even exceeded expectations. More than 30 organisations and individuals took part, and the official signing of the Heat Protection Charter gave the project greater visibility and institutional support.

The feedback from the participants of the different network events, shows that the pilot helped raise local awareness of heat-related health risks and made participants feel more confident in responding to them. People appreciated the inclusive approach, the practical results like maps and hotline information, and the clear link between city policy and everyday practice. The pilot also seems to have strengthened social connections and cooperation across different institutions. At the same time, participants pointed out the need for stronger structural support to adapt buildings and outdoor spaces, as well as regular follow-up activities to keep the network active and visible.

2. Introduction

The aim of the document is to evaluate the implementation of 4 pilot actions to improve heat resilience in cities in central Europe.

The Ready4Heat pilot actions developed by the cities are the following:

The city of Hajdúböszörmény in Hungary has created 47 green islands placed at heat hotspots across the city. The 23 locations have been selected using heat maps with the cooperation of stakeholders involved in citizen engagement. The green islands each have a bench to rest under the shade created by trees planted next to the green island and the plants growing on a wooden structure.

The city of Maribor in Slovenia has installed two pergolas with strategically selected plants to provide shade and cooling effects in two different kindergartens. The first one is protecting the south oriented part of the building from the heat in summer days. The second one has been installed in the second



kindergarten and provides shade over the sandbox. Two different plants are been testing and compared (kiwi and white Isabella vine). The pergolas are made of local wood.

The city of Weiz in Austria has invested in the feasibility of an innovative and sustainable solar powered cooling solution for buildings. In this case the pilot action has been implemented in a nursing home. In order to determine the feasibility, a solar-assisted cooling solution was installed at the pilot location. The operation of the system was monitored and energy data was collected in order to be able to compare the performance of the pilot system with other types of building cooling.

The city of Worms in Germany has established long term structures for raising awareness on heat and health among the citizens. The pilot action tests how a network with relevant actors can be kept alive in a long run. The purpose of the network is to develop and implement a district concept for heat reduction in a particularly affected part of the city.

In order to gain the information needed for the evaluation, the 4 pilot cities worked with quantitative and qualitative key performance indicators (KPIs) appropriately selected for each pilot action. The KPIs give us a global picture of the performance of the pilot actions. The KPIs arise if the pilot action has been successfully implemented or not and also show us what can be improved if needed.

To further evaluate the pilot actions, questionnaires on the well-being of the users were distributed among target groups. The purpose of the questionnaires was to gain insight into the satisfaction of users of the pilot actions. The suggestions gathered in the questionnaires will also help the pilot cities to improve the pilot actions.

In addition to this, we have tested the awareness of the heat wave related problems in the cities among stakeholders. As well as assessing people's well-being, we also hand out specific questionnaires during the stakeholder kick-off events, the citizens' engagement workshops and the advanced trainings for people working with the vulnerable groups. The results of these questionnaires will help us to better understand how well-informed and prepared the population is in the event of a heat wave. Additionally, the questionnaires will assist us in identifying trends and patterns among the stakeholders.

Finally, we will share lessons learned during the implementation process and recommendations for a smooth replication of the pilot actions by interested cities.

3. Pilot actions

3.1. Quantitative Key Performance Indicators (KPIs)

The Key Performance Indicators (KPIs) provides valuable information about the performance and the success of the pilot actions.

Each pilot city has implemented a specific pilot action, resulting in different KPIs for each city. However, two general KPIs are common to all pilot cities.

The KPIs have been realistically set according to these four factors:

- Budget limits
- Data availability
- Equipment required (Electronic measuring instruments for air temperature and air humidity)
- Knowhow of the staff coordinating and implementing the pilot action



The quantitative KPIs provide exact information on the pilot actions. The methodology for the measurement of the KPIs has been collected in the deliverable *D.2.1.2 Concept on the pilot action implementation*.

3.1.1. General KPIs

In order to obtain a comprehensive overview of the pilot action implementation and their impact in the pilot area, the 4 pilot actions have following common KPIs:

- Action implemented (Yes / No). *If no or just partially implemented, an explanation is needed.*
- Estimated number of people benefiting from the pilot action

City	Action Implemented (Yes/No)	Number of people benefiting
Hajdúböszörmény	Yes	131.000
Maribor	Yes	349 (children and adults working)
Weiz	Yes	113 Residents, 120 Staff (+ visitors)
Worms	Yes	150 (directly), 1.500 (indirectly)

3.1.2. Specific KPIs

This chapter provides a detailed analysis of the pilot action results based on specific key performance indicators, as well as lessons learned and recommendations for replication in other cities and municipalities.

3.1.2.1. Hajdúböszörmény (Hungary)

Due to its low elevation and continental climate, Hajdúböszörmény is particularly vulnerable to heat stress. The projected increase in heat days, prolonged heat waves, and tropical nights represents a significant health risk, particularly for vulnerable groups, which served as a basis for designing the pilot activity.

Key data:

- Within the framework of the project in spring 2024, the municipality created 47 shade green islands in 23 locations across the city, in public spaces and in institutional courtyards.
- Each island consists of a pergola and connecting benches, surrounded by creepers, trees, perennials and annual flowers.
- The area of each shaded island is 4 m², of which 1.5 m² is occupied by the seating area of the benches.
- The municipality did not use sustainability-certified wood to build the constructions because the primary goal was to use materials that would reduce transportation costs and related environmental impact while staying within the project budget, as certified wood is significantly more expensive and difficult to obtain in the quantities required.
- The total amount spent on the 47 green islands was 79.853 Euro.

These green blocks provide cooling shade and improve the microclimate of the area through evaporation of the plants. The main objectives of the pilot action were to increase urban green spaces in Hajdúböszörmény,



but also to provide more shaded areas, particularly in public spaces vulnerable to the urban heat island effect; to create spaces that residents can better utilize during the summer months; to expand the number of recreational areas and to enhance urban biodiversity.

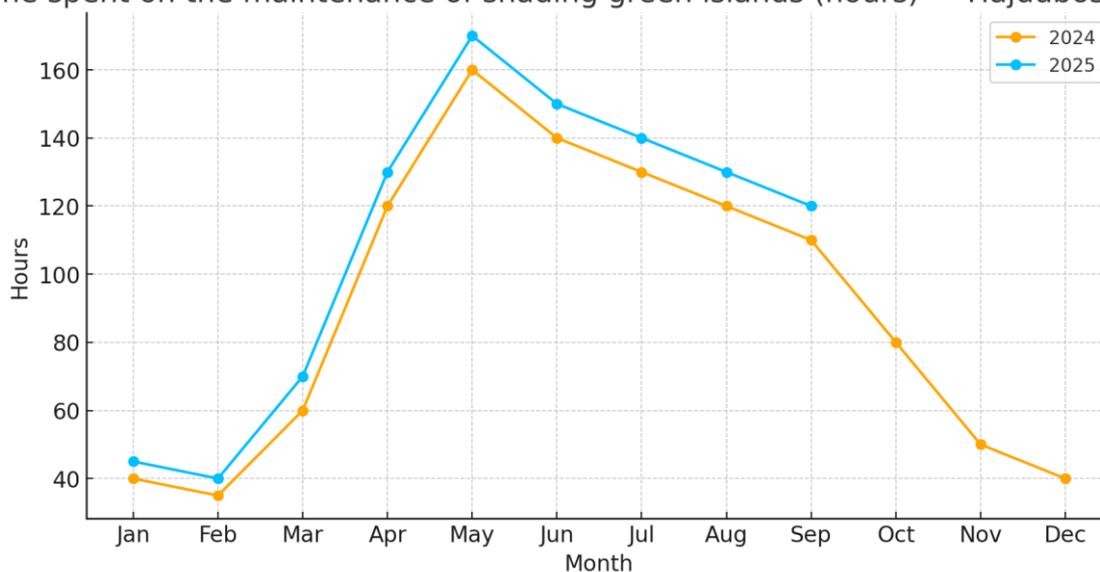
The measurements related to the pilot activities were conducted during the summers of 2024 and 2025. The following key performance indicators (KPIs) were established to evaluate the success of the pilot activity:

- Time spent on care (working hours)
- Air Temperature (°C) (before/after) installing the green islands under each green island
- The average air temperature between May and September in the specific area (yard) where the development takes place
- Surface Temperature (°C) (before/after) installing the green islands under each green island
- Area of shaded surface (m²) at noon (between 11:00 and 13:00)
- Number of green islands installed (47)
- Sustainability-certified wood (yes/no)
- Number of people using the green island at a certain time during the summer
- Money spent on a green island
- Amount of money spent in total

The findings for each KPI are shown below.

KPI - Time spent on care (working hours)

Time spent on the maintenance of shading green islands (hours) — Hajdúböszörmény



Maintenance work consisted of watering, weeding, replacing dead plants, and minor repairs to wooden structures. The data on the maintenance of shading green islands in Hajdúböszörmény (see graph above)

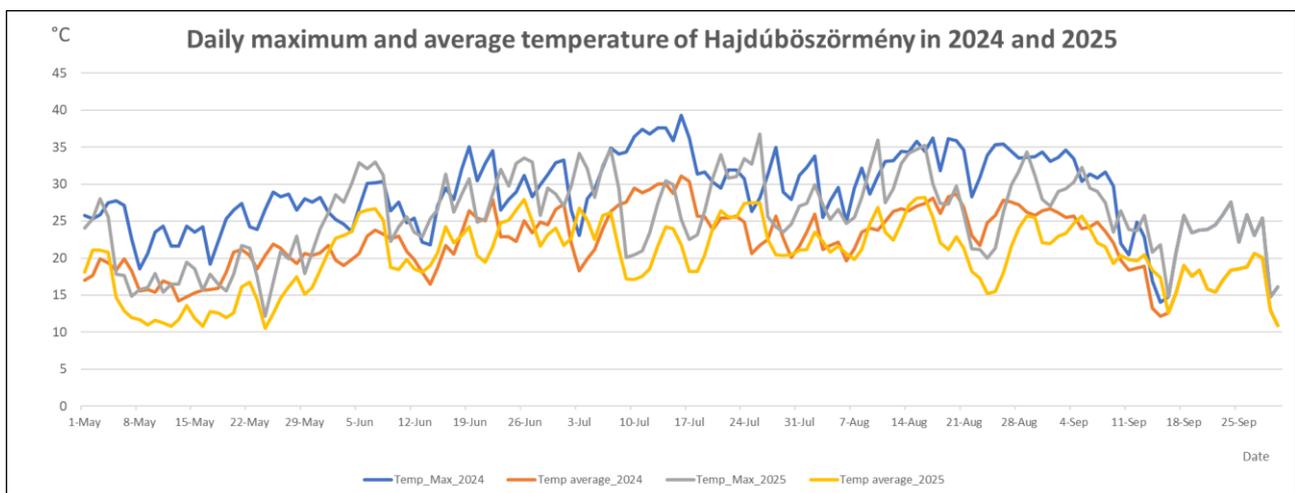


shows a clear seasonal pattern. In both 2024 and 2025, the lowest number of hours is recorded during the winter months, when maintenance needs are naturally limited. From March onwards, there is a sharp increase, peaking in May, which is by far the most demanding month. In 2024, the peak reached 160 hours, while in 2025 it rose even higher to 170 hours, as a result of the increase and growth of vegetation mass.

After May, the number of hours gradually decreases, although summer months still require significant attention, with values remaining above 120 hours until August. By September, a steady decline continues, but 2025 consistently shows slightly higher values compared to 2024 across all months for which data is available. This indicates a general trend of increasing maintenance workload in 2025. In the last quarter of 2024, the hours dropped sharply to 80 in October, 50 in November, and just 40 in December, reflecting the reduced need for maintenance in colder months. Although data for these months in 2025 is not available, it is reasonable to expect a similar seasonal decline.

Overall, the comparison highlights that while the seasonal cycle of maintenance is stable - low in winter, highest in late spring, and gradually decreasing through summer and autumn - the workload in 2025 has been consistently greater than in the previous year. The amount and distribution of seasonal rainfall can also affect the workload, as it influences the frequency of irrigation tasks.

KPI - The average air temperature between May and September in the specific area (yard) where the developments take place



The data presented in the table were calculated based on measurements from several meteorological stations operating in the region. Therefore, the values represent average data that combine observations from different stations, providing a more general picture of the regional weather conditions, rather than reflecting the measurements of a single station located near the Green Island.

The temperature data of Hajdúböszörmény in 2024 and 2025 show clear seasonal fluctuations between May and September (see graph above). Maximum temperatures: In both years, daily peaks often exceeded 30 °C in June-July, with 2025 showing slightly higher extremes compared to 2024. Average temperatures: The daily averages generally stayed between 15-25 °C, with stable summer plateaus and notable short-term fluctuations caused by weather variability. Year-to-year comparison: 2025 records indicate slightly higher maximum values and more frequent peaks above 30 °C, while averages remained relatively similar to 2024.

Trend: The data suggest increasing heat intensity, especially in mid-summer, which can have direct implications for green infrastructure maintenance. Overall, the figures highlight a warming tendency in 2025 compared to 2024, underlining the importance of continued monitoring and adaptive measures.

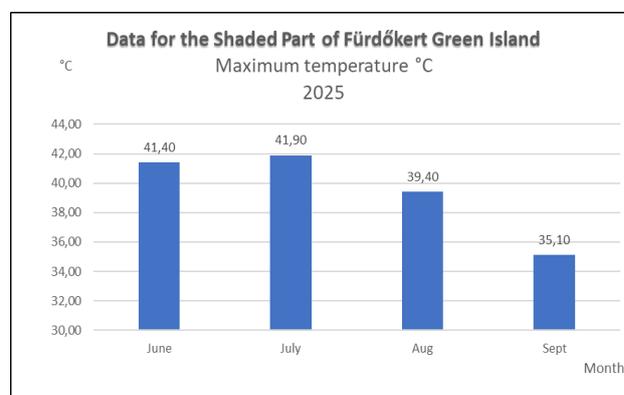
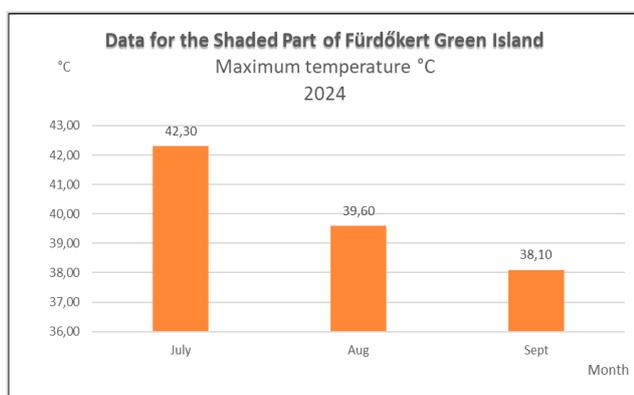


KPI - Surface Temperature (°C) under each green island for the years 2024 and 2025

The Green Islands were installed in heat hot spots, which are among the warmest areas within the urban environment. In these locations, the temperature is typically higher than in the surrounding, less built-up or greener areas. This is mainly due to the large proportion of paved surfaces (such as asphalt and concrete) and the limited vegetation, which cause heat to absorb more easily and dissipate more slowly.

The purpose of placing the Green Islands in such areas is to reduce local temperatures, improve the microclimate, and mitigate the urban heat island effect in places where heat stress is the most significant.

Maximum temperature in Fördökert pilot site



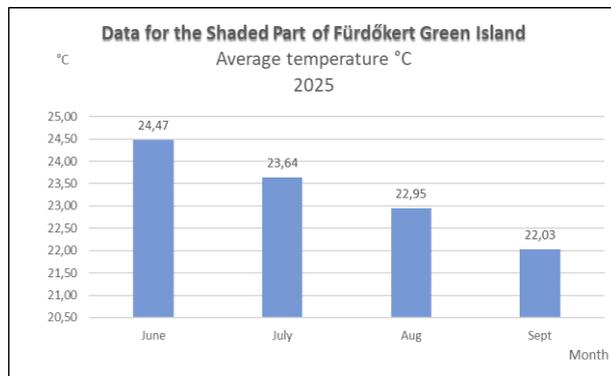
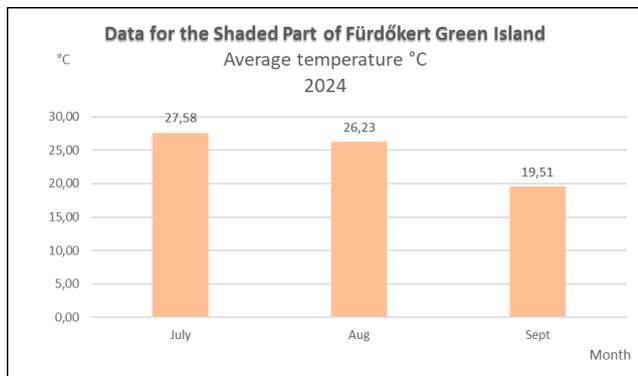
The maximum temperature data for the shaded part of Fördökert Green Island show clear differences between the summers of 2024 and 2025 (see graphs above).

In 2024, the highest temperature was recorded in July at 42.3 °C, followed by a gradual decrease to 39.6 °C in August and 38.1 °C in September. By contrast, in 2025, June and July both reached similarly high peaks of 41.4 °C and 41.9 °C, respectively, while August dropped slightly to 39.4 °C, and September saw a significant reduction to 35.1 °C.

The comparison highlights two important findings. First, peak summer temperatures in shaded areas were slightly lower in 2025 than in 2024, which suggests that the expanding vegetation cover played a role in cooling. Second, the decrease in September 2025 was much more pronounced than in the previous year, showing that the shading effect became increasingly effective as the vegetation matured and provided broader coverage.



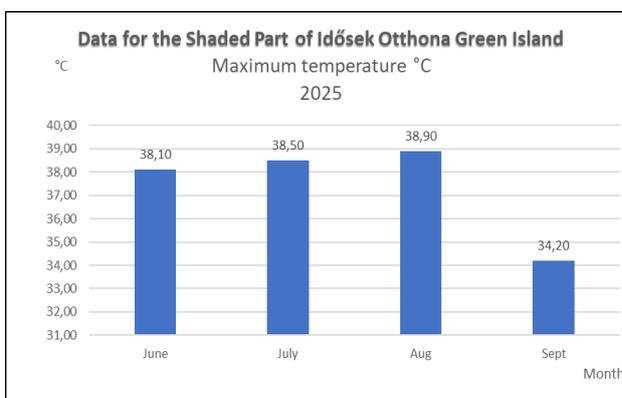
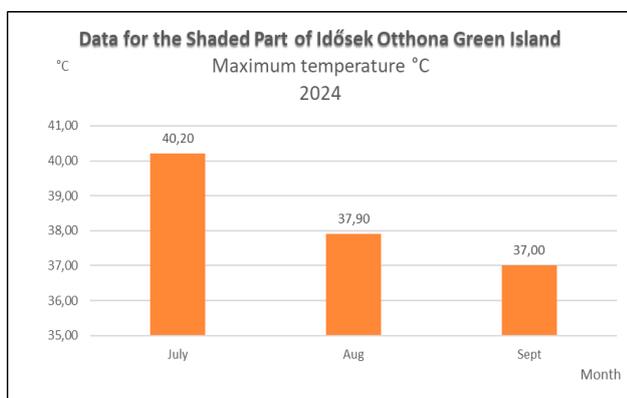
Average temperature in Fördökert pilot site



The temperature data for the shaded part of Fördökert Green Island shows notable differences between the summers of 2024 and 2025 (see graphs above). In 2024, the hottest month was July with an average temperature of 27.58 °C, followed closely by August at 26.23 °C. By September, however, temperatures dropped more sharply to 19.51 °C, marking a clear transition into autumn. This indicates that the summer of 2024 was characterized by a pronounced heat peak in mid-summer, followed by a rapid cooling. In contrast, the data for 2025 reveals a much milder and more balanced pattern. June already started at 24.47 °C, but the following months did not bring the same intensity of heat as in 2024. July averaged 23.64 °C, August 22.95 °C, and September 22.03 °C. The temperatures remained relatively stable and declined gradually without any extreme peaks.

When comparing the two years, the difference is striking: the summer of 2024 was significantly hotter, particularly in July and August, while the summer of 2025 was cooler and more even. This variation has practical implications for the shaded green island. Higher summer temperatures, as in 2024, increased the need for irrigation and intensified maintenance efforts, especially during July and August when plants are most stressed by heat. On the other hand, the milder conditions of 2025 reduced heat-related stress on vegetation, easing some aspects of maintenance work, even if regular care and watering was still required.

Maximum temperature in Elderly home pilot site



The maximum temperature data for the shaded part of Idősek Otthona Green Island highlights important differences between the summers of 2024 and 2025 (see graphs above).

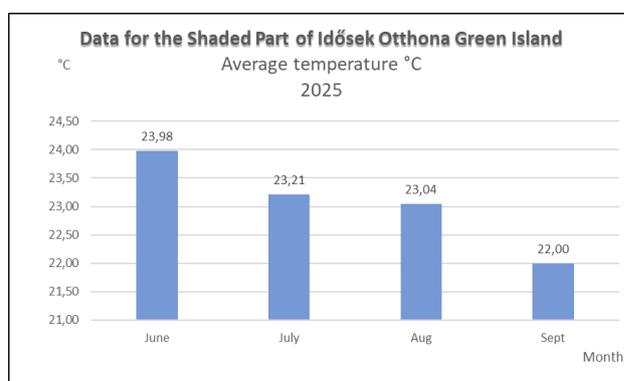
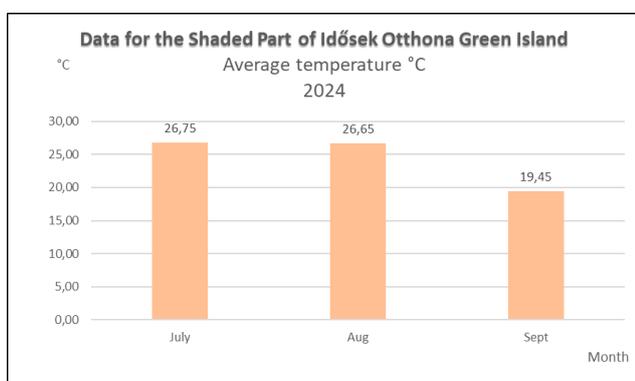
In 2024, the hottest month was July, reaching 40.2 °C, which represents an extreme heat level even in shaded conditions. Temperatures then declined slightly in August to 37.9 °C and continued to fall in



September, though still remained high at 37.0 °C. This indicates that the summer of 2024 was marked by an intense heat peak in July, followed by persistently elevated maximum temperatures well into early autumn. In 2025, the seasonal trend appears different. June already recorded a high maximum of 38.1 °C, showing that extreme heat arrived earlier in the season compared to 2024. July and August remained consistently hot at 38.5 °C and 38.9 °C, but unlike in 2024, the values did not cross the 40 °C threshold. By September, the maximum dropped more sharply to 34.2 °C, signaling a clearer seasonal cooling compared to the previous year.

When comparing the two years, it becomes clear that 2024 was hotter overall in peak intensity, with July surpassing 40 °C, while 2025 was slightly cooler but sustained high heat levels over a longer period beginning already in June. Additionally, the decline in September was much more pronounced in 2025, indicating a quicker transition to milder conditions.

Average temperature in Elderly home pilot site



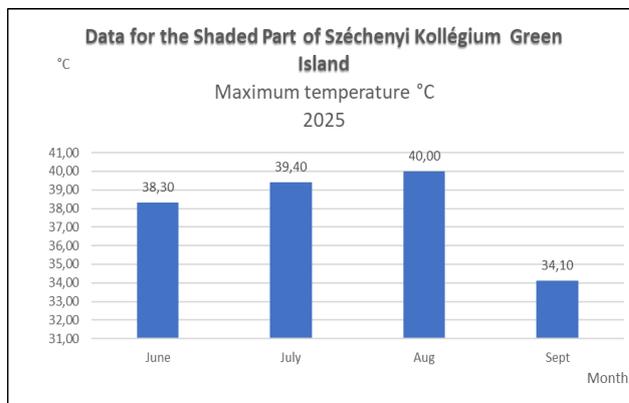
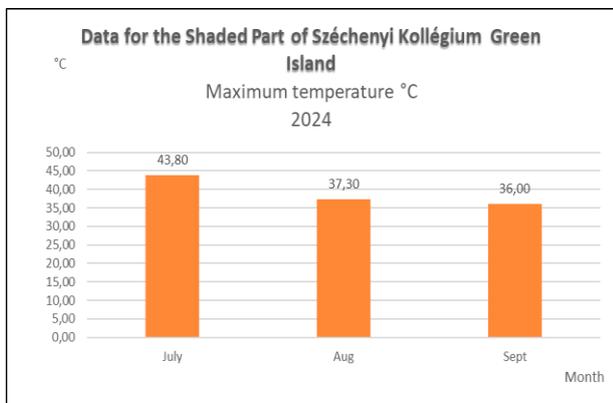
The average temperature data for the shaded part of Idősek Otthona Green Island shows clear differences between the summers of 2024 and 2025 (see graphs above).

In 2024, the hottest months were July and August, with average temperatures of 26.75 °C and 26.65 °C, respectively. These values indicate a consistently warm summer period, with both months maintaining nearly identical levels of heat. By September, the average temperature dropped sharply to 19.45 °C, showing a pronounced seasonal transition. This pattern highlights that 2024 had a stable but high summer heat load, followed by a steep decline as autumn began. In contrast, 2025 displayed much milder conditions throughout. June already started with an average of 23.98 °C, but the subsequent months did not rise significantly. July recorded 23.21 °C, August 23.04 °C, and September 22.00 °C. Unlike in 2024, the differences between months were minimal, and no clear heat peak occurred. Instead, the summer of 2025 was characterized by a lower and more balanced temperature profile, with only a gradual cooling toward September.

Comparing the two years, 2024 was considerably warmer in July and August - by more than 3 °C on average - while 2025 remained relatively moderate and stable. The sharp September cooling in 2024 contrasts with the smoother seasonal change in 2025.



Maximum temperature in Széchenyi István Secondary School pilot site

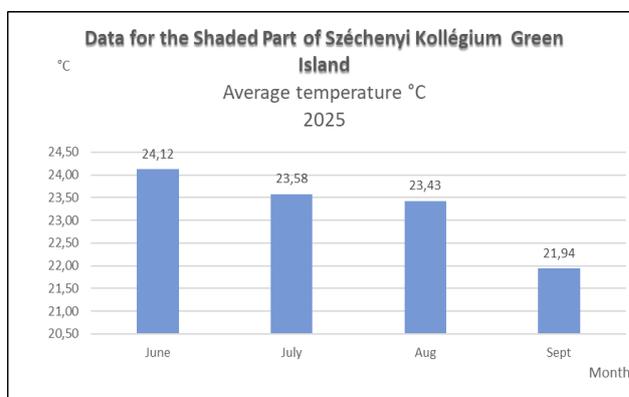
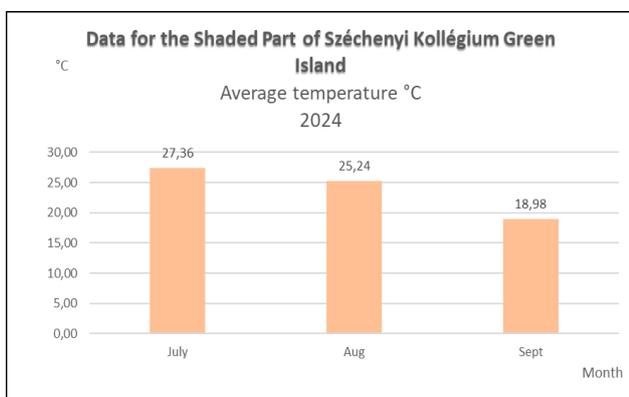


The maximum temperature data for the shaded part of Széchenyi Kollégium Green Island shows clear contrasts between the summers of 2024 and 2025 (see graphs above).

In 2024, July recorded an exceptionally high maximum temperature of 43.8 °C, far exceeding the other months and indicating an extreme heat event even in shaded conditions. After this peak, temperatures dropped significantly to 37.3 °C in August and 36.0 °C in September, suggesting a sharp decline after an intense mid-summer. This pattern highlights 2024 as a year of extreme and concentrated heat stress, with July standing out as a particularly challenging month for both vegetation and human comfort. In 2025, the heat distribution was more balanced across the summer. June already began at a high level with 38.3 °C, followed by 39.4 °C in July and a further rise to 40.0 °C in August. Unlike in 2024, the maximum did not reach as extreme a level, but the high temperatures persisted over a longer period. By September, the maximum dropped more sharply to 34.1 °C, marking a more evident seasonal cooling compared to 2024.

When comparing the two years, 2024 was more extreme in peak intensity, with July surpassing 43 °C, while 2025 was slightly cooler but more prolonged in its heat, starting earlier in June and maintaining high values through August. The September cooling in 2025 was also stronger, providing some relief earlier than in 2024.

Average temperature in Széchenyi István Secondary School pilot site



The average temperature data for the shaded part of Széchenyi Kollégium Green Island shows a marked difference between the summers of 2024 and 2025 (see graphs above).

In 2024, July reached the highest average temperature at 27.36 °C, followed by August with 25.24 °C. By September, the temperature dropped more sharply to 18.98 °C, indicating a strong seasonal transition from

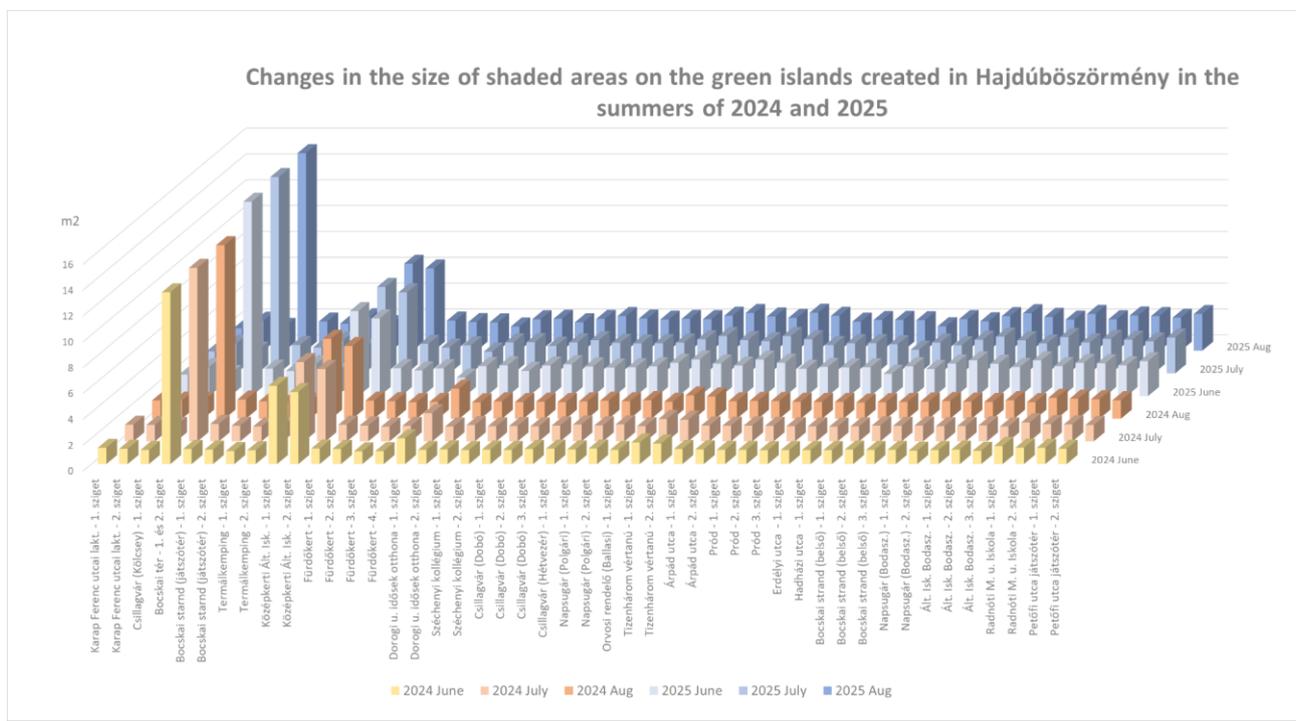


late summer into early autumn. The data highlights a distinct summer peak, with particularly hot conditions in July, before a rapid cooling in September. In 2025, the pattern was much milder and more balanced. June already started at 24.12 °C, but the following months did not bring any significant increase. July recorded 23.58 °C, August 23.43 °C, and September 21.94 °C. Compared to 2024, the average temperatures were consistently lower—by around 3 to 4 °C in the peak summer months—and the decline toward September was more gradual.

Comparing the two years, 2024 was significantly hotter, in contrast, 2025 was more moderate, with no sharp peaks and a smoother transition through the summer months.

Overall, in comparison to 2024, the year 2025 showed noticeably lower maximum and average temperatures, a change that can be attributed to the green islands installed on site. The planted greenery has played a crucial role in creating cooler microclimates by providing shade, increasing evapotranspiration, and reducing the amount of heat stored in built surfaces. As a result, not only were extreme peak temperatures less frequent, but the daily averages also declined, contributing to a more balanced and comfortable environment. These findings clearly demonstrate that the initiative to establish vegetation has been effective. The green installations have achieved their purpose, mitigating the heat and proving to be a valuable measure for improving local climate conditions and overall environmental quality.

KPI - Area of shaded surface (m2) at noon (between 11:00 and 13:00)



The graph above illustrates the changes in the size of shaded areas on the installed green islands in Hajdúböszörmény during the summers of 2024 and 2025. The data clearly indicate a significant increase in shaded surface areas between the two years, with the most pronounced growth occurring in July and August of 2025.

In 2024, shaded areas were generally modest, with most locations showing only a few square meters of coverage. However, by 2025, the shaded areas expanded substantially, in some cases doubling or even



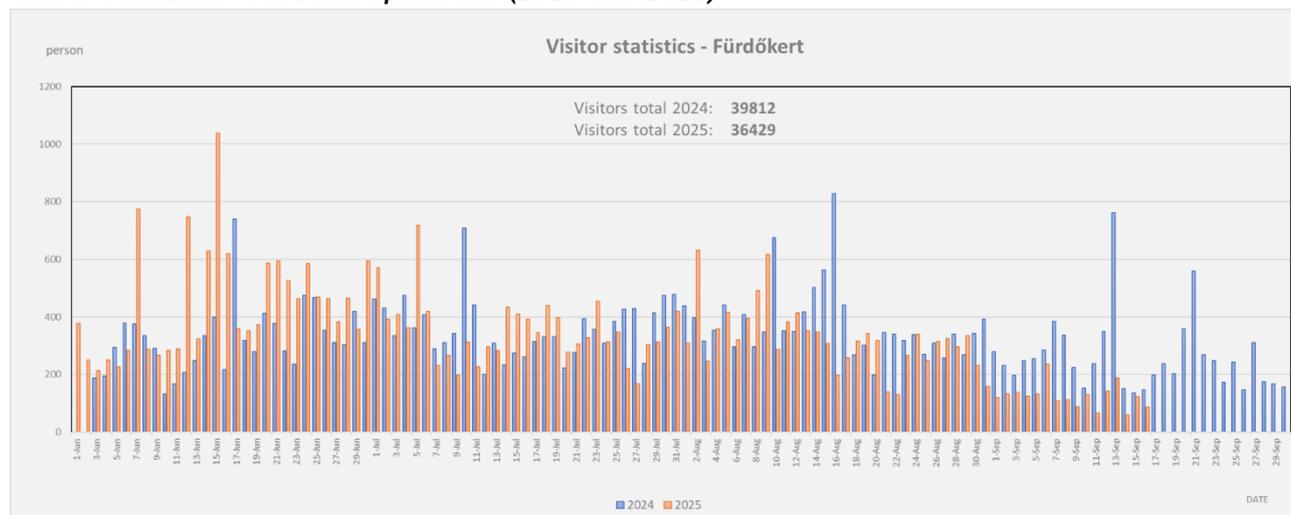
tripling in size compared to the previous summer. This trend is consistent across almost all of the listed locations, suggesting a systematic improvement.

The main factor behind this increase is the vegetation planted in these green island spaces. Newly planted trees and greenery matured within a year, providing broader and denser canopies that significantly enlarged the shaded zones. This not only demonstrates the effectiveness of urban greening projects but also highlights their role in mitigating the urban heat island effect and improving overall comfort for residents.

Overall, the data strongly support the conclusion that vegetation played a decisive role in the growth of shaded areas, confirming that green infrastructure is an effective strategy not only for climate adaptation but also for mitigating the impacts of heatwaves in urban environments.

KPI - Number of people using the green island at a certain time during the summer

Visitor Statistics - Fördökert pilot site (2024 and 2025)

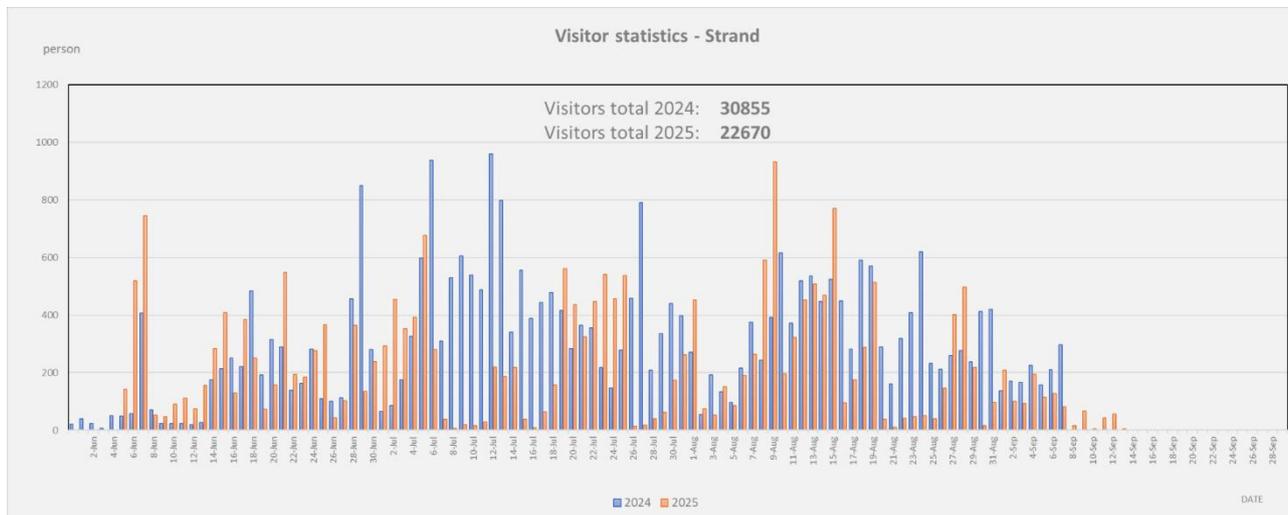


The graph above compares the number of visitors to the Fördökert pilot site from June to September in the years 2024 (blue bars) and 2025 (orange bars).

In 2024, the total number of visitors was 39,812, while in 2025 was 36,429. In this pilot site, a total of 4 green islands were installed.



Visitor Statistics - Strand pilot site (2024 and 2025)



The graph above compares the number of visitors to the Strand pilot site from June to September in the years 2024 (blue bars) and 2025 (orange bars).

In 2024, the total number of visitors was 30,855, while in 2025 was 22,670. In this pilot site, a total of 5 green islands were installed.

By summarising the entry data from the two pilot sites, it became possible to estimate how many people potentially benefited from the advantages provided by the installed green islands. The data clearly show that in both years - during June, July, and August - visitor numbers were high, meaning that the pilot sites reached a wide audience and ensured strong visibility for the pilot action. This also demonstrates that the placement of these green islands effectively targeted highly frequented locations, thereby maximising the impact of the pilot action.

In addition to the quantitative data, the qualitative feedback collected through the wellbeing questionnaires also confirmed the positive reception of the pilot action. Respondents consistently emphasised the usefulness and comfort provided by the shaded areas, often describing them as a valuable “service” during hot summer days. This feedback was echoed by the site operators, who likewise reported positive experiences to the local government, highlighting both the practical benefits of the project and the recognition it received from the community.

Taken together, these findings indicate that the green islands not only successfully fulfilled their purpose - improving comfort and reducing heat stress - but also reached a significant number of residents and visitors, reinforcing the relevance of expanding similar interventions in the future.

3.1.2.2. Maribor (Slovenia)

Within the READY4HEAT pilot implementation in Maribor, the Municipality of Maribor installed two green pergola structures at Kindergarten Ivana Glinška (Ribiška) and Kindergarten Jožice Flander (Žvrgolišče - Focheva). The pergolas, built from locally sourced wood and designed to support climbing plants (kiwi and grapevine), were installed in beginning of 2024 to enhance outdoor thermal comfort and promote heat resilience through nature-based solutions.



Each pergola covers approximately 25 m² of playground area, providing partial shade while the vegetation matures. HP2000 7-in-1 weather stations were installed at both sites to continuously monitor environmental parameters such as temperature, humidity, solar radiation, and air quality. This report focuses on detailed microclimatic data from the Focheva site, which serves as a representative pilot location for quantitative analysis.

Continuous environmental monitoring was implemented using HP2000 7-in-1 weather stations, configured to record hourly data at both locations.

Each station measured:

- Air temperature (°C)
- Relative humidity (%)
- Solar radiation (W/m²)
- Air quality and barometric pressure (hPa)

Sensors were positioned:

- Outside the pergola (fully exposed area)
- Under or near the pergola (semi-shaded area)
- Indoors in the nearest classroom (reference measurement)

The dataset covers the period January - December 2024 and January - October 2025. Hourly data were aggregated into daily and monthly averages for comparative analysis between the two years, focusing on the summer period (June - September) when heat stress is most relevant.

Note: The pergolas are located in outdoor playgrounds; therefore, they did not influence indoor temperatures directly. Their primary impact was on the outdoor microclimate, particularly in areas where children play during hot weather.

User well-being data were collected through teacher and parent questionnaires and interviews at both kindergartens.

Key findings

Temperature and Humidity Comparison (2024 vs 2025)

A comparative analysis between June - September 2024 and 2025 demonstrates stable indoor conditions and measurable moderation effects under the pergola.

Year	Avg Outdoor Temp (°C)	Avg Indoor Temp (°C)	ΔT (Outdoor-Indoor) (°C)	Outdoor RH (%)	Indoor RH (%)
2024	21.6	23.7	-2.15	71.9	56.2
2025	21.2	23.8	-2.69	68.6	57.3

Interpretation:

Indoor temperatures remained stable (22-26 °C) across both summers, showing no significant impact from the pergolas, as the structures are located at a distance from the indoor spaces. The pergolas primarily influenced the outdoor microclimate in the play areas where children spend time outside.



During the transitional months (June and September), outdoor air temperatures in the pergola zones were up to 5 °C lower compared to fully exposed areas, demonstrating localized shading and buffering effects even before full vegetation coverage.

Humidity levels were consistently lower indoors ($\approx 55 - 58\%$) and higher outdoors ($\approx 68 - 72\%$), indicating typical building performance rather than pergola influence.

The results therefore suggest that, while pergolas did not affect indoor conditions, they already improved comfort in outdoor playground areas, where their effect is most relevant for user well-being.

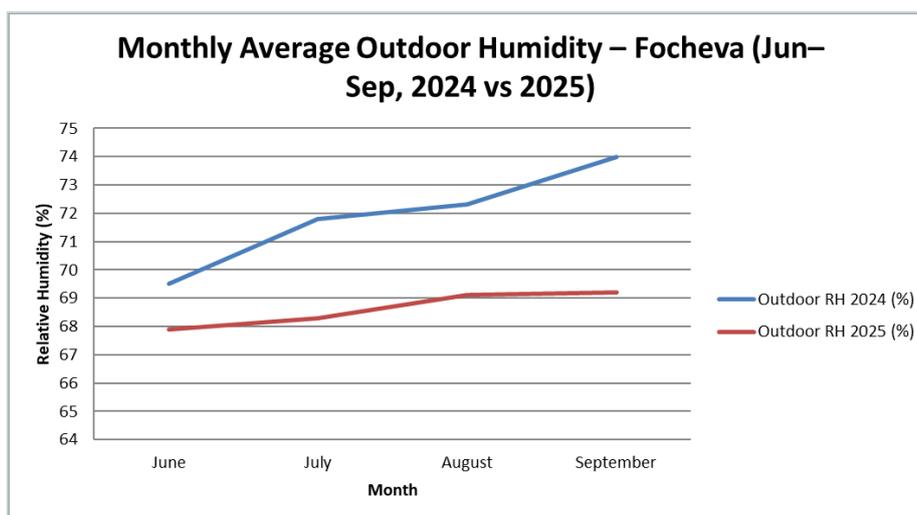
Regarding the KPI on electricity consumption for cooling, we currently do not have measurable data for the two kindergartens. At this stage, the vegetation on both pergolas (at Ribiška and Focheva) has not yet developed sufficiently to provide full shading or significantly influence indoor temperatures. Therefore, no measurable reduction in electricity use for cooling has been detected so far. However, once the plants mature and provide full green coverage, a follow-up monitoring will be carried out to compare indoor temperature stability and potential impacts on cooling needs.

In the case of Kindergarten Ribiška, where the pergola is closer to the façade, the effect is expected to be more visible in the future once the vines reach full growth.

Graphical Overview

Monthly Outdoor Humidity (Focheva, 2024-2025)

The figure below shows that outdoor relative humidity was slightly lower in 2025 compared to 2024, especially during the summer months (June - August). This reflects drier and warmer weather conditions in 2025, which correspond to overall higher outdoor comfort variability. Despite inter-annual climatic differences, humidity trends remained stable, confirming consistent sensor performance and environmental comparability between years.

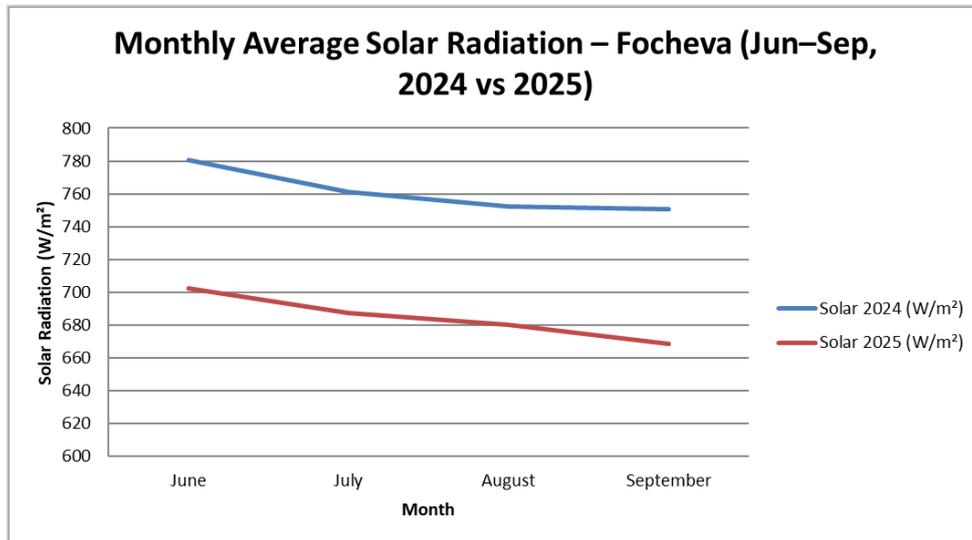


Monthly Solar Radiation (Focheva, 2024-2025)

Solar radiation levels were higher in 2024 across all summer months, especially in June and July. The 2025 season recorded slightly reduced solar input, explaining the minor decrease in outdoor

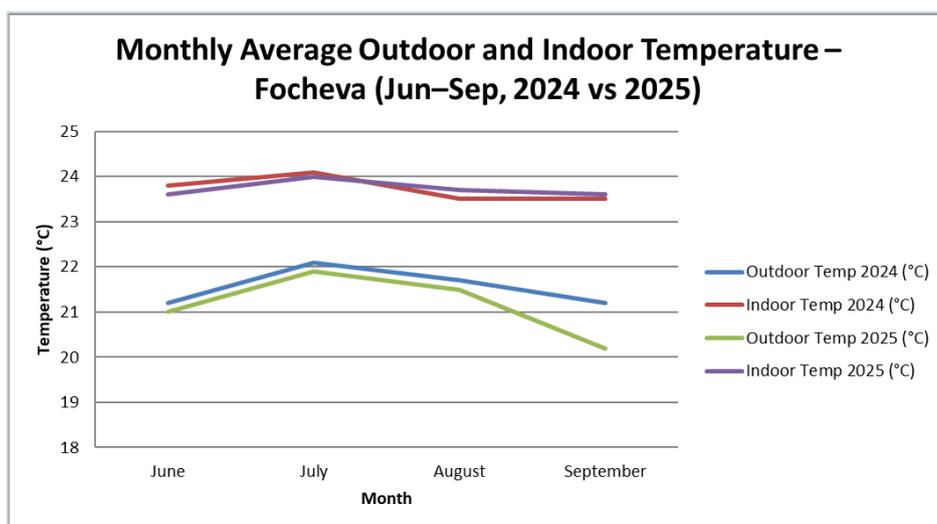


temperature peaks that year. This confirms that shading needs and user comfort improvements correlate directly with solar exposure intensity.



Monthly Average Outdoor and Indoor Temperature (Focheva, 2024-2025)

The comparison shows that indoor temperatures remained relatively stable (22-26 °C) across both years, while outdoor temperatures varied more strongly due to weather fluctuations. This confirms that pergolas primarily affect outdoor comfort zones, not indoor classrooms. The presence of the pergola reduced direct solar exposure and provided partial shading even before full vegetation coverage.

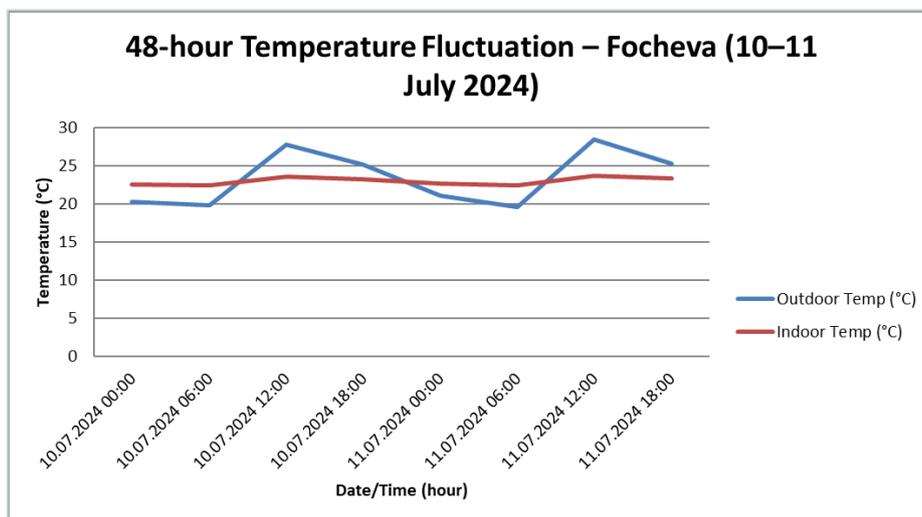


48-hour Temperature Fluctuation (Focheva, 10-11 July 2024)

The diurnal cycle illustrates that outdoor temperatures fluctuate rapidly during day - night transitions, while indoor conditions remain buffered and stable. This highlights the difference between building inertia and outdoor exposure, confirming that pergolas enhance comfort primarily in outdoor play areas.

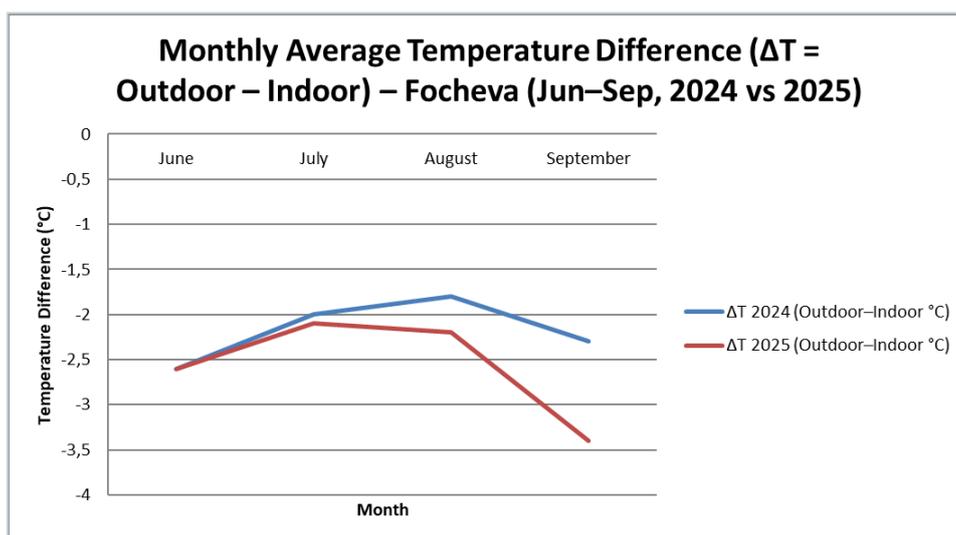


The 48-hour pattern demonstrates the local effect of shading and the importance of vegetation growth for future cooling improvements.



Monthly average outdoor and indoor temperature (Focheva, 2024-2025)

The figure confirms the stability of indoor temperatures (22-26 °C) and moderate outdoor variation between years. Pergolas helped reduce local outdoor peaks, particularly in July and August.



The difference remained between -2 and -3 °C across both summers, indicating consistent thermal buffering by the building and localized improvement in shaded zones.

The graphs show that outdoor summer peaks were slightly higher in 2024, while indoor temperatures remained within a narrower, more comfortable range. This confirms the mitigating effect of the pergola structure, which stabilizes thermal conditions and reduces direct exposure to solar radiation.



User Perception and Comfort

Feedback from staff and teachers at both kindergartens revealed positive perceptions of the new pergolas.

Respondents noted that:

- The pergolas create a visually pleasant and psychologically cooler space;
- Children spend more time outdoors and exhibit calmer behaviour during hot days;
- The educational value of planting and caring for vegetation promotes environmental awareness among children.

Representative feedback

- “Children prefer playing under the pergola; it feels calmer and less hot.”
- “Once the plants grow, it will become a real green classroom.”

Awareness and Behavioural Impact

The pilot significantly raised awareness among kindergarten staff and parents about climate adaptation and urban heat mitigation. The pergolas now serve as educational and demonstration tools, linking nature-based design with real microclimatic benefits.

Staff reported increased understanding of how shading, greenery, and natural materials contribute to resilience against heat.

Challenges and Lessons Learned

- Limited shading in the first year due to immature vegetation.
- Seasonal weather variations influenced measured differences.
- The need for continued monitoring and community engagement was identified.
- Still, the first results demonstrate that such interventions are effective, low-cost, and replicable.

Recommendations

- Accelerate plant growth with climbing species to achieve full green coverage by 2026.
- Add water-misting systems or drinking stations to enhance comfort.
- Continue environmental monitoring through 2026-2027 for vegetation maturity evaluation.
- Expand participation by involving children in data observation as part of climate education activities.

Conclusion

The READY4HEAT pilot in Maribor, implemented at Ribiška and Focheva kindergartens, demonstrates how small-scale green infrastructure can measurably improve microclimatic comfort and well-being. Even before full vegetation growth, pergola structures have:

- Reduced direct heat exposure,
- Stabilized indoor and outdoor conditions, and
- Fostered environmental awareness and behavioural change.

As vegetation matures, further cooling and comfort improvements are expected, confirming that green pergolas are an effective, replicable, and educationally valuable solution for climate adaptation in public childcare facilities.



3.1.2.3. Weiz (Austria)

The pilot action in Weiz, was initiated to respond to the increasing challenge of heat stress in elderly care facilities, which are particularly vulnerable due to the age and health conditions of their residents. Rising temperatures and more frequent heatwaves pose significant health risks for these groups, making effective cooling strategies essential. The chosen location for the intervention was the main dining room of Volkshilfe Seniorenzentrum Weiz, a nursing home, characterized by large glazed areas and high internal heat loads, which amplify the risk of overheating during summer months. The core purpose of the pilot was to assess the overall feasibility of introducing a solar-powered cooling solution for buildings in an institutional setting. This feasibility study encompassed several dimensions: the technical integration of a high-efficiency cooling system with an on-site photovoltaic (PV) installation, the evaluation of governance structures and contractual arrangements for operation and maintenance, and the comparison of different cooling options to identify the most suitable and sustainable solution for elderly care environments.

The implementation process extended over a considerable timeframe. Planning and procurement activities were carried out between 2023 and 2024, followed by the installation of the system in September 2025. The timing of the installation, at the end of the summer season, meant that real-life operational testing during heatwaves was not adequately possible. Consequently, the evaluation approach combines limited measured baseline data with theoretical projections derived from the technical specifications of the installed system. These projections allow for an estimation of cooling performance, energy consumption, and cost efficiency under typical summer conditions. External factors significantly influenced the pilot. One of the most critical challenges was the delay caused by the necessary contractual negotiations with the headquarters of the senior center operator. These administrative processes proved to be highly time-consuming and difficult to resolve, as they involved clarifying responsibilities for operation, maintenance, and liability. The prolonged discussions between the municipality, the operator, and the building owner led to a significant postponement of the installation. The delayed installation restricted the opportunity for comprehensive performance monitoring during periods of high outdoor temperatures. However, this limitation does not undermine the primary objective of the pilot, which was to demonstrate overall feasibility of a solar powered cooling solution for buildings. By successfully completing the installation and resolving governance challenges—such as defining maintenance responsibilities and contractual obligations—the pilot provided valuable insights into the practical requirements for implementing PV-supported cooling systems in similar institutional contexts. This experience highlights that feasibility is not only a matter of technical suitability but also of administrative readiness and stakeholder coordination.

KPIs and relevant data

For the evaluation of the pilot action in Weiz, the analysis of the defined KPIs relies primarily on technical specifications rather than extensive real-time measurements, as the installation was completed at the end of the summer season and the monitoring period was therefore very short. To ensure a meaningful assessment, projections were developed using the performance data provided in the manufacturer's documentation for both the cooling system and the photovoltaic installation. These projections allow us to estimate cooling capacity, energy consumption, and cost efficiency under typical summer conditions.

The cooling system installed in the Volkshilfe Seniorenzentrum Weiz is a Daikin VRV 5 S-series unit with a nominal cooling capacity of 12.7 kW. According to the technical data, the system achieves a Seasonal Energy Efficiency Ratio (SEER) of 7.9 and a Seasonal Coefficient of Performance (SCOP) of 4.9, which indicates a high level of energy efficiency compared to conventional split systems that typically operate at SEER values around 4.5. The discharge air temperature of approximately 13.9 °C and the airflow rate of 650 liters per second confirm that the system is dimensioned to maintain indoor temperatures in the target range of 22–24 °C even under high thermal loads. These specifications form the basis for estimating the KPI related to temperature reduction and thermal comfort.



Energy consumption was calculated by combining the cooling capacity with the expected operating hours during peak summer periods. Assuming 300 hours of operation per year, the projected electricity demand for cooling is approximately 3,800 kWh. This figure is significantly lower than the estimated 6,500 kWh that a conventional system with lower efficiency would require for the same cooling load. This comparison supports the KPI on energy savings and demonstrates the advantage of using high-efficiency technology. The photovoltaic system installed on the roof of the senior center consists of 14 AE CMD-108 Meteor modules with a total capacity of 6.09 kWp. Based on the planning documents and local solar yield calculations, the expected annual production is around 7,003 kWh. This output is sufficient to cover the entire projected electricity demand of the cooling system and still provide surplus energy for other building loads. Consequently, the KPI on cost efficiency and sustainability is strongly supported by these figures, as the integration of PV ensures near-zero grid dependency for cooling and reduces operational costs over the system's lifetime.

In summary, while real measurement data is limited, the technical specifications of the installed systems provide a robust basis for evaluating the pilot's success. The high SEER and SCOP values, combined with the PV system's capacity to fully offset cooling energy demand, confirm that the solution meets the defined KPIs for energy efficiency, cost-effectiveness, and feasibility. These projections underline the potential of PV-supported cooling as a viable strategy for heat adaptation in elderly care facilities.

Key findings

The findings of the Weiz pilot clearly demonstrate that the chosen technical solution and governance approach fulfill the core objectives of the project. Although the installation was completed late in the season and therefore only limited real-time data could be collected, the analysis based on technical specifications provides a reliable indication of the system's expected performance. The Daikin VRV 5 S-series cooling system, with a nominal capacity of 12.7 kW and a high Seasonal Energy Efficiency Ratio (SEER) of 7.9, is designed to maintain indoor temperatures within the target range of 22 to 24 degrees Celsius even under high thermal loads. This confirms that the system is appropriately dimensioned for the specific conditions of the senior center, which include large glazed areas and significant internal heat sources.

Energy consumption projections underline the efficiency advantage of the installed system. Assuming an annual cooling operation of approximately 300 hours, the expected electricity demand is around 3,800 kilowatt-hours. Compared to conventional air conditioning systems with lower efficiency values, which would require roughly 6,500 kilowatt-hours for the same cooling load, this represents a substantial reduction in energy use. Furthermore, the integration of a photovoltaic system with a total capacity of 6.09 kilowatt-peak ensures that the entire cooling demand can be met through on-site renewable energy generation. With an estimated annual PV yield of about 7,003 kilowatt-hours, the system not only covers the cooling requirements but also provides surplus energy for other building operations. This finding strongly supports the KPI related to cost efficiency and sustainability, as it demonstrates the potential for near-zero grid dependency and significant operational savings.

In addition to technical performance, the pilot confirmed the feasibility of implementing such solutions in institutional settings from an organizational perspective. The project successfully navigated complex contractual negotiations and governance challenges, which were initially a major source of delay. By resolving these issues and completing the installation, the pilot proved that PV-supported cooling systems can be integrated into elderly care facilities when clear responsibilities for maintenance and operation are established. Overall, the findings indicate that the Weiz pilot achieved its primary goal: demonstrating the technical and administrative feasibility of solar-powered cooling as an effective measure for heat adaptation in vulnerable environments.



Performance of the pilot and comparison with other cooling options

The performance of the Weiz pilot was assessed against the four KPIs defined during the conceptual phase: temperature reduction, energy consumption compared to conventional systems, energy efficiency of the cooling device, and cost efficiency. The evaluation based on technical specifications provides a clear picture of the expected performance. Additionally, the pilot solution was compared to other cooling options including district cooling, passive cooling options and conventional cooling for buildings.

The installed air conditioning system, with a cooling capacity of 12.7 kW and a SEER value of 7.9, is designed to maintain indoor temperatures in the range of 22 to 24 degrees Celsius even under high thermal loads. This meets the KPI for temperature reduction, as the system is dimensioned for the specific conditions of the senior center's main dining room, which include large glazed areas and significant internal heat sources. Compared to passive cooling strategies such as shading or natural ventilation, which can only partially mitigate heat stress, the active system offers a reliable solution for maintaining comfort during prolonged heatwaves. Passive measures alone would not suffice in a nursing home environment where vulnerable residents require stable indoor conditions.

Energy consumption projections indicate that the installed system will require approximately 3,800 kilowatt-hours per year for cooling, assuming 300 operating hours. This is significantly lower than the estimated 6,500 kilowatt-hours for a conventional split system with lower efficiency values. The integration of a 6.09 kWp photovoltaic system further enhances performance, as its expected annual yield of around 7,003 kilowatt-hours can fully cover the cooling demand and provide surplus energy for other building loads. This exceeds the KPI target for cost efficiency and sustainability, as it ensures near-zero grid dependency and reduces operational costs over the system's lifetime.

From an environmental perspective, the system uses R32 refrigerant, which has a Global Warming Potential (GWP) of 675—substantially lower than older refrigerants such as R410A. In addition, R32 has zero ozone depletion potential (ODP), meaning it does not contribute to the depletion of the ozone layer. This is an important consideration for compliance with international environmental standards and for reducing the ecological footprint of cooling technologies. Combined with the renewable energy contribution from the PV system, the pilot solution significantly reduces greenhouse gas emissions compared to conventional cooling systems powered entirely by grid electricity.

When comparing this solution to other cooling options considered for the site, the advantages become clear. District cooling (Fernkälte) was evaluated but deemed infeasible due to the absence of an existing network in Weiz and the high infrastructure costs associated with its implementation. Component activation (Bauteilaktivierung) could provide some thermal buffering but would require extensive structural modifications and would not deliver sufficient cooling during extreme heat events. Ventilators and simple air circulation systems offer only marginal improvements in perceived comfort and cannot guarantee safe indoor temperatures for elderly residents. Passive building cooling measures, such as shading and improved insulation, are valuable complementary strategies but cannot replace active cooling in this context. In contrast, the PV-supported VRV system combines high cooling performance with renewable energy integration, making it the most effective and feasible option for the specific requirements of the senior center's needs.

Overall, the pilot meets and confirms the targets set for all KPIs. It demonstrates that PV-supported cooling is not only technically viable but also economically and environmentally advantageous compared to conventional systems and alternative approaches. The solution ensures thermal comfort, minimizes energy consumption, and leverages renewable energy to achieve long-term sustainability. These findings confirm the relevance of this approach for replication in similar institutional settings where vulnerable populations require reliable protection against heat stress.



Insights and lessons learned

The implementation of the Weiz pilot provided valuable feedback and insights into both technical and organizational aspects of introducing PV-supported cooling systems in elderly care facilities. One of the most positive outcomes was the strong local collaboration with the responsible staff at the senior center and the building management team. Their engagement ensured that the technical requirements were well understood and that the installation process could be adapted to the specific conditions of the site. The conceptual phase also worked very well, as the planning documents and feasibility analysis provided a clear framework for decision-making. Stakeholder involvement at the local level proved to be a key success factor, as it facilitated communication, built trust, and created a shared understanding of the project objectives. However, the pilot also revealed significant challenges. The most critical issue was the prolonged negotiation process with the administrative headquarters of the senior center operator. These contractual discussions were complex and time-consuming, as they involved clarifying responsibilities for maintenance, liability, and operational procedures. This delay ultimately pushed the installation to the end of the summer season, limiting the opportunity for real performance testing under heatwave conditions. In addition, cooperation with some external service providers was less smooth than expected, which occasionally led to coordination problems and scheduling conflicts.

The lessons learned from these experiences highlight that the complexity of implementation increases with the number of institutions involved. When multiple stakeholders and hierarchical structures are part of the process, governance challenges can become a major barrier to timely execution. Therefore, it is essential to involve higher-level administrative units of the institutions at an early stage of the project. Early engagement of decision-makers at the organizational headquarters can prevent delays, ensure faster approval processes, and create clarity regarding contractual and operational responsibilities. This approach will significantly improve the efficiency of future projects and reduce the risk of bottlenecks caused by administrative hurdles.

In summary, the pilot demonstrated that strong local collaboration and clear conceptual planning are critical success factors, while delayed involvement of central administrative bodies can jeopardize timelines. For future replication, it is recommended to combine early stakeholder engagement at all organizational levels with robust governance frameworks to ensure smooth implementation and long-term sustainability.

Recommendations

Based on the results and feedback from the Weiz pilot, several actionable recommendations can be made to improve future implementations of PV-supported cooling systems in institutional settings. First and foremost, governance and administrative processes should be addressed at an early stage. The experience in Weiz showed that contractual negotiations with the central administration of the senior center were the main source of delay. To avoid similar bottlenecks, it is essential to involve higher-level decision-makers and administrative units from the very beginning of the planning phase. Early engagement will ensure clarity regarding responsibilities for operation, maintenance, and liability, and will accelerate approval processes.

Second, stakeholder engagement at the local level should continue to be a priority. The strong collaboration with on-site staff and building managers was a key success factor in Weiz and should be replicated in future projects. Local actors provide practical insights into building conditions and user needs, which are critical for designing effective solutions. However, this local engagement must be complemented by structured communication with all institutional layers to prevent governance gaps.

Third, technical planning should integrate both active and passive cooling strategies. While the PV-supported cooling system proved to be the most effective solution for maintaining thermal comfort in the case of the senior center in Weiz, measures such as shading, improved insulation, and natural ventilation can further reduce cooling loads and may be suitable for other use cases or as complimentary measure. Overall approaches like these will strengthen resilience and reduce operational costs in the long term.



3.1.2.4. Worms (Germany)

The Worms pilot tested a governance-based model for heat adaptation, focusing on establishing and consolidating a municipal heat protection network. Quantitative indicators were used to measure cooperation intensity, stakeholder outreach, and tangible outputs of the network's activities. By September 2025, more than 30 organisations and individuals were actively involved in the "Health and Climate" network. This included associated institutions such as the public health department, care providers, municipal departments, NGOs and volunteer groups that contributed to workshops and activities even before formal membership. As of June 2025, 36 organisations had formally signed the Heat Protection Charter, with several others having expressed their intent to join. The first signing took place at the Heat Action Day on 4 June 2025 with 25 organisations present, marking the official relaunch of the Worms Heat Protection Network. A core steering group and sub-network structure were established, meeting regularly every quarter. The central steering group met on 4 June 2025 during the network's launch, while additional working sessions for childcare, elderly care, outdoor work and communication were organised in March, May and August 2025.

Three major public and professional events were carried out in 2025: a heat-health information session for citizens in March, the Heat Action Day and network launch on 4 June, and a citizen engagement activity with M4Adapt planned for October 2025. Altogether, the pilot reached more than 180 direct participants. This included eight participants at the Heat Adaptation Grant Workshop (22 November 2024), thirteen at the Expert Workshop with Care Facilities (18 February 2025), around twenty at the Kita Workshop (5 March 2025), and ten to fifteen at each of the two advanced trainings in March and May 2025. Approximately fifty people took part in the Heat Action Day, and more than fifty additional participants were engaged through sub-network meetings and summer programme activities.

By summer 2025, the climate department mailing list included around 180 subscribers from municipal, social and health sectors. Several pilot measures were completed as part of the implementation: the "Map of Cool Places" was finalised in February 2025 and printed in March, the digital heat and shade routing tool ("HEAL") was implemented in May 2025, and the "heat-shuttle" service operated during the summer of 2024. Participatory heat planning was launched with care facilities in cooperation with the Frankfurt University of Applied Sciences, with on-site visits taking place in June 2025 and participation workshops between July and October 2025.

Although a planned cooperation between vintners and early childcare could not be realised, other cross-sectoral collaborations were successfully established, notably between municipal staff, care facilities and research partners. In addition, a professional communication agency was contracted with a budget of €27,000 to develop the network's communication strategy and visual identity. The resulting outputs included participatory workshop materials, a flyer and self-assessment form for institutions, and a summer campaign for early childcare distributed to more than twenty kindergartens. From early-2025 onwards, all network meetings integrated standardised feedback forms to collect qualitative data on participant satisfaction, perceived usefulness and cooperation quality. Taken together, these results show that all quantitative indicators were achieved or exceeded and that the Worms pilot successfully created a stable institutional foundation for long-term heat adaptation at the local level.

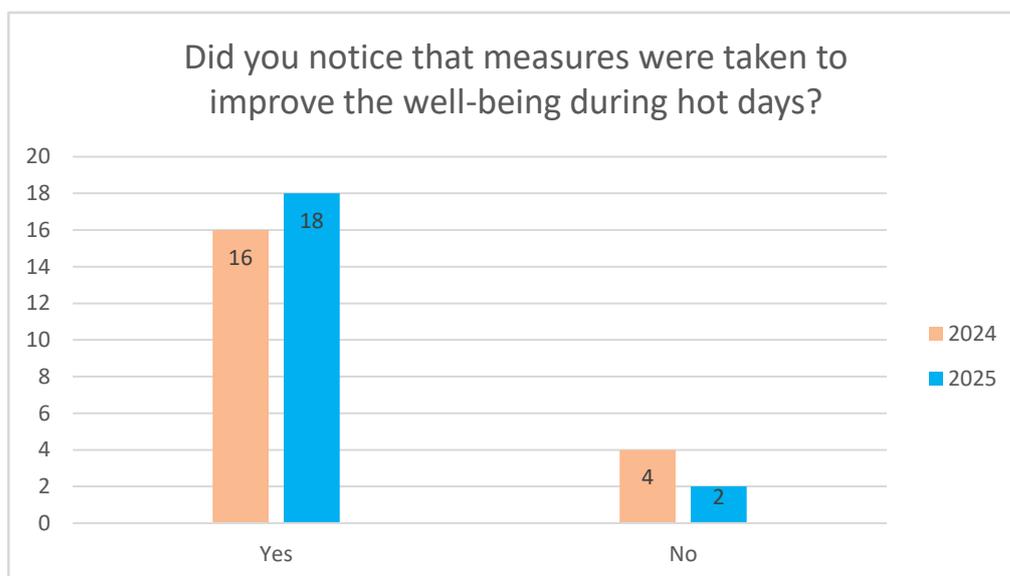


3.2. Qualitative Key Performance Indicators (KPIs)

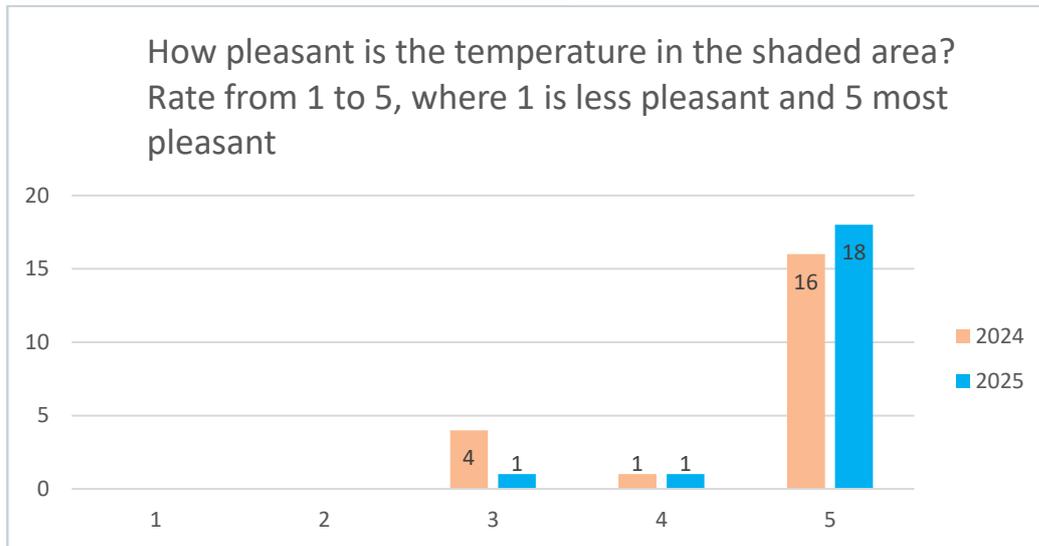
3.2.1. Well-being of the users

3.2.1.1. Hajdúböszörmény (Hungary)

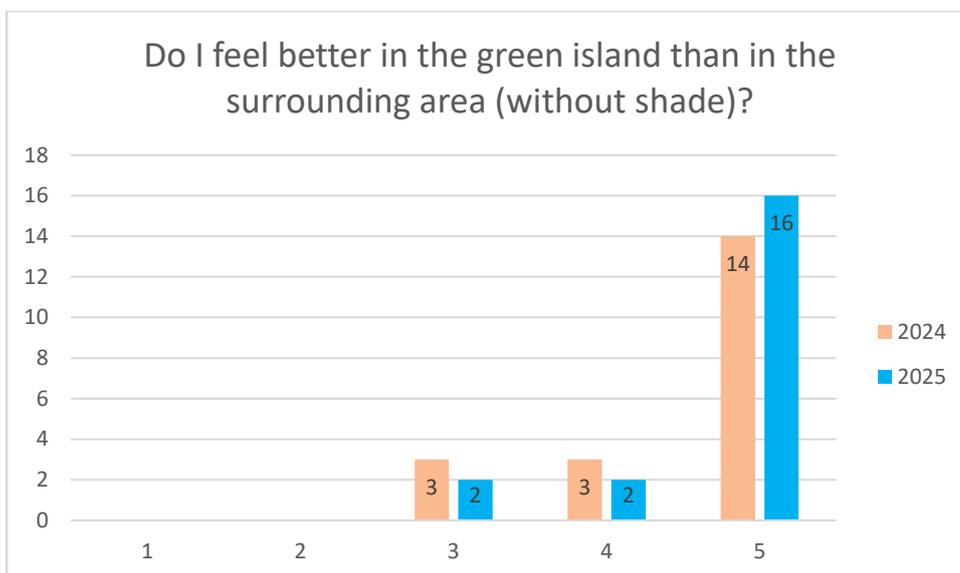
The results of a survey among users of the green islands in Hajdúböszörmény, indicate that most respondents noticed measures taken to improve the well-being during hot days. In 2024, the majority answered Yes, though a small group did not perceive such interventions. In 2025, the recognition of these measures was even stronger, with more participants confirming their presence and fewer indicating No. Overall, the data suggests that cooling and shading measures were increasingly effective and more clearly recognized by people in 2025 compared to 2024 (see graph below).



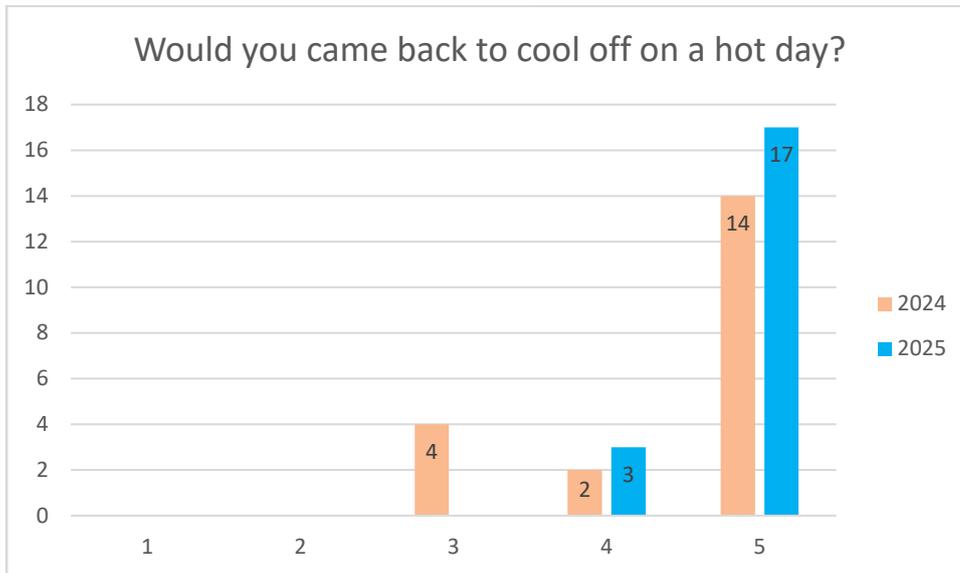
Most respondents found the temperature in the shaded area very pleasant, with the majority giving the highest score (5). In 2024, some participants rated it lower (3 or 4), while in 2025 the evaluations were even more positive, with more respondents selecting the maximum score. Overall, the data suggests that the shaded area was consistently perceived as comfortable, with satisfaction increasing further in 2025.



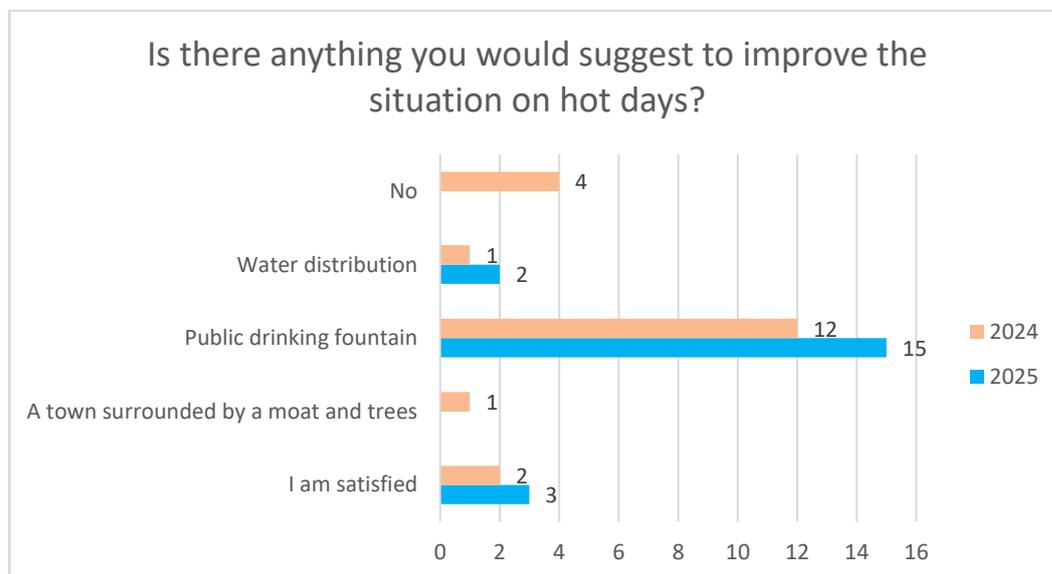
The survey results show that in both 2024 and 2025, the majority of respondents felt significantly better in shaded and cooled areas compared to the surrounding environment. In 2024, most answers concentrated at the highest satisfaction level (score 5), with some responses at levels 3 and 4. In 2025, the pattern was even stronger: more people rated their comfort at the maximum level (score 5), while fewer gave lower scores. Overall, the data suggests that shaded and cooled areas consistently improve comfort, and this positive effect was even more strongly recognized in 2025.



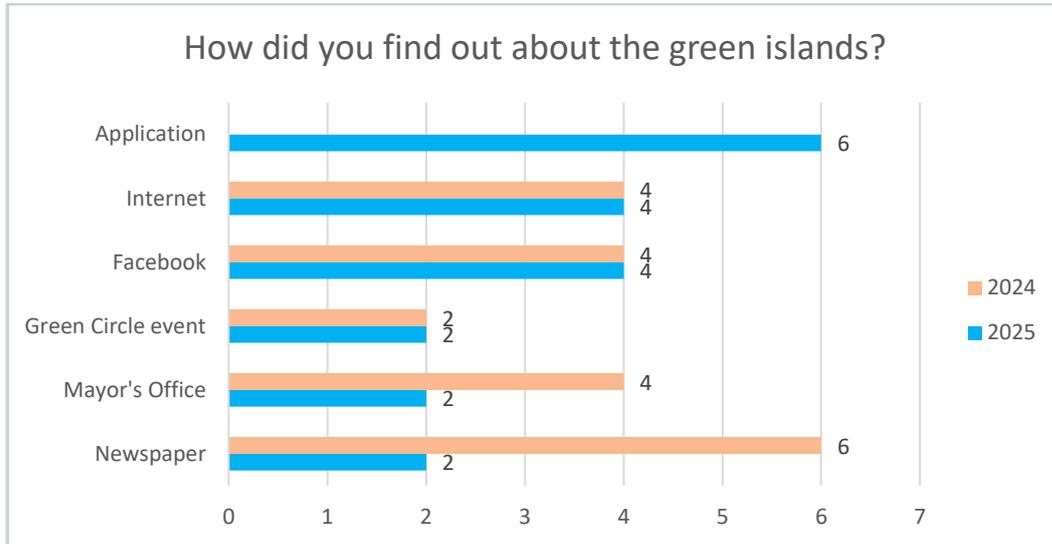
The responses show that most people would gladly return to the shaded area to cool off on a hot day. In 2024, the majority rated their willingness at the highest level (5), though some gave lower scores (3 or 4). In 2025, the results were even more positive, with more participants selecting the maximum score and fewer giving lower ratings. Overall, the data highlights that shaded areas are highly valued for their comfort and are popular places to spend time during hot periods; positive feedback increased further in 2025 (see graph below).



The suggestions highlight that the most common request in both years was for more public drinking fountains, with an even stronger demand in 2025 compared to 2024. A smaller number of respondents mentioned water distribution or other creative ideas, while some expressed that they were already satisfied or saw no need for further measures. Overall, the data shows that while satisfaction levels are generally high, access to free and easily available drinking water remains the key area where people see room for improvement, especially during hot days.



The data shows that in 2024, people mostly learned about the green islands through newspapers and the Mayor’s Office, while online sources like the internet and Facebook also played a role. By 2025, there was a noticeable shift: the city application became the most common source of information, followed by strong use of the internet and Facebook. Overall, the trend suggests a move away from traditional communication channels toward digital platforms and apps, reflecting changing habits in how people access local environmental information.



Key findings

The installed green islands received particularly positive feedback from the older age group, who expressed strong appreciation and gratitude. A written response from the Retirement Home highlighted that, residents greatly enjoy the island, actively tend and use it, and would gladly welcome additional installations in the future. Based on our observations, residents also make frequent use of the islands in playgrounds and bus stops, where they are considered highly beneficial. At these locations, people often spend half an hour to an hour, which would be uncomfortably long under direct sunlight, whereas the shaded environment provides a much more pleasant experience.

There were also some critical remarks, mainly due to the fact that the trees and creepers along the islands do not produce a significant canopy in the initial period. When focusing only on their early size, without yet seeing the final state of these green cooling blocks, some residents perceived their effectiveness as insufficient. However, once the plants grow enough to provide adequate shade for the benches, we are confident that the vast majority of residents will recognize the usefulness of the islands. People often get impatient and want to see immediate results. In green infrastructure developments, it is worth placing greater emphasis on this aspect in communications.

Based on the findings, several recommendations can be made to improve the pilot action and guide future interventions.

- Access to public drinking water should be expanded, since surveys clearly highlighted drinking fountains as one of the most important needs for improving comfort on hot days. This could be combined with temporary water distribution points during peak heatwaves.
- Efforts to increase shade and cooling green infrastructure should continue, especially in locations that experienced extreme temperature peaks (heat-islands). Planting additional trees, installing green pergolas, or integrating cooling surfaces (such as green facades, green roofs, or water surfaces) could further enhance comfort and reduce heat stress.
- Communication and outreach should increasingly rely on digital platforms, particularly applications and social media, as these have proven to be the most effective channels in 2025.



At the same time, some traditional channels should be maintained to ensure inclusivity for older residents. Communication is strongly facilitated by short, easy-to-understand messages.

- The recognition of cooling measures in 2025 suggests that visibility and awareness campaigns are effective; therefore, future strategies should continue to emphasize public engagement and information-sharing about available interventions.
- Overall, future developments should primarily focus on the improvement of green infrastructure, the expansion of water accessibility, and effective communication.

3.2.1.2. Maribor (Slovenia)

Within the READY4HEAT pilot actions, the Municipality of Maribor implemented two pilot installations of green pergolas in Maribor:

- Kindergarten Ivana Glinška - Ribiška unit, and
- Kindergarten Jožice Flander - Žvrgolišče (Focheva unit).

Both pilots aimed to improve outdoor comfort, promote climate adaptation awareness, and assess the impact of green shading structures on user well-being.

The well-being assessment combined:

Quantitative environmental monitoring

- Continuous microclimatic measurements (temperature, humidity, solar radiation) collected by HP2000 7-in-1 weather stations at both kindergartens.
- Stations were placed outside and under the pergolas.
- Data analysed for June-September 2024 and 2025 (detailed numeric results from the Focheva site as representative case).
- Qualitative user questionnaires and interviews conducted among teachers and staff at both kindergartens. A total of 17 respondents participated in the qualitative well-being survey. Topics covered comfort, safety, awareness, and perceived benefits of the pergolas.

Key findings

- Indoor areas remained stable (22-26 °C) across both summers.
- Cooling effects up to 5 °C were recorded during transitional months (June, September).
- Humidity indoors remained comfortable (~55-58 %), confirming a healthy indoor microclimate.
- While vegetation was still maturing, the pergolas already demonstrated partial thermal moderation and better comfort stability.

Qualitative Results - User Questionnaires and Interviews

Availability of Shaded Areas

Teachers confirmed that existing shade is insufficient, as trees offer limited coverage. Pergolas are seen as essential improvements that will significantly enhance outdoor comfort once vegetation fully grows.



“There is a clear consensus that shaded areas are currently insufficient. The installation of pergolas is seen as an essential improvement.”

Importance of Shade for Comfort and Well-being

Respondents rated shaded areas as very important, both for children’s health and staff well-being. Shade allows longer and safer outdoor play, even during hot or light rainy conditions.

“Shaded zones such as pergolas are crucial for comfort and emotional well-being.”

Impact of Weather on Outdoor Activities

Hot and sunny days strongly affect daily planning. Teachers adjust schedules to avoid heat exposure, often limiting time outdoors.

“Weather conditions directly affect how long children can play outside; pergolas help extend this time.”

Likelihood of Spending More Time Outdoors with More Shade

Nearly all respondents answered “Yes” or “Absolutely.” More shaded areas mean more frequent and longer outdoor play.

Expected Benefits of Pergolas

Mainly:

- Protection from sun and heat
- Longer, safer playtime
- Learning about plants and nature
- More attractive outdoor space
- *“Pergolas are not only functional but educational and aesthetic improvements.”*

Suitability of Pergola Locations

Teachers generally agree that pergolas are well placed, but additional ones would be beneficial for larger playgrounds.

Experience and Comfort

Pergolas are described as comfortable and beneficial even in their early stage.

Comfort ratings: mostly 9-10 out of 10.

Perceived improvement in shade, usability, and atmosphere.

Efficiency During Heat and Safety for Children

- Pergolas provide effective protection from direct sunlight, improving safety during peak hours.
- Full potential expected once greenery develops.

Impact on Outdoor Time

Teachers confirmed longer outdoor activities due to available shade. Children can stay outside even during warmer midday hours.



Satisfaction with Design

Design highly rated for natural materials, simplicity, and aesthetics. Suggestions include adding benches or interactive features.

Effects on Children's Health and Well-being

Observed improvements in:

- Comfort and mood
- Engagement and attention during outdoor play
- General well-being
- *"Pergolas create a calmer, more inviting environment for children."*

Long-term Potential

All respondents believe pergolas will have lasting benefits:

- Improved comfort, environmental learning, and long-term health impact once greenery is established.
- *"As vegetation matures, pergolas will support learning and climate adaptation for years to come."*

Summary of Perceptions

- 100 % of respondents consider pergolas *useful and beneficial*.
- >90 % rated comfort improvement between 8-10/10.
- All expect stronger cooling and visual impact after vegetation growth.
- Pergolas foster educational value and environmental awareness.

Challenges and Limitations

- Vegetation not yet mature, limiting current shading effect.
- Short monitoring period for 2025 data.
- Some survey limitations due to small sample size.

Despite this, both quantitative and qualitative data confirm positive effects on comfort and awareness.

Recommendations

- Support faster plant growth to ensure full shading.
- Add misting or hydration features for enhanced comfort.
- Conduct a follow-up survey in 2026 to evaluate changes after vegetation maturity.
- Continue educational integration of pergolas into daily activities.
- Expand the model to other kindergartens in Maribor.



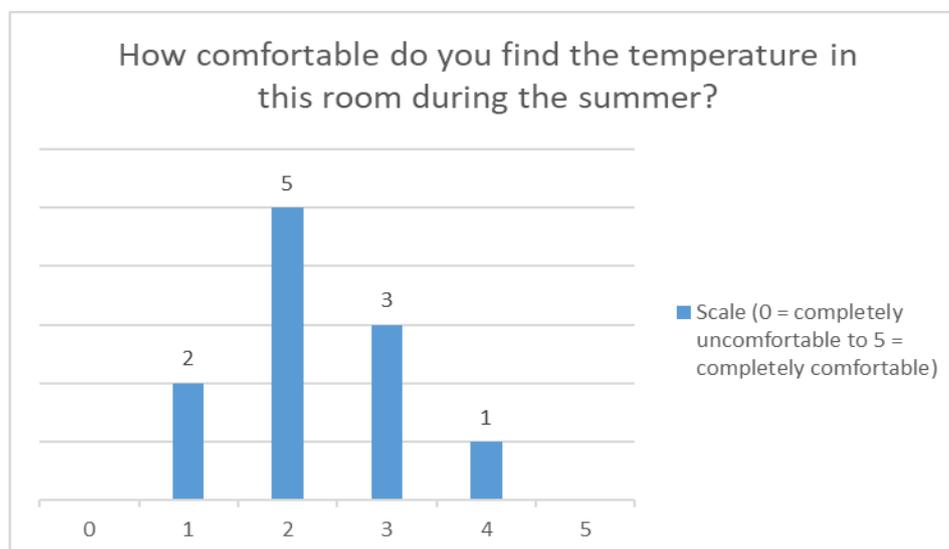
Conclusion

The Maribor READY4HEAT pilots demonstrate the social, educational, and environmental value of small-scale green infrastructure.

3.2.1.3. Weiz (Austria)

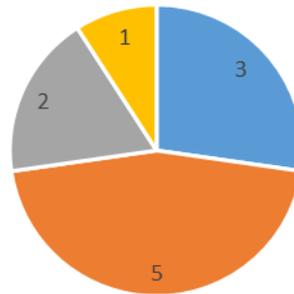
Due to the delayed implementation of the pilot action in Weiz, the collection of data regarding user well-being was very limited. The installation of the PV-supported cooling system was completed at the end of the summer season, which meant that the system could not be tested under real heatwave conditions and that questionnaires could only be distributed after the technical completion of the project. As a result, there is no comprehensive dataset available to compare pre- and post-pilot conditions or to conduct a detailed statistical analysis of changes in comfort levels.

Nevertheless, the qualitative feedback received from local stakeholders and staff at the senior center indicates that the overall acceptance of the pilot action is very positive. Respondents expressed appreciation for the initiative, highlighting that the integration of a renewable energy-based cooling solution is perceived as an important step toward improving thermal comfort and protecting vulnerable residents during future heatwaves. The concept was well understood and welcomed by those involved, and the presence of the system is seen as a reassurance that the facility is better prepared for extreme temperature events. The assessment of the residents of the senior citizens' center and the staff was gathered using a short questionnaire.



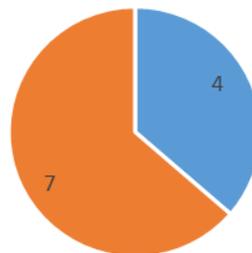


How do you assess the idea of using solar-powered cooling in the senior citizens' center?



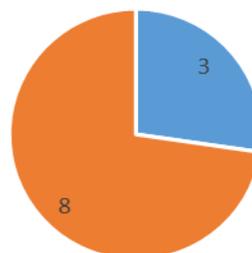
■ Very positive ■ Rather positive ■ Neutral ■ Rather negative ■ Very negative

Do you consider the installation an important step towards improving thermal comfort and protecting residents during future heat waves?



■ Yes, definitely ■ Yes, partially ■ No

Does the installation make you feel that the senior center is better prepared for extreme temperatures?



■ Yes, definitely ■ Yes, somewhat ■ No



For future projects, it is recommended to align installation timelines with the summer season to enable full-scale monitoring and user surveys under real stress conditions. This will provide more robust evidence of the impact on well-being and allow for targeted adjustments to maximize user comfort.

3.2.1.4. Worms (Germany)

The qualitative evaluation of the Worms pilot focuses on the well-being, awareness and satisfaction of stakeholders and target groups who participated in network activities, workshops and trainings. Feedback was collected through structured questionnaires and direct discussions at the Kick-off event, citizen engagement activities, advanced trainings and sector-specific workshops such as those with kindergartens and care institutions. The analysis highlights a clear improvement in awareness of heat-related health risks, as well as strong appreciation for the practical relevance and exchange opportunities offered by the network.

Across all events, participants rated their satisfaction with the content and facilitation as high. Most respondents indicated that they had gained new knowledge about the connection between heat and health, especially concerning preventive measures in daily routines. During the Kick-off event, the majority of participants welcomed the approach of building a municipal network and underlined the need for continuous cross-sector collaboration. Feedback emphasised the added value of combining technical information on heat-health protection with participatory elements, which helped to strengthen motivation for local engagement.

In the **citizen engagement** workshops, participants reported an increased sense of confidence in addressing heat risks within their own institutions and neighbourhoods. The open discussions allowed participants to share local experiences and identify shared challenges, such as the lack of shaded outdoor spaces, limited financial resources for cooling equipment and the need for clearer communication with parents, clients and vulnerable residents. Several respondents noted that they felt “better prepared for the next heat period” and that they planned to integrate the learned measures into their daily routines. The participatory structure of the workshops was described as empowering and inclusive, fostering an exchange between citizens, social workers and municipal representatives.

The **advanced trainings**, which targeted outdoor workers, educators and trainers, received very positive evaluations. More than 85% of participants rated the trainings as “useful” or “very useful”, especially valuing the practical tips on hydration, rest breaks and the early recognition of heat stress. Participants appreciated that the trainings combined scientific input with local examples from Worms. Several participants suggested repeating the trainings annually before the summer season and expanding them to additional professional groups such as bus drivers and municipal maintenance staff.

Specific qualitative insights also emerged from the workshop with kindergartens in March 2025. Educators identified several challenges in coping with high summer temperatures: insufficient shading on playgrounds, overheated indoor rooms, and limited communication between staff and parents about sun protection and hydration. At the same time, the workshop generated concrete solutions such as introducing regular drinking breaks, creating shaded zones with natural vegetation, and testing small-scale water play areas for cooling. Participants expressed that the exchange with the city’s climate adaptation team gave them new confidence to advocate for improvements within their institutions.

Overall, the qualitative feedback demonstrates that the Worms pilot successfully strengthened local awareness of heat-health risks and improved participants’ ability to respond to them. Respondents valued the inclusive process, the tangible outputs such as maps and hotline information, and the direct link between municipal policy and everyday practice. The results indicate that the pilot has increased social resilience and cooperation across institutional boundaries. However, participants also emphasised the need for more structural support in adapting buildings and outdoor areas, and for regular follow-up formats to maintain the network’s visibility and continuity.



Based on these insights, the following recommendations were derived: continue offering regular seasonal trainings to refresh knowledge and reach new target groups; expand participatory formats for early childcare and elderly care; provide small grants or incentives for local institutions to implement adaptation measures; and integrate the feedback process permanently into the city's monitoring framework. These qualitative findings confirm that the Worms heat protection network not only improved institutional coordination but also had a measurable positive effect on awareness, preparedness and well-being among the city's most vulnerable groups.

4. Testing awareness of the heat wave problems in the cities

The purpose of this section is to gain a clearer understanding of the knowledge that individuals from different institutions and organisations and also common citizens have about heat waves and their associated risks. This understanding will help us identify the areas where we should concentrate our efforts in order to mitigate the effects of heat waves more effectively.

To collect this information, we developed several questionnaires, which are described in Deliverable *D.2.1.1 Set the Quantitative and Qualitative KPIs*. These questionnaires were distributed and completed by stakeholders during the following events held in the pilot municipalities:

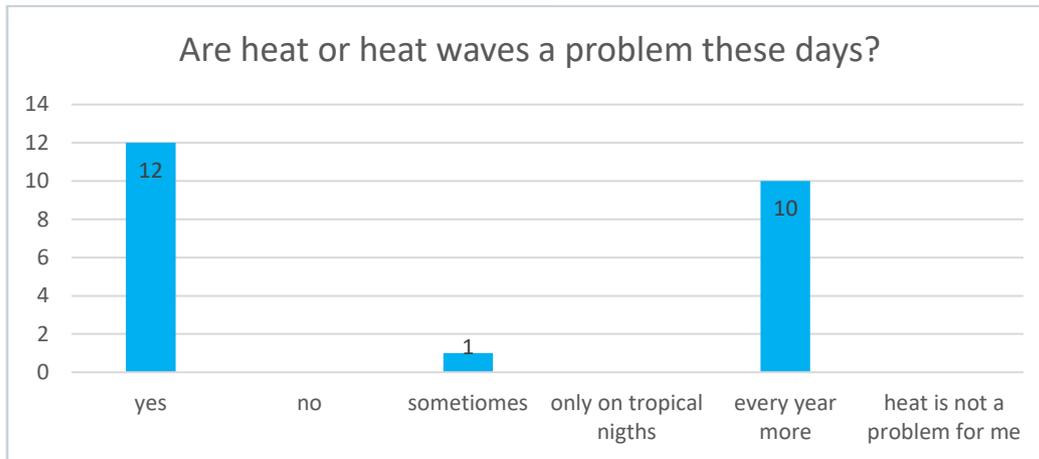
- Kick-off events for stakeholders (Summer 2023)
- Citizen engagement workshops (November 2023 - March 2024)
- Advanced trainings for actors working with vulnerable groups (December 2024 - August 2025)

The results of these questionnaires will help us assess how well-informed and prepared the population is in the event of a heat wave. In addition, the questionnaires will enable us to identify trends and patterns among stakeholders, as well as their willingness to cooperate and sustain collaboration in the future.

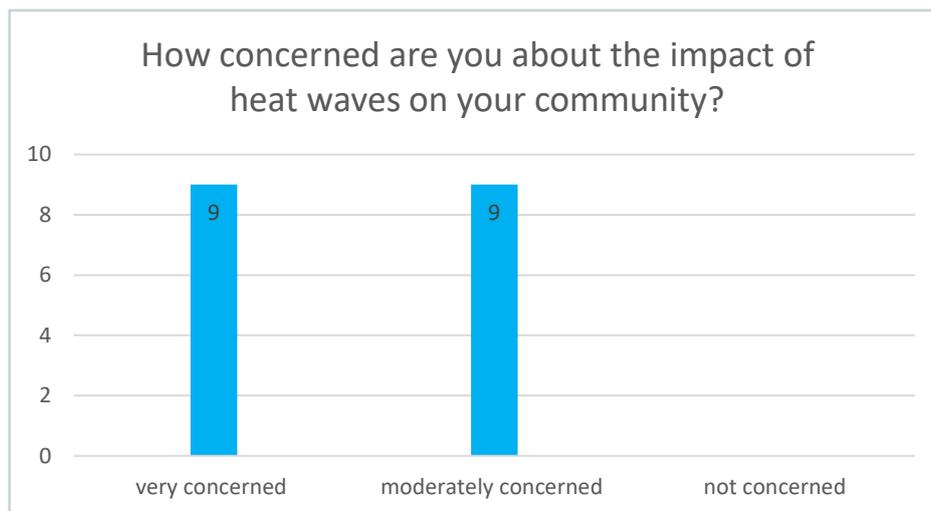
4.1. Kick-off event for stakeholders

4.1.1.1. Hajdúböszörmény (Hungary)

All participants of the Kick-off event considered heatwaves to be a problem; within this, 43% judged the situation to be worsening year by year. However, 100% of the respondents indicated that they had personally noticed an increase in the number of heat days or other heat-related problems in recent years (see graph below).



The responses further indicated that 50% of the respondents expressed concern, while the remaining 50% expressed a high level of concern regarding the impact of heatwaves on their community (see graph below).



56% of respondents were not aware of any heat wave early warning system, while 44% reported being aware; however, 100% of respondents reported that they consult weather news and forecasts when necessary.

With regard to further steps needed to raise public awareness of heat waves, respondents - in their open-ended answers - emphasized the importance of informing citizens about heat-related issues and of awareness-raising more generally. They also linked the matter to the role of urban green spaces and the need to expand them, as well as to broader concerns of energy efficiency and water retention.

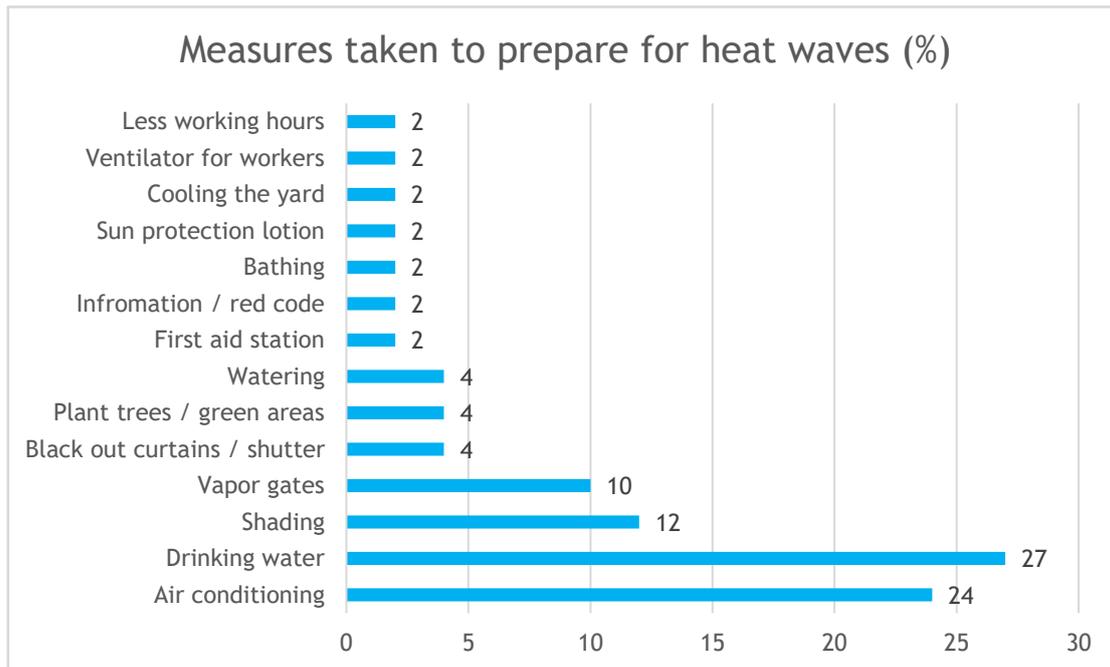
Key findings

The Kick-off event engaged 18 participants, primarily representatives of vulnerable groups and local government. The majority already acknowledged heat and the increasing frequency of heatwaves as key challenges and expressed concerns regarding their impacts. Although slightly more than 50% of the



participants were not yet familiar with the forecasting system, they indicated that they are able to access reliable information on heatwaves through television, the internet, and other media whenever needed.

As shown in the graph below *Measures taken to prepare for heatwaves*, most respondents were familiar with and reported using classic solutions such as air conditioning, increased water consumption, shading and mist cooling gate.

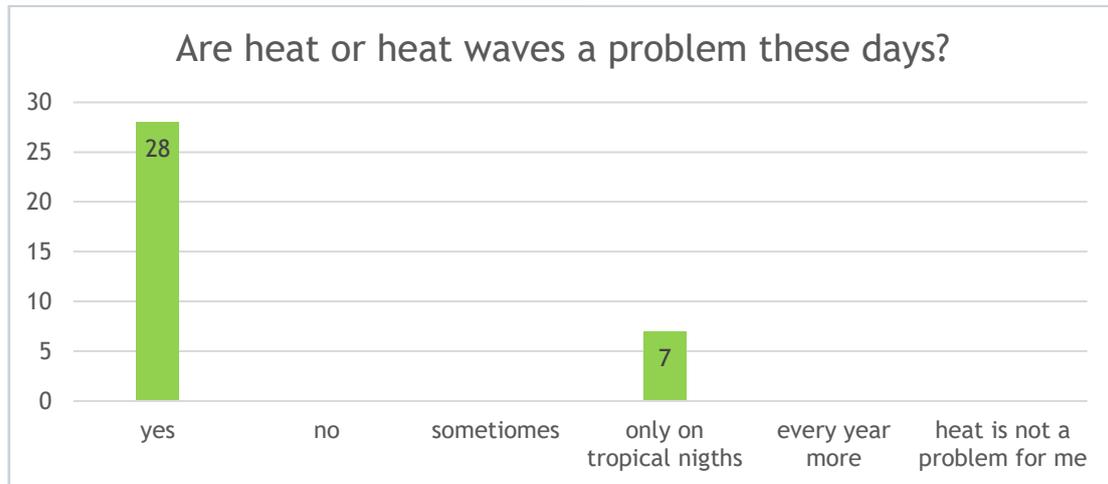


Overall, all participants were interested in the topic and demonstrated a high level of cooperation. They actively engaged in discussions, shared their perspectives, and expressed openness to potential future collaborations. It is worth highlighting that the participants were visibly inspired by the joint discussion of the topics, showed interest in each other's experiences, and connected with one another across the various themes.

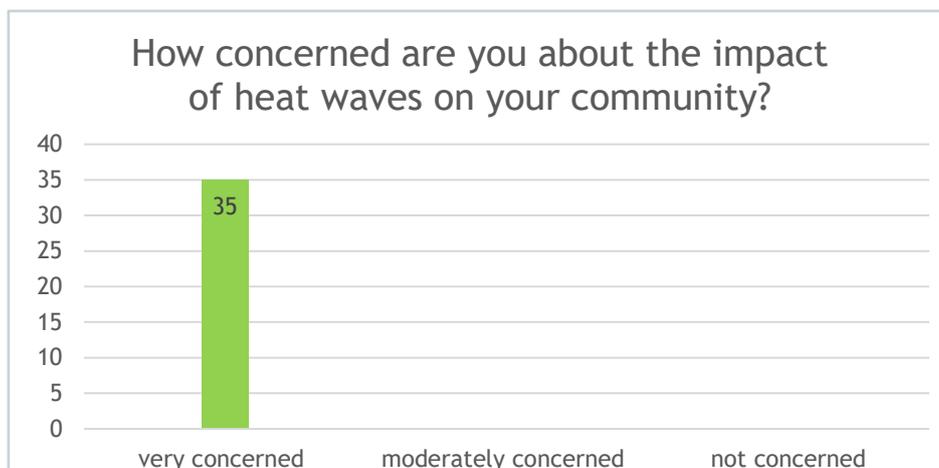
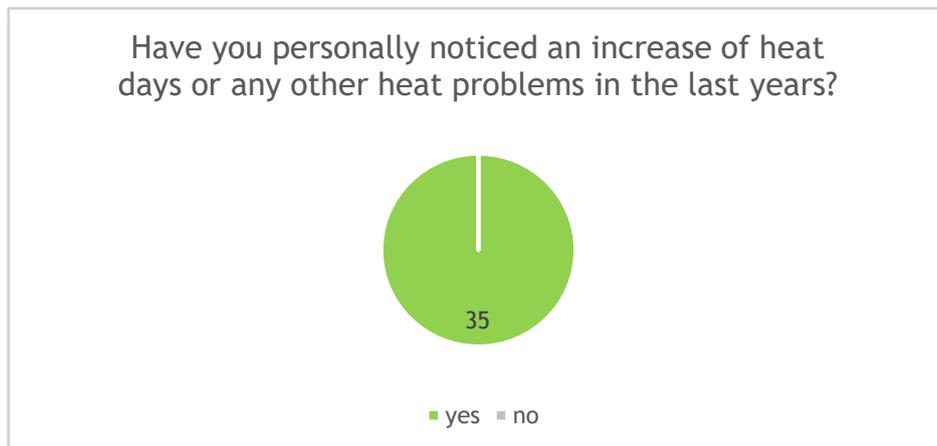
4.1.1.2. Maribor (Slovenia)

In the Kick-off event with stakeholders, we started cooperation with vulnerable groups in the field of preparing measures to mitigate climate change effects. General measures were given how to protect the population against heat waves, ideas to mitigate heat waves were collected in discussion and afterwards with post it notes. All participants agreed that heat waves are a rising problem and measures to protect the population should be taken.

Target groups were associations of pensioners, disabled, kindergarten teachers, people with chronic diseases, outdoor workers, pregnant women. Also, National health Institution and Health care center participated at the event.



As shown in the graph above, 80% of participants considered heat waves a problem.



All participants noticed an increase of heat days or problems caused due the heat in the last years. In addition, all participants were very concerned about the impact of heat waves in Maribor.



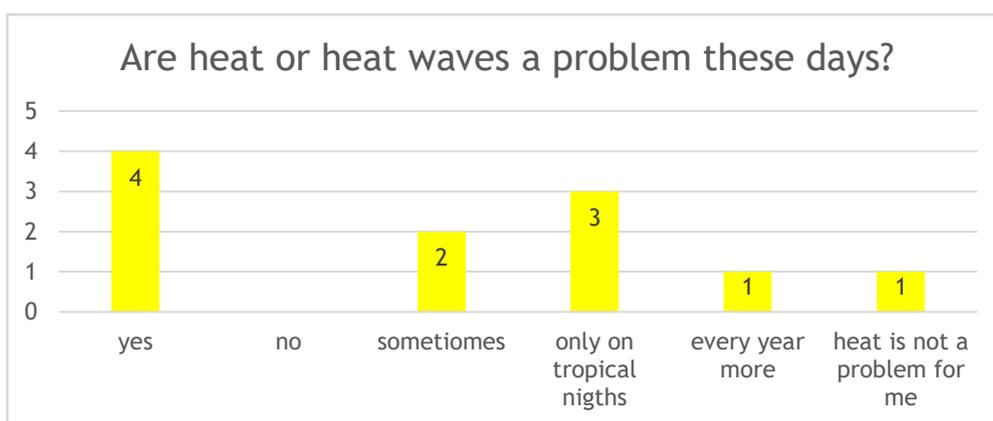
Stakeholders at the kick-off event discussed main issues and proposed several measures to mitigate heat waves such as:

- Planning of more green spaces at hot spots of the city centre, planning trees with wide tree canopy to offer enough shade, choice of tree species which does not cause allergies;
- Planning of green roofs and green facades;
- Blue infrastructure in several areas of the city;
- Drinking fountains;
- Benches with backrest in order to allow resting to elderly people in the shade of the trees;
- Special workshops for disabled people who are not as much aware of measures for self-protection against heat waves;
- Awareness raising campaigns and alarming systems in public spaces, in residential facilities, settlements, as well as nursing homes for elderly people;
- Addressing public and private companies where workers are outdoors in hot summer days.

All participants were interested in further cooperation in workshops to learn more about measures to be taken to protect the vulnerable groups.

4.1.1.3. Weiz (Austria)

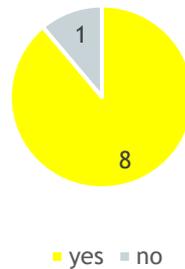
The responses collected during the kick-off event provide a clear picture of how participants perceive heat and heatwaves in their daily lives. A majority of respondents indicated that heat is indeed a problem, with several noting that the situation is worsening every year. While some participants reported that heat is only an issue during tropical nights or occasionally, the overall trend suggests that extreme temperatures are increasingly recognized as a challenge.



When asked whether they had personally noticed an increase in the number of hot days or other heat-related problems in recent years, almost all respondents confirmed this observation. This indicates a strong awareness of climate-related changes and their local impact. Concern about the effects of heatwaves on the community was also evident: most participants described themselves as either very concerned or moderately concerned, while only a small minority expressed no concern at all.

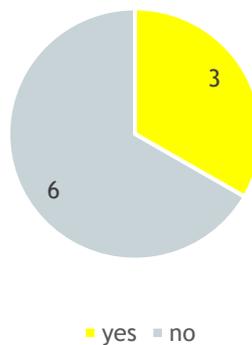


Have you personally noticed an increase of heat days or any other heat problems in the last years?

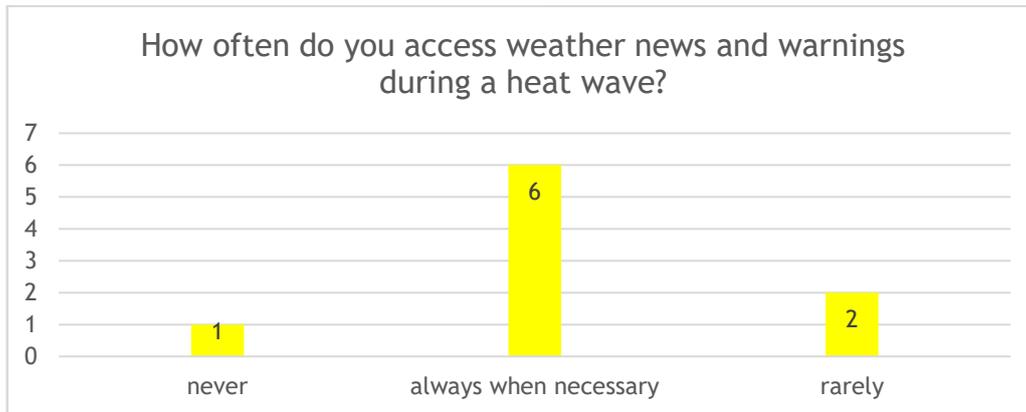


Knowledge about early warning systems for heatwaves was limited. Only a few respondents were aware of existing measures such as heat protection plans or weather alerts, while the majority indicated that they had no knowledge of such systems. This highlights a gap in public awareness and suggests the need for improved communication and outreach.

Do you know of any early warning system for heat waves in your country?

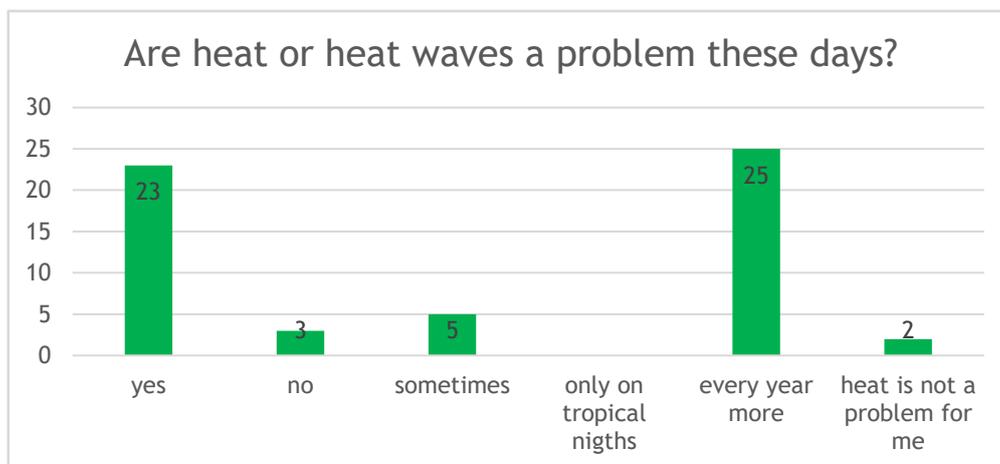


Regarding personal behaviour during heatwaves, most participants stated that they regularly access weather news and warnings when necessary, although a few admitted to doing so rarely or never. Suggestions for improving public awareness included the use of mobile applications, increased educational efforts, and more information in local media channels.



4.1.1.4. Worms (Germany)

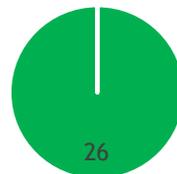
The kick-off event in Worms introduced the Heat Protection Network to local actors from administration, health care, education and the social sector. Participants filled out a short questionnaire to gauge their awareness of heat-related risks and expectations for cooperation. Seven questions assessed perceived relevance, familiarity with the topic, and satisfaction with the event.



The first question produced a clear and almost unanimous answer: nearly all participants agreed that heat and heat waves already represent a serious issue in their professional and personal environments. Only one or two respondents expressed uncertainty, and none rejected the statement. The result shows that local awareness of the problem is not emerging but already firmly established, reflecting Worms' repeated experience of extreme summer temperatures.



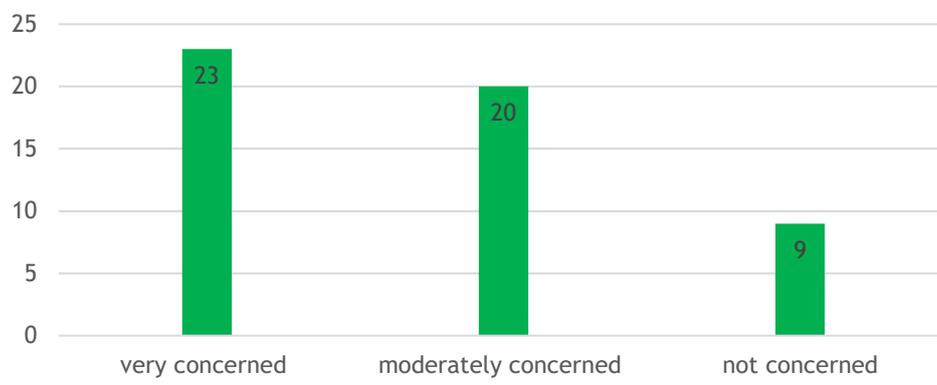
Have you personally noticed an increase of heat days or any other heat problems in the last years?



■ yes ■ no

Here, the pattern is even more pronounced. Every respondent answered affirmatively, indicating that the perception of intensifying heat events is shared across all professional backgrounds. This strong consensus points to the direct lived experience of climatic change within Worms and underscores that stakeholder no longer view heat as an abstract environmental topic but as a concrete factor shaping their daily work.

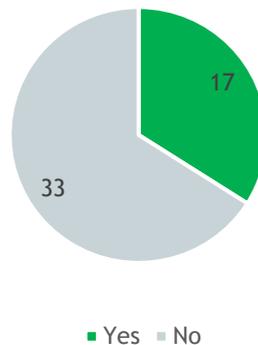
How concerned are you about the impact of heat waves on your community?



Concern levels were generally high. Most respondents selected the upper categories on the scale, signalling that they consider heat waves a growing challenge for local well-being and public health. Only a few indicated no concern. Taken together, the responses suggest that while people are already engaged with the issue personally, they are equally attentive to the wider social consequences for vulnerable groups within their community.

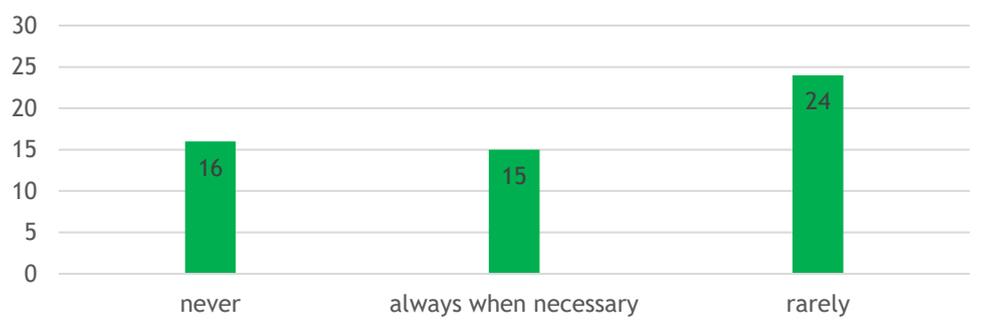


Do you know of any early warning system for heat waves in your country?



Awareness of official heat warning systems appears considerably lower. However, the majority selected Yes, showing that many participants were unfamiliar with the formal alerts provided by the national meteorological service. This contrast between high risk perception and limited system awareness reveals an important information gap and highlights the need for clearer communication about existing warning mechanisms and how to access them.

How often do you access weather news and warnings during a heat wave?



Most respondents indicated that they follow weather and warning information sometimes, while a smaller group reported to never check. The distribution suggests that proactive information-seeking behaviour is common, though not yet systematic across all sectors. Many participants appear to rely on personal habits rather than institutional procedures, implying that there is potential to develop more standardised communication routines during extreme heat events.

Overall, the results from the kick-off survey reveal an audience that is both highly aware of heat as a pressing issue and motivated to act. Stakeholders already observe the effects of rising temperatures in their professional lives and express significant concern for community well-being. At the same time, their limited familiarity with formal heat warnings and uneven reliance on information sources demonstrate that awareness alone is not sufficient. It must be matched by accessible, well-communicated tools and protocols. The event therefore fulfilled a double role: it confirmed the strong baseline of engagement in Worms and



helped identify where practical improvements in information flow and coordination could make a tangible difference.

4.2. Citizen's engagement workshops

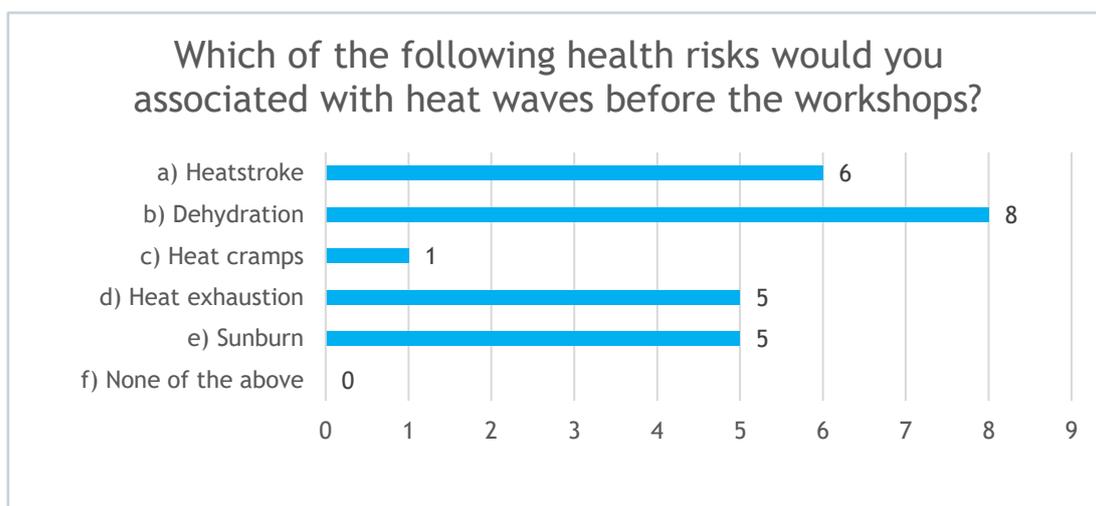
4.2.1.1. Hajdúböszörmény (Hungary)

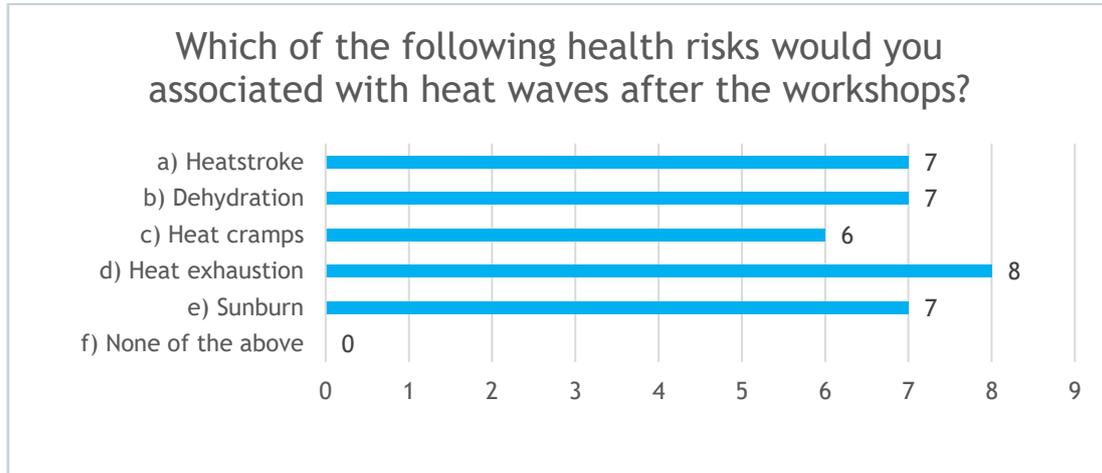
Children representatives

The sample consisted of participants between 30 and 69 years of age, all were women. The majority of the participants lived with family, one lived alone and one with a partner.

Before the workshops, half of the participants considered themselves well-informed, while after the workshops this proportion increased to 100%. The majority of respondents get their information about heat waves from the radio and from their family members and friends, and most of them follow these sources closely for updates related to heat waves. Before the workshop, 50% of the participants were not particularly concerned about the personal effects of heat waves, whereas after the workshops the 75% indicated that they were fairly concerned or concerned. With regard to their experiences during heat waves, the majority of respondents highlighted being mentally tired and uncomfortable.

The graphs below show how the perception of health risk factors changed thanks to the workshop. The information provided contributed to raising participants' awareness of the significant impact of heat on various health problems.



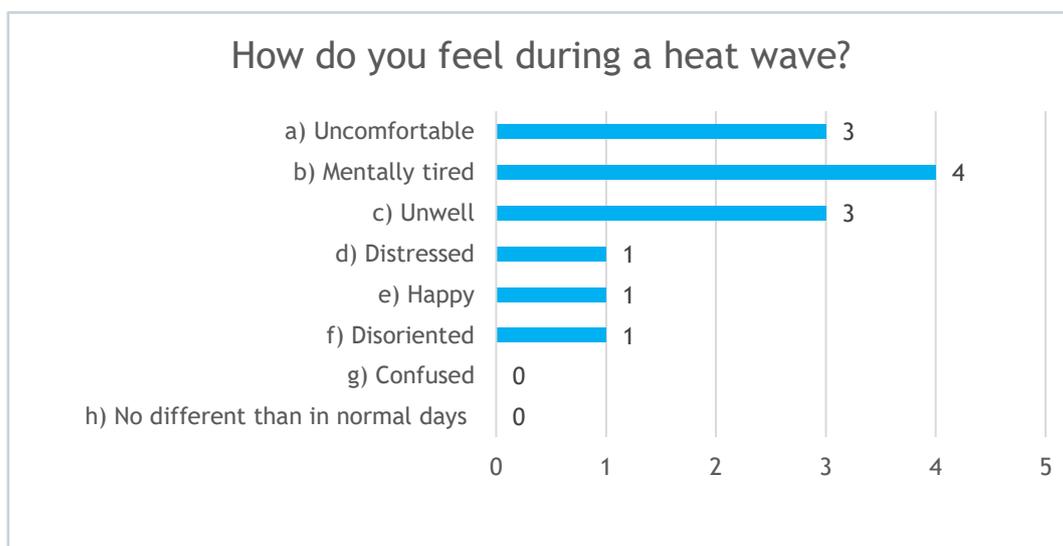


Health workers

The sample consisted of participants between 30 and 69 years of age. The majority were men, lived with family, two of them lived alone and one with other people/in shared accommodation.

Before the workshop, 44.4% of participants had limited knowledge about heat waves, while 55.6% were relatively well-informed; at the same time, all participants clearly expressed greater concern about the issue after the workshop. After the workshop, all participants reported being well-informed. There was no significant difference in the association of different health risks with heat waves before and after the workshops; the respondents had a good level of awareness of the topic. The vast majority clearly exchange information about heat waves with their families and friends, that is, within their immediate social environment; at the same time, newspapers were identified as the least utilized source of information about heat waves.

The graph below shows which feelings the participants most strongly associate with heatwaves.



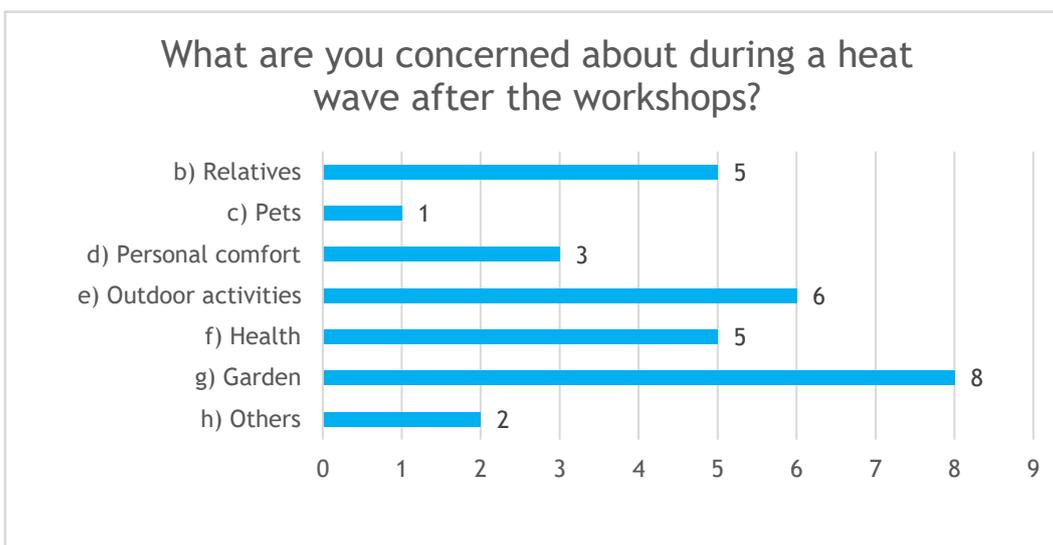
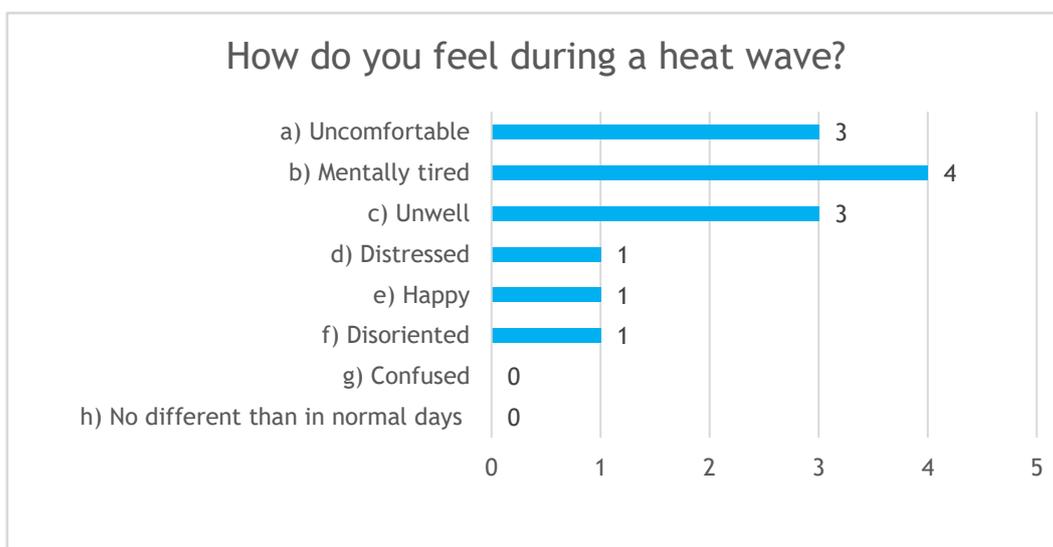


Outside workers

The sample consisted of participants between 30 and 69 years of age, the majority were men.

All participants were either engaged in outdoor work or represented employees working in such conditions. The majority of the participants lived with family, one person lived alone. Before the workshop, 77.8% felt less informed about heat waves, whereas after the workshop 100% of participants classified themselves as well-informed. As for the nature of health problems related to heat waves, all participants were already informed, and the workshop primarily reinforced their existing knowledge. The majority of respondents get their information about heat waves from the radio and from their family members and friends, and most of them follow these sources closely for updates related to heat waves.

The following two graphs present how the perception of factors causing concern during heat waves changed before and after the workshop.



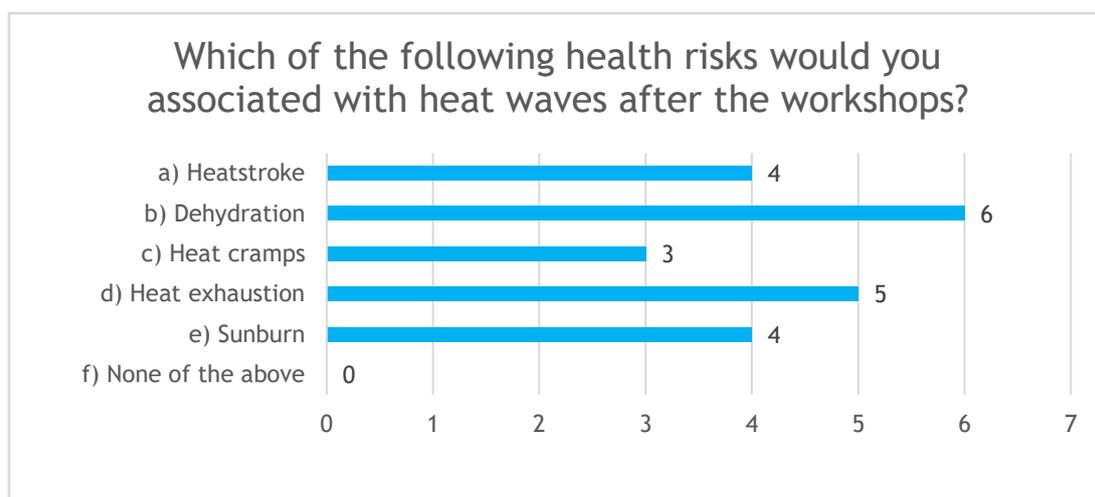
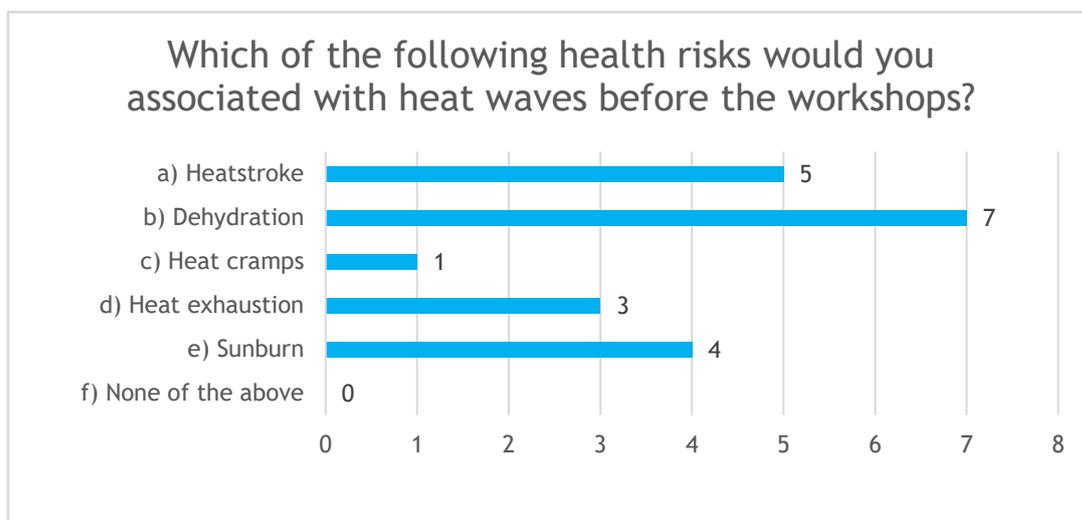


Elderly people

The sample consisted of participants between 30 and 80 years of age, the majority were women. The majority of the participants lived with other people / in shared accommodation, one person lived alone, one person resident in care facilities.

While before the workshops 50% of the respondents had some or only general knowledge about heatwaves, after the event 100% of them felt knowledgeable or very knowledgeable. The majority of respondents get their information about heat waves from the radio and from their family members and friends, and most of them follow these sources closely for updates related to heat waves. With regard to their experiences during heat waves, the majority of respondents highlighted being mentally tired and uncomfortable. After the workshops, the participants mainly expressed concern for their family members, as well as regarding outdoor activities and gardening.

The following two graphs show how the respondents made a stronger connection between heat and health issues.





Respondents representing various vulnerable groups viewed the planned revision of measures, water retention efforts, tree planting, the creation of tree alleys and green spaces, and the establishment of cooling points as particularly useful activities.

According to the majority, the heat wave measures developed appear to adequately address the key challenges. Participants noted that they had the opportunity to share all their suggestions, including the importance of follow-up actions, utilizing renewable energy for cooling, and ensuring effective communication and information sharing.

In terms of cooperation and partnership opportunities, respondents generally encouraged collaboration between the local municipality, civil society organizations, institutions and companies that could provide financial support for specific activities related to the topic. They also suggested involving public space supervisors, joint representatives of the residents' associations, and student volunteers. The vast majority of respondents were also open to taking on an active role themselves.

Regarding the potential for behavioural change, the majority of participants provided highly positive feedback. Most of them indicated that they intend to apply both newly acquired and previously known – but now more consciously understood – information from the workshop in their daily lives. They also reported feeling better prepared to address the topic and expressed a clear willingness to share the knowledge gained within their communities.

Key findings

The events were attended by a total of 33 participants, including representatives of vulnerable groups such as school and kindergarten directors and staff, staff of the health visitor service (professionals working with pregnant women and infants), managers and staff of nursing homes, nurses, caregivers, pensioners, mental health group leader, coach, leaders of local sports clubs, local company representatives, field guards, public space workers, managers of the local waste management company, and representatives of civil society organizations. Unfortunately, it has been difficult to involve health workers (GPs, specialist clinics, hospitals, etc.) in the activities, because the Hungarian health system is in many ways heavily overloaded and time-limited.

It proved highly valuable that the events were facilitated by a trained moderator, which supported active group work and engagement, while also providing a clear framework for the activities.

The focus groups reflected an adequate level of diversity in terms of backgrounds and perspectives. Overall, the participants demonstrated above-average levels of knowledge and awareness, and they tended to display a more environmentally conscious and sustainability-oriented mindset compared to the general population.

The events demonstrated clear outcomes: participants recognized their own potential to contribute to heat wave adaptation at the individual level, while also reporting that they gained valuable ideas and practical insights through peer exchange. They established stronger connections with each other and enhanced their knowledge on specific topics. Most importantly, the core objective was achieved, as the process generated a concrete set of proposed measures to support the city's future adaptation efforts. Throughout the successive workshops, a consistently high level of interest and engagement was observed, particularly among the groups focusing on children, pregnant women, and the elderly.

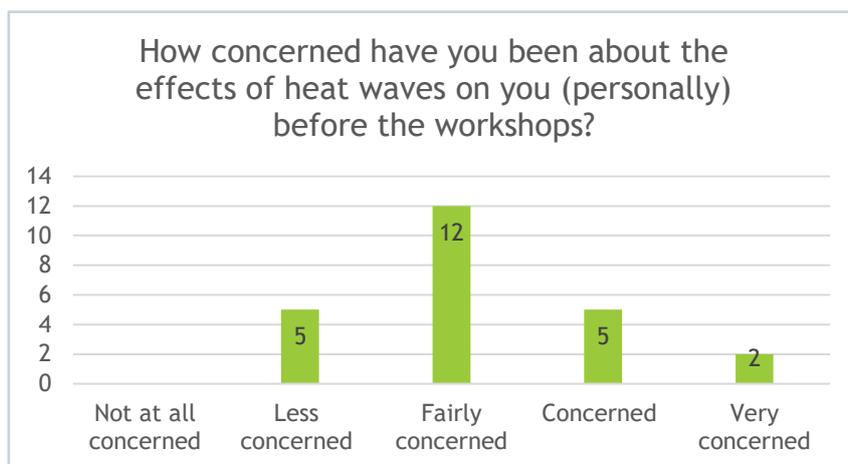
These findings highlight both the existing awareness of climate-related risks and the participants' interest and commitment to applying the newly acquired knowledge related to the topic. Taken together, these outcomes provide a solid foundation for the further development and implementation of adaptation measures both within the project and beyond.



4.2.1.2. Maribor (Slovenia)

In Maribor 10 workshops with stakeholders representing vulnerable groups in kindergartens, organizations working with elderly people, disabled people, Health care centre and city quarters as well as with general public and media about the importance of cooling the city with tree canopy cover have been carried out.

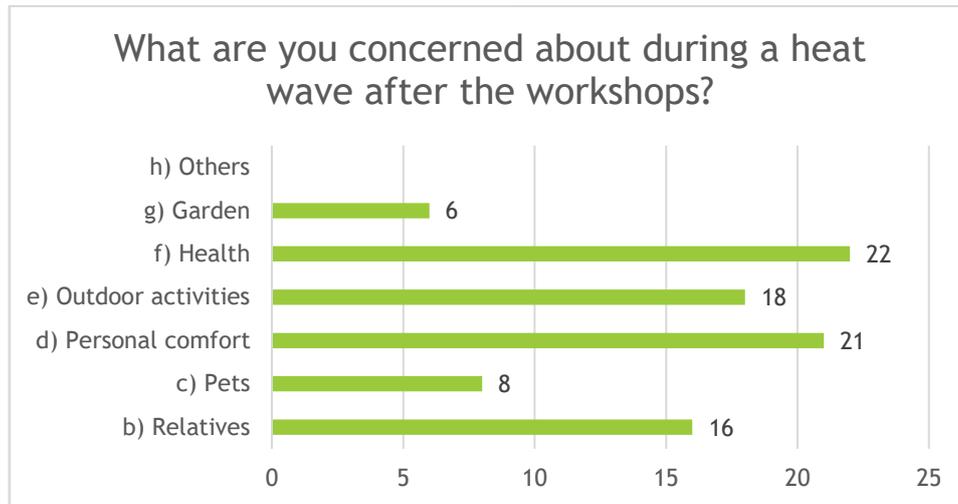
The objective of the workshops was to collect suggestions for measures to mitigate effects of heat events for target groups and stakeholders. A methodology with power point presentation, interactive discussions and suggestions of measures were carried out for protecting the vulnerable groups during heat events.



The questionnaires showed that participants in workshops gained knowledge about health risk during heat waves and were more concerned about the effects.



Before the workshop 20% were concerned about the effects of heat waves and after the workshop there was an increase from less concerned and fairly concerned to concerned - 50% of participants were more concerned.

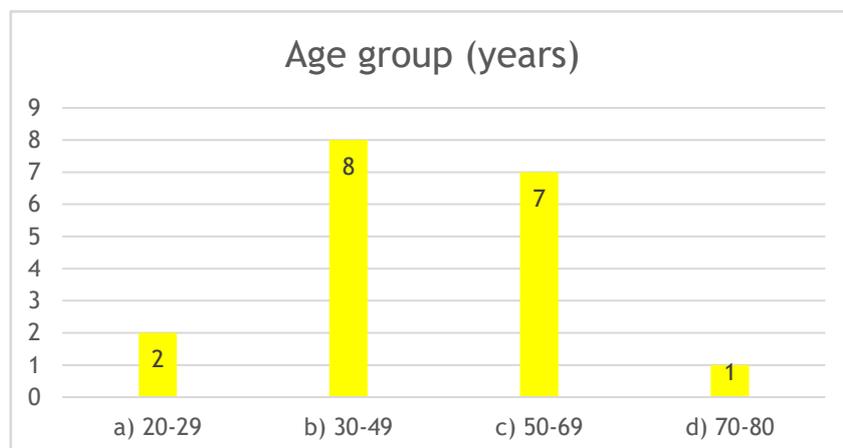


After the workshop participants were more concerned about health and outdoor activities during heat waves.

The target groups were aware of climate change and suggested green space and benches with possibility to rest in the shadow of trees, resting in the cool forests of nearby Pohorje hill, neighborhood help for elderly people who live alone, possibilities to rest during the day in cool public spaces, planning activities during morning hours, upgrading the information system of Health care center to raise awareness among elderly and people with chronic disease. Most of target groups suggested also climatization in at least one room of the building (kindergarten, elderly homes, where people can find cool space during heat waves.

4.2.1.3. Weiz (Austria)

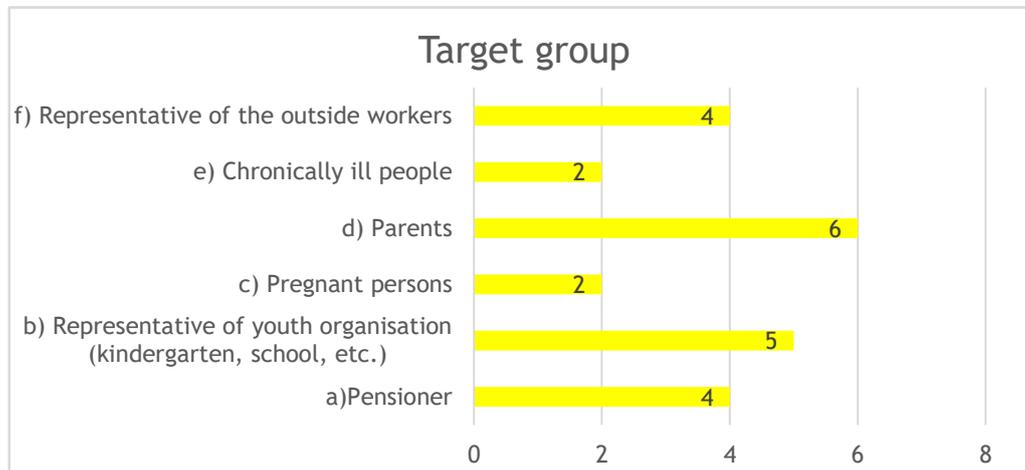
The survey results reveal a heterogeneous demographic composition, with the majority of participants aged between 30 and 69 years. The gender distribution is slightly male-dominated, and most respondents live in family settings.



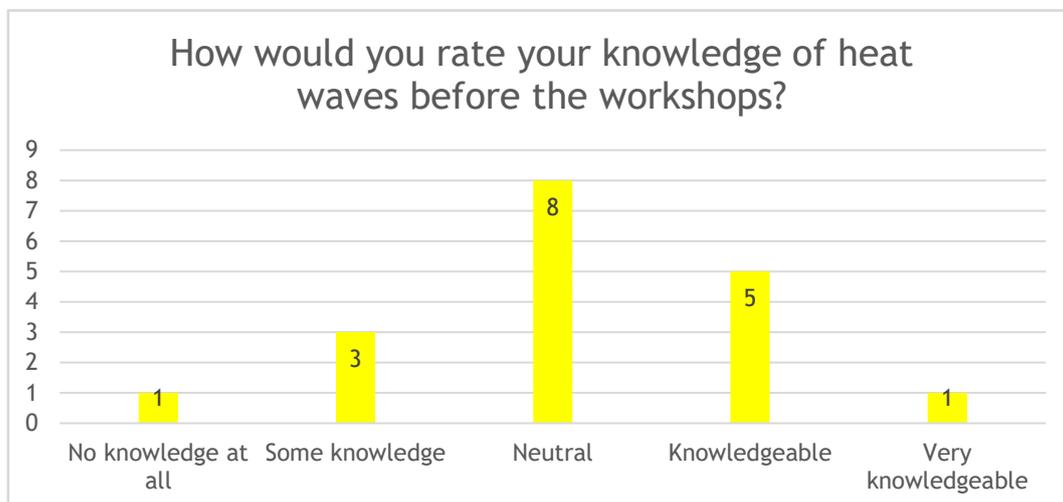
The target groups involved in the survey represent a diverse range of individuals who are particularly vulnerable to extreme heat events. These include pensioners, youth representatives, parents, pregnant women, and people with chronic illnesses, as well as outdoor workers who are frequently exposed to high

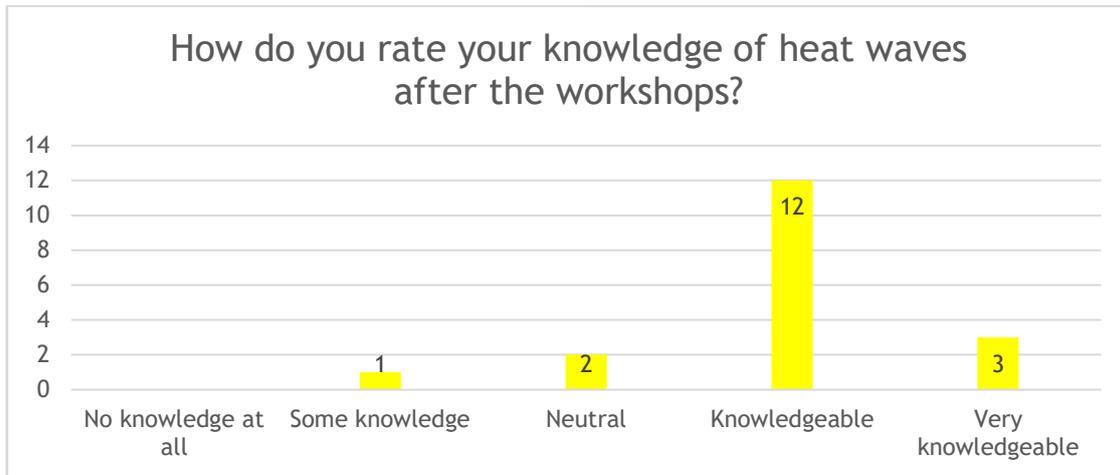


temperatures. This diversity ensures that the perspectives and needs of different segments of the population are considered when developing heat adaptation strategies.



Before the workshops, knowledge about heatwaves was predominantly neutral to moderately developed. After the workshops, a clear increase in knowledge was observed: most participants now consider themselves knowledgeable or very knowledgeable.





Awareness of health risks such as heatstroke, dehydration, and heat cramps also increased after the workshops, indicating a stronger perception of personal vulnerability.

Participants recognize the importance of heat prevention measures and rate long-term solutions such as green spaces and micro-parks as particularly effective.

E. Action Plan Content			
Q1: What do you think of these measures after the workshops have been conducted:			
	very useful	useful	not useful
a) Develop a city-wide heat wave plan	13	5	
b) Implement a country-wide early warning alert system	12	6	
c) Coordination between city planning, health, social services departments, emergency services, and national meteorological agency	15	3	
d) Launch public information campaigns on resources available and strategies to keep cool	12	5	1
e) Deployment of public water misters and fountains	13	5	
f) Telephone check-ins with older & other vulnerable residents	9	7	2
g) Elaboration of an app-based map for the city's public 'cool locations and promotion of it	3	9	5
h) Long-term planning: add porous road and sidewalk coverings, plant green roofs, add trees, develop 'micro parks'	17	1	
i) Elaboration of a map for the city's public cooling spaces (woods, parks, trees...)	7	11	
j) Establish cooling centres/oasis	9	8	1

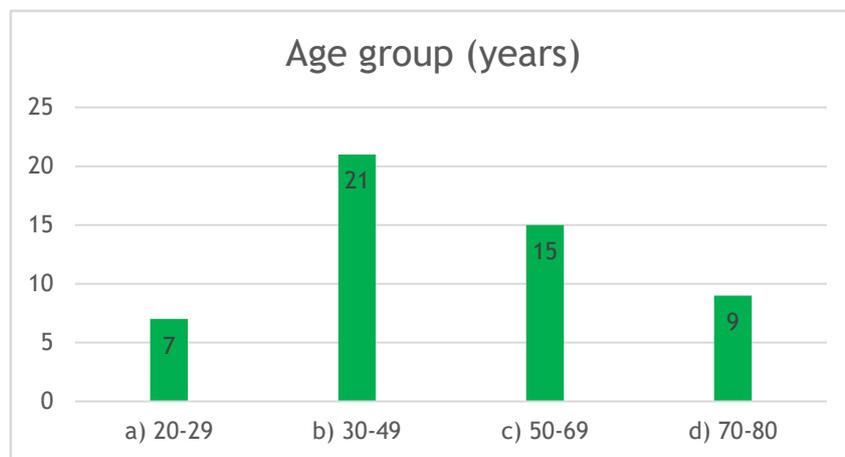
The workshops themselves were rated positively overall, with scientific information and the opportunity to discuss personal ideas highlighted as especially helpful. In the open responses, participants emphasized the need to improve target group outreach and involve regional stakeholders more actively. Partnerships with organizations such as the Red Cross and medical institutions were suggested. Regarding individual behaviour,



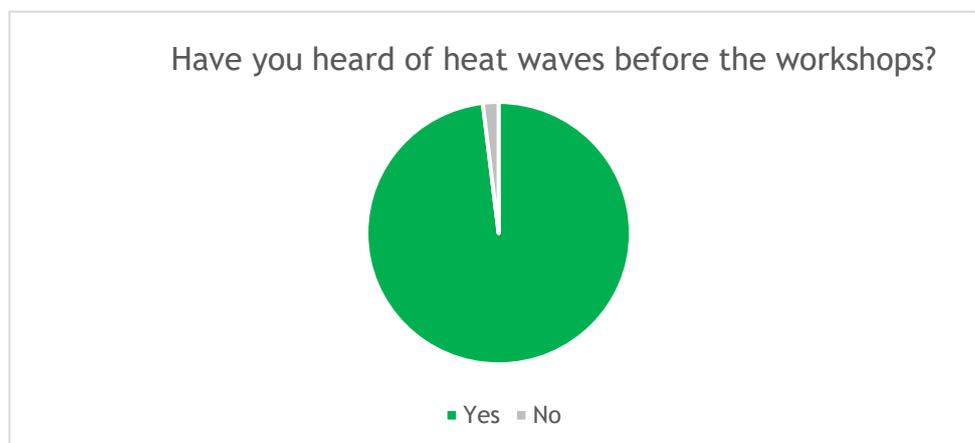
respondents indicated plans to drink more water and adjust working hours during heat peaks. Overall, all participants feel better prepared to cope with extreme heat events after the workshops.

4.2.1.4. Worms (Germany)

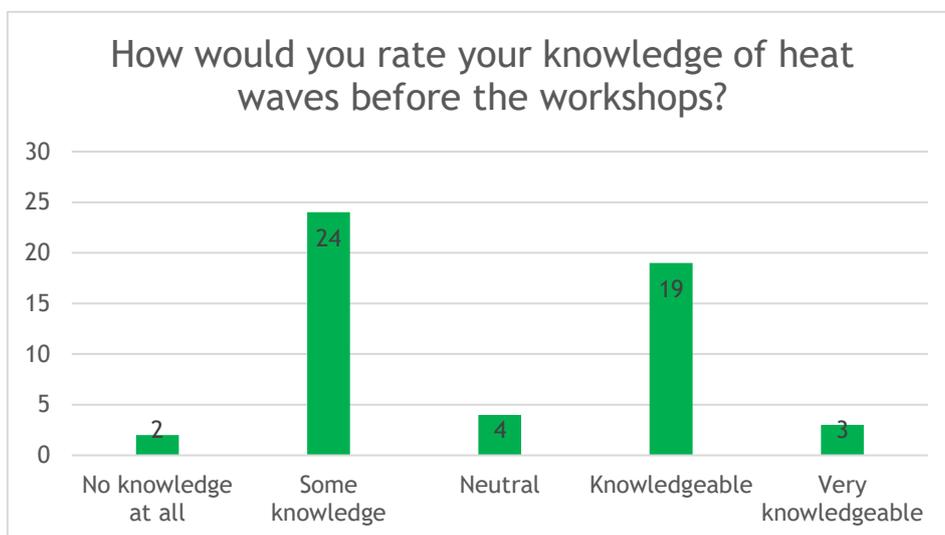
The citizen engagement workshops in Worms were designed to assess how well participants understood heat-related risks before and after the sessions and to identify where local information flows could be improved. The majority of attendees came from professional backgrounds, staff of care facilities, schools, NGOs, and municipal institutions, so the results primarily reflect the awareness level of local multipliers rather than the general public. The following charts show the most relevant findings.



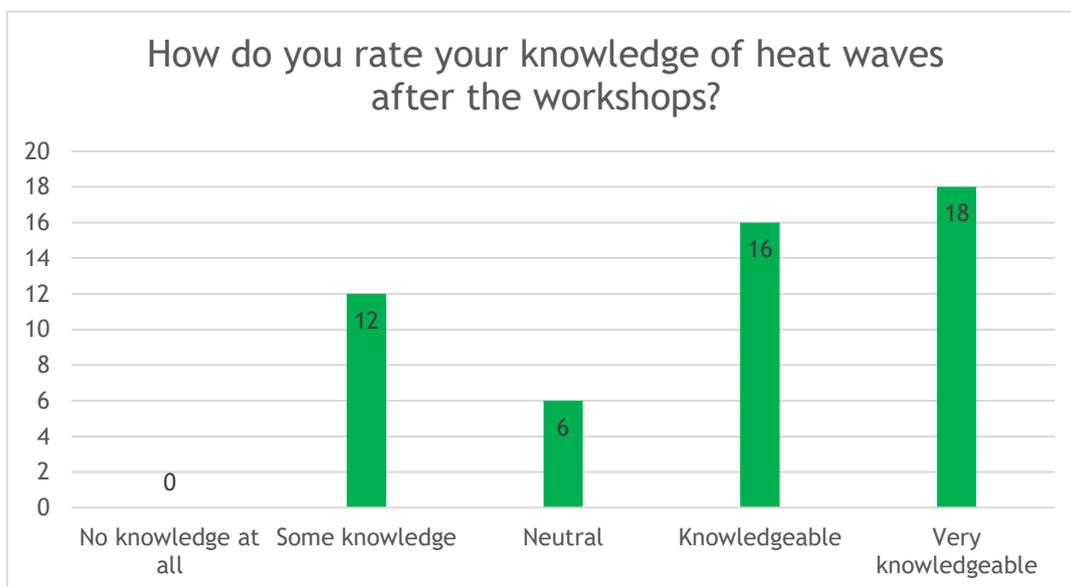
In the citizen engagement workshops a majority of participants were in the age group 30-49, while some participants joined from other age groups. The focus on people that function as multipliers in different functions might be the reason for this occurrence.



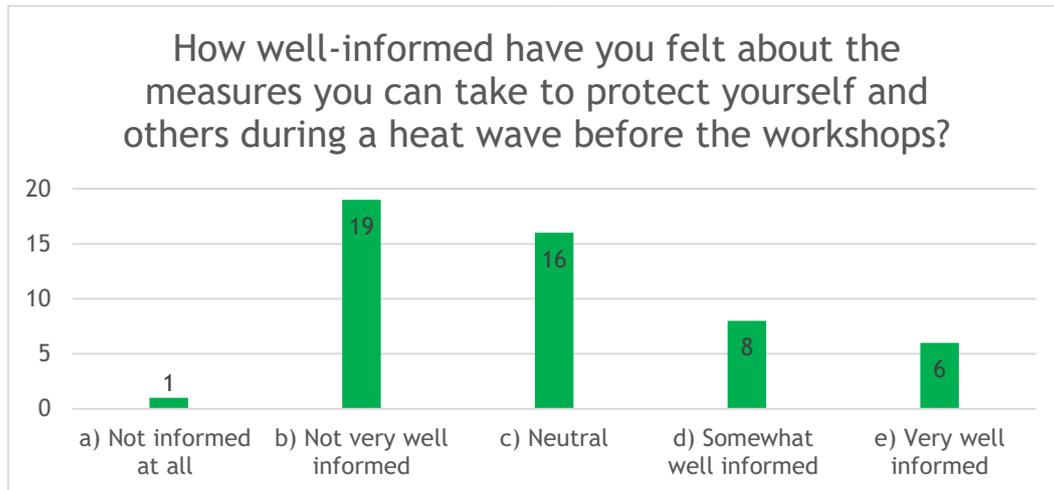
The pie chart leaves little room for interpretation: virtually everyone had already heard of heat waves prior to the workshops, with only a single *No* response. This indicates that basic awareness of the phenomenon is universal among the participants and that the workshops could therefore focus on deepening understanding rather than on introducing the topic itself.



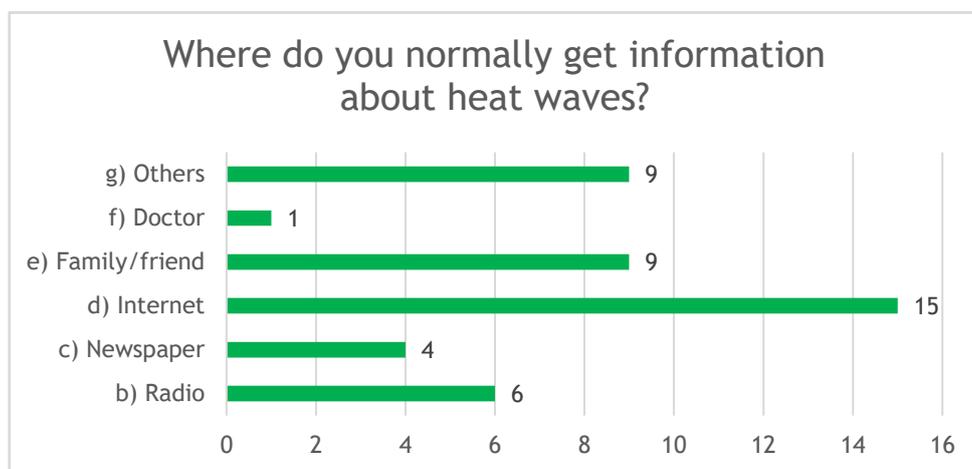
Responses show a balanced distribution, with most participants rating themselves as having *some knowledge* or being *knowledgeable*. A smaller number described themselves as *very knowledgeable*, and only a handful admitted to having little or no knowledge. This pattern points to a moderate but uneven baseline—participants were familiar with the concept but differed widely in how confidently they could explain or act on it.



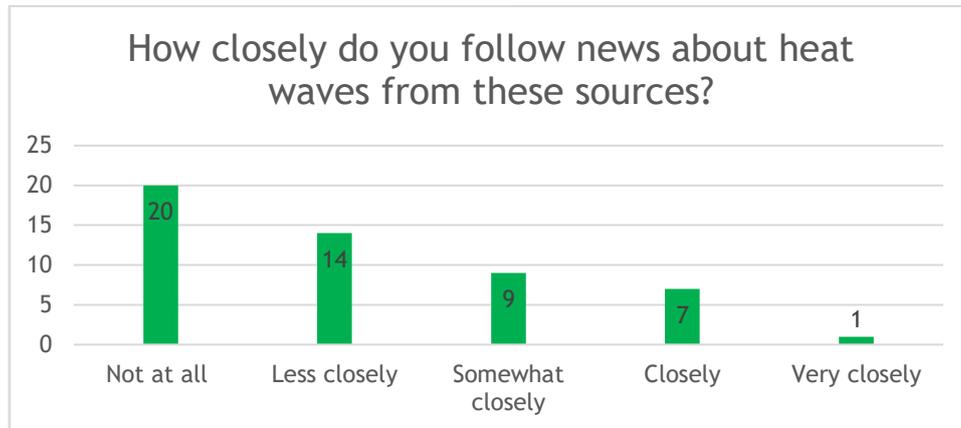
In contrast to the previous question, the distribution clearly shifts toward the higher categories. *Knowledgeable* and *very knowledgeable* now dominate, while the lowest categories have almost disappeared. This suggests a tangible learning effect: the workshops succeeded in turning general familiarity into more structured and applied knowledge, helping participants translate abstract awareness into practical understanding.



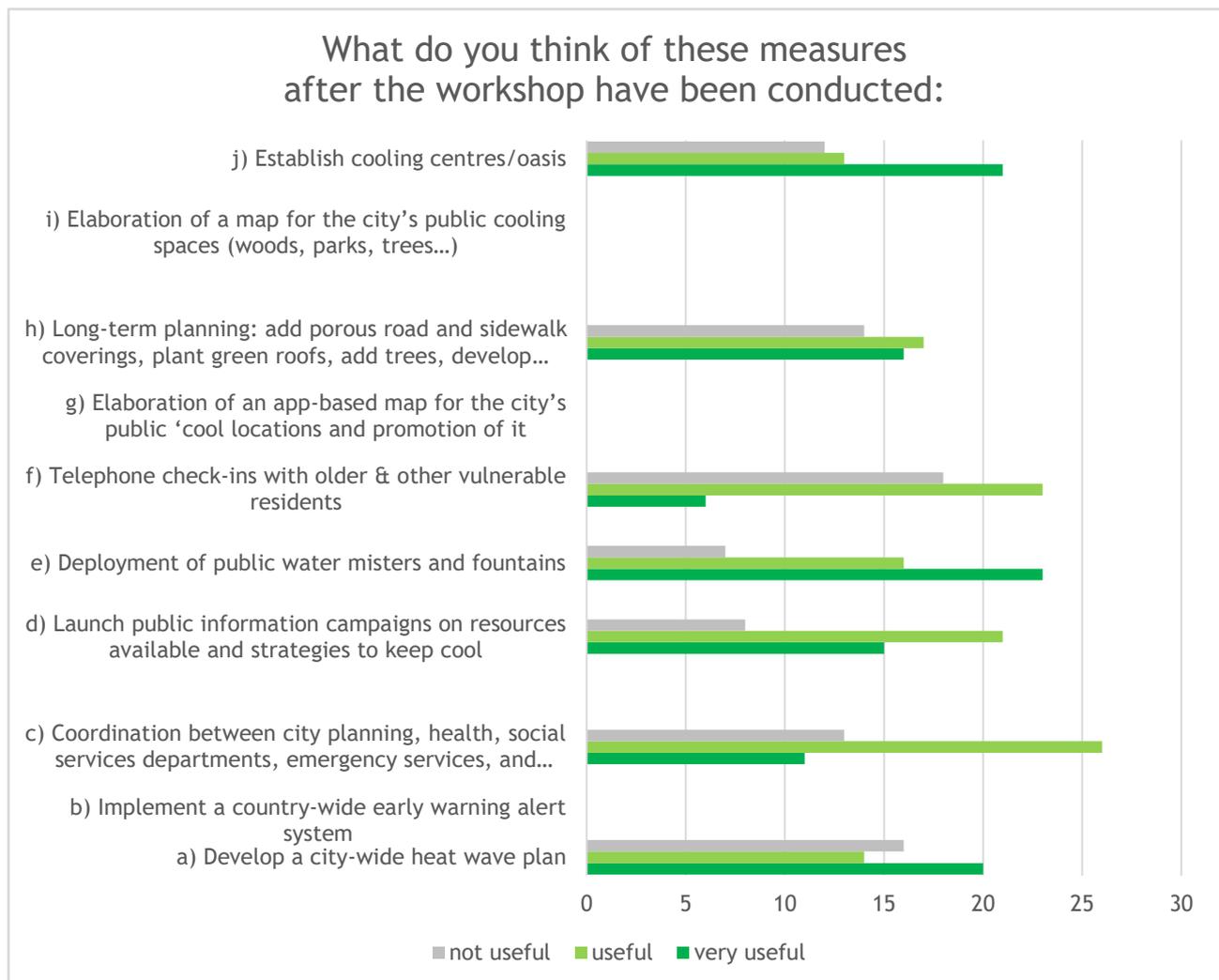
Here, the responses concentrate around the middle of the scale. The largest group selected *not very well informed*, followed by *neutral*. Only a few rated themselves as *very well informed*. This result confirms that, while people were aware of heat waves in general, they often lacked detailed knowledge of specific protective actions—precisely the type of information the workshops aimed to convey.



The bar chart reveals a clear hierarchy of information sources. The internet is by far the most frequently used channel, followed by family and friends and other informal sources. Traditional media such as radio and newspapers play a secondary role, while consultation with doctors appears rare. The finding underscores the importance of digital communication and peer-to-peer exchange in reaching the local population.



When asked about how actively they follow these channels, many respondents selected *not at all* or *less closely*, with far fewer choosing *closely* or *very closely*. This shows that even though people know where to find information, they may not actively seek it out. Passive awareness dominates over proactive monitoring, indicating a behavioural gap that could be addressed through more engaging and recurring messaging during summer months.





The final figure, which compares the perceived usefulness of different policy measures, offers a nuanced picture. Coordination between city planning, health, and social sectors (option c) and the development of a city-wide heatwave plan (option a) received the highest number of “very useful” votes. Telephone check-ins with vulnerable persons (option f), long-term urban planning measures such as porous surfaces (option h), and establishing cooling centres (option j) were also viewed favourably. Less emphasis was placed on measures like fountains or misters, which some participants saw as symbolic rather than systemic. Overall, the ranking reflects a clear preference for coordinated, structural solutions over short-term or decorative interventions.

Taken together, the workshop results show a well-informed but still maturing awareness landscape. Participants entered the sessions with broad familiarity and left with significantly improved confidence and practical knowledge. They value structured institutional coordination and long-term urban strategies more than one-off public campaigns. The data also highlight a communication gap: people rely heavily on digital and informal sources yet rarely follow them closely, meaning that local authorities must actively maintain attention rather than assume that information will spread organically. The citizen engagement workshops thus served both as a learning forum and as an important diagnostic tool, revealing where understanding is strong and where active outreach is still required to transform awareness into preparedness.

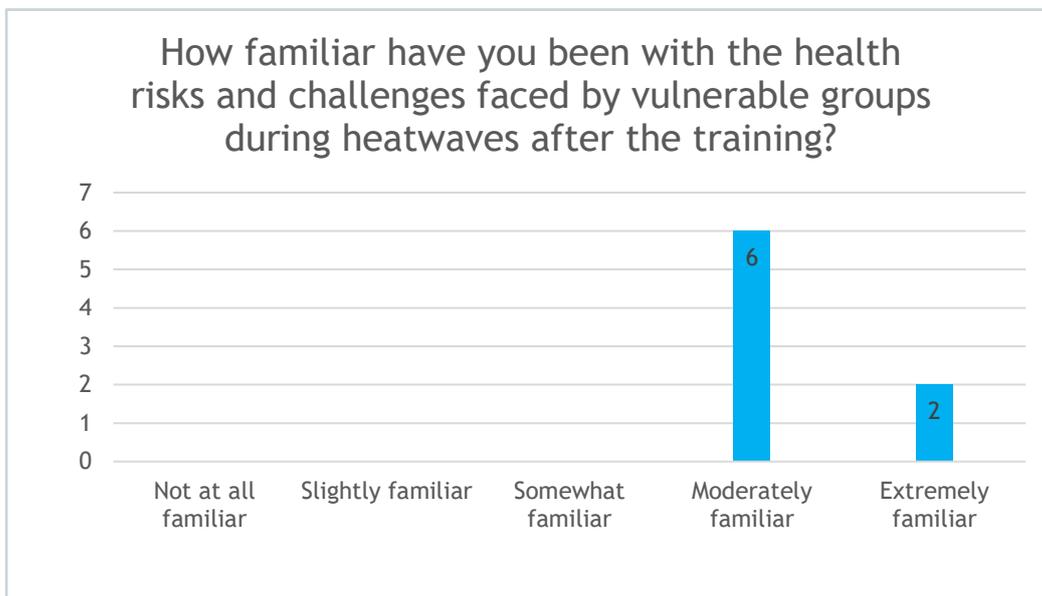
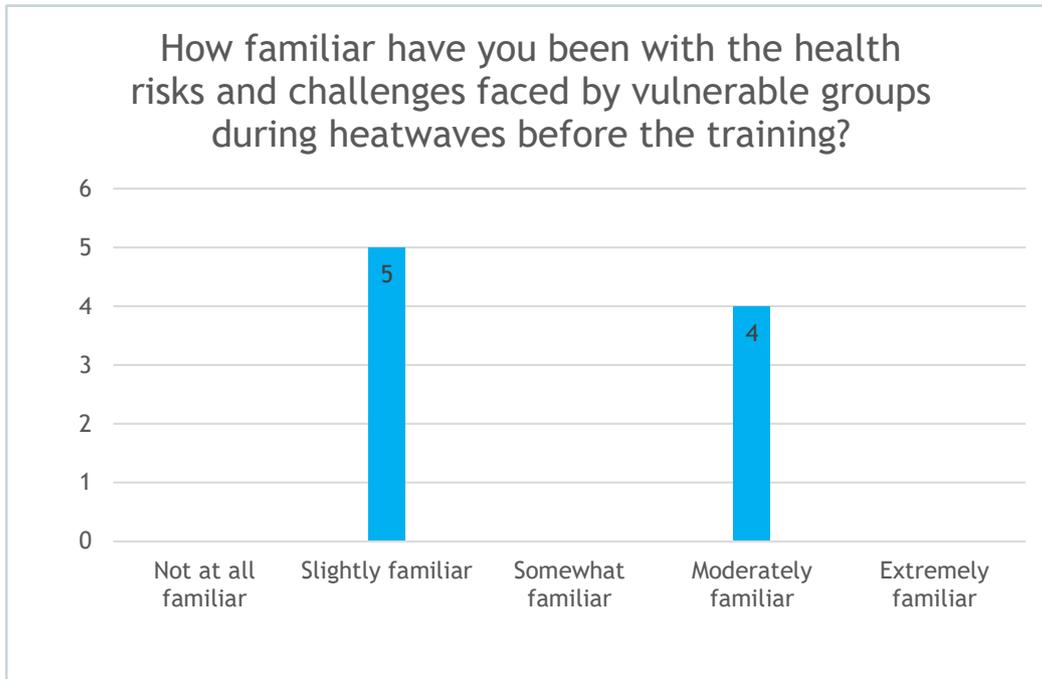
4.3. Advanced trainings

4.3.1.1. Hajdúböszörmény (Hungary)

Children representatives - kindergarten

The sample consisted of participants between 20 and 69 years of age, with the majority being between 30 and 49. All participants were women working in the public sector. They were all either school teachers or kindergarten teachers.

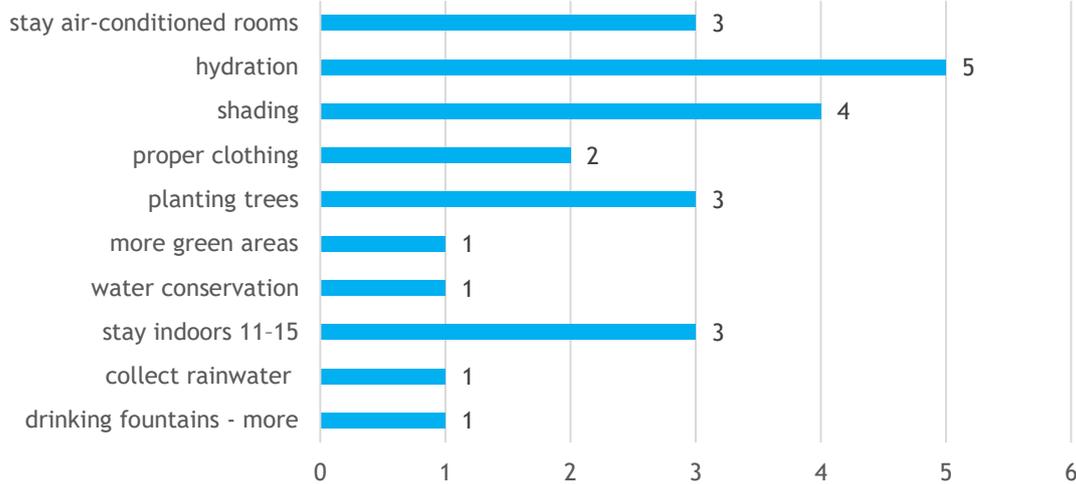
Before the training, 100% of the participants were able to name three key measures or behaviours that could help protect vulnerable groups during heatwaves. While 56% of respondents were slightly, and 44% were moderately aware of the health risks and challenges affecting vulnerable groups, these proportions shifted positively following the training: most respondents reported being moderately or highly familiar with the topic (see figure below).



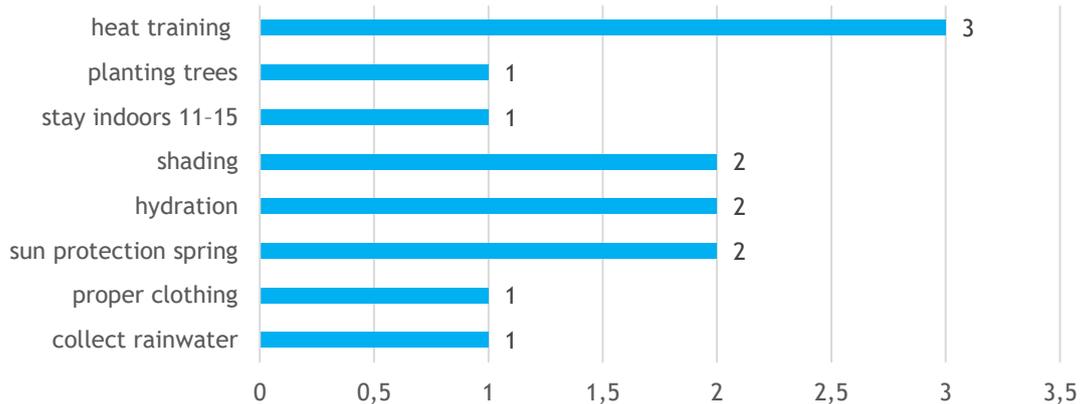
Even before the training, respondents already possessed basic information about key measures to protect vulnerable groups, most frequently highlighting the use of air conditioning, shading, and adequate hydration. After the training, some new elements were added, such as the importance of sun protection in spring and promoting heat acclimation through a physically active and healthy lifestyle (see in graphs below).



Could you name three key measures or behaviours that can help protect vulnerable groups during heatwaves before doing this training?



Could you name three key measures or behaviours that can help protect vulnerable groups during heatwaves after the training you have done?



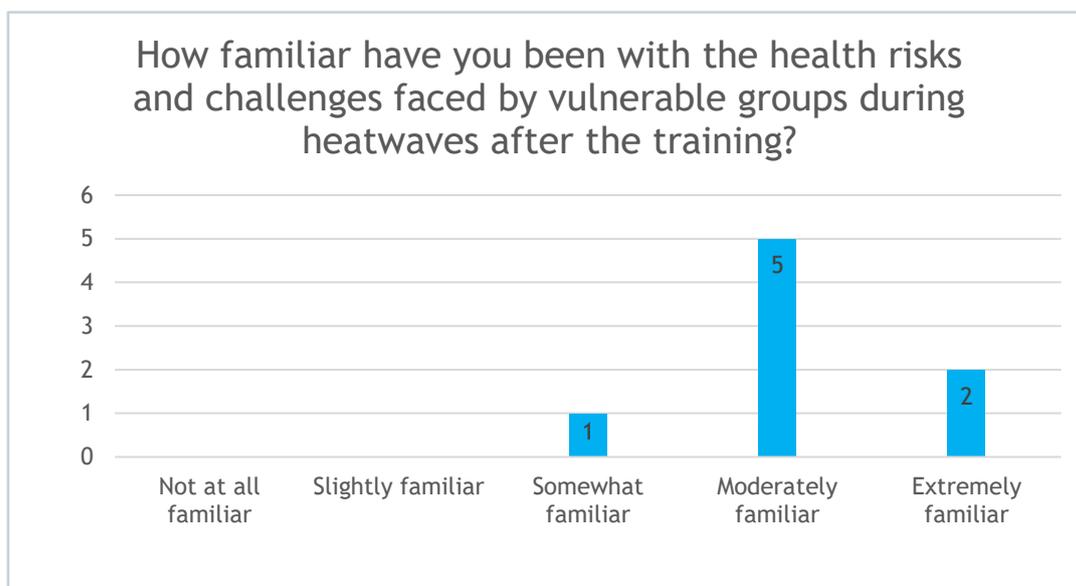
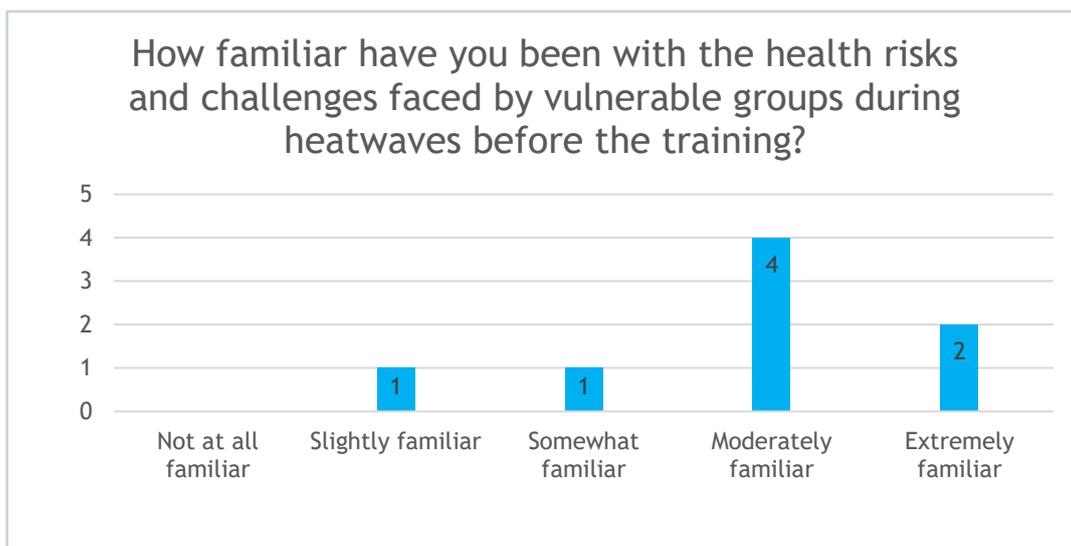
According to the suggestions, the municipalities, the government, elderly care organizations, child protection organizations and family helpers should play a greater role in supporting vulnerable groups during heatwaves. According to the respondents, the main skills or knowledge areas that can help effectively communicate and engage with vulnerable groups during heatwaves are: responsibility, awareness raising and further training.



Outside workers

The sample consisted of participants between 20 and 69 years of age, of whom 75% were men and 25% were women. The respondents included actors from the public sector, state institutions, and NGOs.

By the end of the training, knowledge about the health risks and challenges faced by vulnerable groups during heatwaves had increased even among those respondents who had previously reported having somehow little awareness (see graphs below).



Before the training, 67% of the participants were able to name three key measures or behaviours that could help protect vulnerable groups during heatwaves, while after the event this proportion increased to 83%.

50% of the respondents had not previously participated in training on dealing with vulnerable groups during heatwaves, while 63% of the participants had experience in working with vulnerable groups during heatwaves. 17% of the participants felt less confident in addressing the specific needs and concerns of



vulnerable groups during heatwaves before the training; after the training, all participants indicated a higher level of confidence.

12 % of the respondents rated the overall quality and relevance of the training as acceptable, and 88 % as very good in preparing them to deal with vulnerable groups during heatwaves. None of the participants selected the two lowest categories.

57% of the participants considered it likely, 29 % considered it very likely, and 14 % neutral that they would adopt and continue practicing the behaviours and measures discussed in the training when dealing with vulnerable groups during heatwaves. In addition, 86 % of the participants agreed with the statement that the training facilitated collaboration and coordination among different actors dealing with vulnerable groups during heatwaves.

According to the suggestions, the municipality, media, employees and the offices should play a greater role in supporting vulnerable groups during heatwaves. According to the respondents, the main skills or knowledge areas that can help effectively communicate and engage with vulnerable groups during heatwaves are: empathy, communication skills and communication between the different groups.

Elderly people - social workers

The sample consisted of participants between 30 and 69 years of age. All participants were women working in. The respondents included actors from the public and private sector - social workers and nurses - and NGOs.

While 29% of respondents were slightly, 14% were somewhat, and 57% were moderately aware of the health risks and challenges affecting vulnerable groups, these proportions shifted positively following the training, as by then everyone indicated that they had become moderately familiar with them.

Before the training, 50% were not able to name 3 key measures helping vulnerable groups (see graph below).

Before and after the training, participants named roughly the same measures or behaviours that can help protect vulnerable groups during heatwaves. These included greening the environment for its microclimate-improving effect, the importance of hydration among the elderly, and the significance of physical activity.

71% of the respondents had not previously participated in training on dealing with vulnerable groups during heatwaves, at the same time 71% of the participants had experience in working with vulnerable groups during heatwaves.

In response to the question about what actions or measures they take in their current role to support vulnerable groups during heatwaves, all respondents mentioned the more widely known basic solutions, such as shading, hydration, air cooling, and sun protection. At the same time, inadequate infrastructure and the use of air conditioning were raised as problems; the latter can easily cause elderly people to catch a cold, thus it is not an optimal solution in all cases.

According to the suggestions, municipalities and the state should play a greater role in supporting vulnerable groups during heatwaves. According to the respondents, the main skills or knowledge areas that can help effectively communicate and engage with vulnerable groups during heatwaves are: health, environment, meteorology, and communication skills.

40 % of the respondents rated the overall quality and relevance of the training as acceptable, 40 % good, and 20% as very good in preparing them to deal with vulnerable groups during heatwaves. None of the participants selected the two lowest categories. All elements of the training were considered useful, and among them the examples and the health impacts were highlighted. 100% of the participants believed that the training improved their ability to effectively communicate and engage with vulnerable groups during heatwaves; furthermore, everyone considered it likely or very likely that they would adopt and continue

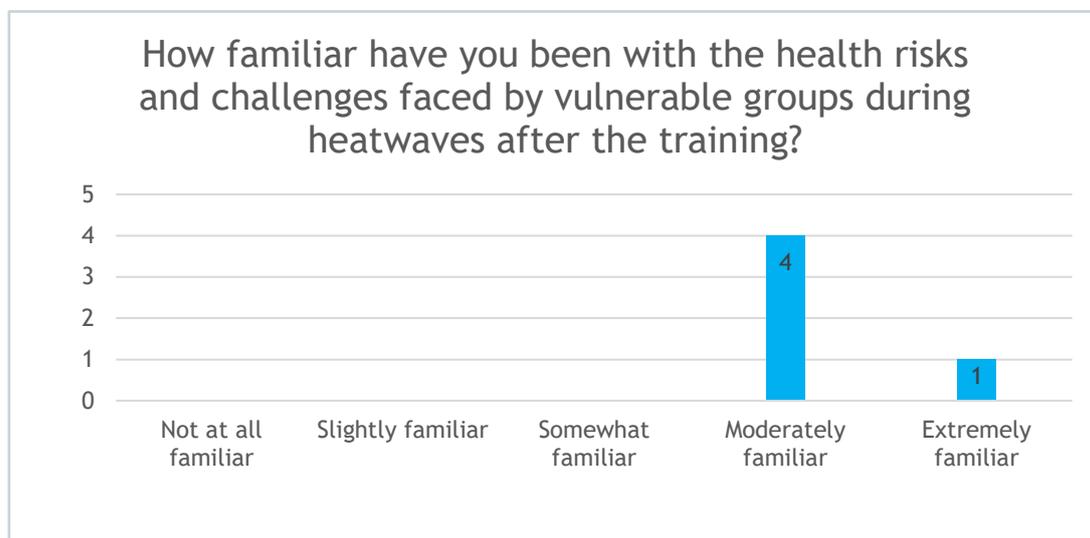


practicing the behaviours and measures discussed during the training when working with vulnerable groups during heatwaves.

Children representatives - teachers and student support professionals

The sample consisted of participants between 30 and 69 years of age; 86% of the participants were men, and 14% women. The respondents were teachers and instructors.

While 38% of respondents were slightly, 12% were somewhat, and 50% were moderately aware of the health risks and challenges affecting vulnerable groups before training, these proportions shifted positively following the training, as by then all participants indicated that they had become moderately familiar with them (see graph below).



Before the training, all participants were able to name 3 key measures helping vulnerable groups; in this group, a notably high number of respondents mentioned the importance of greening the environment (planting trees) as key measures. After the training, new responses also emerged, such as wearing sun-protective clothing, proper nutrition and preparing the body to better withstand the heat through physical exercise (sport).

In this group 100% of the participants had not previously participated in training dealing with vulnerable groups during heatwaves, and only 37% had experience with vulnerable groups from this perspective.

100% of the participants felt somewhat confident in addressing the specific needs and concerns of vulnerable groups during heatwaves before the training; after the training 25% of the participants felt somewhat confident, 50% fairly confident and 25% completely confident.

According to the suggestions, municipalities, NGOs, healthcare and elderly care organizations should play a greater role in supporting vulnerable groups during heatwaves. According to the respondents, the main skills or knowledge areas that can help effectively communicate and engage with vulnerable groups during heatwaves are: access to additional teaching materials, education, and the greening of the environment.

50 % of the respondents rated the overall quality and relevance of the training as good, and 50% as very good in preparing them to deal with vulnerable groups during heatwaves. None of the participants selected the 3 lowest categories (see graph below).



All elements of the training were considered useful, and among them the showing the rise of heat waves was highlighted. 100% of the participants believed that the training improved their ability to effectively communicate and engage with vulnerable groups during heatwaves; furthermore, everyone considered it likely or very likely that they would adopt and continue practicing the behaviours and measures discussed during the training when working with vulnerable groups during heatwaves.

88% agreed that the training has facilitated collaboration and coordination among different actors dealing with vulnerable groups during heatwaves. The suggestions highlighted the importance of awareness raising (especially environmental) and sensitization, making greater use of the media to reach wider audiences, and organizing more training sessions in order to better prepare key actors for dealing with vulnerable groups during heatwaves.

Key findings

In general, it can be stated that following the workshops and training, both the level of knowledge and the degree of awareness improved positively among the majority of participants. Across all target groups, openness and deep interest were consistently observed. On several occasions, participants shared feedback indicating that they considered the topic to be so important and engaging that they not only intend to share the acquired knowledge within their immediate and broader communities, but also plan to actively seek further opportunities and solutions in both their personal lives and professional environments.

Respondents highlighted the need to place greater emphasis on the active involvement of the following organizations in addressing the issue: municipalities, governmental bodies, local NGOs, elderly care institutions and organizations, child protection institutions, family support services and media.

The recommendations emphasized the need to raise awareness and to strengthen sensitization efforts. They also underlined the importance of utilizing different communication channels to reach broader audiences, and of providing additional training opportunities to better equip key stakeholders for supporting vulnerable groups during heatwaves.

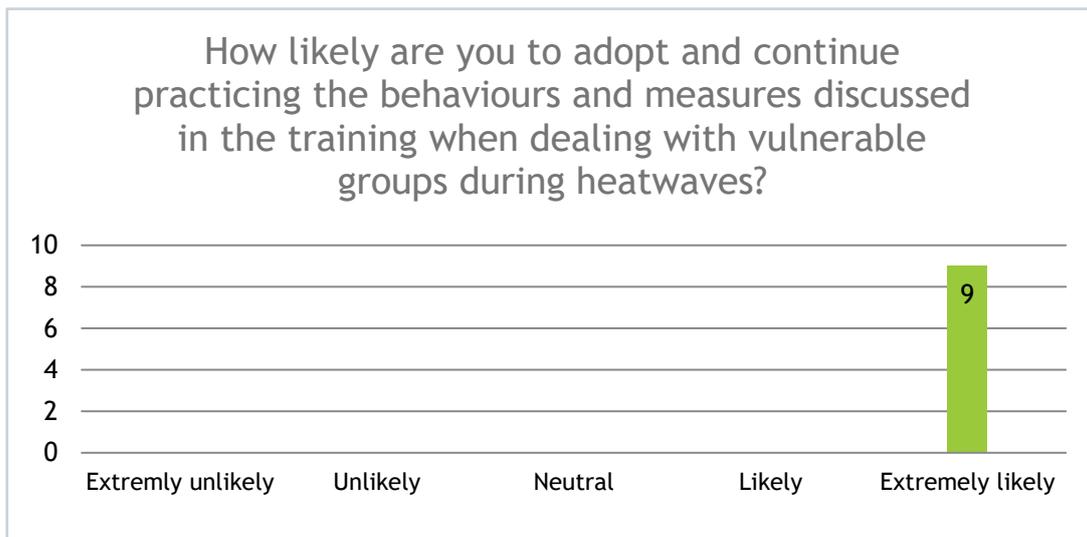
There was a strong demand among participants for the greening of the urban environment in general.



4.3.1.2. Maribor (Slovenia)

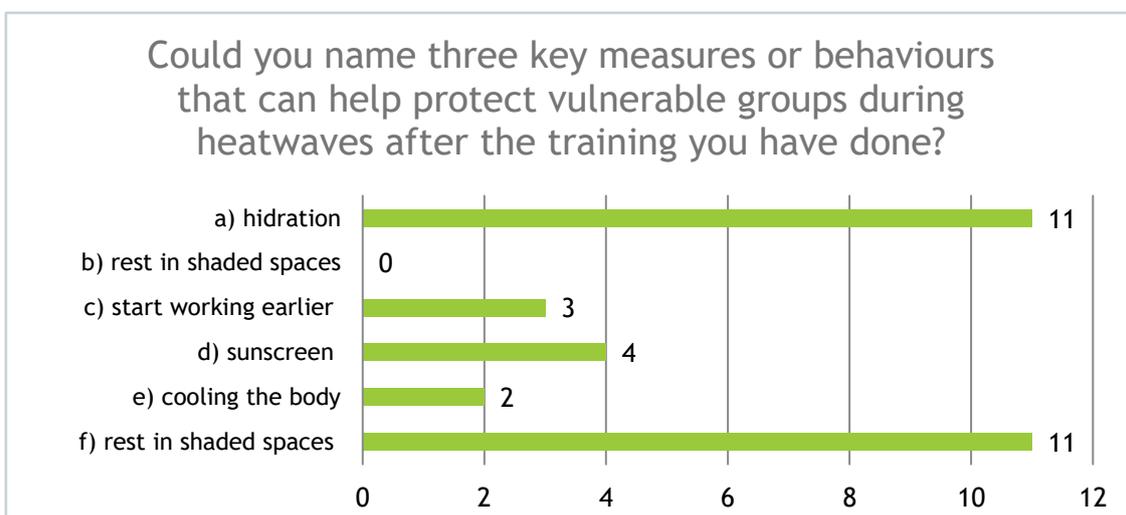
In Maribor the trainings were carried out by external expert - Faculty of Health Sciences of the University of Maribor to raise awareness about health risk for vulnerable people and to present health protection measures for each vulnerable group.

Advanced trainings were organized for kindergarten teachers about health protection for small children during heat waves.



Kindergarten teachers were already well informed about heat protection measures for children due to information from National Health Institute. Nevertheless, they were pleased to hear about the signs of overheating in children.

A training was held for foremen at construction site at a public company for staff working with outdoor workers regarding health protection during heat waves.



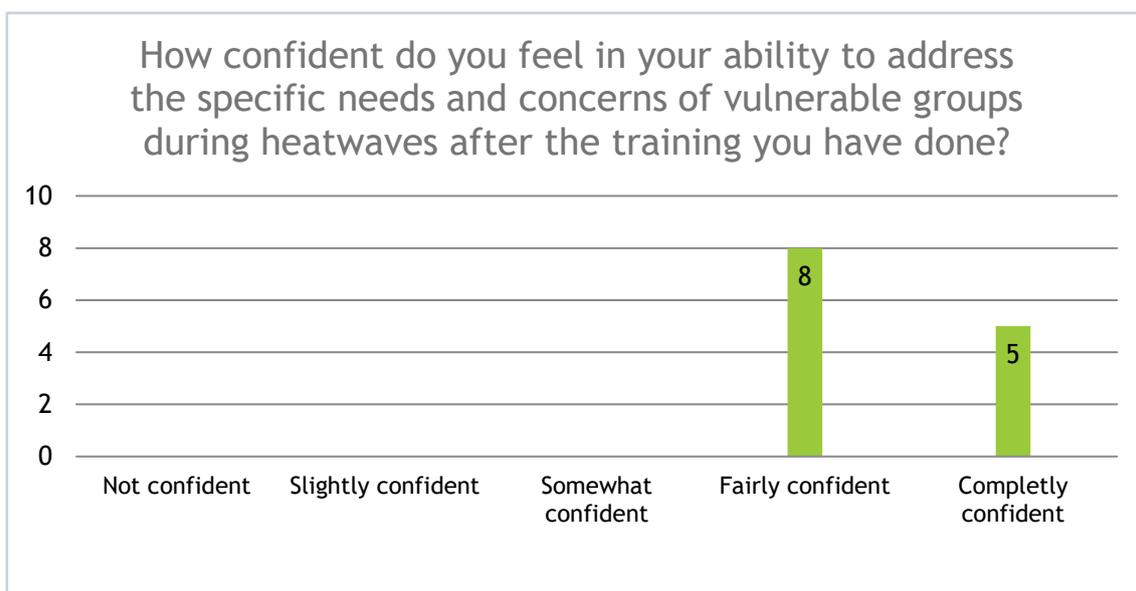


They were aware of health problems for outdoor workers, listed main measures and learned new ones, but emphasized that the legislation is not enough precise to protect outdoor workers when they are exposed to heat waves.

Another training was organized at the health care center for people with chronic diseases.

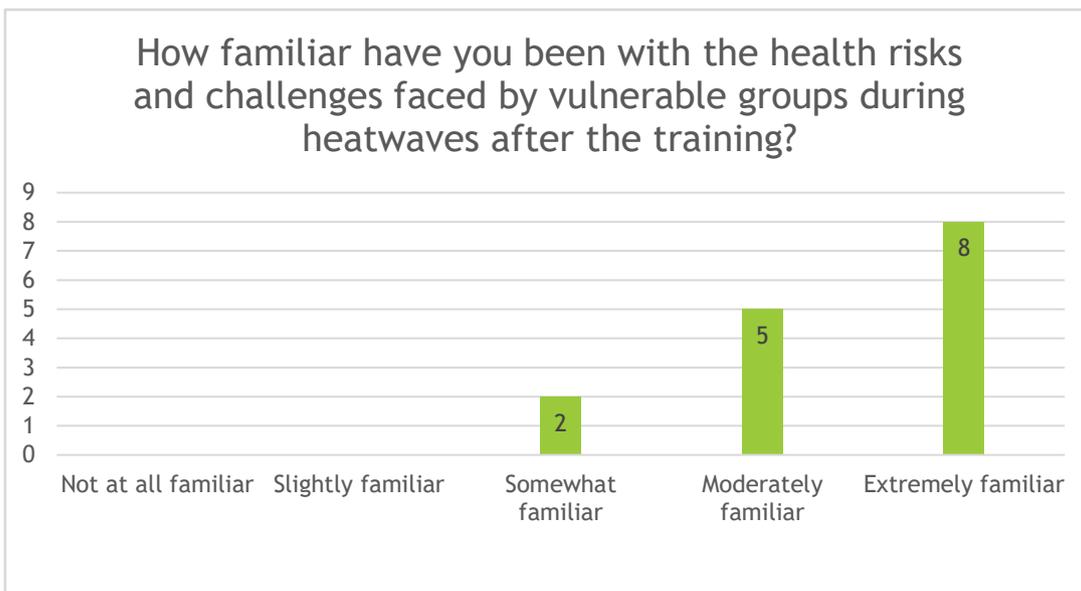
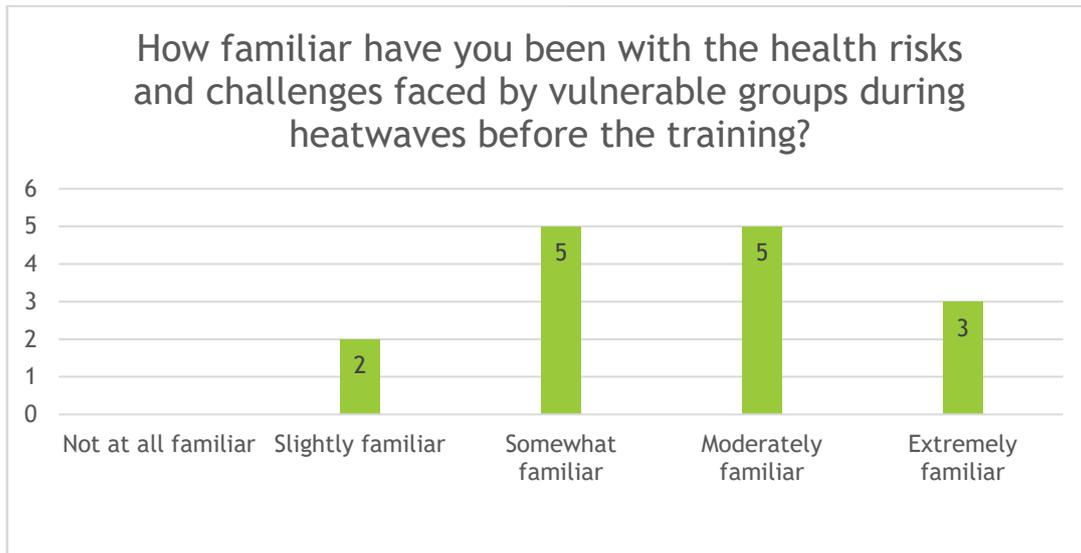
At associations for disabled - deaf people we organized a training where disabled have difficulties to find information or to understand information in media.

We organized an advanced training regarding health protection for coordinators at associations of pensioners helping elderly people, living alone at home, to raise awareness about measures and what are the health risk, when to phone the emergency.



The coordinators who are visiting elderly people at home were more confident after the training to address specific needs of elderly people.

At the University clinical centre Maribor a training for pregnant women and nurses was held.



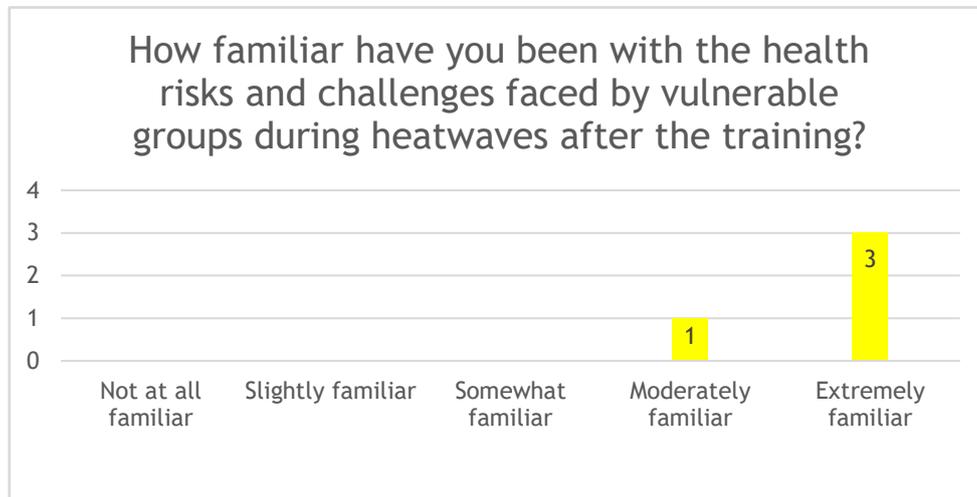
The graph shows how the participants gained awareness about heat risks for pregnant women during heatwaves.

4.3.1.3. Weiz (Austria)

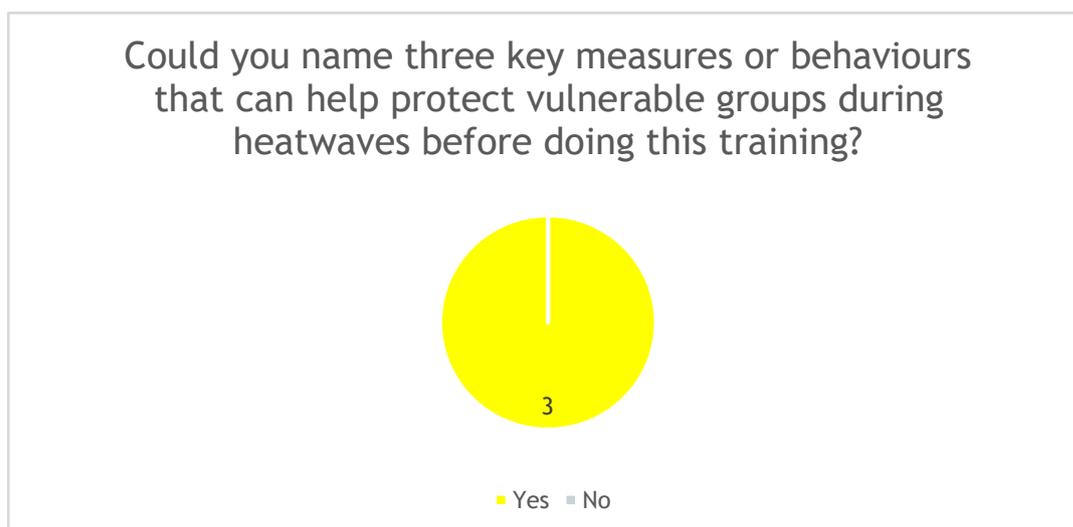
The advanced training sessions in Weiz were attended by a small but diverse group of participants, primarily from the public sector and NGOs, including doctors, hygiene specialists, and project managers. The age distribution ranged from 30 to 69 years, with most respondents falling into the 30-49 age group. Before the training, participants reported moderate familiarity with health risks and challenges faced by vulnerable groups during heatwaves, with two respondents indicating *somewhat familiar* and two *extremely familiar*. After the training, awareness improved significantly: three participants rated themselves as *extremely*



familiar and one as *moderately familiar*. This demonstrates a clear increase in knowledge and understanding of the topic.



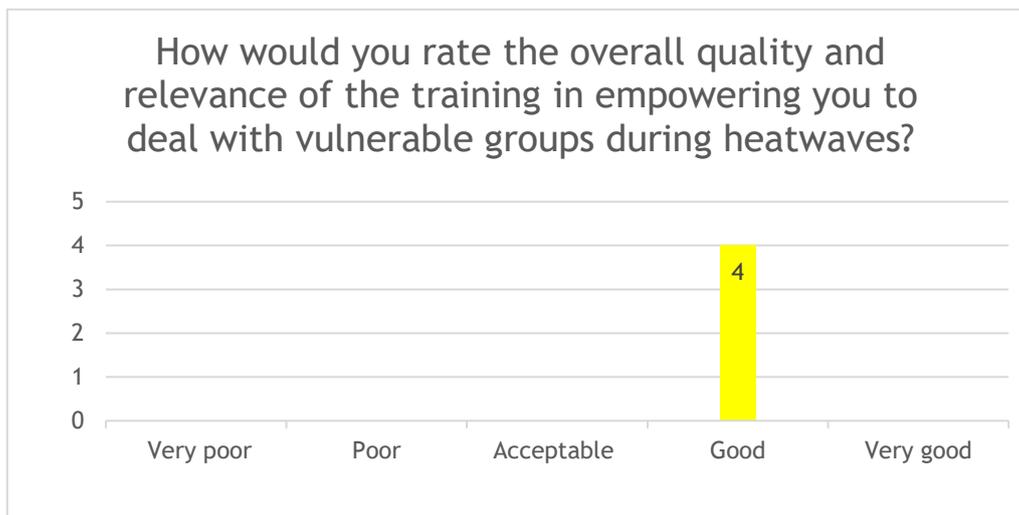
Prior to the training, most participants could already name several protective measures, such as seeking shade, maintaining social contact, and implementing specific heat protection strategies. After the training, responses included more structured and practical measures like staying indoors during peak heat hours, drinking plenty of fluids, and maintaining communication with family or caregivers. This indicates that the training reinforced existing knowledge and introduced additional actionable behaviours.



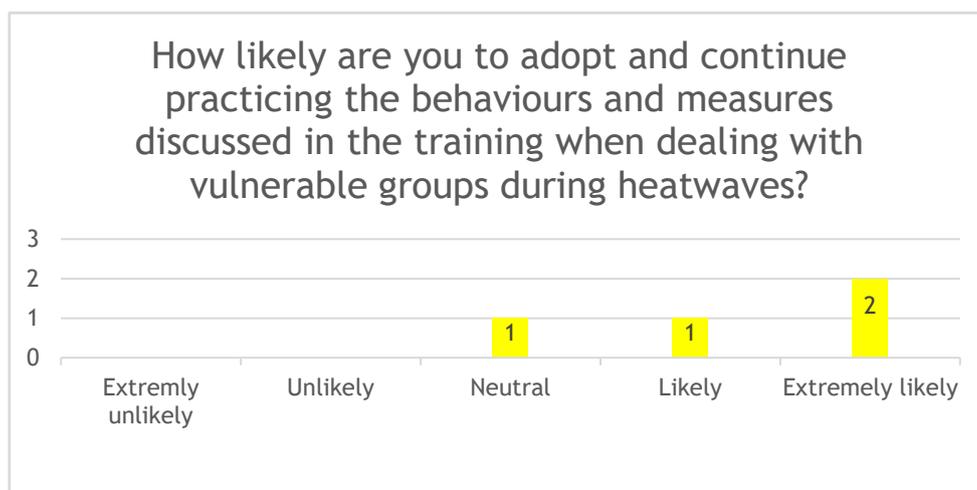
Confidence in addressing the needs of vulnerable groups improved after the training. Initially, two participants felt *fairly confident*, while post-training responses showed one participant as *completely confident* and another as *fairly confident*. This suggests that the training had a positive impact on self-assessed preparedness.



All participants rated the overall quality and relevance of the training as *good*. The most valued aspects included opportunities for discussion, knowledge transfer, and interactive elements. Three respondents agreed that the training improved their ability to communicate and engage with vulnerable groups, while one expressed uncertainty.



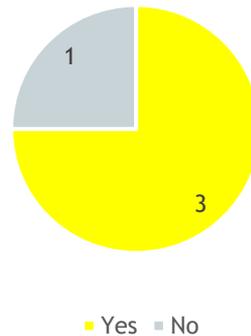
When asked about the likelihood of adopting recommended behaviours, two participants indicated they were *extremely likely* to apply the measures, one *likely*, and one *neutral*. Some participants reported sharing knowledge with colleagues, including doctors and nursing staff, which suggests a multiplier effect beyond the training itself.



Three respondents agreed that the training facilitated collaboration among different actors, while one disagreed. Suggestions for improvement included stronger political focus on heat prevention and more employer support for implementing measures.



Do you support the statement, that the training has facilitated collaboration and coordination among different actors dealing with vulnerable groups during heatwaves?

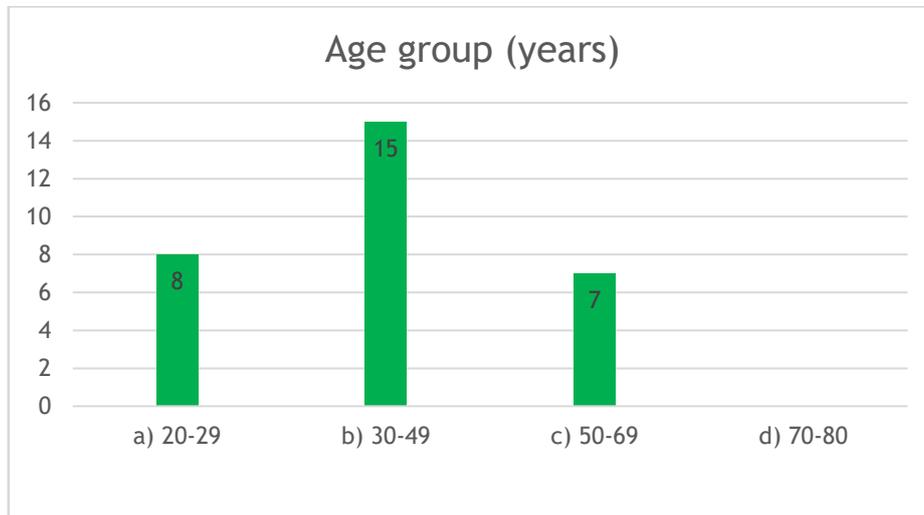


Participants identified potential barriers such as economic pressure on employees, language issues among migrant groups, and social accessibility challenges. These insights highlight the need for tailored communication strategies and additional resources for vulnerable populations. Overall feedback was positive, with participants emphasizing the importance of continuing awareness-raising efforts. Recommendations for future sessions included maintaining the interactive format and expanding coverage of practical communication strategies. One participant stressed the need for ongoing political and institutional commitment to heat prevention.

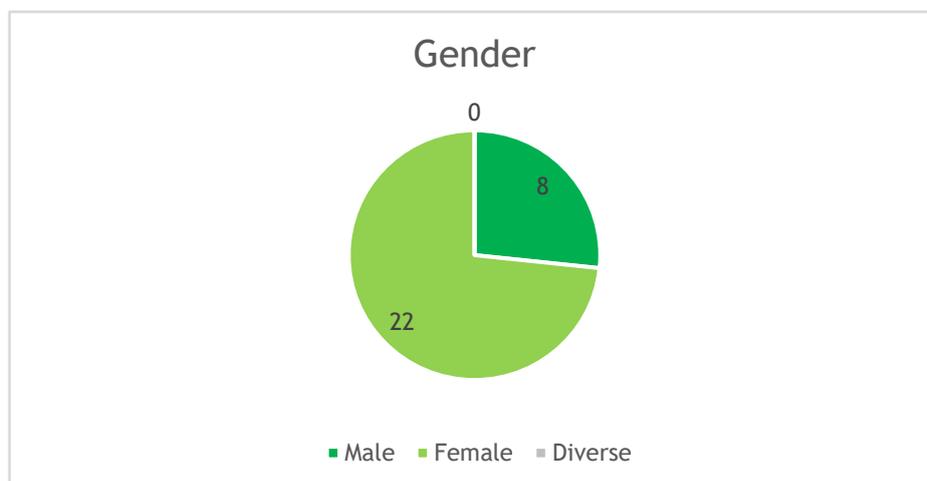
4.3.1.4. Worms (Germany)

The advanced trainings targeted specific occupational groups; educators, outdoor workers and sports trainers; and combined expert input with self-assessment questions on preparedness. The collected feedback shows that awareness of personal and organisational responsibility increased notably through concrete examples and discussions of everyday situations. Participants reported that the training helped them recognise warning signs of heat stress and better communicate preventive measures to those in their care. Many respondents suggested continuing the trainings annually and broadening them to other professional groups. The general tone of the evaluations was very positive, highlighting the relevance and practical benefit of the sessions.

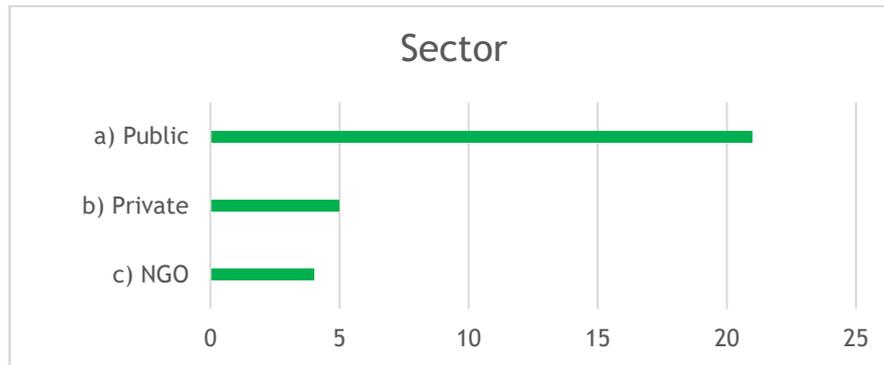
In summary, all three feedback rounds confirm that the Worms pilot effectively raised awareness among multipliers and professional stakeholders. The results underline that focusing on those who already hold responsibility for vulnerable groups leads to deeper, more sustainable awareness gains than general information campaigns alone.



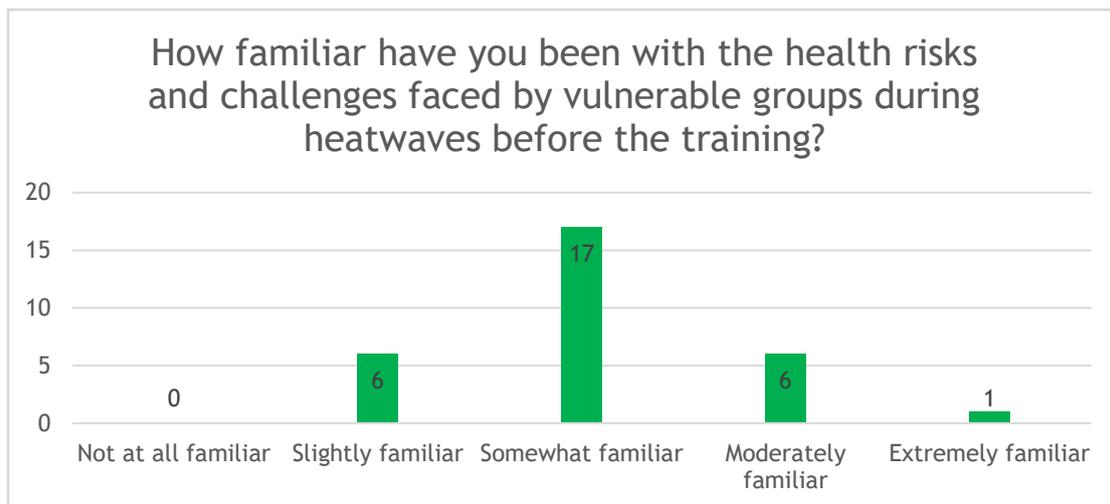
The age distribution shows that most participants were between 30 and 49 years old, followed by a smaller group aged 20-29 and another cluster in the 50-69 category. No respondents were over 70. The demographic composition therefore represents the city's active workforce, precisely those groups most exposed to occupational heat risks and best positioned to implement adaptation measures in their organisations.



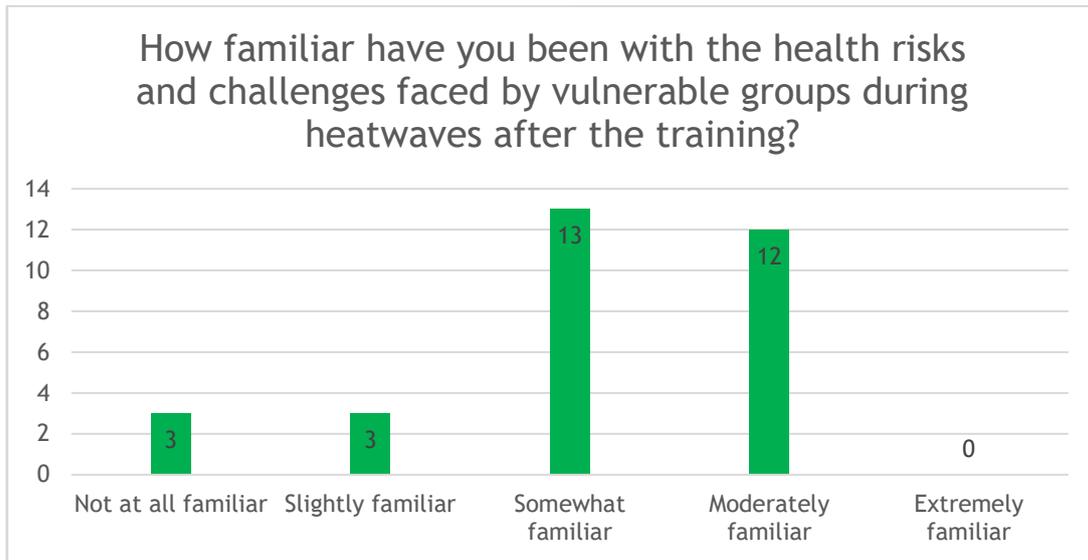
The pie chart indicates that around three-quarters of participants identified as *female* (22) and roughly one-quarter as *male* (8), with no responses in the *diverse* category. This gender balance reflects the composition of the social and care professions represented in the training, suggesting that many participants were women working in health, education or municipal social services.



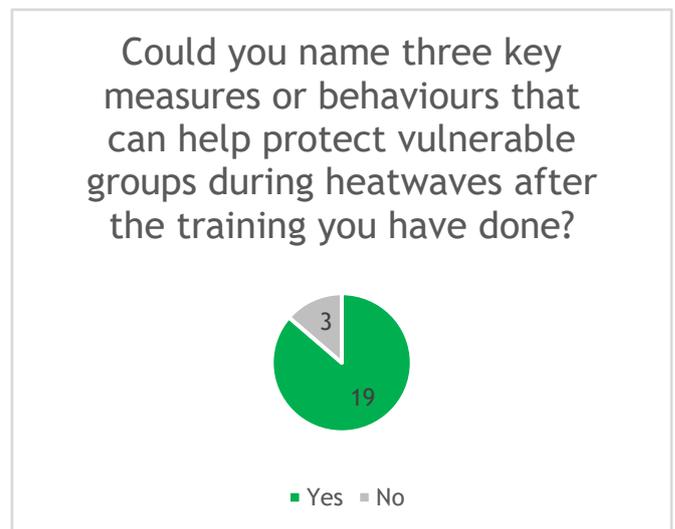
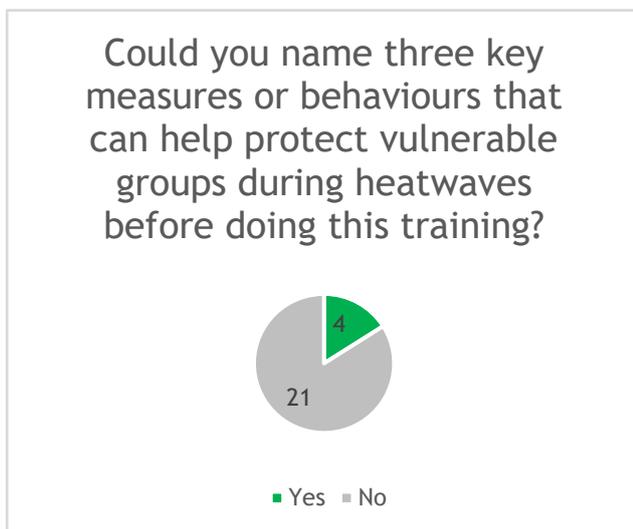
The sectoral distribution is heavily weighted toward the *public sector*, which accounts for more than 20 participants. The *private sector* and *NGOs* are represented by smaller groups. The dominance of public institutions illustrates that the trainings were well integrated into municipal structures, reaching precisely the actors responsible for implementing the Heat Action Plan in Worms.



Before participating, the largest share of respondents described themselves as *somewhat familiar* with the health risks and challenges faced by vulnerable groups during heatwaves. A smaller number selected *slightly familiar* or *moderately familiar*, and only one person reported being *extremely familiar*. This distribution points to a moderate baseline awareness, participants knew the issue but lacked in-depth understanding of specific risks and response strategies.



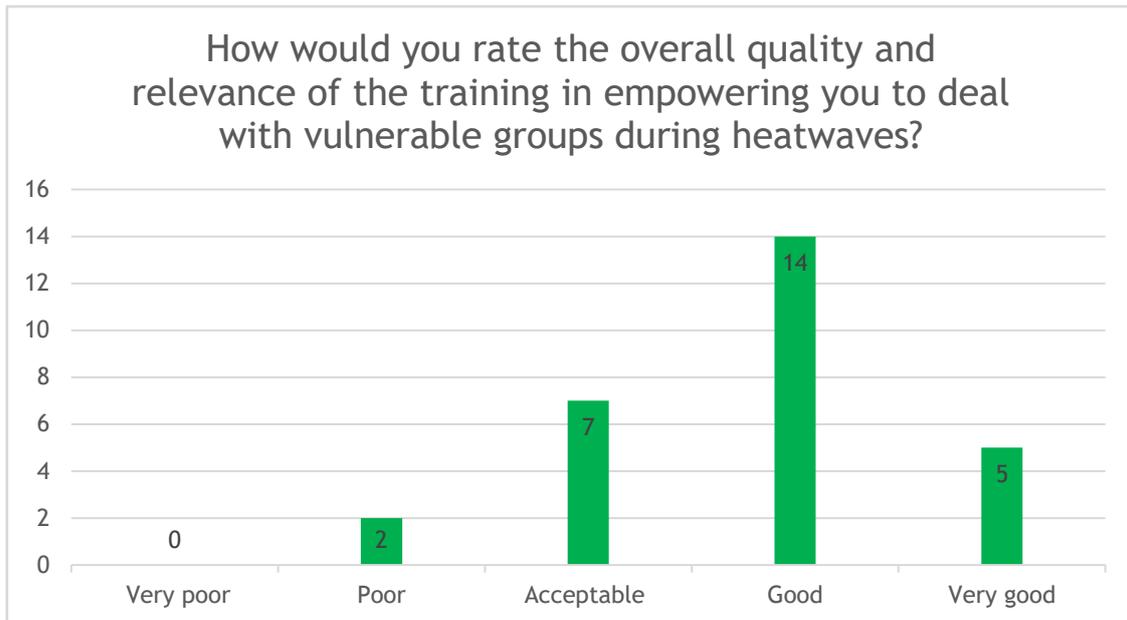
Following the sessions, the graph shifts markedly toward higher familiarity levels. The number of participants in the *moderately familiar* and *somewhat familiar* categories is now nearly equal, with only a few remaining at the lower end of the scale. The increase in “moderately familiar” responses shows that the training effectively improved practical understanding without overwhelming participants with technical complexity. Many left with a more confident sense of how to identify and mitigate heat-related risks in their daily work



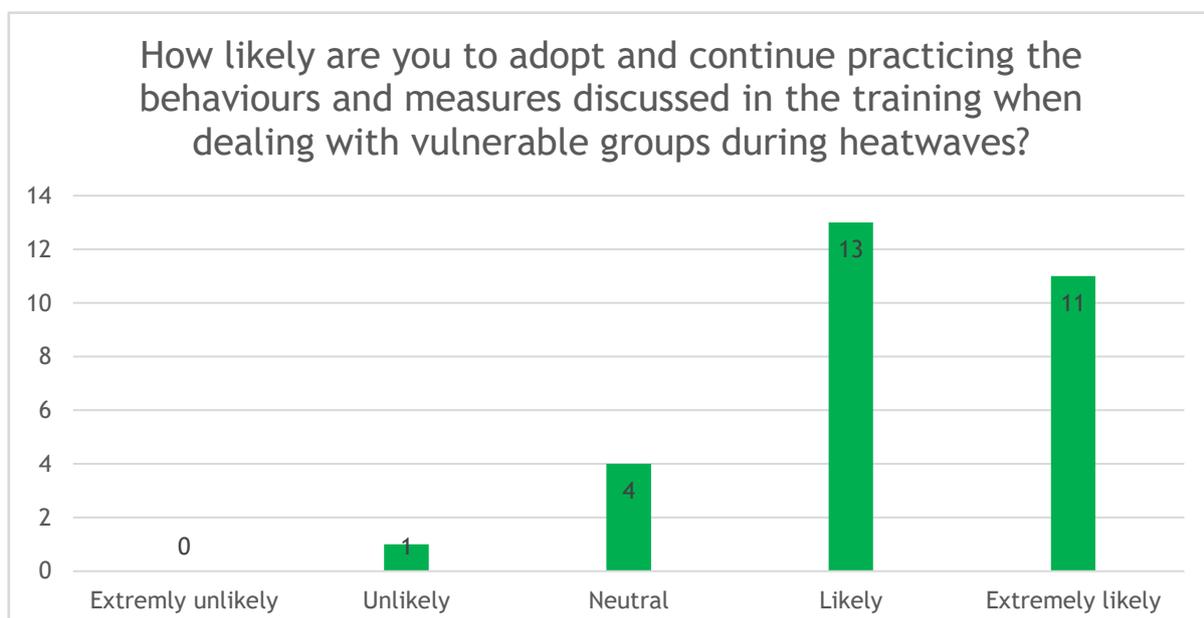
Before the training, only a small portion of participants said they could name three specific protective measures or behaviours relevant for vulnerable groups. After the training, this relationship reversed—almost everyone answered “Yes.” The shift demonstrates a concrete gain in practical knowledge, showing that participants could recall actionable interventions by the end of the session.



Most participants reported no previous training on dealing with vulnerable groups during heatwaves. This confirms that the advanced training filled a significant educational gap in the local context and offered a first structured opportunity for professional learning on this topic. Roughly one-third of participants stated that they had prior *experience* in supporting vulnerable persons during extreme heat, while two-thirds did not. The training therefore combined experienced practitioners and newcomers, enabling peer learning and the exchange of lived examples.

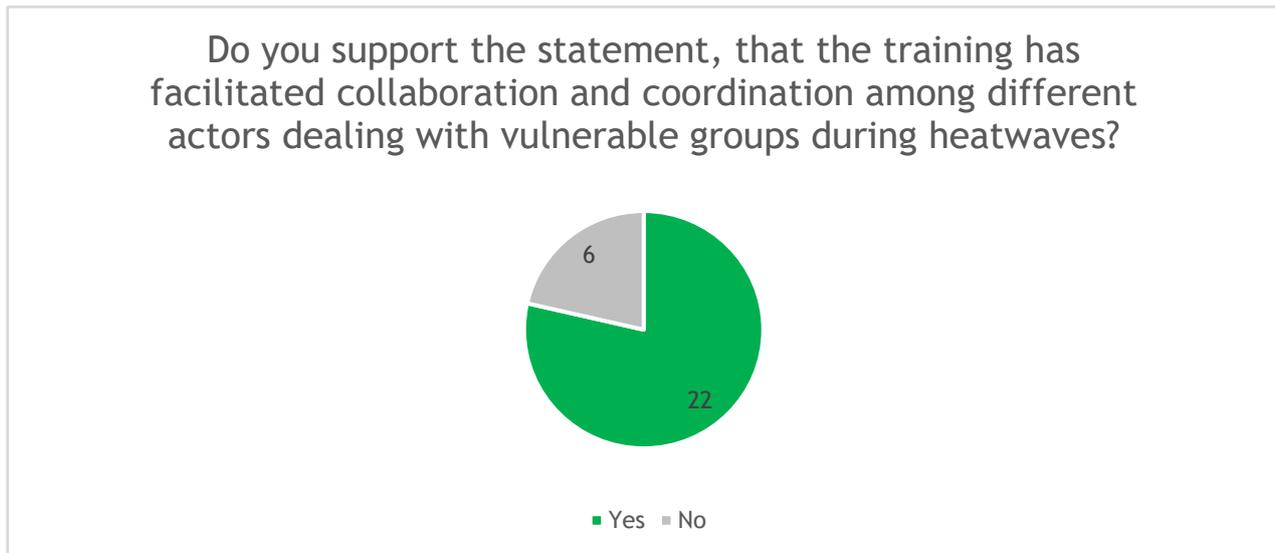


The evaluation of quality and relevance is strongly positive. The majority of respondents rated the training as *good* or *very good*, with only a few marking it as *acceptable* or lower. This confirms that the combination of scientific input and applied discussion was well received and perceived as directly relevant to the participants' work.





The bar chart shows that nearly all participants intend to apply what they learned: most selected *likely* or *extremely likely* to continue practising the discussed behaviours and measures. Only one person marked “unlikely.” This demonstrates that the training not only increased knowledge but also motivated practical implementation.



When asked whether the training facilitated collaboration among different actors, 22 participants responded “Yes,” and 6 “No.” The clear majority thus recognised that the sessions improved cooperation and exchange between sectors such as health, care, education and municipal services.

Altogether, the data show that the advanced trainings reached their target group effectively and achieved measurable learning outcomes. Participants left with greater familiarity with heat-related health risks, improved ability to name concrete measures, and a stronger intention to apply and share the knowledge gained. The strong representation of public-sector professionals means that the results will directly feed into the institutional routines of Worms’ heat adaptation network. Beyond individual learning, the sessions also strengthened professional relationships and inter-sectoral coordination, an essential step in transforming awareness into sustained institutional practice.

5. Media coverage

5.1.1.1. Hajdúböszörmény (Hungary)

During the project, particular emphasis was placed on awareness-raising and public outreach through strategic cooperation with media actors. To this end, clear, timely and relevant information was regularly provided, in line with the project’s overall objectives. This approach contributed to broader visibility, enhanced public awareness, and ensured more effective and sustainable dissemination of the project’s results.



The reaction of the media in the frame of the pilot actions was generally positive. Local newspapers provided supportive coverage, while the project website and Facebook page generated considerable interest and engagement from the target audience.

Local television provided repeated coverage of the project's progress, including a 14-minute interview with one of the key staff members responsible for the strategy and action plan, alongside a representative of the city's technical partner in the project. Moreover, additional articles were published in regional newspapers, further enhancing the outreach and visibility of the project.

Furthermore, the feedback from those who downloaded and used the application was highly satisfactory, confirming both the relevance and usefulness of the pilot activities. Overall, the communication channels contributed to a constructive public perception and strengthened the visibility of the project.

To ensure better awareness raising and more effective media coverage, a multi-channel communication strategy is essential. Strengthening cooperation with local and regional newspapers, online platforms, and radio/TV outlets can help reach a wider audience and ensure continuous visibility. At the same time, the project's own channels - such as the website, Facebook page, and other social media platforms - should be regularly updated with engaging, easy-to-share content.

In our case the active participation of key local government actors - including the mayor and local representatives - in major project-related events significantly contributed to visibility, as their involvement consistently ensured media presence. Moreover, dissemination activities proved particularly effective when news and information are shared during periods of increased public attention to the issue of heatwaves, especially in early summer and summer months. This approach further strengthened the impact and outreach of the project's awareness-raising efforts.

Another important tool is the active involvement of stakeholders and end-users. By encouraging satisfied users of the city application to share their positive experiences, authentic messages can be generated that resonate strongly with the public. Furthermore, organizing press events, increases direct contact with journalists and the community, fostering long-term interest.

Finally, systematic monitoring and evaluation of communication activities - for example, tracking media mentions, social media engagement, and user feedback - allow the adjustment of the strategy to achieve maximum impact in awareness raising.

5.1.1.2. Maribor (Slovenia)

Media local and national were in favour of all project activities, pilot action, strategy & action plan and heat warning system. They published Ready4Heat news when we had a press release. All media - electronic, newspaper, TV, Slovene Press Agency are aware of the health problems during heat waves and are covering very well this thematic. They asked when new activities are occurring, so that they can publish ongoing activities. With their help we reached out the population, different target groups, elderly people listening to radio, watching TV, the younger generation with electronic media, and various target groups by official municipal Facebook. Several media reached out for information, when we published news at the official webpage of the municipality.

In general media expressed positive reactions to all project activities and were interested how the Municipality will continue with realisation of measures listed in the Heat Health Action Plan.

5.1.1.3. Weiz (Austria)

The response to the pilot action in Weiz has so far been generally positive, but the overall level of coverage has been limited. Communication about the project has primarily taken place through municipal channels,



including the city newspaper and the official social homepage of the municipality. This content provided basic information about the objectives and benefits of the pilot, focusing on its contribution to climate adaptation and improved comfort in elderly care facilities. However, due to the late completion of the installation, media outreach has only occurred to a small extent and has not yet reached its full potential. The timing of the implementation was a key factor influencing media visibility. Because the system was installed at the end of the summer season, there was little opportunity to showcase real-life performance during heatwaves, which would have provided strong content for public communication. As a result, the narrative so far has been limited to technical descriptions and general project objectives rather than tangible user experiences or measurable impacts.

To improve awareness and strengthen media engagement in the future, it will be essential to adopt a more proactive communication strategy. This should include the preparation of comprehensive press releases highlighting the innovative aspects of the solution, its environmental benefits, and its relevance for protecting vulnerable groups. Visual storytelling through photos and short videos from the senior center can help make the topic more relatable and appealing to a broader audience. Furthermore, collaboration with regional and national media outlets, as well as specialized platforms in the fields of energy efficiency and healthcare, will be important to extend the reach beyond local channels. Continuous updates, particularly during the next summer season when the system can demonstrate its full performance, will provide valuable opportunities for impactful media coverage and sustained public interest.

5.1.1.4. Worms (Germany)

The pilot in Worms received consistent and diverse media coverage throughout 2024 and 2025, positioning the topic of heat protection as a central issue in local reporting. Early commentary pieces, such as the Wormser Zeitung editorial “In der Hitzewelle aufeinander aufzupassen, ist nicht schwer” (13 August 2024), helped to raise awareness among citizens by highlighting the city’s “heat telephone” and encouraging mutual care during heat waves. As the network was officially expanded in spring 2025, further coverage framed the initiative as part of Worms’ systematic implementation of its Heat Action Plan and participation in the EU project Ready4Heat. The article “Hitzeschutz-Netzwerk wird erweitert” (14 May 2025) presented the network as an example of cross-sectoral cooperation, linking administrative structures with schools, kindergartens, clinics and care facilities. Subsequent reports like “Mehr Hitzeschutz in Heimen” (14 June 2025) and “Hitze ist eine ernstzunehmende Gefahr für die Psyche” (24 June 2025) broadened the perspective by discussing structural and psychological dimensions of heat stress, thereby contextualising Worms’ approach within broader public health debates.

During summer 2025, the local press continued to follow the project closely, particularly through coverage of the Heat Protection Network’s summer programme. Articles such as “Sommerprogramm für Hitzeschutz” (18 July 2025) and “Dem Umgang mit Hitze auf der Spur” (30 July 2025) illustrated how Worms addressed heat protection across multiple target groups—from elderly residents and care facilities to businesses and sports associations—and highlighted the cooperation with Frankfurt University of Applied Sciences as a model for applied research. Later coverage, including “Lüften muss oft reichen” (23 August 2025), connected Worms’ experience to wider national discussions on insufficient heat adaptation in hospitals, reinforcing the urgency of systemic investment. Overall, the media response was consistently positive, portraying the pilot as both an innovative municipal approach and a practical contribution to European cooperation on heat resilience. The high visibility in regional newspapers and online portals significantly strengthened public awareness and credibility of the Worms pilot, contributing to the long-term anchoring of heat adaptation as a recognised policy field in the city.



6. Conclusions

6.1.1.1. Hajdúböszörmény (Hungary)

The pilot action was implemented as expected. Based on evaluations and subjective experiences, it is anticipated that in the long term the green islands will provide adequate shade, improve the thermal comfort of those present, and support both recreation and pedestrian mobility for the local population and vulnerable groups. The general acceptance among the target groups was positive, and the pilot action was considered useful. The municipality aims to continue finding resources to maintain the green islands and further raise awareness.

From the project experiences, the following key findings has to be highlighted:

- It is advisable to start small scale and initially create only as many shade-providing green blocks as your available financial resources, human resources, and regular on-site monitoring and maintenance safely allow. Consideration should also be given to long-term sustainability; commitments should be undertaken only to the extent that they can be reliably maintained from a financial perspective.
- It is essential that the costs of maintenance work in later periods, as well as repairs and any plant replacements, should be calculated into the annual municipal budget. Proper maintenance and constant upkeep of green infrastructure guarantee its quality and effectiveness; this requires continuous work and therefore cannot be based exclusively on occasional subsidies (grant funding).
- When installing the islands, it is important to consider that the plants will not provide sufficient shade at the first time, therefore it should be emphasized in communication that some time and patience are required on the part of users to achieve better results; this could help prevent critical reviews. In the first few years, it may be helpful to plant annual, fast-growing climbing plants also on the islands, which can provide shade even in the early stages.
- The size of green areas, the amount of vegetation, user habits, and weather factors (e.g. drought) all influence maintenance and upkeep work. However, there are several options that can considerably contribute to overcoming difficulties with anticipatory planning (e.g., selecting appropriate drought-tolerant, perennial plant species; using automatic drip irrigation systems; mulching; using durable materials; engagement of volunteers for irrigation activities; etc.). It is worth planning all of these aspects in advance before starting a new development. Wooden structures should be built from durable materials to withstand extreme weather conditions.
- In determining appropriate locations for such cooling islands, particular consideration should be given to ensuring their placement in unshaded, highly frequented, and easily visible areas, thereby maximizing their utilization by the public. Suitable locations may include playgrounds, public squares, urban parks, and public transport waiting areas (e.g. bus stops). Special attention should be paid to areas surrounding institutions that attract vulnerable groups (e.g., schools, healthcare facilities, retirement clubs, nursing homes, etc.), but which have little or no shade or green space nearby.
- It is useful to have a water supply near the green islands; this allows for watering the vegetation and can also be convenient for people resting on the islands to refresh themselves.
- The amount and distribution of seasonal rainfall can also affect the workload, as it influences the frequency of irrigation. Without an automatic irrigation system, regular watering can be a significant additional task during the summer months. Furthermore, watering cooling islands installed in enclosed spaces (e.g., institutional courtyards) can be problematic during certain periods (e.g.,



summer closures); these factors must be taken into account during planning. During the project, the local green NGO also participated in the irrigation with volunteer work.

The awareness-testing processes related to the project concluded with particularly positive results and experiences. Apart from the difficulty of involving stakeholders working in the healthcare sector - due to the considerable workload of the invited actors - the other participants were highly active and engaged, providing mainly supportive feedback.

In general, the participating groups showed that they had relevant basic knowledge about the health risks associated with heat and heat waves for specific vulnerable groups, as well as the options and solutions at their disposal to mitigate these effects. At the same time, we were able to share new information with them during the events, which gave them a more detailed picture of the topic and equipped these actors with further knowledge. A general observation was that there was a noticeably strong demand among the participants for greening the urban environment.

From the project experiences, the following key findings has to be highlighted:

- It was very useful to involve stakeholders from the beginning. This not only provided us with valuable insights and practical information, but also made them feel appreciated, which made them even more interested and active. These events also supported the enhancement of communication and exchange among individuals and colleagues in this topic.
- If healthcare professionals cannot be involved in awareness-raising trainings or events, local actors who are connected to healthcare in other ways - such as dietitians or lifestyle counselling clubs - may be engaged instead or in addition. Furthermore, awareness efforts may be supported by healthcare professionals giving interviews or delivering lectures through local media on problems related to heat and heatwaves.
- If awareness-raising events include actors who are particularly committed to the topic (e.g., heads of institutions working with target groups, dedicated staff members), and if the municipality or some delegated actor (e.g., an NGO) has sufficient capacity, it is advisable to support stakeholders in exploring how they can make use of available opportunities for heat preparedness, how they can implement their own awareness-raising actions, or how they can review their planned future developments to ensure that heat preparedness becomes a basic consideration.
- When planning new developments aimed at heat protection and addressing the needs of vulnerable groups (e.g. energy-efficient renovation of institutions, external shading of buildings, renewal of green areas, creation of new green infrastructure elements), it is recommended to collect feedback from target groups through workshops, participatory design, or surveys to ensure that the measures respond to real needs.
- Based on the feedback, it is strongly recommended to continuously strengthen general awareness-raising efforts and to provide stakeholders with informational materials about the heat and health related topics. Short, concise, informative materials and guides are preferred, which do not take long to read. Involve all possible communication channels.

Conclusion

As heat and heatwaves have a significant impact on everyday life, people in general – including those consulted and involved in the project – clearly recognize the importance of the issue and express a clear demand for solutions that can mitigate negative effects both in daily activities and in the workplace. While



individuals are able to take certain actions on their own, there is a strong expectation for systemic measures, with municipalities identified as key actors responsible for implementing such interventions. From a municipal perspective, prioritizing green infrastructure development represents one of the most effective responses to this challenge, offering long-term benefits for residents’ well-being and health. Investing in green infrastructure today is not only about cooling our cities, but about safeguarding the health, resilience, and well-being of future generations.

6.1.1.2. Maribor (Slovenia)

The READY4HEAT pilot implementation in Maribor successfully demonstrated how small-scale, nature-based shading interventions can improve thermal comfort, well-being, and awareness of climate adaptation in public educational environments.

Two pilot sites – Kindergarten Ivana Glinška (Ribiška) and Kindergarten Jožice Flander (Focheva) – each received a newly built wooden pergola designed for climbing vegetation (kiwi and grapevine).

Environmental monitoring (temperature, humidity, solar radiation) and user surveys showed:

- Improved thermal stability and reduced heat stress in the shaded areas;
- High user satisfaction and strong positive perception among teachers and parents;
- Raised awareness of climate resilience and the importance of shade in urban design;
- Educational co-benefits, as pergolas were integrated into learning activities about plants and the environment.

Quantitative measurements indicated that indoor and pergola-shaded areas-maintained temperatures 2-5 °C lower than fully exposed outdoor spaces, especially during transitional summer months (June and September).

Teachers reported that children spent more time outdoors and experienced greater comfort under the pergolas.

Parameter	2024	2025	Trend
Avg Outdoor Temp (°C)	21.6	21.2	↓ Slightly lower
Avg Indoor Temp (°C)	23.7	23.8	→ Stable
Avg ΔT (°C)	-2.15	-2.69	↑ Stronger difference
Outdoor RH (%)	71.9	68.6	↓ Drier conditions
Indoor RH (%)	56.2	57.3	→ Stable

Source: ENERGA 2024-2025 monitoring (Focheva site)

The pilot results will serve as a reference for integrating small-scale, nature-based measures into urban adaptation plans of the Municipality of Maribor. Future monitoring (2026-2027) will capture the full greening effects and enable comparison of pre- and post-vegetation performance. The experience confirms that such



low-cost, replicable interventions can contribute significantly to climate resilience and children's environmental education.

Challenges and Lessons Learned

Some challenges were identified during implementation:

- Limited shading effect in the first season due to young vegetation;
- Short monitoring period in 2024-2025, preventing full assessment of long-term cooling trends;
- Maintenance considerations (irrigation, vine growth management).

These limitations were addressed through adapted maintenance plans, additional data collection, and ongoing monitoring planned through 2026-2027. Despite early-stage vegetation, user perception and measured comfort already showed improvement.

Future Plans and Continuation

Based on the positive outcomes, ENERGAP and local stakeholders plan to:

- Continue monitoring both pilot pergolas during the next two summer seasons to evaluate the full impact once vegetation matures.
- Accelerate greening efforts with additional plantings and improved maintenance practices to support vegetation growth.
- Expand the concept to other kindergartens and public facilities in Maribor as a replicable low-cost adaptation model.
- Develop educational modules linking shading, greenery, and climate adaptation into kindergarten curricula.
- Use the results to inform further strategies for scaling up nature-based solutions across Central European cities.

Conclusion

The Maribor pilot actions confirmed that green pergolas are an effective, low-cost, and educationally valuable solution for mitigating urban heat while improving user well-being.

The combination of environmental data and positive user feedback validates the project's approach and provides a strong foundation for future replication.

As vegetation matures, further improvements in thermal performance and user satisfaction are expected.

The READY4HEAT experience in Maribor thus serves as a model example of integrating technical, social, and educational dimensions of climate adaptation in public urban spaces.

6.1.1.3. Weiz (Austria)

The pilot action in Weiz successfully demonstrated the overall feasibility of implementing a solar-powered cooling solution in an elderly care facility. The most important findings confirm that the installed cooling system, combined with a 6.09 kWp photovoltaic installation, has positive effects on energy efficiency, cost-effectiveness, and sustainability. Technical projections indicate that the cooling system can maintain indoor



temperatures within the target range of 22-24 °C even under high thermal loads, while its high SEER value of 7.9 ensures significantly lower energy consumption compared to conventional systems. The PV system's expected annual yield of approximately 7,003 kWh is sufficient to cover the entire cooling demand, enabling near-zero grid dependency and reducing operational costs over the system's lifetime. These results underline the potential of PV-supported cooling as a viable strategy for heat adaptation in vulnerable environments. The primary objectives of the pilot were met, despite the challenge of delayed implementation caused by complex contractual negotiations with the senior center's administrative headquarters. These governance issues were eventually resolved, allowing the installation to be completed successfully. However, the late timing limited opportunities for real-life performance monitoring during heatwaves and restricted the collection of user well-being data. This shortcoming emphasizes the importance of aligning installation schedules with critical seasonal periods in future projects.

Looking ahead, there is a clear plan to build on the lessons learned and scale up similar solutions in comparable settings. Future strategies should focus on early engagement of decision-makers at all organizational levels to avoid administrative delays, combined with robust governance frameworks that clarify responsibilities for maintenance and liability. Technical planning should always assess both active and passive cooling measures to further enhance resilience and reduce energy demand.

In terms of awareness testing, the findings highlight that, stakeholders recognize heatwaves as an increasing challenge and value preventive measures. Workshops and advanced trainings significantly improved knowledge about health risks and protective behaviours, while participants expressed strong interest in long-term solutions such as green infrastructure and renewable energy integration. These insights are highly relevant for local authorities and care institutions, as they demonstrate the need for continuous education and communication strategies to strengthen preparedness for extreme heat events. Lessons learned from the awareness activities include the importance of interactive formats, partnerships with health organizations, and targeted outreach to vulnerable groups. Recommendations for future initiatives include expanding training programs, leveraging digital tools for communication, and ensuring political and institutional commitment to heat prevention. These measures will help create a more resilient community and support the replication of successful approaches.

Conclusion

The Weiz pilot confirms that PV-supported cooling systems are overall feasible but also economically and environmentally advantageous. The project provides a strong foundation for scaling up similar solutions and integrating them into broader climate adaptation strategies. By combining innovative technology with effective governance and stakeholder engagement, this approach offers a sustainable pathway to protect vulnerable populations from the growing risks of heat stress.

6.1.1.4. Worms (Germany)

The evaluation of the Worms pilot demonstrates that the establishment of a municipal heat protection network can serve as a highly effective instrument for implementing and sustaining local heat adaptation strategies. All quantitative and qualitative indicators confirm that the pilot achieved its objectives and, in several dimensions, exceeded the initial expectations. More than 30 organisations and individuals were actively involved, and the formal signing of the Heat Protection Charter created both visibility and institutional legitimacy. The continuous engagement of multipliers, from care, education, and municipal sectors, proved to be a decisive success factor, enabling long-term behavioural and organisational change beyond the duration of single events.



Qualitative assessments show that the pilot substantially improved awareness, coordination and perceived responsibility among professionals working with vulnerable groups. Participants reported higher confidence in implementing preventive measures, improved collaboration between sectors, and a clearer understanding of how heat-health risks can be addressed within their daily operations. The participatory design of workshops and trainings created a sense of ownership among stakeholders and helped to link local practice with broader European learning processes.

Testing of awareness revealed that targeting multipliers rather than the general public leads to deeper engagement and more sustained outcomes. Instead of focusing solely on short-term information transfer, the pilot fostered institutional readiness and embedded heat protection into existing structures such as care networks, kindergartens and municipal services. The results therefore point to a shift from temporary awareness campaigns towards integrated, process-oriented climate adaptation at city level.

The communication and media strategy amplified this effect by ensuring regular public visibility through local press coverage and online communication channels. Articles in the Wormser Zeitung and related media positioned the network as an innovative and socially relevant initiative, thereby strengthening public trust and political support.

In terms of challenges, the evaluation identified the need for additional resources to address structural adaptation measures, especially shading, ventilation and green infrastructure in social and educational facilities. Stakeholders also highlighted the importance of maintaining active coordination after the project ends. The continuation of the network through the municipal climate adaptation department, backed by the city council's decision to uphold the Heat Action Plan, provides a solid foundation for long-term durability.

Conclusion

The Worms pilot represents a transferable governance model for heat adaptation in medium-sized European cities. Its combination of municipal leadership, professional networks and participatory formats proved effective in mobilising diverse actors and improving local resilience. Future priorities should include consolidating the feedback and monitoring system, maintaining regular trainings for multipliers, and securing multi-level funding to expand physical adaptation measures. The experience from Worms underlines that social cooperation and institutional commitment are key drivers for lasting climate resilience.